Discretionary Adjustments in Relative Performance Awards

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Abstract

Relative Performance Evaluation (RPE) awards provide a higher payout when a firm outperforms a selected peer group. Using a unique dataset that includes the *ex post* performance metric boards use to determine final payouts, we document discontinuities in these performance metrics around key contractual benchmarks that are influential in determining the award payout. Board-selected performance metrics cluster more frequently at or just above these benchmarks than below. The clustering suggests boards exercise discretion at vesting to boost payouts. This pattern is notable given that most RPE awards use Total Shareholder Return as the performance metric - where it is difficult for firms to influence peer performance that could produce a discontinuity in relative stock price performance. RPE awards that are based on total shareholder returns allow us to measure the economic impact of such discretionary adjustments, which we find significantly affect award values and incentives. The discontinuity and economic impact vary based on different features of the RPE contract. While RPE awards are promoted by shareholders and institutions for their formulaic structure that limits discretion, our findings show that boards may still intervene at vesting in ways that materially affect outcomes.

1. Introduction

Formula-based performance awards are an integral component of executive compensation. These awards are grants of cash or equity, where a formula tied to a performance metric determines the monetary payout when the award vests (Bettis, Bizjak, Coles and Kalpathy (2010), Li and Wang (2016), and Bettis, Bizjak, Coles and Kalpathy (2018)). A central feature of these awards is that the award structure which includes the payout formula, performance metric and vesting period are established by the board of directors when the awards are initially granted. There are two primary reasons behind the adoption of these instruments. One, their structure incentivizes executives to focus on firm performance. Two, they provide transparency in the relation of pay to performance. Since the award structure and future payout are determined at grant, this limits the board's ability to make ad hoc or discretionary changes at vesting. This is a primary reason why activist shareholders and institutional investors have advocated for the adoption of formula-based awards. David Kokell, ISS' head of U.S. compensation research, when asked about why ISS is a proponent of these awards stated "If it's just based on a subjective assessment, it's hard for the investor to evaluate how closely payouts are linked to actual performance."[1] One of the guiding principles that Vanguard uses in evaluating pay practices is that most of executive pay be driven by objective, quantitative goals.[2] A variety of legislative, regulatory, and market forces have also played an important role in the movement towards these compensation plans that can, at least in spirit, be categorized as non-discretionary.[3]

[1] See Equilar C-Suite Issue 17 – Discretion: How Should Boards Approach its Application within Incentive Plans? (page 2). The use of discretion also plays an important role in ISS recommendations for Say-on-Pay votes. According to ISS guidance effective proxy statement disclosures and rational for the use of discretion are important considerations on Say-on-Pay recommendations.

[2] During the COVID 19 pandemic when the market suffered a significant performance decline both proxy advisors and institutional investors fought attempts by boards to adjust payout metrics or payout formulas in RPE awards further supporting one of the goals of using these plans is to preclude using discretion.

[3] The SEC mandates different reporting requirements for any type of award that is considered discretionary. For example, starting in 2004 the SEC requires firms to report any discretionary bonus payments in Form 8-K.

We examine whether these formula-based performance awards truly adhere to the objective standards that have driven their increased adoption and support, effectively eliminate discretionary adjustments to payouts upon vesting, and establish a transparent and direct link between pay and performance. Our focus in on the use of discretion by boards in payouts for relative performance awards (RPE). RPE awards provide a payout dependent on a firm's performance relative to a predetermined peer group of firms.[4] While boards could use discretion to adjusts payouts to any type of formula-based performance awards, there are several reasons why we focus on RPE awards. First, is their importance in executive pay. In the sample of firms that we study using the Incentive Lab database between 2007 and 2021, 62% of firm used an RPE award.[5] Second, the structure of an RPE award has features where the use of discretion can have significant monetary benefits. Third, for RPE awards where Total Shareholder Return (TSR) is the performance metric, we can calculate the effect that any adjustment has on award value and incentives, which is a distinguishing and important contribution of our study.

We leverage a proprietary dataset from Incentive Lab (IL), which contains the performance metric values that are used by boards of directors when these awards vest, to determine payouts for performance-based awards at the end of their respective performance periods. Our sample consists of firms that granted an RPE award between 2007 and 2021.[6] We focus our analysis

[4] There is a large academic literature on RPE. Some of the earlier foundational studies on RPE include Holmstrom (1982), Antle and Smith (1986), Gibbons and Murphy (1990), Jensen and Murphy (1990), Janakiraman, Lambert, and Larcker (1992), Abowd and Kaplan (1999), and Aggarwal and Samwick (1999). More recent papers on RPE and peer firms include Albuquerque (2009), Gong, Li, and Shin (2011), Bettis, Bizjak, Coles and Young (2014), Jenter and Kanaan (2015), Ma, Shin, and Wang (2018), Bakke, Mahmudi, and Newton (2020), Jayaraman, Milbourn, Peters, and Seo (2021), and Bizjak, Kalpathy, Li, and Young (2022).

[5] RPE awards are also important multipliers used to determine the payout of other types of performance awards. Relative performance awards, in particular RPE awards based on TSR, are often used as a modifier to adjust pay up or down for other types of performance awards where the performance metric is often based on accounting performance or an internal goal. According to FW Cook, in 2014, 71% of firms used relative TSR in combination of other financial metrics.

[6] Firms are not required to report the value of the performance metric value they used to determine the award payout in the proxy statement. Recent regulatory change along with pressure from proxy advisors and shareholders, have led to an increase in firms reporting this measure.

around three important performance milestones in the RPE award payout function – threshold, target, and maximum percentile rankings. These three important performance goals often create significant "jumps" or "kink" points where meeting or just exceeding these goals significantly increases the award payout relative to just missing them. For example, these awards are deliberately structured with a performance threshold below which no payout is made, but which triggers a substantial increase in payout once the threshold is met or exceeded. Achieving performance just above target and maximum also typically results in similar discrete changes in award payout. Additionally, beyond the monetary effects of just exceeding these milestones, certain performance milestone, especially the target percentile, serves as an important reference point that board, shareholders and analysts use as a signal to evaluate executive performance.

We test for discontinuities around the threshold, target, and maximum percentile rankings at vesting that were set when the award was initially granted.[7] The discontinuity tests indicate that a disproportionate number of firms report percentile rankings at the end of the performance period that just meets or exceeds the threshold, target, and maximum relative to falling just short of these milestones. To illustrate, for an RPE award, the performance metric used to determine payout is the ranking of the firm's performance relative to a set of peers. Using the target goal as an example, our findings indicate that firms report a ranking of the firm's performance relative to the peer group that just meets or exceeds the ranking that triggers the target payout compared to just falling short of the target.

We find that the magnitude of the discontinuity varies across award features. The results indicate a greater level of discontinuity for awards that use accounting metrics compared to awards that use stock price. Accounting metrics provide more latitude for performance adjustment in the

[7] Our discontinuity analysis is similar to that in McCrary (2008), Bennett et al. (2017), and Byzalov et al. (2019).

performance metric relative to stock price (TSR) awards. We also see more discontinuity in the reported percentile ranking for awards with a custom peer group relative to awards using a market index. Custom peer awards have on average significantly fewer peers (for example,16) relative to awards tied to a broad market index such as the S&P index (500), so it is relatively less onerous to surpass a fewer number of peers to achieve the target percentile. The results are also consistent with a signaling explanation. Custom peers are generally product market competitors. Meeting or beating the target conveys positive information to investors about the firm's competitive standing in the product market.

We find that awards where payouts are discrete (i.e., where there is no linear interpolation in determining the payouts between the award threshold, target, and maximum) exhibit more discontinuity compared to awards that use linear interpolation. When there is no linear interpolation mapping a payout to the relative ranking, jumping a peer (i.e., increasing a percentile ranking) has a greater impact on the award payout. We also find that contracts with more pronounced concavity in their payout structures exhibit greater discontinuities. This effect is particularly evident in cash awards, which tend to display greater concavity than equity awards. Because concave structures impose larger losses for narrowly missing performance benchmarks, our findings suggest that such contractual features may incentivize firms to report performance more favorably to benefit the executive.

Our discontinuity results are quite striking given that the firm's performance is evaluated relative to its peers and RPE firms cannot directly control peer firm performance. Overall, our results are consistent with two non-mutually exclusive explanations. First, firms likely use discretion, when available, to report performance at or above the target percentile ranking. For example, excluding certain peer firms from analysis. Second, firms may take active steps to report

stock return performance above the marginal peer firm to achieve the targeted percentile ranking. Additionally, event study results indicate that firms likely take actions to boost stock returns towards the end of the performance period to improve relative performance.

While our evidence indicates the presence of potential adjustment of RPE payouts, an important question is how this affects award values and incentives. We address this question by using Monte Carlo simulations to examine the value and incentive effects of payout adjustments. Applying our simulations to the RPE award data, we find that the potential monetary gains to executives are substantial. For instance, introducing a discretionary upward adjustment of 5 percentile points – just enough to meet the threshold specified in the RPE contract – results in an average payout increase of $794,459 per executive. This represents nearly one-third of the average award value when evaluated without any discretionary adjustment. We also observe economically meaningful increases in payouts for executives positioned near both the target and maximum performance thresholds. Meeting or exceeding target performance has important signaling value about managerial ability (Bartov et al. (2002) and is crucial for maintain stock price and, by extension, the perception of managerial competence (Graham et al. (2005). We provide a measure of the monetary impact on pay as a result of signaling or any other incentives firms have to use discretion to beat performance targets.

Using Monte Carlo simulations, we demonstrate that adjusting contract payouts to the threshold percentile ranking diminishes pay-for-performance sensitivity, or delta. This occurs because, in the absence of any discretionary adjustments, pay-for-performance sensitivity is positive for contracts near the threshold. When payouts are discretionarily moved to the threshold, the incentive effects tied to stock price movements are diminished. We observe similar patterns – namely, a negative or modestly positive change in delta – around the target and maximum

performance benchmarks. From a contracting standpoint, we conclude that discretionary payout adjustments significantly benefit managers through increased compensation at the cost of diminishing managerial incentives.

Our findings have implications for the ongoing debate over whether executive compensation is structured to minimize agency problems between shareholders and managers or whether executives capture the compensation process to extract rents from shareholders (e.g., Bebchuk, Fried, and Walker (2002), Core, Guay, and Larcker (2003), and Murphy and Jensen (2011)). For example, our findings contribute to CEO pay-for-luck literature (Garvey and Milbourn (2006), Bizjak, Lemmon, and Naveen (2008) and Daniel, Li, and Naveen (2019)). Our study contributes to the literature on whether CEO pay is rigged to favor executives (Morse, Nanda, and Seru (2011)) as well as the literature on whether firms use stealth compensation in order to hide compensation and avoid scrutiny from shareholders and other parties related to overall pay levels (Kuhnen and Niessen (2012)).[8]

We contribute to recent studies that use information on RPE and peer group information to examine corporate policies and competitive effects. Gong, Li and Yin (2019) and Anginer, Irvine, Lie and Yildizhan (2023) find evidence of strategic timing of earnings release and earnings management by RPE firms while Bloomfield, Heinle, and Timmermans (2024) provide evidence of sabotage and peer harming strategic disclosures by RPE firms. In contrast to these studies, we provide evidence that firms may not necessarily time information about firm performance or

[8] Our work also relates to research on executive stock option repricing. Repricing of stock option is a particular type of ex-post adjustment where firms respond to poor performance by lowering the exercise price of executive stock options. The literature on stock option repricing includes Saly (1994), Brenner, Sundaram and Yermack (2000), Chance, Kumar and Todd (2000), Carter and Lynch (2001), Chidambaran and Prabhala (2003), and Kalpathy (2009).

attempt to influence peer performance but chose to use their own discretion to adjust the payout metric.[9]

Our paper is related to Bennett et al. (2017) but differs in important ways. Their work focuses on accounting awards that use earnings based (e.g., EPS, EBIT, EBT etc.) performance metrics. More importantly they do not have data on the ex-post metric value used to determine award payout. To illustrate the importance of having data on ex post adjustment they do not find any discontinuities for RPE accounting awards while we do. They do not look at RPE awards with TSR as the performance measure which are by far the most common type of RPE award or examine the value and incentive implications of discretionary adjustments.

Our paper is also related to Atanasov, Black, and Boutchkova (2022). They examine ex-post firm reported performance for 86 firms in the US oil gas industry. Their sample includes performance awards based on own-firm performance and relative performance. They also find discontinuities in reported performance. A weakness of their study is their exclusive focus on the oil and gas industry. Any evidence of discontinuity in the ex-post reported metric may not be representative of this practice in other industries. Unlike their paper, we can place a value on the monetary impact of these discontinuities.

Overall, our study raises interesting questions about how to measure the value and incentives of performance-based awards if firms make ex-post adjustments to payouts. Numerous parties, including academics and practitioners, use corporate proxy statements to gather information on executive pay levels, composition, and design. In terms of performance-based awards, the information provided in the proxy statement allows for calculations of the value and incentive

[9] Other related studies include Do, Zhang and Zuo (2022) and Wruck and Wu (2022) that show evidence of increased risk-taking by RPE firms. Feichter, Moers and Timmermans (2022) find that RPE contracts influence competitive aggressiveness.

properties (i.e., delta and vega) of these awards. To the degree that boards potentially make ex-post adjustments using discretion, traditional valuation models will not incorporate these ex-post adjustments into ex-ante calculation of award value or incentives and produce inaccurate measures. Our work also provides insights into the value and incentive effects that discretion can have for performance awards that use absolute performance as the payout metric and provides motivation for future studies on the use of discretion in performance-based awards.

2. RPE Award Design and RPE Payout

2.1 RPE Award Design

The most typical type of RPE award in our sample is a rank order tournament used to assess award payout. Under this RPE plan, the firm grants an RPE award to the executive where the performance is measured for the RPE firm and a group of peers over a defined period of time. Total shareholder returns (TSR) is the most common measure of performance, but a number of awards include accounting metrics to measure relative performance. After the performance measurement period (typically three years) ends, the RPE firm is grouped with its peers and ranked by performance in order to obtain a performance percentile ranking. The percentile rank is then mapped by a payout function to determine the actual award payout to an executive. Figure 1 shows a typical payout function based on percentile ranking for an RPE award estimated at $6.4 million granted to Seifi Ghasemi, CEO at Air Products and Chemicals, Inc. in 2018. As illustrated in Figure 1 for Air Products, the RPE award pays the target number of shares for median performance (i.e., at the 50th percentile ranking), which is the most common type of target payout for an RPE award. The target number of shares under this award is 31,489. For this award, there is no payout when performance is below the 30th percentile ranking. The minimum award payout is 30% of the target

amount for performance at the 30th percentile and payouts increase monotonically through the 75th percentile. The payout is capped at 200% of the target amount when performance exceeds the 75th percentile. For this award, payouts increase between the 30th and 75th percentile, and linear interpolation is used to determine the payout between the 30th and 75th percentile.

There are three main types of peer groups used as benchmarks in the RPE award design: custom peer, board-based market index, or industry-specific index. Air Products uses a custom peer group with peers listed in Figure 1. A custom peer group is a set of firms specifically selected for inclusion in the benchmark group. For custom peer groups, both the types of firms and the size of the peer group are determined by the board typically in consultation with a compensation consultant. For a broad-based market index, the set of firms is determined by the index itself such as the firms covered in the S&P 500 or S&P 1500 indices. Industry-specific indices include firms that comprise a specific market or industry sector such as the Dow Jones U.S. Construction and Utility Index, Morgan Stanley REIT Index, or S&P Forest Products Index.

2.2 RPE Payout Disclosure

Companies typically disclose the performance under the RPE grant in the proxy statement associated with the fiscal year during which the performance period ends. Going back to the Air Products example, the company disclosed the performance, i.e., percentile rank, and the share payout associated with the RPE award in their 2020 fiscal year proxy statement. As illustrated by Figure 2, the company disclosed the target shares under the plan as well as the shares paid out to its four named executive officers, including the CEO. The total stock return was 115% over the three-year performance period which placed Air Products in the 92nd percentile of its peer group which was greater than the 75th percentile ranking required for the maximum payout under the

plan. As a result, the CEO, Seifi Ghazemi, earned 200% of the target number of shares of 31,489 for a payout of 62,978 shares.

3. Empirical Methodology

In this section, we describe the methods we use to run simulations to examine RPE outcomes, statistically test for discontinuities around RPE benchmarks, and calculate end-of-period RPE performance.

3.1 Monte Carlo Simulations

To examine the final outcome associated with an RPE award at the end of the performance period, we employ the methods used in Bizjak, Kalpathy, Li, and Young (2022). We use Monte Carlo simulations. This method is typically used by firms to value RPE awards. We use an illustrative RPE award to highlight the distribution of outcomes associated with the award as well as the monetary effects of applying discretion in the final outcomes.

Our illustrative example comprises an RPE award that is associated with Total Shareholder Return (TSR), the most common type of performance metric used in practice. There are 16 peer firms for an RPE award using a custom peer group and 500 peer firms for as RPE award using a broad-based market index. We use a performance period of three years for the award. The product of the target number of shares and the stock price is $1M. Defining target shares and stock price independently is not necessary because the original number of shares is multiplied by the ex-post RPE target multiplier and the original share price is multiplied by (1 + TSR) at the end of the contract's life. Thus, the final payout is $1M × target multiplier × (1 + TSR).

We simulate the holding period returns of these firms for the performance period specified in the RPE contract (three years in our example) using Geometric Brownian Motion for stock

prices. The continuous rate of return is $\left(\mu - \frac{\sigma^2}{2}\right)T + \sigma\tilde{w}\sqrt{t}$. Where μ is the instantaneous drift rate, σ is the annualized volatility, T is the performance period of the contract in years, and $\tilde{w}$ is the Normal disturbance term with mean of zero and variance of one. We assume an instantaneous drift rate of 10.5% (11.6%) per year, a volatility in stock returns of 30.4% (24.8%) per, a correlation coefficient of 0.492 (0.134) between all firms' stock returns for a custom (index) RPE award. The parameters we use come from averages for firms in our sample. We simulate 10,000 trials over the 3-year performance period.

The simulations yield a rank which is converted into a percentile rank. The percentile ranking is calculated as 100% - (Rank-1)/(# of firms -1). For the illustrative example that we study, we assume that any performance below the 25th percentile is associated with zero payouts. The 25th percentile, i.e., the threshold, is associated with a payout that is 50% of the target number of shares; the 50th percentile, i.e., the target, is associated with a payout that is 100% of the target number of shares, and any performance beyond the 80th percentile, i.e., the maximum, is associated with a payout that is 200% of the target number of shares. There is linear interpolation between the 25th and 50th percentile and between 50th and 80th percentile.

After simulating the disturbance terms for all firms, we calculate the simulated return for each firm through the performance period, rank the firms at the end of the performance period, and determine the multiplier for the target award. The final $ payout is the shares multiplied by the ending stock price.

3.2 Discontinuity in Percentile Rankings

We examine discontinuities in the density functions of end-of-the-period RPE percentile rankings following the econometric methodology in McCrary (2008). The typical RPE award contains important performance percentile cutoffs related to award payouts. These cutoffs include

the threshold, target, and maximum along the domain of percentile rankings. In our data (described later), firms report both the performance, i.e., percentile ranking, as well as the performance as a percentage of the percentile ranking associated with the target payout. For our discontinuity test, we examine the discontinuity around a value of one (a value of one around the target would mean that the actual percentile ranking equals the target percentile ranking). The discontinuity test of McCrary (2008) encompasses two steps. The first step involves producing a histogram representing the distribution or underlying density of the performance measure, i.e., the actual percentile ranking as a percentage of target. The next step involves smoothing the histogram. This is done by estimating a weighted regression separately on each side of the reference point (i.e., one for our tests). The dependent variable is the standardized number of observations falling in each bin and the independent variable is the midpoints of each bin. The McCrary (2008) discontinuity test compares the height of the smooth density from the regression just to the left and to the right of the reference point. For our tests, the reference point is one. The crucial parameters for the test are the bin-size for the histogram and the bandwidth used in the estimation. In selecting the bin-size and the bandwidth, we use the default values recommend by the DCdensity procedure in STATA.[10] The DCdensity test uses a default bin-size which equals $2\hat{\sigma}n^{-1/2}$ where $\hat{\sigma}$ is the sample standard deviation of the running variable and n is the number of observations. The procedure estimates a global fourth order polynomial for each side of the reference point and computes a value that equals $3.348[\tilde{\sigma}^2(b-a)/\sum \tilde{f}''(X_j)^2]^{1/5}$ on each side where $\tilde{\sigma}^2$ is the regression mean-squared error, $b-a$ equals X_j for the regression on the right-hand side and $-X_j$ for the regression

[10] For more details on McCrary (2008) test implemented using the *DCdensity* procedure in STATA see https://eml.berkeley.edu/~jmccrary/DCdensity/.

on the left-hand side, X_j is the bin-size, and $\tilde{f}''(X_j)^2$ is the estimated second derivative implied by the global polynomial model. The bandwidth is set to equal the average of the two values.

Some of our tests require comparing the discontinuity estimates across different assignment groups. The traditional McCrary (2008) test does not allow for such a comparison. We follow the methodology in Byzalov and Basu (2019) that provides a flexible estimation technique that incorporates multiple explanatory variables.[11] We use the author-provided STATA procedure *kinkyX* to implement our tests. We implement the STATA command: *kinkyX Y X, binwidth(0.01) est_bins(150) em_bins(5) em_type(i) degree(3) cluster(firmid)*, where *Y, the actual percentile ranking minus the target percentile ranking,* is centered around 0 and *X* represents the explanatory variables. We report *p*-values of the estimated coefficients resulting from the Byzalov and Basu (2019) procedure in the figures. The *Smooth0*, *Smooth1*, *Smooth2* and *Smooth3* labels (not reported in our figures) correspond to the coefficients on the intercept, first, second and third degree of the explanatory variable, *kinky* (again, not reported) corresponds to the coefficient on the discontinuity estimate. We report the coefficient on the interaction variable *kinky*h* in our figures along with the *p*-values where *kinky* refers to the discontinuity estimate and *h* refers to the specific assignment variable.

3.3 Calculated Percentile Rankings

RPE percentile rankings are calculated using the RPE award structure for each firm as reported in the firm's proxy statement. We include all RPE grants where the peer group is identified as either a custom peer group or a large index peer group (industry groups were eliminated due to constituent identification challenges). When estimating award values, we limit the sample to awards based on stock returns rather than accounting performance. Using the holding

[11] For more details on Byzalov and Basu (2019) test implemented using the *kinkyX* procedure in STATA see https://dbyzalov.com/kinkyX.ado

period return variable *RET* in CRSP database, we find the Total Shareholder Return (TSR) for the peer firm and all identified firms in the peer group for the range of dates specified by the contract. Any firm that does not have returns for the entire period is removed from the analysis. The percentile rank of each RPE firm is calculated with near 100th percentile representing the highest performers and near 0th percentile representing the lowest performers. As with our simulations, we convert the rank into percentile ranking using 100% - (Rank-1)/(# of firms -1).

4. Data

We obtain from ISS Incentive Lab (IL) detailed data from proxy statements (DEF 14A) on the various aspects of RPE awards granted to named executive officers (NEOs) over the period 2007-2021. The IL database, introduced to the academic literature by Bettis, Bizjak, Coles and Kalpathy (2018), covers firms based on the largest 750 U.S. firms, measured by market capitalization in each of these years. Since the set of the 750 largest firms changes from year to year, back and forward-filling leads to a coverage of more than 750 firms overall.[12] We supplement the above data with data from CRSP and Compustat.

The IL database contains information on awards that are tied to either absolute performance metrics or relative performance metrics. Given the focus on RPE awards in this paper, we include all the necessary features about these RPE awards such as peer group, performance metric, performance assessment period, award payout structure, etc.

We also obtain from ISS, IL data on payouts pursuant to the RPE award. We are the first in the literature to use this database. While IL gathers detailed data on the payout structure, when

[12] Data will not be available for some firms in a given year for the usual reasons (e.g., mergers, delistings, etc.).

reported in the firm proxy statement, IL also gathers information on what firms ultimately use as value of the performance metric in determining the final award payout. This is reported in the proxy statement in the years in which the performance period ends and the award vests. For RPE awards, the performance metric is the firm's rank or the percentile ranking relative to the chosen peer group. To be more specific, consider an RPE award based on TSR. IL provides information on what the firms reports the percentile ranking relative to target that the firm will use to determine the award payout. Going back to the earlier example on Air Products (Figure 2), the firm disclosed that it placed in the 92nd percentile among its peers, and given the target of 50th percentile, the performance translates to 1.84 or 184% of the target. We call this *ActualMetricPercentofTarget*. A value below one indicates that the firm reports a relative ranking of performance below the target whereas a value at or above one indicates that the firm reports a relative ranking of performance at or above the target. In the IL payout data, the actual metric value, i.e., the percentile ranking Air Products used to determine payout appears as 92.00 and *ActualMetricPercentofTarget* appears as 1.84.

Table 1 presents details of our sample. Our sample starts in 2007 and ends in 2021. We report the number of observations at the firm, firm-year, and firm-year-award levels. The IL data on all grants, both annual and long-term, that are tied explicitly to performance metrics encompass 1,928 firms and 21,025 firm-years between 2007 and 2021. Firms that include some form of RPE total 1,189 which corresponds to 8,311 firm-year observations. RPEs comprise 62% and 40% of the overall performance-vesting grants at the firm and firm-year levels, respectively. These proportions are similar to those in Bizjak, Kalpathy, Li and Young (2022) for the period 2006-2017. Additionally, RPEs comprise 21% of all grants at the firm-year-award level. Table 1 also presents details of IL data on payouts pursuant to RPE awards. RPE payouts are reported by 730

firms that comprise 2,809 firm-years between 2007 and 2021 which corresponds to 61% and 34% of all RPE grants at the firm and firm-year levels, respectively. RPE payouts constitute 25% of all RPE grants at the firm-year-award level. While not all RPE firms report payout details, there is an increase in the frequency of firm payout disclosures over time. We suspect that this may be driven by pressure from proxy advisors, shareholders, and other market participants. We discuss the time-series patterns in more detail later. After merging the IL payout data with the IL grants data, we are left with a sample that encompasses 550 firms, 1,755 firm-years, and 8,489 firm-year-awards. While we are able to merge almost all of the payout observations (i.e., 18,109 displayed in Table 1), after we require non-missing data from the IL payout database on actual metric performance reported (rank or percentile ranking) and other data items, we are left with 8,489 award level data that we use for further analysis in the paper.

Table 2 presents the RPE usage information both in terms of original grants as well as eventual payouts disclosed by firms. Panel A shows that the most common peer group type used in RPE grants is a custom peer group (66%), followed by an industry index (22%) and broad market index such as S&P 500 (12%). Panel B indicates that total shareholder return (TSR) is the most prevalent performance metric chosen in RPE grants (69%) which is followed by accounting (30%). Non-financial metric usage (1%) is rare in the sample. The statistics summarized in Panels A and B are quite similar to those reported in other studies (Bizjak et al. (2022)). The usage statistics for the sample of firms reporting the RPE end-of-period payouts presented in Panels C and D are generally quite similar to those in Panels A and B. We note that the payout sample has a slightly higher proportion of firms using a broad market index as the peer group and TSR as the performance metric.

Table 3 provides time-series patterns in disclosure of RPE payouts in their annual proxy statements. By "year" we mean the fiscal year pertaining to the original RPE grant. We observe in Panel A that firms are increasingly reporting RPE payout details over the sample period. The lower number in 2021 reflect the yet-to-be released proxy statements for firms granting RPE awards in fiscal year 2021. The use of custom peer groups has increased over time, peaking in 2015, and reverting back to 2007 levels by the end of the sample period, i.e., 2020. On the other hand, the use of TSR as the performance metric and restricted stock as the back-end instrument has increased steadily over time (Panel B). Panel B also shows that firms have shown an increasing preference for RPEs with a multi-year performance period over an annual performance period. Table 4 provides a similar time-series pattern as in Table 3, but in the original RPE grants. The time-series patterns in grants that we observe in Table 4 are generally similar to those in Table 3 for payout disclosures. In summary, Tables 2, 3 and 4 indicate that the usage and time-series patterns in RPE payout disclosures are broadly similar to the patterns we see in the original grants.

Table 5 presents summary information on the key variable in our study, i.e., the actual metric performance reported by companies in their annual proxy statements that we obtain from IL. The data from IL provides information on both the actual metric performance (percentile ranking or rank) as well as the performance as a percentage of the target specified in the RPE grant. We use the actual metric performance as well as the contractual details provided in the grants data to calculate the metric performance as a percentage of the threshold and the maximum. We provide the statistics for the full sample in Panel A. We observe that average firm reports a performance well in excess of the threshold with a mean (median) of 1.73 (1.76). The reported performance for the average firm is slightly above the target specified in the award with a mean (median) of 1.13 (1.15). Lastly, the average firm reports a performance below the maximum with a mean (median)

of 0.72 (0.75). At a first glance, it is interesting to note that the proximity of the reported performance to the target. Nevertheless, this is a point estimate and is not informative of the distribution of outcomes around the target. We tackle this issue more forcefully in later sections of the paper.

Panel B provides the same information broken down by peer group type. The statistics for custom peers, market index and industry index are similar to those reported in Panel A for the full sample. Panel C provides the same information broken down by the performance metric. We observe that the statistics for the sample of firms with TSR as the metric are somewhat similar to the overall sample. Firms with an accounting metric report larger performance realization relative to threshold, target and maximum. Firms with non-financial metric report lower performance realizations, albeit we note that we have a small sample size for this group of RPE granting firms with non-missing data on reported performance.

5. Discontinuity in Reported Performance Around Contractual Benchmarks

In this section, we examine whether reported performance clusters around the target specified in the RPE grant and the variation in the discontinuity by peer group type, discretion in performance metric, and contractual features.

5.1 Distribution of Outcomes for an Illustrative Example

We begin our analysis using the illustrative example described in section 3. We start with this exercise to demonstrate what the counterfactual outcomes might look like for a random RPE grant. To recall, in this example, the RPE award has Total Shareholder Return (TSR) as the performance metric. Excluding the RPE granting firm, there are 16 peer firms for this RPE award. We use a performance period of three years for the award which is typical for RPE awards.

We run Monte Carlo simulations using 10,000 trials. Under each trial, we simulate the rank of the RPE granting firm among its peers and repeat this 10,000 times. The outcomes of these 10,000 trials are displayed in Figure 3. The histogram reveals that the distribution of outcomes is close to resembling a uniform distribution with roughly 600 outcomes for each of the 16 ranks. As one would expect with such a distribution, there is no discontinuity anywhere along the distribution. In the next sub-section, we discuss how the distribution compares with what firms using RPE report to shareholders.

5.2 Discontinuity in Reported Performance

We employ the test developed in McCrary (2008) to test for the presence for the discontinuity in reported performance around the target specified in the RPE award. We test for the presence of discontinuity in the running variable, *ActualMetricPercentofTarget* which is the metric reported in the proxy statement as a percentage of the target specified for the metric under the RPE grant. The unit of observation in firm-year-award level for all executive officers. We have non-missing data on 8,489 awards for which we are able to run the McCrary test.

Figure 4 presents our main findings for the overall sample of RPE reported performance. Of the 10,763 awards we initially start with (Table 1), we are able to run the discontinuity analysis for 8,489 RPE awards. For the most part, the density function of the running variable, *ActualMetricPercentofTarget*, looks close to resembling a uniform distribution similar to our simulations (discussed in previous sub-section) with an important distinction. There is a sharp increase in the density function at 1 which implies that firms report percentile rankings are disproportionately at or above the target percentile ranking compared to below (p-value < 0.001). This is striking given that the firm's performance is evaluated relative to its peers and any performance effects will have to account for not just the RPE firms but also peer group firms. Our

counterfactual exercise with simulations indicates that we should not expect to see any such discontinuity with RPE awards, so the observed discontinuity indicates that our results are not driven due to chance. The results are consistent with two non-mutually exclusive explanations. First, firms are likely using discretion, when available, to report performance at or above the target percentile ranking. For example, excluding certain peer firms from analysis. Second, firms take active steps to report stock return performance above the marginal peer firm to achieve the targeted percentile ranking. We examine stock return performance in an event-study setting later in the paper. Any active steps firms undertake to influence stock returns towards the end of the performance period is potentially less onerous with custom peer group compared to a broad-based market index. With a market index such as the S&P index with 500 peers or an industry index with a large number of firms, given how far short the RPE firm is from the target percentile, the continuous nature of the number of peer firms that the RPE firms must cross in order to just hit or beat the target percentile makes it harder to influence performance at the end of the performance period. With custom peer groups with a typical peer group size of 15 peers, it is relatively less onerous to surpass a fewer number of peers to achieve the target percentile.

Results in Figure 5 confirm this intuition. We observe strong evidence of discontinuity in the density function for RPE awards using a custom peer group (p-value < 0.001). We find no such discontinuity in RPE firms using either a broad-based market index (p-value = 0.371) or an industry index (p-value = 0.171). We apply the methodology in Byzalov and Basu (2019), discussed earlier, to compare the discontinuity estimates. There is strong evidence of a higher discontinuity estimate for custom peers relative to both a market index (p-value = 0.000) and an industry index (p-value < 0.001). Although difficult to test for directly, these results for customer peers relative to a broad index are also consistent with a signaling explanation. Target performance

is a very visible measure reported in discussions in the annual proxy statements. Custom peers are generally product market competitors. Meeting or beating the target conveys positive information to investors about the firm's competitive standing in the product market.

Overall, we observe that RPE performance disclosures indicate a striking pattern of discontinuity around the target percentile ranking with effects stronger for firms using a custom peer group.

5.3 Effect of RPE Metric on Discontinuity in Reported Performance

RPE awards include a variety of performance metrics for performance evaluation. The three main categories being: TSR, accounting, and non-financial. TSR, as discussed earlier, is stock return-based and is calculated based on RPE firm's stock return (including dividends) relative to stock returns of peer firms. Accounting metrics used in RPE fall into four main categories: Cashflow; Sales; Earnings which include measures such as EBT, EBIT, EBITDA, EPS, Operating Income, Net Income; and Financial Ratios such as ROI, ROIC, ROA, ROE, Profit Margin. Non-financial metrics include things like customer satisfaction that are not reflected in annual financial statements. As Table 2 shows, TSR is the mostly commonly used performance metric in RPE. Nearly a third of RPE awards use accounting metrics. Non-financial metrics account for a small fraction in RPE awards.

There is latitude for discretion in how firms define the accounting and non-financial metrics and how they are eventually evaluated. For example, it is a common practice for performance-contingent awards with accounting metrics to be defined differently from GAAP because of various exclusions and adjustments (Atanasov et al. (2022), Pawliczek (2021)). This leads to considerable differences in now these metrics are calculated for both the RPE firm as well as its peers. To the extent that boards internally use discretion and subjective judgement in calculating

or adjusting the metrics at the end of the performance period, we expect to see greater discontinuity around targets for contracts that employ accounting or non-financial metrics relative to TSR.

We present the discontinuity results in Figure 6. As expected, we observe that RPE awards with disclosed performance related to accounting metrics (Panel B) are associated with a larger discontinuity estimate compared to those tied to TSR metrics (Panel A) with both estimates being statistically significant (p-value < 0.001). Difference in discontinuity estimates for accounting versus TSR using Byzalov and Basu (2019) is statistically significant (p-value = 0.006). Discontinuity estimate for the sample of firms with non-financial metrics (Panel C) is not statistically significant (p-value = 0.273).

Our results on clustering around the target percentile ranking for RPE awards in general, but for accounting metrics in particular is especially striking and important in relation to evidence in Bennett et al. (2017). Their paper examines a subset of RPE awards that use accounting metrics. Calculating the realized performance for both the RPE and peer firms, Bennett et al. observe no clustering around the target performance goal. Nonetheless, as we pointed out earlier, there is considerable discretion in how accounting metrics are calculated, how boards exclude certain components, and how the comparable metrics are defined for peer firms. The net effects of these complex and subjective calculations are only observed in firm performance disclosures that our data accurately pick up and are hard to be calculated ex-post. This explains why we find clustering around the target in RPE awards that use accounting measures that the Bennett et al. study fails to find. Importantly, our paper shows that discretion in calculation of performance is an important contributing factor in the observed discontinuity around the target percentile ranking.

5.4 Effect of Contractual Features on Discontinuity in Reported Performance

Several aspects of the RPE contractual structure gives rise to incentives for managers to try and meet or beat contractual benchmarks. There are two notable features that we examine. The first one being the presence or absence of linear interpolation around the target. Lack of interpolation means that if a firm's percentile ranking fell just short of the target percentile, then the executive does not earn the target number of shares thereby creating strong incentives to be at or above the target. Therefore, we expect greater discontinuity among awards that do not allow for linear interpolation around the target. The second contractual feature we examine is the presence of concavity in the structure of RPE awards. As Bennett et al. (2017) point out, when there is concavity in the payout-for-performance relation, managers have incentives to just meet the target and not exceed it by a lot. Not meeting the target results in a greater loss in payout. This asymmetry leads to there being an expectation to see larger discontinuity among awards with concavity.

We present results relating to interpolation in Figure 7. Consistent with the previous discussion, we find evidence that RPE awards that do not allow for linear interpolation around the target (Panel B) are associated with a larger discontinuity estimate compared to those that allow for interpolation (Panel A) with both estimates being statistically significant (p-value < 0.001). Difference in discontinuity estimates with interpolation versus without interpolation using Byzalov and Basu (2019) is statistically significant (p-value $= 0.007$).

Figure 8 presents results for concavity in the payout-for-performance relation. We define concavity in three different ways. First, we distinguish between awards where the backend instrument is cash versus equity. RPE award payout (in dollars) has two components to it. The first is the multiplier effect where the multiplier is the shares paid out as a percentage of the target. The second component is share price at the time of the payout. With both cash and equity, the multiplier effect would mean that managers have incentives to be at or above the target relative to below.

Importantly, though, with equity as the backend instrument there is the additional share price effect that makes the award more convex compared to a similar award where the backend instrument in cash. Therefore, the discontinuity estimate should be greater for awards paid in cash relative to equity. Panel A confirms this intuition. While both estimates obtained using the McCrary (2008) test are statistically significant (p-value < 0.001), the estimate for cash awards is greater than that for equity awards (p-value = 0.006) using the methodology in Byzalov and Basu (2019).

Our second measure of concavity is similar to the measure in Bennett et al. (2017) where the slope of the payout-performance relation is measured to the left of the target, i.e., between threshold and target, and compared with the slope to the right of the target, i.e., between the target and the maximum. A concave (convex) award is defined as one where the slope to the right is less (more) than the slope to the left. We drop awards where the slopes are the same. The results presented in Panel B indicate that while both estimates are statistically significant (p-value < 0.001), the discontinuity estimates are not different from each other (p-value = 0.968) suggesting that concavity measured explicitly using the slopes does not differentially influence the clustering around the target.

The third measure of concavity is the region surrounding both the threshold as well as the maximum payout. As we see in the illustration in Figure 1, the region around the threshold level of payout (at 30^{th} percentile rank) as well as the region around the maximum payout (at the 90^{th} percentile rank) assume a concave shape. Given the previous discussions, we should expect to see significant discontinuity in the density function around both these points. Accordingly, using data on percentile ranking at the threshold level of payout as well as percentile ranking at the maximum level of payout, as well as information on the reported percentile ranking, we construct measures for threshold and maximum and call them *ActualMetricPercentofThreshold* and

ActualMetricPercentofMaximum, respectively. Panel C presents the discontinuity test results using the McCrary (2008) test for the density functions of the two running variables separately. We see that both estimates are statistically significant (p-value < 0.001) providing further evidence on how concavity in the payout-performance relation can influence clustering of performance around the important benchmarks.

Overall, our results are consistent with the idea that contractual provisions create stronger incentives for clustering of reported percentile ranking around the target percentile ranking.

5.5 Discontinuity in Calculated Performance

Our results show that reported performance exhibits clustering around contractual benchmarks that benefit managers. As discussed previously, there are two non-mutually explanations for this pattern. First, firms use discretion available to them in pushing the firm performance at or above the target percentile ranking. Second, firms actually take actions to boost stock returns towards the end of the performance period. The reported percentile ranking likely reflects a combination of the two explanations. Nevertheless, it is unclear to what extent our data indicate the latter explanation. We examine this now.

Using the methods described in section 3.3, we perform our own calculations for determining the end-of-the period percentile ranking (i.e., not the firm reported value but using the actual stock price performance) for all RPE grants in the IL data for which we have complete information on both the RPE firms as well as the peer firms. We report the results in Figure 9. Panel A displays the results where the benchmark is the target percentile ranking specified in the RPE award. The figure shows that the density function of the running variable, which is the calculated percentile ranking as a percentage of the target percentile, looks generally uniform except at the target at which point there is a sharp jump in the density (p-value < 0.001). Panel B

reports results from a similar excise conducted at the threshold percentile ranking. The discontinuity estimate is smaller in magnitude and statistically significant, albeit marginally (p-value = 0.079). Results for maximum percentile ranking (Panel C) again indicate a sharp jump in the density function at the maximum percentile and statistically significant (p-value < 0.001).

We note that all three discontinuity estimates are generally smaller when compared to those estimated using firm reported percentile ranking. Firm reported performance likely reflects both the use of board discretion as well as active actions to influence stock returns at the end of the performance period in order to bet benchmarks. Overall, the results in this section indicate that realized performance for RPE firms exhibits suspicious patterns of clustering around contractual benchmarks.

6. Event Study Around Performance Expiration

Results in the previous section indicate that realized performance clusters around the target. To examine this issue more carefully, we conduct an event study in a narrow time window of (–10,+10) trading days surrounding the performance expiration date, where day 0 represents the event day which is when the RPE award expires. We use the sample of firms for which we previously calculated end-of-period percentile rankings. We define performance expiration date based on information on the grant date and performance begin and end date provided in the IL database. The market-adjusted stock returns using CRSP value-weighted for RPE firms around the performance expiration date is displayed in Figure 10, Panel A. Our analysis reveals a noticeable decline in stock prices following the performance expiration. This suggests that executives may be engaging in practices that attempt to boost stock prices just prior to the performance period's expiration, potentially aiming to secure more favorable payout from the RPE award.

When we focus on firms whose grants were just above (10%) the target percentile ranking (Panel B), we observe a similar pattern in stock returns post-expiration with a bigger magnitude of stock price decline. This suggests that executives in such firms may have strong incentives to boost stock prices, given the proximity to the target percentile. The sharp decline in stock returns after the performance expiration, overall, indicates that any pre-expiration price increase appears transitory in nature.

We perform statistical tests for difference in cumulative abnormal returns for the pre- and post-performance period end periods. For the full sample comprising of 1,433 awards in Panel A of Figure 10, the average cumulative abnormal returns are -0.0024 for the [-10,0] period and 0.0019 for the [0,10] period. The difference of 0.0043 is statistically significant at the 10% level (p-value = 0.0527). For the smaller sample comprising 56 awards in Panel B, the average cumulative abnormal returns are -0.0060 for the [-10,0] period and 0.0077 for the [0,10] period. The difference of 0.0137 is statistically marginally significant (p-value = 0.1008). The statistical inferences are constrained given the small sample size used in this analysis.

While the event study results are only suggestive, they validate our earlier findings of clustering of performance around contractual benchmarks. The analysis is indictive of the idea that managers potentially take actions to boost the RPE firm's end-of-the performance period stock price in order to meet or beat performance milestones specified in the incentive contract. We say this is suggestive because we are unsure what the precise channels are and it is unclear what the net effects are, once we account for peer firm actions since the RPE firm's stock returns need to be examined in relation to its peers.

7. Effects of Discretionary Adjustments on Payout Values and Incentives

7.1 Value Gain to Managers

In this section we examine the monetary gains to managers from discretion applied to percentile rankings using Monte Carlo simulations. We use the same illustrative example (discussed earlier) of an RPE award with a custom peer group comprising of 16 peers (including the RPE firm) and a performance period of three years. We assume a drift rate of 10.5% per year, an annualized volatility in stock returns of 30.4%, and a correlation coefficient of 0.492 between all firms' stock returns. These parameters come from averages for firms in our sample. We simulate 10,000 trials over the 3-year performance period. Stock prices are assumed to follow a Geometric Brownian Motion. The product of the target number of shares and the stock price is $1M and the final payout is $1M × target multiplier × (1 + TSR). Without any ex-post discretion, any performance below the 25th percentile results in a target multiplier of zero. Performance at the 25th percentile, i.e., the threshold, results in a target multiplier of 50%; performance at the 50th percentile, i.e., the target, results in a target multiplier of 100%, and any performance beyond the 80th percentile, i.e., the maximum, results in a multiplier of 200%. There is linear interpolation between the 25th and 50th percentile and between 50th and 80th percentile.

We examine the effects of simulated outcomes when firm's use discretion to artificially increase percentile rankings that are near to, but below either the threshold, target, or maximum percentile rankings. Specifically, we examine values under three scenarios: no discretion, within 5 percentage points, and within 10 percentage points. For example, in the case of 5 percentage point discretion, if a firm were to have a percentile rank greater than or equal to 20th percentile but less than 25th percentile, the contractual multiplier should be zero, but in this case the firm would award a multiplier of 50% of target (the payout that results from 25th percentile performance). This discretion would also be applied in the same manner for performance just below target (50th

percentile) and maximum (80th percentile) as well. The final payout is \$1M × target multiplier × (1 + TSR) where the targe multiplier may have received the discretionary adjustment.

Table 6 contains the results from this exercise. We report results for the illustrative example in Panel A. We use the zero discretion as the baseline. This represents the true outcome from the simulations with no performance adjustments. The column "average payout" reflects the average across all 10,000 observation (trials) and the last column is the average conditional on those observations which are moved up to 1. When we apply a discretion of 0.05 uniformly to the simulated percentile rankings (i.e., when it is 0.95 to 0.99) around the threshold, the average increase in payout is \$485,303 which is quite substantial. Intuitively, there are two effects that impact the payout. The multiplier effect is the percentage payout of shares as a percentage of the target number of shares. The stock price effect is the shares paid out times the share price at the performance period end. When the firm's stock price is low (typically below the threshold), any discretion helps move the multiplier from zero to 50% of the target number of shares upon hitting the threshold. Consequently, the multiplier effect dominates the stock price effect, and since the multiplier effect in this case is substantial this explains the economically large value gain of \$485,303 compared to no payout when the performance falls short of the threshold. When we apply a discretion of 0.05 uniformly to the simulated percentile rankings around the target, the average increase in payout is \$72,517 which is relatively more modest compared to the threshold results. Here, both the multiplier and stock price effects are modest with a lower value gain. Finally, when we apply a discretion of 0.05 uniformly to the simulated percentile rankings around the maximum, the average increase in payout is \$204,922 which is higher compared to the target results. In this case, the stock price effect is high since the firm is near the maximum and dominates the multiplier effect. We obtain similar inferences when we apply a discretion of 0.1. We note that

with the threshold, an application of discretion of 0.1 results in an average payout increase of $461,467 which is lower than $485,303 with the discretion of 0.05. This is because a higher discretion value pulls in more poor performers to the threshold causing the average payout increase to be smaller due to the stock price effect. An interesting insight from this exercise is the smaller value gain around the target relative to both the threshold and the maximum. What explains the strong clustering patterns we observe around the target percentile? We suspect that investors regard the target as a visible benchmark and meeting or beating the target signals to the investors the firm's competitive position in the market. Overall, though, the simulation exercise shows that the monetary gains from discretion are quite substantial for executives.

We repeat the above Monte Carlo simulation and apply this to our actual sample of RPE awards where the payout schedule, threshold, target, and maximum are unique to each RPE award's actual contract structure. For a firm in any given year, we use the largest RPE grant for the simulation analysis. We report results in Panel B. The results are directionally quite similar to those we see with the illustrative example. The $ payout increase is the highest when discretion is applied to the threshold. The average increase in payout in our sample is $794,459 ($789,310) when a discretion of 0.05 (0.10) is applied relative to the threshold. The monetary gains to the average executive in our RPE sample are quite large. For example, the $794,459 value gain corresponds to nearly a third of the value of the award evaluated at the target when no disctretionary adjustment is made to the payout. We observe similar results around the target and the maximum. The average increase in payout around target is $196,673 ($379,190) when the discretion applied is 0.05 (0.10) which represents an increase of 7.7% (15.7%) of the award value when no discretion is applied. Finally, when examining payout changes around the maximum, we

see an average increase in payout of $345,684 ($705,686) when the discretion applied is 0.05 (0.10) representing an increase of 4.8% (9.7%) of the award value when no discretion is applied.

7.2 Incentive Effects of Discretion

Results from the previous section indicate large increases in monetary gains for an executive when discretion in applied to the payout. In this section we examine the effects of increasing the payout on executive incentives. Specifically, we examine how pay-for-performance sensitivity (i.e., delta) changes with discretion.

In order to estimate delta, we run a Monte Carlo simulation with 10,000 trials for the same illustrative award discussed earlier. For each trial, we simulate returns for the RPE firm and its peers using the expected returns for the stock. Following the methodology in Bizjak, Kalpathy, Li, and Young (2022), we calculate the end-of-the-performance period payout based on the simulated returns for the RPE award with a 1% increase in stock price for the RPE firm at the grant date and compare that to the payout without the 1% increase in stock price. The difference in payouts represents the end-of-the-period delta for the RPE award. We take the average value across all 10,000 trials in the Monte Carlo simulation. We repeat these calculations under the assumption that the firm will apply discretion to any percentile rank that is within 5 or 10 percentile points of the threshold, target, or maximum and report results in Table 7.

Panel A of Table 7 presents results on RPE delta for the illustrative example. The average increase in delta is –$5,350 (–$9,531) when a discretion of 0.05 (0.10) is applied relative to the threshold. In other words, moving the contract payout to the threshold lowers incentives. This arises because without any discretionary change in payouts, pay-for-performance sensitivity is positive for contracts that are close in proximity to the threshold. Applying discretionary changes so that the payout is moved to the threshold weakens the incentives that would arise from changes

in stock price. We see similar effects, i.e., either a negative or a small positive change, around the target and maximum. In Panel B we report results on RPE delta for our actual sample of RPE awards. The average increase in delta is –$12,795 (–$12,830) when a discretion of 0.05 (0.10) is applied relative to the threshold. This represents a 10% (16.1%) reduction in delta for discretion around the threshold. We observe similar, but smaller, effects on discretion on RPE delta around target and maximum.

Overall, our results indicate a large economic increase in RPE award payouts arising from discretionary adjustments around contract performance hurdles. We find that these payout increases are associated with a reduction in pay-for-performance sensitivity. We conclude that from a contracting perspective, discretionary adjustments to payouts greatly benefits managers in terms of value increases while diminishing incentives to increase stock price.

8. Conclusion

RPE awards with payouts tied explicitly to a peer group are increasingly becoming a central component of executive pay in the U.S. We examine the eventual payouts pursuant to the contract structure laid out in the RPE grants. Using a unique dataset of payout information disclosed in the firm's annual proxy statements, we show that there is strong evidence of discontinuity in reported performance of the RPE firm around the target percentile ranking. In other words, we observe that there is a sharp increase in the frequency of RPE firms that report performance at or just above the target percentile compared to below the target. We observe similar discontinuity patterns around the threshold and maximum percentiles specified in the plans. Such patterns are not to be expected for relative awards since performance that trigger payout depends not only on the RPE firm, but also on the firms encompassing the peer group over which the RPE firm presumably has no control

over. Through Monte Carlo simulations, we show that ex-post adjustment to an RPE award payout through discretion is associated with economically large gains to an executive while at the same time weaking incentives.

Our work has important implications of proxy advisors, institutional investors, and regulators. To the degree that firms make ex-post adjustments in award payout the numbers reported in SEC filings may not be accurate. One important rationale behind recent changes in the rules that have increased the disclosure of information about executive pay is to increase transparency and oversight of pay. Our findings suggest that shareholders and investors could benefit from an increase in the reporting and transparency of adjustments in the ex-post performance measures and actual payouts in performance-based awards.

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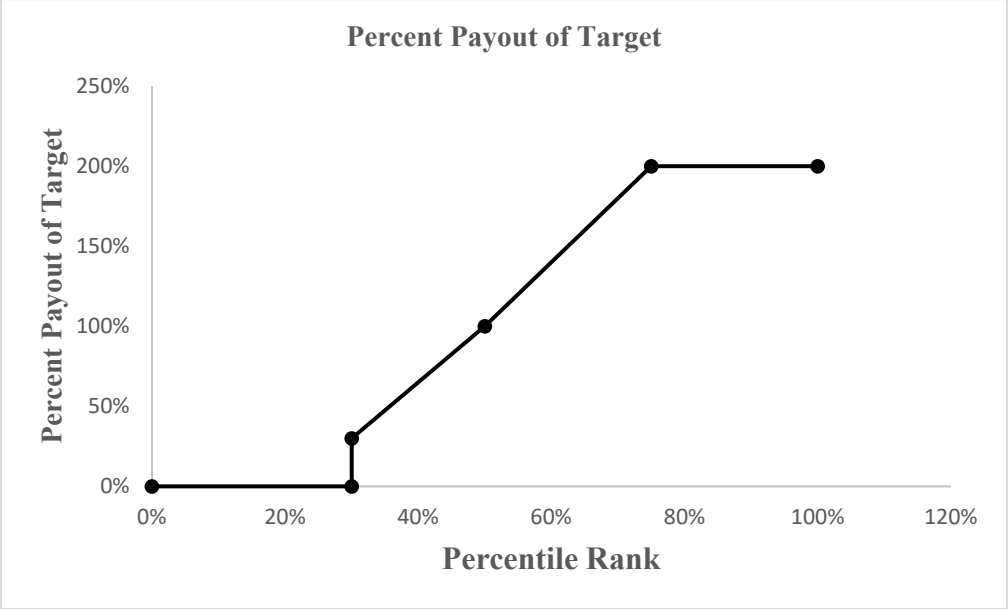
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Figure 1. Illustration of RPE Award: Air Products and Chemicals, Inc.'s Fiscal Year 2018 Grant to its CEO

This figure illustrates the payouts for an RPE award to Seifi Ghasemi, CEO of Air Products and Chemicals, Inc. granted on December 1, 2017 with an estimated grant date value of $6.4 million. The metric used to evaluate performance is the three-year annualized total stock return (TSR). The number of shares awarded, which is defined as a proportion of a target number of shares, depends on the percentile rank of Air Product's TSR in a group of 14 peer firms (including itself) selected by Air Product's Compensation Committee. The target number of shares granted is 31,489 which is payable for relative performance at the 50th percentile.

Payout Structure



RPE Custom Peer Group
Celanese Corp.
Chemours Co.
Danaher Corp.
Dover Corp.
Eastman Chemical Co.
Ecolab Inc.
Hunstman Corp.
Illinois Tool Works Inc.
Ingersoll-Rand plc.
Olin Corp.
Parker-Hannifin Corp.
PPG Industries Inc.
Praxair, Inc.

Percentile Rank	Target Multiplier
0% to 30%	0%
30%	30%
50%	100%
75% to 100%	200%

Figure 2. Disclosed RPE Performance and Award Payout: Air Products and Chemicals, Inc.'s Fiscal Year 2020 Disclosure

This figure provides a snapshot of the proxy statement disclosure on performance and payout in Fiscal Year 2020 of the RPE award to Seifi Ghasemi, CEO of Air Products and Chemicals, Inc. granted on December 1, 2017 with an estimated grant date value of $6.4 million. The metric used to evaluate performance is the three-year annualized total stock return (TSR). The number of shares awarded, which is defined as a proportion of a target number of shares, depends on the percentile rank of Air Product's TSR in a group of 14 peer firms (including itself) selected by Air Product's Compensation Committee. The target number of shares granted is 31,489 which is payable for relative performance at the 50th percentile. The company paid out 62,978 shares as part of the plan.

FISCAL 2018-2020 PERFORMANCE SHARES PAYOUT

The Committee determined final payout levels for performance share awards granted in fiscal 2018 with a performance cycle ending at the end of fiscal 2020. For the three-year performance period, our TSR was 115% and the TSR percentile rank was 92%. This resulted in a payout factor of 200% for the fiscal 2018-2020 performance cycle. The Committee did not exercise its discretion to adjust the payout factor for this performance cycle. The final payout for the fiscal 2018-2020 performance cycle is outlined in the following table.

Officer	Target Performance Shares Grant	Performance Shares Earned
Seifi Ghasemi	31,489	62,978
M. Scott Crocco	6,297	12,594
Sean D. Major	3,704	7,408
Samir J. Serhan	3,704	7,408

30 AIR PRODUCTS

Figure 3: Simulated Rankings Using an Illustrative Example

The figure presents rankings obtained using Monte Carlo simulations. Stock prices are assumed to follow a Geometric Brownian Motion. We use a representative hypothetical example of an RPE award with a custom peer group comprising of 16 peers (including the RPE firm) and a performance period of three years. We assume a drift rate of 10.5% per year, an annualized volatility in stock returns of 30.4%, and a correlation coefficient of 0.492 between all firms' stock returns. These parameters come from averages for firms in our sample. We simulate 10,000 trials over the 3-year performance period. The histogram shows the frequency distribution of outcomes from those 10,000 trials.

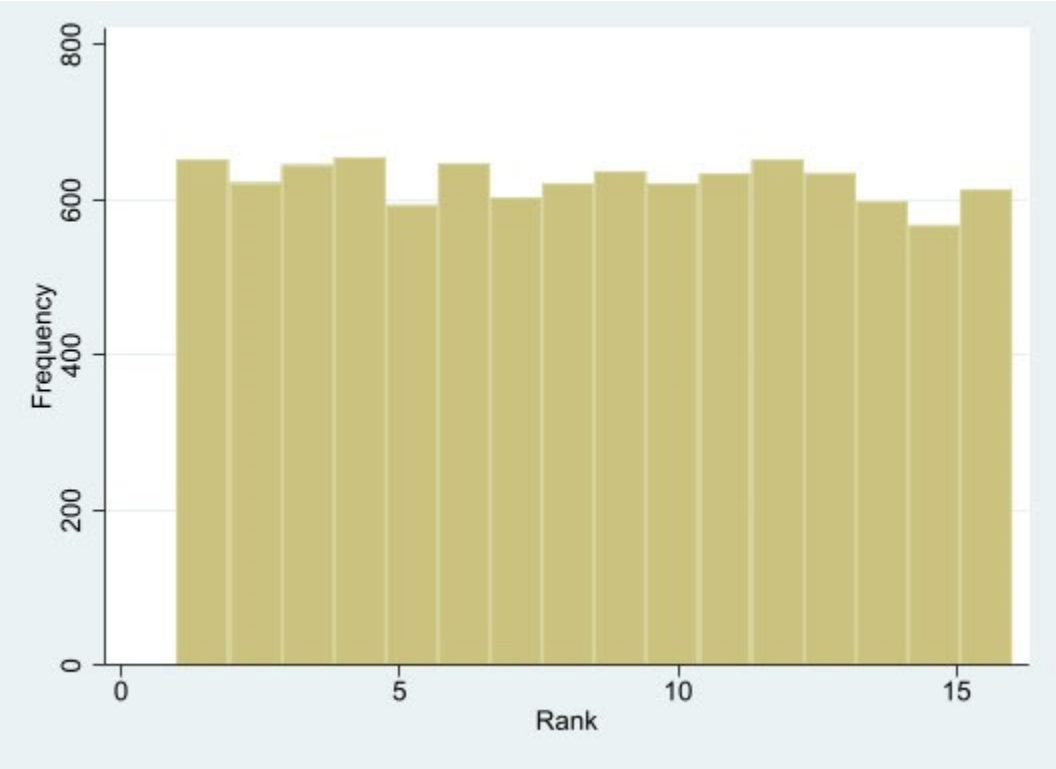
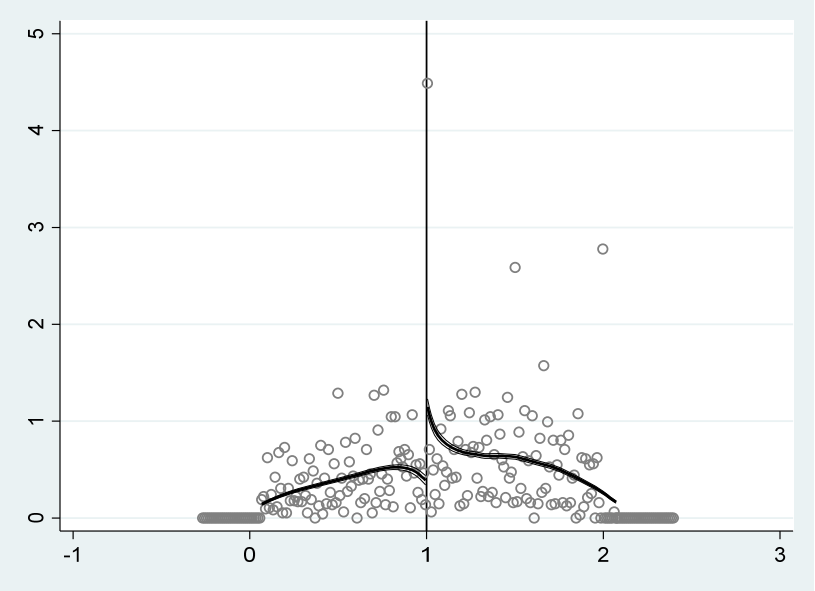


Figure 4: Disclosed Performance as a Percentage of Target in RPE

The figure presents the discontinuity in the density of *ActualMetricPercentofTarget* at 1 using McCrary (2008). *ActualMetricPercentofTarget* is the metric reported in the proxy statement as a percentage of the target specified for the metric under the RPE grant. The analysis involves 8,489 RPE awards from 2007 to 2021. The plot of discontinuity in the density of *ActualMetricPercentofTarget* at 1 using McCrary (2008) is presented below the histogram.

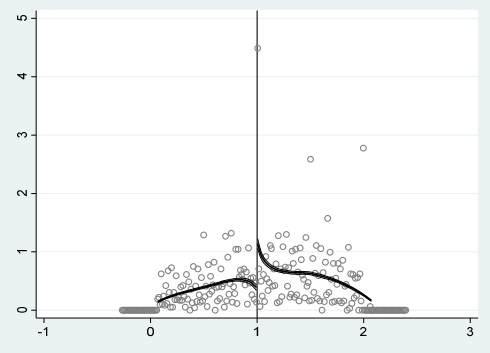


Discontinuity estimate: 1.1279
Standard error of estimate: 0.0757
p-value:0.000

Figure 5: Disclosed Performance as a Percentage of Target in RPE Based on Benchmark

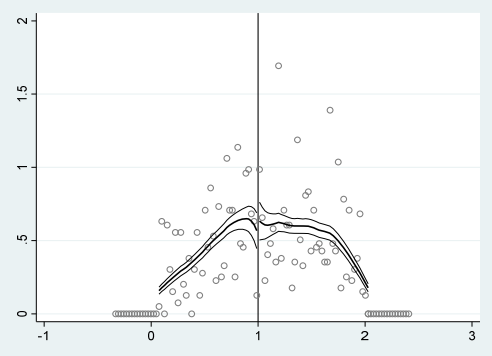
The figure presents the discontinuity in the density of *ActualMetricPercentofTarget* at 1 using McCrary (2008). *ActualMetricPercentofTarget* is the metric reported in the proxy statement as a percentage of the target specified for the metric under the RPE grant. The analysis includes 5,073 RPE awards involving custom peers in Panel A; 1,559 RPE awards involving a market index in Panel B; and 1,857 RPE awards involving an industry index in Panel C.

Panel A: Custom Peers



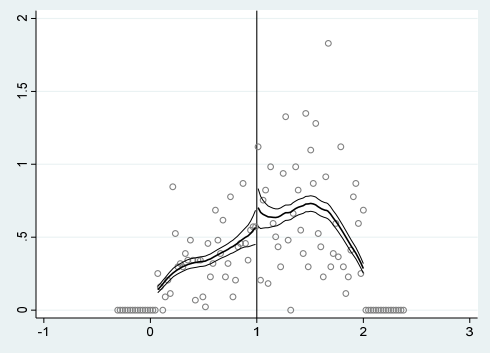
Discontinuity estimate: 1.8717; Standard error of estimate: 0.1238; p-value:0.000

Panel B: Market Index



Discontinuity estimate: 0.1464; Standard error of estimate: 0.1635; p-value: 0.371

Panel C: Industry Index



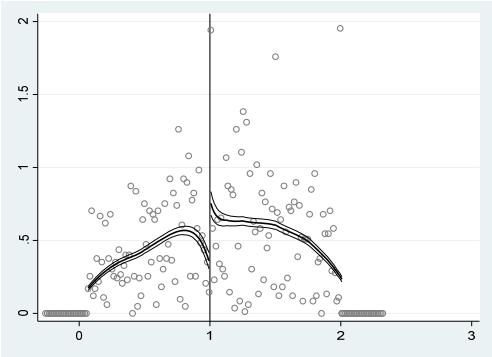
Discontinuity estimate: 0.2068; Standard error of estimate: 0.1510; p-value: 0.171

Coefficient on Market Index (relative to Custom Peers) using methodology in Byzalov and Basu (2019): -0.8080, p-value 0.009
Coefficient on Industry Index (relative to Custom Peers) using methodology in Byzalov and Basu (2019): -1.2232, p-value 0.000

Figure 6: Disclosed Performance as a Percentage of Target in RPE Based on Performance Metric

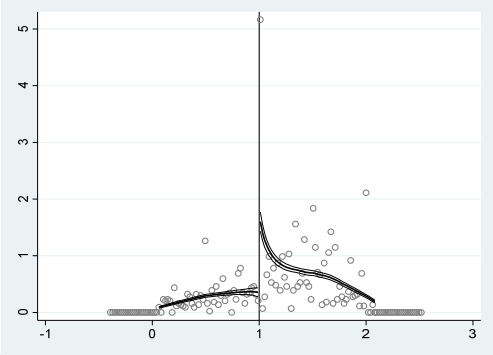
The figure presents the discontinuity in the density of *ActualMetricPercentofTarget* at 1 using McCrary (2008). *ActualMetricPercentofTarget* is the metric reported in the proxy statement as a percentage of the target specified for the metric under the RPE grant. The analysis includes 6,288 RPE awards involving stock returns (TSR) in Panel A; 2,092 RPE awards involving accounting in Panel B; and 109 RPE awards involving non-financial in Panel C.

Panel A: Stock Return (TSR)



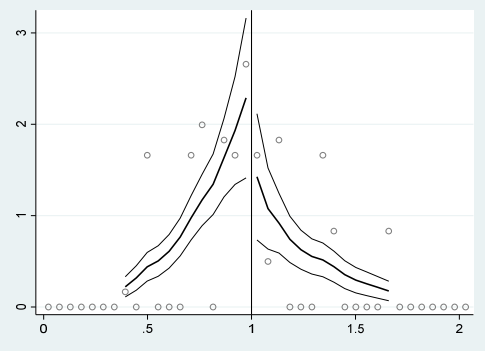
Discontinuity estimate: 0.7955262; Standard error of estimate: 0.1006367; p-value:0.000

Panel B: Accounting



Discontinuity estimate: 1.555206; Standard error of estimate: 0.1336339; p-value:0.000

Panel C: Non-Financial



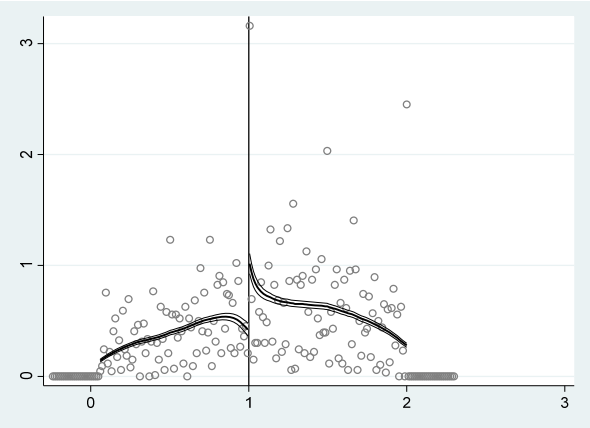
Discontinuity estimate: -0.384719; Standard error of estimate: 0.3512341; p-value 0.273

Coefficient on Accounting (relative to TSR) using methodology in Byzalov and Basu (2019): 1.3543, p-value 0.006
Coefficient on Non-Financial (relative to TSR) using methodology in Byzalov and Basu (2019): -1.3723, p-value 0.393

Figure 7: Disclosed Performance as a Percentage of Target in RPE Based on Interpolation around the Target

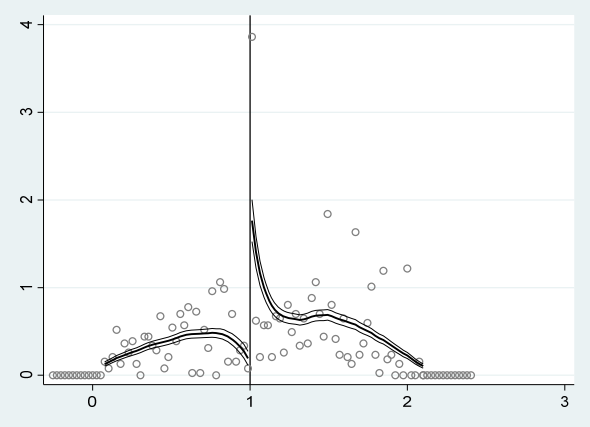
The figure presents the discontinuity in the density of *ActualMetricPercentofTarget* at 1 using McCrary (2008). *ActualMetricPercentofTarget* is the metric reported in the proxy statement as a percentage of the target specified for the metric under the RPE grant. The analysis includes 6,954 RPE awards involving interpolation around the target in Panel A; and 1,535 RPE awards involving no interpolation around the target in Panel B.

Panel A: Interpolation



Discontinuity estimate: 0.9269; Standard error of estimate: 0.0879; p-value:0.000

Panel B: No Interpolation



Discontinuity estimate: 2.5607; Standard error of estimate: 0.2710; p-value:0.000

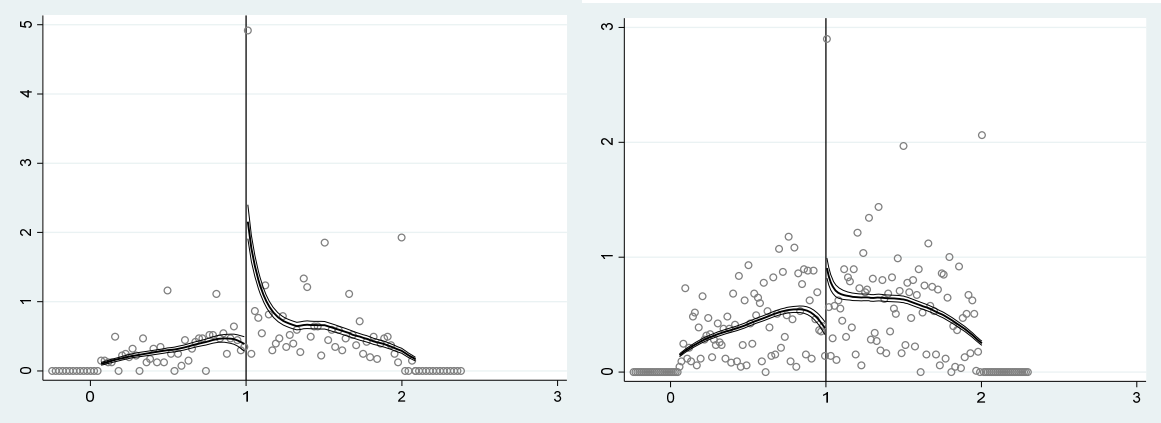
Coefficient on Interpolation (relative to No Interpolation) using methodology in Byzalov and Basu (2019): -1.3942, p-value 0.007

Figure 8: Effect of Concavity on Discontinuity in Reported Performance

The figure presents the discontinuity in the density of *ActualMetricPercentofTarget* at 1 using McCrary (2008). *ActualMetricPercentofTarget* is the metric reported in the proxy statement as a percentage of the target specified for the metric under the RPE grant. In Panel A, we report discontinuity estimates separately for cash and equity being the backend instruments. The analysis includes 1,789 RPE awards involving cash as the backend instrument and 6,700 RPE awards involving equity as the backend instrument. In Panel B, we identify a contract as being concave (convex) around the target if the slope in the payout-performance relation between threshold and target is higher (lower) than the slope in the payout-performance relation between target and maximum. In Panel C, we calculate the percentile ranking as a percentage of threshold and maximum percentiles and report discontinuity estimates separately. There are 5,826 RPE awards for the analysis around the threshold and 7,521 RPE awards for the analysis around the maximum for the period from 2007 to 2021.

Panel A

Cash *Equity*



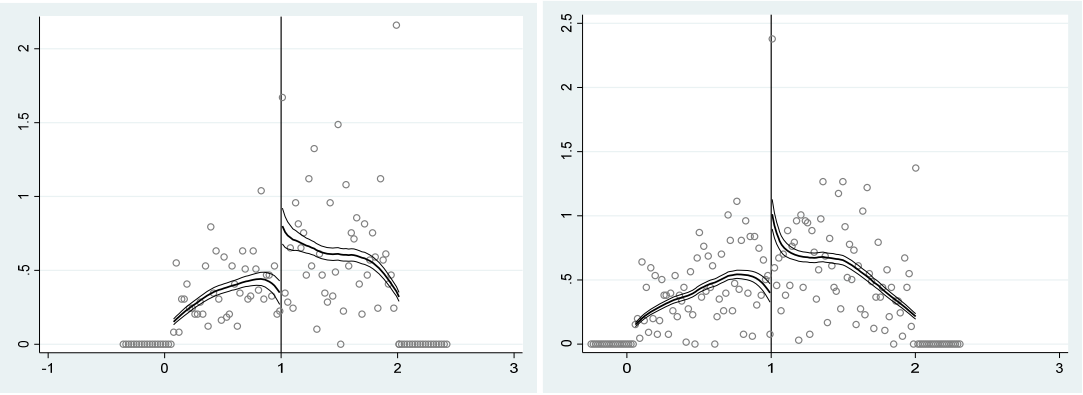
Discontinuity estimate: 1.8154
Standard error of estimate: 0.1620; p-value:0.000

Discontinuity estimate: 0.9235
Standard error of estimate: 0.0949; p-value:0.000

Coefficient on Cash (relative to Equity) using methodology in Byzalov and Basu (2019):1.4100, p-value 0.006

Panel B

Concave *Convex*



Discontinuity estimate: 0.8752
Standard error of estimate: 0.1506; p-value:0.000

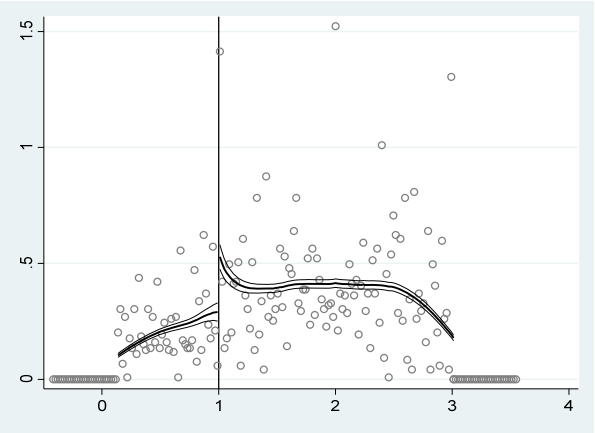
Discontinuity estimate: 0.9898
Standard error of estimate: 0.1165; p-value:0.000

Coefficient on Concave (relative to Convex) using methodology in Byzalov and Basu (2019): -0.0114, p-value 0.968

Figure 8 (continued): Effect of Concavity on Discontinuity in Reported Performance

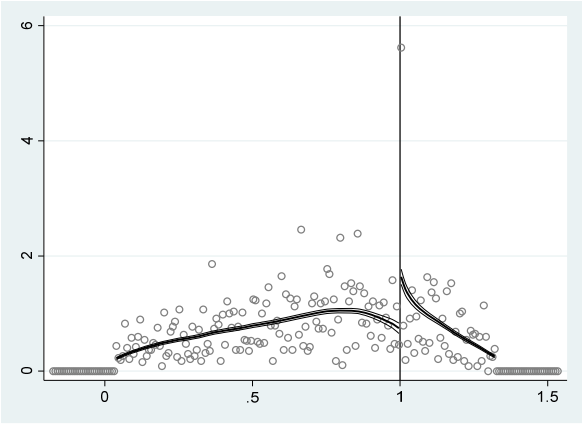
Panel C

Threshold



Discontinuity estimate: 0.6086
Standard error of estimate: 0.0886; p-value: 0.000

Maximum



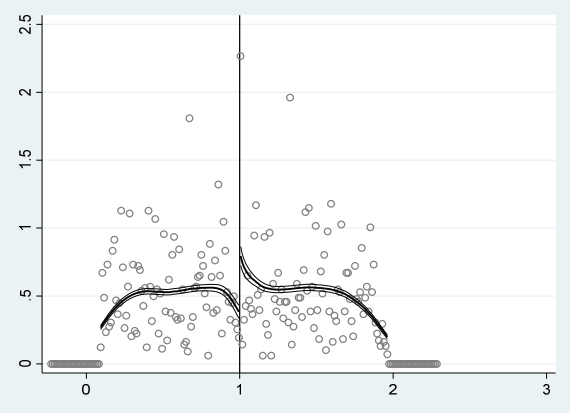
Discontinuity estimate: 0. 8269
Standard error of estimate: 0.0766; p-value: 0.000

Figure 9: Calculated Percentile Ranking as a Percentage of Target, Threshold, and Maximum

The figure presents the discontinuity in the densities of calculated percentile ranking as a percentage of target percentile (Panel A), threshold percentile (Panel B) and maximum percentile (Panel C) at 1 using McCrary (2008). The percentile rankings are calculated by authors using information on firm and peer performance as a percentage of the percentile rankings specified for the metric under the RPE grant. The analysis involves 8,847 RPE awards in Panel A, 8,416 RPE awards in Panel B, and 8,620 RPE awards in Panel C for the period 2007-2021.

Panel A

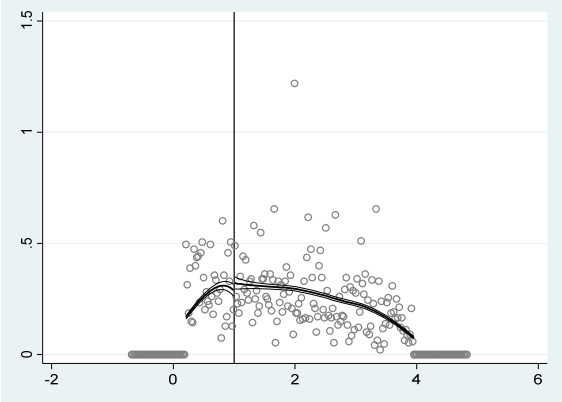
Target



Discontinuity estimate: 0.7791
Standard error of estimate: 0.0819; p-value:0.000

Panel B

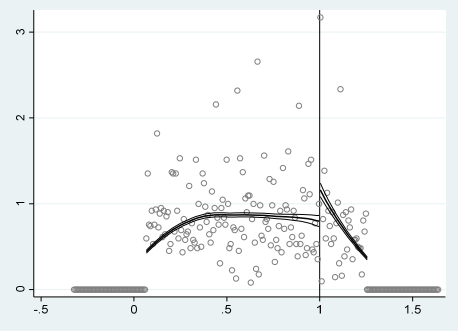
Threshold



Discontinuity estimate: 0.1139
Standard error of estimate: 0.0649; p-value:0.079

Panel C

Maximum



Discontinuity estimate: 0.3894;
Standard error of estimate: 0.0551; p-value: 0.000

Figure 10: Event Study Around RPE Performance End Date

Panel A presents the market-adjusted returns from an event study conducted within 10 trading days surrounding the performance expiration date using the full sample of RPE grants. We use the CRSP value-weighted index for measuring market returns. Day 0 represents the event day – the performance expiration. Panel B presents the market-adjusted returns for firms whose RPE grants ended up between the target and up to 10% above the target percentile ranking at the end of the performance period.

Panel A: Full Sample



Panel B: Percentile Ranking at or up to 10% of Target Percentile Ranking

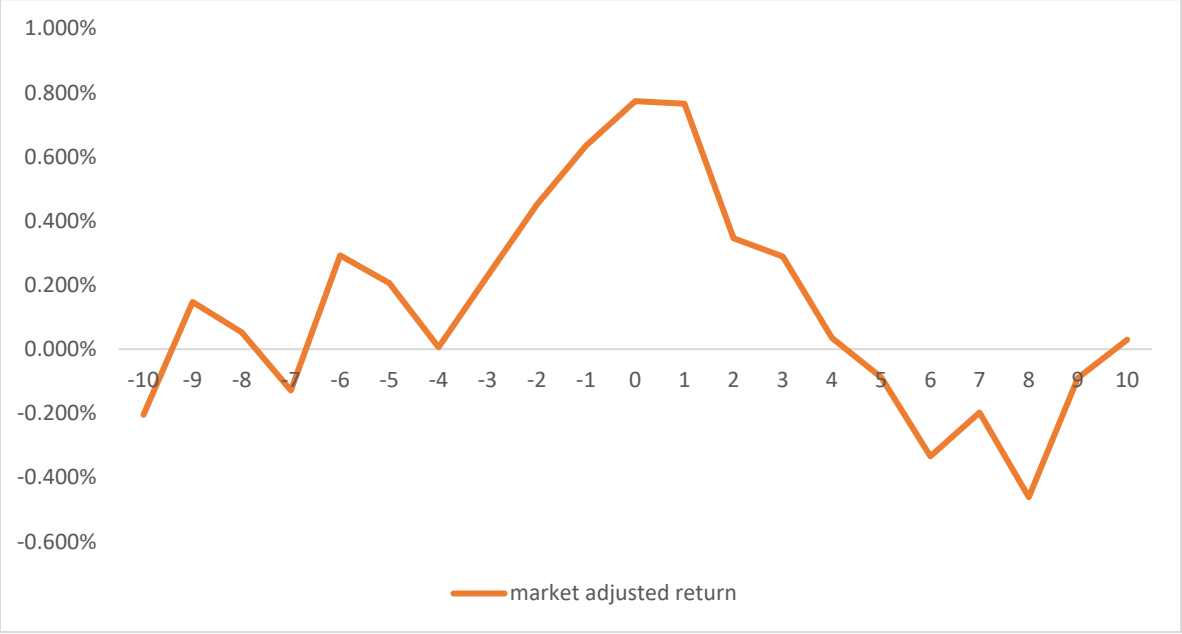


Table 1: Sample Construction

The table below describes the construction of sample used in the paper. We provide information on our sample at both the firm, firm-year, and firm-year-award levels for the original grant as well as the eventual payout.

	Firms	Firm-Years	Firm-Year-Awards
Incentive Lab database on all grants	1928	21025	351346
RPE grants	1189	8311	73766
RPE payouts	730	2809	18109
RPE payouts matched with original grants	550	1755	8489

Table 2: RPE Usage Statistics – Original Grants and Final Payouts

The following tables provide descriptive statistics of RPE usage and select contractual details for the RPE awards in our sample for the years 2007 to 2021. Panels A and B provide the distribution of RPE grants broken down by peer group type and performance metric, respectively. Panels C and D provides the distribution of RPE payouts broken down by peer group type and performance metric, respectively. Observations are at the award level. Columns may not add up to 100% because firms can use more than one RPE award with different characteristics.

Panel A: RPE Grants

	RPE Peer Group Type		
N	Custom Peers	Broad Index	Industry Index
73766	66%	12%	22%

Panel B: RPE Grants

	RPE Performance Metric		
N	Stock Return (TSR)	Accounting	Non-Financial
73766	69%	30%	1%

Panel C: RPE Payouts

	RPE Peer Group Type		
N	Custom Peers	Broad Index	Industry Index
8489	60%	18%	22%

Panel D: RPE Payouts

	RPE Performance Metric		
N	Stock Return (TSR)	Accounting	Non-Financial
8489	73%	26%	1%

Table 3: Year-wise Distribution of RPE Payouts

The following tables provide year-wise distribution of payouts involving RPE for the years 2007 to 2021. Panel A provides the different types of peer groups used in RPE. Panel B provides the distribution of the performance metrics used, the back-end payout instrument, and the performance periods utilized. Columns may not add up to 100% because firms can use more than one RPE award with different characteristics.

Panel A: RPE Usage and Peer Group Type

Year	N	Select Peers	Broad Index	Industry Index
2007	22	50%	13%	38%
2008	25	46%	15%	38%
2009	28	45%	34%	21%
2010	247	68%	12%	20%
2011	524	68%	15%	17%
2012	584	75%	15%	10%
2013	709	71%	13%	16%
2014	336	80%	12%	8%
2015	245	81%	10%	9%
2016	999	61%	18%	21%
2017	1141	64%	16%	20%
2018	1139	56%	20%	24%
2019	1280	61%	16%	23%
2020	1006	51%	21%	28%
2021	204	76%	9%	15%

Panel B: Performance and Back-end Payout Instrument

	Performance Metric		Back-end Instrument		Performance Period	
Year	Stock Return (TSR)	Accounting	Cash	Stock	One-Year	Multi-Year
2007	40%	60%	43%	58%	43%	58%
2008	42%	58%	38%	62%	38%	62%
2009	79%	21%	38%	62%	64%	36%
2010	69%	31%	17%	83%	26%	74%
2011	75%	25%	17%	83%	35%	65%
2012	67%	33%	26%	74%	43%	57%
2013	61%	39%	34%	66%	40%	60%
2014	54%	46%	53%	47%	64%	36%
2015	48%	52%	68%	32%	87%	13%
2016	72%	28%	23%	77%	29%	71%
2017	69%	31%	24%	76%	16%	84%
2018	78%	22%	19%	81%	18%	82%
2019	77%	23%	15%	85%	14%	86%
2020	79%	21%	16%	84%	19%	81%
2021	43%	57%	78%	22%	43%	58%

Table 4: Year-wise Distribution of RPE Grants

The following tables provide year-wise distribution of grants involving RPE for the years 2007 to 2021. Panel A provides the different types of peer groups used in RPE. Panel B provides the distribution of the performance metrics used, the back-end payout instrument, and the performance periods utilized. Columns may not add up to 100% because firms can use more than one RPE award with different characteristics.

Panel A: RPE Usage and Peer Group Type

Year	N	Select Peers	Broad Index	Industry Index
2007	3272	70%	18%	13%
2008	3036	65%	19%	16%
2009	3525	71%	15%	13%
2010	3870	72%	14%	14%
2011	4060	70%	17%	13%
2012	4766	69%	17%	14%
2013	4994	64%	18%	19%
2014	5447	65%	16%	19%
2015	5301	64%	16%	20%
2016	5212	67%	8%	25%
2017	5612	65%	6%	29%
2018	5366	63%	6%	31%
2019	5227	64%	6%	30%
2020	5707	62%	8%	31%
2021	5576	61%	9%	30%

Panel B: Performance and Back-end Payout Instrument

	Performance Metric		Back-end Instrument		Performance Period	
Year	Stock Return (TSR)	Accounting	Cash	Stock	One-Year	Multi-Year
2007	54%	46%	37%	63%	47%	53%
2008	58%	42%	36%	64%	44%	56%
2009	60%	40%	35%	65%	43%	57%
2010	62%	38%	31%	69%	40%	60%
2011	66%	34%	28%	72%	38%	62%
2012	66%	34%	26%	74%	38%	62%
2013	67%	33%	24%	76%	34%	66%
2014	68%	32%	23%	77%	34%	66%
2015	70%	30%	22%	78%	31%	69%
2016	72%	28%	20%	80%	28%	72%
2017	74%	26%	19%	81%	28%	72%
2018	77%	23%	18%	82%	26%	74%
2019	79%	21%	17%	83%	26%	74%
2020	78%	22%	17%	83%	27%	73%
2021	77%	23%	17%	83%	22%	78%

Table 5: Reported Performance Achievement in the RPE Payout Year

The table presents summary statistics of the reported performance achievement (percentile or rank) in the payout year as a percentage of threshold, target and maximum specified in the RPE contract.

Panel A: Full Sample

Percentage of:	N	P25	Median	P75	Mean	Std. Dev.
Threshold	5826	1.120	1.760	2.375	1.725	0.768
Target	8489	0.750	1.146	1.520	1.127	0.508
Max	7521	0.475	0.750	1.000	0.724	0.324

Panel B: Peer Group Type

Customer Peers

Percentage of:	N	P25	Median	P75	Mean	Std. Dev.
Threshold	3280	1.080	1.800	2.400	1.735	0.770
Target	5073	0.750	1.127	1.500	1.117	0.509
Max	4291	0.456	0.741	0.978	0.707	0.316

Market Index

Percentage of:	N	P25	Median	P75	Mean	Std. Dev.
Threshold	1149	1.140	1.640	2.400	1.688	0.781
Target	1559	0.704	1.120	1.517	1.095	0.501
Max	1502	0.475	0.773	1.000	0.737	0.329

Industry Index

Percentage of:	N	P25	Median	P75	Mean	Std. Dev.
Threshold	1397	1.200	1.784	2.320	1.734	0.753
Target	1857	0.820	1.248	1.580	1.182	0.507
Max	1728	0.496	0.800	1.038	0.752	0.339

Panel C: Performance Metric

Stock Return (TSR)

Percentage of:	N	P25	Median	P75	Mean	Std. Dev.
Threshold	4496	1.080	1.727	2.366	1.703	0.772
Target	6288	0.700	1.120	1.500	1.098	0.518
Max	5667	0.433	0.714	0.953	0.695	0.325

Accounting

Percentage of:	N	P25	Median	P75	Mean	Std. Dev.
Threshold	1277	1.280	1.825	2.440	1.804	0.755
Target	2092	0.944	1.233	1.560	1.213	0.474
Max	1830	0.613	0.866	1.038	0.807	0.312

Non-Financial

Percentage of:	N	P25	Median	P75	Mean	Std. Dev.
Threshold	98	0.875	1.017	1.227	1.132	0.424
Target	109	0.773	0.965	1.133	0.967	0.282
Max	85	0.718	0.849	0.967	0.845	0.206

Table 6: Effect of Discretion on RPE Payout Value

The table presents simulated RPE values at the end of the performance period obtained using Monte Carlo simulations. Stock prices are assumed to follow a Geometric Brownian Motion. For Panel A, we use a representative hypothetical example of an RPE award with a custom peer group comprising of 16 peers (including the RPE firm) and a performance period of three years. We assume a drift rate of 10.5% per year, an annualized volatility in stock returns of 30.4%, and a correlation coefficient of 0.492 between all firms' stock returns. These parameters come from averages for firms in our sample. We simulate 10,000 trials over the 3-year performance period and report the average in the table. The value of the award at the target on grant date is $1 million. Any performance below the 25th percentile is associated with zero payouts. The 25th percentile, i.e., the threshold, is associated with a payout that is 50% of the target number of shares; the 50th percentile, i.e., the target, is associated with a payout that is 100% of the target number of shares, and any performance beyond the 80th percentile, i.e., the maximum, is associated with a payout that is 200% of the target number of shares. There is linear interpolation between the 25th and 50th percentile and between 50th and 80th percentile. In the table, we report the end of the performance period values from applying discretion to the simulated outcomes around the threshold, target, and maximum percentiles. We examine the values under a range of discretion applied to the simulated percentile rankings. Panel B applies the same technique to the firms in our sample, but the payout schedule, threshold, target, and maximum are unique to each award as described in the Proxy Statement.

Panel A: Illustrative Example

Contractual Benchmark	Discretion Applied (Percentile)	Average Payout Before Discretion is Applied ($)	Average Payout Increase After Discretion is Applied ($)
Threshold	0.05	0	485,303
Target	0.05	1,160,275	72,517
Maximum	0.05	3,278,758	204,922
Threshold	0.1	0	461,467
Target	0.1	1,066,878	139,265
Maximum	0.1	3,003,052	358,843

Panel B: Actual RPE Sample

Contractual Benchmark	Discretion Applied (Percentile)	Average Payout Before Discretion is Applied ($)	Average Payout Increase After Discretion is Applied ($)
Threshold	0.05	0	794,459
Target	0.05	2,545,812	196,673
Maximum	0.05	7,148,331	345,684
Threshold	0.1	0	789,310
Target	0.1	2,411,596	379,190
Maximum	0.1	7,269,853	705,686

Table 7: Effect of Discretion on RPE Delta

The table presents pay-for-performance sensitivity (delta) at the end of the performance period obtained using Monte Carlo simulations. Stock prices are assumed to follow a Geometric Brownian Motion. For each trial, we simulate stock returns for the RPE firm and its peers using the expected returns for the stock. Following the methodology in Bizjak, Kalpathy, Li, and Young (2022), we calculate the end-of-the-performance period payout based on the simulated returns for the RPE award with a 1% increase in stock price for the RPE firm at the grant date and compare that to the payout without the 1% increase in stock price. The difference in payouts represents the end-of-the-period delta for the RPE award. For Panel A, we use a representative hypothetical example of an RPE award with a custom peer group comprising of 16 peers (including the RPE firm) and a performance period of three years. We assume a drift rate of 10.5% per year, an annualized volatility in stock returns of 30.4%, and a correlation coefficient of 0.492 between all firms' stock returns. These parameters come from averages for firms in our sample. We simulate 10,000 trials over the 3-year performance period and report the average in the table. The value of the award at the target on grant date is $1 million. Any performance below the 25th percentile is associated with zero payouts. The 25th percentile, i.e., the threshold, is associated with a payout that is 50% of the target number of shares; the 50th percentile, i.e., the target, is associated with a payout that is 100% of the target number of shares, and any performance beyond the 80th percentile, i.e., the maximum, is associated with a payout that is 200% of the target number of shares. There is linear interpolation between the 25th and 50th percentile and between 50th and 80th percentile. In the table, we report the end of the performance period values from applying discretion to the simulated outcomes around the threshold, target, and maximum percentiles. We examine the values under a range of discretion applied to the simulated percentile rankings. Panel B applies the same technique to the firms in our sample, but the payout schedule, threshold, target, and maximum are unique to each award as described in the Proxy Statement.

Panel A: Illustrative Example

Contractual Benchmark	Discretion Applied (Percentile)	Average Delta Before Discretion is Applied ($)	Average Delta Increase After Discretion is Applied ($)
Threshold	0.05	64,952	(5,350)
Target	0.05	65,096	518
Maximum	0.05	88,774	1,967
Threshold	0.1	35,485	(9,531)
Target	0.1	52,261	(2,977)
Maximum	0.1	77,743	2,885

Panel B: Actual RPE Sample

Contractual Benchmark	Discretion Applied (Percentile)	Average Delta Before Discretion is Applied ($)	Average Delta Increase After Discretion is Applied ($)
Threshold	0.05	128,084	(12,795)
Target	0.05	125,384	(812)
Maximum	0.05	158,012	6,483
Threshold	0.1	79,506	(12,830)
Target	0.1	118,450	(6,470)
Maximum	0.1	168,089	13,872