Abstract

Firms with short-horizon CEO incentives experience stock price inflation followed by reversal. Short-horizon CEOs exploit the price inflation by selling relatively more stock and making greater abnormal profits than long-horizon CEOs do. The stock price inflation is partly explained by greater earnings surprises and more positive investor reaction to the surprises. To sustain the inflated price, short-horizon firms are more likely to employ income-increasing discretionary accruals. The findings are consistent with recent theories linking short-horizon incentives to stock price inflation, suggest CEOs have some success in doing so, and shed light on the role earnings management plays in the process.
1. Introduction

The time horizon of a CEO’s equity-based incentives depends on the original vesting schedule of her stock and stock option grants, when they were granted, and on the manager’s past sale and exercise decisions about her vested stock and stock options. Recent theoretical models link short-horizon CEO incentives with CEO strategies to boost stock prices artificially in the short run when the CEOs can profit from doing so (see e.g., Goldman and Slezak, 2006; Bolton, Scheinkman, and Xiong, 2006; and Peng and Röell, 2009). The set of potential strategies that a CEO might employ in such stock price inflation attempts is broad, including manipulating reported company performance and influencing investor interpretation of the reported performance. Many prior studies examine the relation between CEOs’ incentives and specific strategies, for example, events of misreporting. In this paper, we take a complementary approach to this literature by focusing on stock returns surrounding the periods in which CEOs face short incentive horizons and thus can profit from successful inflation attempts. If attempts by CEOs to inflate stock prices are successful, we should observe as outcomes positive abnormal stock returns during the inflation period followed eventually by negative abnormal returns when investors learn the true values and correct the mispricing. Focusing on the stock return outcomes has the advantage of capturing the aggregate effect of one or more inflation strategies a CEO employs.

We first examine abnormal stock returns in the periods leading up to, during, and following the times that CEOs face short incentive horizons. We employ the incentive horizon measure developed by Chi, Gupta, and Johnson (2011), which captures the weighted time horizon over which a CEO’s stock and option holdings can generate payoffs for the CEO. In the theoretical models that predict stock price inflation, CEOs must fool at least a subset of investors
into overvaluing the stock, and informed short sellers who might otherwise correct the overvaluation must face short-sale constraints that limit the downward pressure they can exert on share prices. Thus, we focus our tests on firms with high short-sale constraints, and hereafter, results described are for them.\(^1\)

We find that firms with short-horizon CEO incentives exhibit positive abnormal returns over the prior 12 months leading up to the short-horizon year. The abnormal returns are large in magnitude, 62 basis points per month, or 7.44% annually, and are significantly greater than returns for comparable firms whose CEOs face long-horizon incentives. Abnormal returns are flat (not significantly different from zero) in the first half of the year in which firms’ CEOs face short-horizon incentives. In months +7 to +12 of the short-horizon year, however, abnormal returns are a significantly negative 65 basis points per month, and are significantly less than returns for comparable firms with long-horizon CEO incentives. Over the longer term period from months +13 to +36, short-horizon firms underperform long-horizon firms by 52 basis points per month, or 6.24% per year. The pattern of positive abnormal returns leading up to the period when CEOs face short-horizon incentives followed by negative abnormal returns (reversals) during the latter half of the short-horizon year and beyond is consistent with the hypothesis that CEOs facing short-horizon incentives will attempt to inflate share prices when they face incentives that can generate payoffs in the short term, and suggests that at least some CEOs are successful in their inflation attempts.

Given the evidence consistent with stock price inflation followed by reversal, in a second set of tests we examine whether CEOs who face short incentive horizons appear to exploit the stock price inflation that we document. We find that short incentive horizon CEOs sell

\(^1\) Although we do not discuss the results in this introduction section, we report and discuss later that, as expected, abnormal stock returns are generally statistically insignificant for firms with low short-sale constraints. Results for
significantly more stock in the short-horizon year compared to long-horizon CEOs in the same year. A key question is whether these CEOs earn abnormal profits through such sales. We find that they do. Following Jagolinzer, Larcker, and Taylor (2011), we compute abnormal profits to a sale as the dollar amount of stock sold multiplied by the negative of the abnormal returns on the stock following the sale. Under this approach, a CEO who sells stock ahead of negative abnormal returns in the stock will earn positive abnormal profits (and vice versa). We employ a propensity score approach that matches firms with short-horizon CEOs with firms with long-horizon CEOs on many different characteristics. Consistent with the hypothesis that short-horizon CEOs are able to sell stock at inflated prices, we find that they earn significantly positive abnormal profits.

Given the evidence of stock price inflation followed by reversal and of CEOs’ profiting from such inflation, we next examine a potential source of the positive abnormal returns that led to inflation. Earnings announcements are an important corporate event that affects stock valuation. Earnings announcements are usually accompanied by conference calls between managers and investors, which give the managers an opportunity to influence investors’ interpretation of the earnings and the company’s future prospect. If a manager intends to influence investors’ valuation of the firm’s stock, earnings announcements should be an opportune venue for them to do so. Therefore, we examine whether short-horizon firms provide different earnings surprises and whether investors react differently to earnings surprises in the relevant periods. We find that short-horizon firms have significantly greater standardized unexpected earnings (SUEs) than matched long-horizon firms in the year prior to the short-horizon year, but not during the short-horizon year. Moreover, we find that investors react more positively to SUEs for short-horizon firms than for long-horizon firms in the year prior to the
short-horizon year, but not during the short-horizon year. The larger SUE and larger investor response to the SUE partly explain the positive abnormal returns for short-horizon firms.

Given the evidence of greater earnings surprises and stock price inflation followed by reversal, and of CEOs’ profiting from such inflation, we next examine whether short-incentive-horizon CEOs might accomplish such price inflation through standard earnings management strategies based on discretionary accruals. The relation between CEO incentives and the use of discretionary accruals to manage earnings has been widely studied, but the literature has yet to reach a consensus on whether there is a reliable relation (see e.g., Armstrong, et al. 2010). Again here, we employ a propensity score approach that matches firms with short-horizon CEOs with firms with long-horizon CEOs on many different characteristics. Given our focus on the horizon of CEO incentives, we also match on the level of the equity-based incentives the CEOs face. We essentially ask whether similar firms whose CEOs face the same level of equity-based incentives, but differ on when their CEOs can profit from the incentives, differ in their likelihood of employing income-increasing discretionary accruals. If CEO incentives have no effect on the likelihood that a firm employs income-increasing discretionary accruals, then when a CEO can generate payoffs should be unrelated to that likelihood.

We find that firms with short CEO incentive horizons are no more likely than firms with long incentive horizons to employ income-increasing accruals in the 12 months leading up to the short-horizon period. However, in the fiscal year in which the CEO has a short horizon, the short-horizon firms are more likely to employ income-increasing accruals than are matched firms with long CEO incentive horizons. Armstrong et al. (2010) discuss the important issue of hidden bias in tests of the relation between CEO incentives and earnings management (and misreporting) and introduce to the accounting literature the sensitivity analyses developed by
Rosenbaum (2002). Rosenbaum (2011) emphasizes the relatively low power of his tests from Rosenbaum (2002), and introduces new sensitivity tests with much higher power. Based on Rosenbaum’s (2011) sensitivity tests, we conclude that the relation between CEO incentive horizon and the likelihood of employing income-increasing accruals is quite robust to hidden bias concerns (Rosenbaum $r \geq 4.94$).

Taken together, the results on earnings surprises and earnings management provide an interesting look at the pattern of managerial behavior and investor reactions around short incentive horizon years. To be successful, the managerial attempts to inflate stock price need to be credible and undetectable, and our findings show that positive earnings surprises that are not a direct result of accrual management accomplish this. After the stock price inflation and after other methods to attempt stock price inflation are (presumably) exhausted, managers resort to standard accrual management to sustain the inflation stock price. The finding that accrual management is not the first choice of manipulation tool is consistent with recent empirical evidence that the accrual anomaly has been increasingly exploited by arbitrageurs, such as hedge funds. As a result, the accrual anomaly has been slowly dissipating over time and mostly disappeared in recent years (e.g., Richardson et al., 2010; Green et al., 2011; Dechow et al., 2011).

In summary, our results are consistent with recent theoretical models in which CEOs with short-horizon incentives pursue strategies that attempt to fool some investors into overvaluing the firm, and suggest that some CEOs are successful in these attempts and exploit their success through earning abnormal profits on stock sales. Although firms with short CEO incentive horizons are significantly more likely to employ income-increasing discretionary accruals during the year they face short horizons, these strategies at best sustain overvaluation for a period while
insiders sell out of their positions. The share price inflation that we observe occurs in the year leading up to the short-horizon year during which we find no evidence of greater income-increasing discretionary accruals for short-horizon firms.

To the best of our knowledge, we provide the first empirical evidence of a link between stock price overvaluation and the time horizon of firms’ CEO incentives. The evidence illustrates how the temporal structure of managerial incentives can have important capital market effects, and complements the large literature that studies the various economic outcomes of managerial horizon and incentive structures. Earlier studies on managerial horizon and its effects often focus on retiring CEOs because horizons for younger CEOs are difficult to measure (e.g., Dechow and Sloan, 1991; Cassell et al., 2013). Xu (2012) hand-collects CEO contract terms and expands the horizon study to younger CEOs. Our algorithm of estimating incentive horizon can be easily implemented for all executives covered by ExecuComp and provides a dynamic horizon measure that incorporates all forms of equity incentives (stock, option, vested, unvested, newly granted, and previously granted incentives).

Our paper also adds to the body of work that focuses on the determinants of managerial incentive horizons (see e.g., Cadman, Rusticus, and Sunder, 2012; Bhattacharyya and Cohn, 2010; Gopalan, et al., 2013). Cadman, et al. study determinants of the vesting horizons of new option grants, and Gopalan et al. study determinants of the vesting horizons of new stock and option grants and also examine the relation between earnings management and vesting horizon.

In Section 2 of the paper, we formulate our hypotheses. Section 3 describes our data and methods. Section 4 contains our results, and Section 5 concludes.
2. Background and hypotheses

Several theoretical models formalize the link between short-horizon incentives and CEO strategies that attempt to boost short-run stock prices artificially. In Goldman and Slezak (2006) and Peng and Röell (2009), CEOs who face relatively shorter incentive horizons are more likely to attempt strategies designed to boost stock prices artificially in the short run. Bolton, Scheinkman, and Xiong (2006) provide similar arguments, but in their model current shareholders deliberately structure the horizon of CEO incentives to induce managers to pursue such strategies. In their model, a firm’s stock price has a long-term fundamental value component and a short-term speculative component. CEOs can pursue strategies that fool a subset of investors into believing that firm value is higher than its true long-term value. If short-sale constraints bind, the trading actions of the fooled investors lead to an increase in the short-term speculative component of the stock price. Investors eventually realize that the stock is overvalued (or short-sale constraints relax), and correction occurs as the stock price falls to the long-term fundamental value. Because current shareholders value the option to sell their stock to the more optimistic investors in the near term at an inflated price, they optimally incentivize CEOs to undertake strategies to inflate prices in the short run by giving them relatively more short-horizon incentives.

While the various models differ from each other on various dimensions, a common prediction is that CEOs with short incentive horizons have incentive to attempt to inflate share prices. If CEOs are successful in their inflation attempts, we should observe two outcomes: stock price inflation and reversal; and CEOs exploit the inflation by selling more stock and selling it at overvalued prices. This leads to the first two hypotheses we test, stated in alternative form:
**H1:** Firms whose CEOs have short-horizon incentives exhibit evidence of share price inflation (positive abnormal returns) and eventual correction (negative abnormal returns) around the short-horizon period. These effects should obtain only among stocks with high short-sale constraints because these constraints limit downward pressure on the stock by informed investors.

**H2:** CEOs who have short-horizon incentives sell significantly more stock and earn positive abnormal profits than comparable long-horizon CEOs do. As in H1, these effects should obtain only among firms with high short-sale constraints.

The two main hypotheses above focus on the potential outcomes of any attempts CEOs make to inflate share prices and focus on stock returns over relatively long time periods. As such, the hypotheses do not depend on identifying specific actions or information releases that drive share price inflation. Earnings releases are arguably one of the most value relevant types of disclosures that firms make on a routine basis, and are thus plausible sources to investigate as drivers of any stock price inflation we observe. Thus, we formulate hypotheses about the magnitude of earnings surprises and stock price responses to earnings surprises, stated in alternative form as:

**H3:** Firms whose CEOs have short-horizon incentives provide greater earnings surprises than matched long-horizon firms. As in H1, these effects should obtain only among firms with high short-sale constraints.

**H4:** Firms whose CEOs have short-horizon incentives exhibit greater stock price responses to earnings surprises than matched long-horizon firms. As in H1, these effects should obtain only among firms with high short-sale constraints.
Sloan (1996) finds that investors misprice the accrual component of reported earnings, and Beneish and Vargus (2002) find that the mispricing occurs primarily for income-increasing accruals. Investors appear to interpret the income-increasing accruals to imply higher future earnings even though the accruals ultimately reverse and reduce earnings. Thus, ceteris paribus, a manager attempting to lead investors to overvalue a firm should be more likely to employ income-increasing accruals, and ceteris paribus, those abnormal accruals should be larger. Stated in alternative form, we hypothesize that:

\[ H5: \text{Firms whose CEOs have short-horizon incentives are more likely to employ income increasing discretionary accruals than are matched long-horizon firms.} \]

\[ H6: \text{The magnitude of abnormal discretionary accruals is greater for firms whose CEOs have short-horizon incentives than for firms with long CEO incentive horizons.} \]

3. Data and methods

3.1. Sample

Our sample includes all firm-years in Standard and Poor’s ExecuComp database over the period 1992-2009 that have the data required to compute the various incentive measures for CEOs, stock returns, and control variables we discuss below. We end the sample in 2009 because we examine abnormal stock returns for periods up to 36 months following the sample year.

3.2. CEO incentive horizon measure

To examine the importance of CEO incentive horizons, we need a measure that captures the horizons of CEOs’ vested stock and stock options, which technically have a horizon of zero, and their unvested stock and stock options, which may have varying horizons depending on the original vesting schedule and when they were granted. The ideal measure would also capture the
relative size of the incentives at each horizon. Unfortunately, there is not a machine readable
database containing such a measure for a large sample of firms. Thus, we construct an
approximation of the CEO incentive horizon using the algorithm developed by Chi, Gupta, and
Johnson (2011).\(^2\) We describe details of their algorithm next.

We infer the vesting period for restricted stock as follows. For each CEO for each firm-
year, we use the data in ExecuComp to calculate the numbers of restricted shares that vest in
each of the subsequent three years. The number of restricted shares that vest in a particular year
is computed by the accounting identity as the number of restricted shares that the executive had
at the prior year-end plus newly granted restricted shares minus the number of restricted shares at
current year-end. We then compute a time-weighted average of the numbers of shares that vested
across the three years. For example, the proportion of shares that vests in year one is multiplied
by one; the proportion that vests in year two is multiplied by two, and so on. Remaining shares
not vested by year three are assumed to vest in year four. The computation produces a horizon
measure in units of years. We adjust for stock dividends and stock splits in this calculation. This
algorithm approximates the number of years that it takes the initial unvested holdings of shares
in a given firm-year to vest. If no shares vest during the three years, we assume somewhat
arbitrarily that the vesting horizon is four years. The censoring at four years should help to
capture cases when incentives are subject to cliff vesting because Cadman, Rusticus, and Sunder
(2012) find that only 1% of grants cliff vest beyond five years. We perform a parallel
computation for unvested stock options to approximate the vesting horizon for stock options.\(^3\)

\(^2\) Note that we need the horizon of incentives from new stock and stock option grants, as well as the horizon of incentives from existing stock and stock option holdings held by the CEO in a particular year. While data for the former are in firms’ Form 4 filings, data on the latter are not.

\(^3\) If a CEO leaves the company within three years, her unvested incentives may cliff vest. This may produce an *ex post* horizon measure that is shorter than the *ex ante* horizon. For this reason, we exclude all firm-year observations
A numerical example illustrates the algorithm. Suppose CEO A has 300 shares of restricted stock at year 0, and 100 shares vest at the end of each of the next three years. CEO B also has 300 restricted shares, but the 300 shares vest all at once at the end of year 3. Even though both CEOs have all their shares vest in three years, CEO A’s effective incentive horizon is shorter than CEO B’s. Our algorithm captures the difference in the two effective incentive horizons—the estimated incentive horizon for CEO A is 2 years (computed as $1 \times \frac{100}{300} + 2 \times \frac{100}{300} + 3 \times \frac{100}{300}$), and for CEO B is 3 years (computed as $1 \times \frac{0}{300} + 2 \times \frac{0}{300} + 3 \times \frac{300}{300}$).

In practice, some firms specify performance vesting, which is when the vesting of stock options or shares depends on achieving specified accounting-based or other targets (see Bettis et al., 2010). Performance vesting is an important issue because there could be reverse causality between vesting and the outcome variables that we are examining. For example, a CEO could inflate the stock price to a threshold that triggers future vesting. We would observe a relation between short CEO incentive horizon and the abnormal stock return preceding the short-horizon period, but the causality would run from stock return to the incentive horizon instead of vice versa. For firms that employ performance vesting, there is no obvious way to compute an ex ante vesting horizon based on the vesting rules they specify. Our algorithm determines the vesting horizon based on how many shares actually vest over time for each executive. Thus, our algorithm should produce reasonable ex ante estimates of performance-based vesting horizons under the assumption that managers and investors have unbiased expectations about the relevant future performance outcomes that determine the vesting.

that see the CEO departing within the following three years. This exclusion also means that our findings are different from and compliment the earlier findings on retiring CEOs (e.g., Dechow and Sloan, 1991; Cassell et al., 2013).
To assess whether performance vesting biases our finding, in untabulated results we control for a large set of future performance control variables that are potentially performance vesting metrics. The measures include: years +1 and +2 stock returns, the percentage change in earnings per share, and return on assets. We use unadjusted and industry-adjusted versions of these measures. We also include the squares of these measures to attempt to capture nonlinearities in performance vesting rules. When controlling for these future performance measures, we obtain similar results as those tabulated.

Unrestricted stock holdings and vested stock options technically have vesting horizon lengths of zero. We recognize that implicit or explicit expectations by a board of directors may prevent a CEO from selling her entire unrestricted stock or vested option holdings even though those holdings have no vesting restriction.\(^4\) Indeed, across the CEOs in our sample, less than 1% of them sell unrestricted stock and vested option holdings down to zero during their employment periods. We use the observed minimum incentives over a CEO’s time series as an estimate of the minimum level of incentives the CEO is expected to hold throughout her tenure. Instead of assuming an incentive horizon of zero years for these vested incentives, we assume that these incentives have a horizon of four years. Vested stock and stock options above this minimum level are assumed to be able to be sold at the CEO’s discretion, so we assume a horizon of zero years for them.

Our measure captures the vesting horizon length going forward from each firm-year. The measures also explicitly incorporate differences in granting behavior across firms and differences in the prior exercise and stock sales behavior across CEOs.

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\(^4\) Cai and Vijh (2007) present several arguments for why even unrestricted shares cannot freely be sold by managers.
With the horizons from each source of incentives in hand, we combine them into weighted measures that reflect the relative magnitudes of the incentives from each source. The weighted measure should capture the overall time horizon element of the incentives that a CEO faces. For example, a CEO may have incentives that take a long time to vest, but those incentives are small in magnitude compared to her short-term incentives. This CEO faces very different incentives to boost short-term stock prices compared to a CEO with relatively small short-term incentives and relatively large incentives that vest in the long term. To capture such differences, we compute weighted incentive horizon measures based on the relative magnitudes of each source of incentives. We use stock and stock option deltas to measure the magnitudes of incentives.

To calculate the deltas for stock options, we use the Black and Scholes (1973) model modified by Merton (1973) to incorporate dividends. Executives typically exercise their options before maturity (Hemmer et al., 1996; Huddart and Lang, 1996; Heath et al., 1999; Bettis, et al., 2005), so we reduce the contractual option maturity from ExecuComp by 30%. As a proxy for the risk-free rate, we use the average yield on U.S. Treasury securities that most closely matches the option’s (reduced) maturity. We use the standard deviation of stock returns over the prior 60 months to estimate the stock return volatility. We use the average dividend yield over the prior three years as a proxy for the future dividend yield. For newly granted options, strike price and maturity are taken directly from ExecuComp. ExecuComp does not report terms and numbers of individual grants for previously granted options, so we use Core and Guay’s (2002) one-year approximation method to estimate the strike price of previously granted options.

Given the option pricing parameter values and the numbers of vested and unvested options each CEO holds, we use the option pricing model to compute delta, defined as the
change in value for a one-percentage-point increase in the market value of the firm’s equity, and then multiply by the number of options held. We compute separate measures for vested and unvested options. We compute deltas for restricted and unrestricted stockholdings as one percent multiplied by the stock price and then multiplied by the number of shares held.

For each CEO, we compute the overall weighted incentive horizon as the sum of (1) the restricted stock horizon (in years) multiplied by the proportion of total delta that is provided by restricted stock; (2) the unvested stock option horizon (in years) multiplied by the proportion of total delta that is provided by unvested stock option; (3) four years times the proportion of total delta that the time-series minimum represents (i.e., four years times those incentives that we assume the CEO must hold even though they are vested); and (4) zero years times the proportion of total delta provided by the vested stock and stock options above the time-series minimum level. Finally, we define incentive horizon less than one year as short and greater than two years as long. We therefore exclude firm-years where a CEO’s incentive horizon is between one and two years to achieve greater dispersion in horizon.

The incentive horizon measure that we compute omits the effects of bonuses, which are frequently tied to accounting figures. While such bonuses may also induce CEOs to manipulate accounting figures, the bonuses do not depend upon fooling investors into overvaluing a firm. Although we do not see a clear way to incorporate a bonus horizon into our weighted incentive horizon measure, we can report that all of our reported results are robust to controlling for bonus scaled by total compensation (ExecuComp variables bonus/TDC2).
3.3. Short-sale constraints

We measure short-sale constraints using three different measures: idiosyncratic risk of a stock, level of short interest, and total market capitalized of the firm’s stock. Idiosyncratic risk of a stock presents considerable challenges for arbitrageurs. Pontiff (2006) argues that high holding cost and limited opportunity to hedge short positions in a stock with high idiosyncratic risk forces arbitrageurs to hold limited positions in it. Consistent with Pontiff’s argument, Mashruwala, Rajgopal and Shevlin (2006) report a higher concentration of accrual anomaly (Sloan, 1996) in stocks with high idiosyncratic volatility. The association between idiosyncratic volatility and short-sale constraints is also documented by Fu (2009). We follow Fu (2009) and measure idiosyncratic volatility by regressing stocks daily excess returns on market excess returns. We require at least 15 trading days in a month for each regression to reduce the influence of infrequent trading. We compute idiosyncratic risk as standard deviation of regression residual multiplied by the square root of number of trading days.

The second measure of short-sale constraints we use is the level of short-interest scaled by monthly trading volume. We collect data on short interest from Compustat Monthly Short Interest File. A higher level of short interest indicates more binding short-sale constraints because borrowing shares to short becomes more difficult if the stock already has a very high level of short interest (Desai, Ramesh, Thiagarajan, and Balachandran, 2002; Asquith, Pathak, and Ritter, 2005; Boehme, Danielsen, and Sorescu, 2006). A limitation of this measure is that in some situations, a lower level of short interest may indicate higher, rather than lower, short-sale constraints because a lower level of short interest might be the result of short sellers unable to borrow the stocks to sell short.

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5 We find nearly identical results if we use the three factor model of Fama and French (1993) instead of a single market factor.
The third measure we use for short-sale constraints is market value of equity. Smaller firms likely have more information asymmetry, are less liquidity, and therefore are likely to have higher short-sale constraints. We combine the three measures of short-sale constraints into one composite measure as the sum of firm’s quartile rank (1 through 4) for each measure. The minimum is 3 indicating a firm is in the first quartile on all three measures; the maximum is 12 indicating a firm is in the top quartile on all three measures; the median rank of a firm is 6 on the scale of 1 to 12. We classify firms with above (below) median composite short-sale constraints as those with high (low) short-sale constraints.

3.4. Calendar time portfolio returns

We employ the calendar-time-portfolio method to measure abnormal stock returns in the periods leading up to, during, and following the times that CEOs face short incentive horizons. Combining stocks in calendar time portfolios corrects for lack of independence among firms’ returns measured contemporaneously (Fama, 1998). We form two equally-weighted portfolios every month based on incentive horizon, one for short-horizon firms with CEO’s incentive horizon less than a year and another for long-horizon firms with CEO’s incentive horizon greater than two years. We also form an arbitrage portfolio that buys short-horizon portfolio and sells short the long-horizon portfolio. We then regress portfolio returns on market, SMB, HML, and momentum factors (Fama and French, 1993; Carhart, 1997) to measure abnormal stock returns.

3.5. Insider trades and profits

To examine whether CEOs facing short incentive horizons appear to exploit price inflation, we examine CEOs’ trading activity prior to and during the period when CEOs face short incentive horizon. We identify insider trading activity from Thomson Reuters’ Insider Filing Data Feed. Following Jagolinzer, Larcker, and Taylor (2011), we accumulate CEO’s
transactions each day while netting out purchases from sales. We then estimate abnormal returns for up to 180 days as the intercept of a regression of the firm’s returns in excess of the risk free rate on market, SMB, HML, and momentum factors (Fama and French, 1993; Carhart, 1997). CEO’s transactions are profitable (unprofitable) if the stock experiences a negative (positive) abnormal return, i.e., the regression intercept is negative (positive). We multiply the intercept by negative one for ease of exposition. Finally, we weight the intercept by the size of transaction to estimate dollar value of CEO’s trading profit.

3.6. Earnings Surprises and Market Reaction to Earnings

Earnings announcements are an important corporate information event and plausibly an opportune venue for CEOs to influence investors’ valuation of the firm. We first examine the size of quarterly earnings surprises around the short-horizon period. We measure unexpected earnings by the difference between actual earnings and the I/B/E/S analyst consensus earnings. We standardize the unexpected earnings by the standard deviation of unexpected earnings during the past 20 quarters, requiring at least 8 quarters of available data (e.g., see Doyle et al., 2006). This standardization is particular important for our test because we want to control for the innate profit volatility of each firm and capture the unexpected earnings beyond the innate profit volatility. Standardizing by stock price does not control for the innate profit volatility and will likely contaminate our test because of the mispricing we documented in Table 2. To measure investors’ response to the SUE, we scale the day (-1,+1) earnings announcement cumulative abnormal return (CAR) by the SUE. We winsorize SUE, CAR, and CAR/SUE at the top and bottom one percentiles to reduce the influence of extreme outliers. We alternatively measure CAR over the (-1,+5) window and obtain similar findings.
3.7. Earnings Management

To identify firms that use income-increasing discretionary accruals, we begin with a discretionary accrual measure obtained from a modified version of the Jones (1991) model. We run annual cross-sectional regressions of the following model for each of the Fama and French (1997) 48-industry groups:

$$\frac{TA_{it}}{Assets_{it-1}} = \alpha - \frac{1}{Assets_{it-1}} + \beta_1 \frac{\Delta Sales_{it}}{Assets_{it-1}} - \Delta AR_{it} + \beta_2 \frac{PPE_{it}}{Assets_{it-1}} + \epsilon_{it},$$

(1)

where $\Delta Sales_{it}$ is the change in sales, $\Delta AR_{it}$ the change in accounts receivables, and $PPE_{it}$ property, plant, and equipment. Following Hribar and Collins (2002), we calculate total accruals, $\text{TA}_{it}$, as Compustat data item $\text{ibc}$ (income before extraordinary items and discontinued operations from the Cash Flow Statement) minus OCF (Operating activities-net cash flows ($oancf$) minus extraordinary items and discontinued operation ($xidoc$)). We winsorize the variables in equation (1) at 1st and 99th percentile before running the regressions and exclude those industry-years that have fewer than eight observations. We obtain discretionary accruals as the residuals from equation (1).

Kothari, Leone, and Wasley (2005) recommend adjusting discretionary accruals using performance-matched firms. They match firm observations with another firm from the same industry on the basis of their return on assets. Performance-adjusted discretionary accruals are then defined as the difference in discretionary accruals of the subject firm and the matched firm. Given our focus on how managerial incentive horizon affects the discretionary accrual measures, we need to ensure that such matching procedures do not wipe out any effect of incentive horizon by, for example, subtracting discretionary accruals for sample and matched firms with similar
incentive horizons. If incentive horizon affects discretionary accruals, then netting accruals for firms with similar incentive horizons could net out any effects of the incentive horizon. Thus, we follow Kothari et al. except that we impose the additional requirement on the matched firm that it has a different incentive horizon than the sample firm. Specifically, for every observation with an incentive horizon shorter than the sample median (about one year), we choose the match (based on the Fama-French 48 industry, year, and ROA) from among firms with incentive horizons longer than the sample median. We do the converse for every observation with an incentive horizon longer than the sample median. This approach preserves the performance matching from Kothari et al. and also ensures that we retain any variation that depends on differences in incentive horizons.

Beneish and Vargus (2002) find that the accrual mispricing in Sloan (1996) occurs primarily for income-increasing accruals, and the theoretical models that underpin our study focus on managerial attempts to cause overvaluation. Thus, we define a dummy variable equal to one to indicate firm-years in which the discretionary performance-adjusted accrual is income-increasing (i.e., positive), and zero otherwise.

3.8. Method

The propensity score matching method has been shown to be more effective than OLS in matching firms experiencing a particular treatment (for example, CEOs with short incentive horizon) with those without the treatment (for example, CEOs with long incentive horizon). As Armstrong, Jagolinzer, and Larcker (2010) note, controlling for determinants of a treatment in an OLS regression imposes a functional form on the relation between treatment and firm
characteristics. Applying the propensity-score matching methodology, Armstrong et al. find that the positive relation between the level of managerial incentives and accounting irregularities as documented in the literature disappears. Extending this line of research, we employ the propensity-score matching methodology to study the effects of the horizon of managerial incentives. In particular, we estimate the propensity of a firm to award shorter horizon incentives to its CEOs using the following probit model:

\[
\Pr(\text{Short Horizon}_i) = \\
\alpha + \beta_1 \times \text{IncentiveRatio}_i + \beta_2 \times \log \left( \frac{M}{E} \right) + \beta_3 \times \log (\text{Total Assets})_i + \beta_4 \times \text{Leverage}_i + \beta_5 \times \text{ROA}_i + \beta_6 \times \text{Stdev}(\text{CFO})_i + \beta_7 \times \text{CapIntensity}_i + \beta_8 \times \text{InstiOwn}_i + \beta_9 \times \text{GIndex}_i + \beta_{10} \times \text{BoardIndPct}_i + \beta_{11} \times \text{BoardSize}_i + \beta_{12} \times \text{Year}_i + \epsilon_i
\]

(2)

As shown in equation 2, we employ a wide range of firm characteristics that 1) potentially explain managerial incentive horizon and 2) are plausibly correlated with the outcomes that we study, namely insider trading volume and profits, earnings surprises and market reactions, and discretionary accruals. To control for the effect of the level of incentives, we include the incentive ratio from Bergstresser and Philippon (2006) as a control variable. They define the incentive ratio as the delta of the manager’s stock and stock options divided by the sum of that delta, salary, and bonus.

We use the logarithm of market-to-book ratio to control for firm valuation and growth potential. Watts and Zimmerman (1990) argue that large firms face higher political costs and thus have a stronger incentive to use accounting discretion to reduce these costs. Dechow and Dichev (2002) posit that larger firms can estimate accruals more accurately as they have more

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6 Also see Core (2010) for a discussion of Armstrong et al. (2010).
stable operations. We include log of book assets (Compustat item *at*) to control for firm size. We also control for financial leverage (items *dltt / at*). Higher financial leverage increases the volatility of net income and gives the manager a stronger incentive to manage earnings to avoid covenant violations and preserve their credit ratings. On the other hand, higher leverage is a proxy for closer monitoring from debt-holders and could be related to less earnings management. Firm performance potentially affects the incentive level and structure, we control for firm performance with the return-on-assets ratio (items *ni / at*). Firms with more volatile business have a greater incentive to manage earnings to reduce their apparent risk level (Dechow and Dichev, 2002). Thus, we include the standard deviation of cash flows from operations (items *oancf / at*) for the last five years (requiring a minimum of three years of data). Francis et al. (2004) recognize the effects of differences in measurement and recognition of tangible and intangible assets on accrual quality. We control for differences in asset structure through capital intensity, the ratio of net fixed assets to total assets (items *ppent / at*).

Corporate governance mechanisms plausibly affect the incentive structure and managerial behavior, we control for four governance variables: total institutional ownership from Thomson Reuters 13F filings, the Gompers et al. (2003) Governance Index, percentage of independent directors on the board, and board size, all from Risk Metrics. To preserve the sample size, we set missing governance values to zero, and create a dummy for each variable indicating whether the variable value is missing.

Next, using the propensity scores predicted from equation (2), we match firms with short CEO incentive horizons with firms with long CEO incentive horizons. We retain matches with the smallest difference in propensity scores. To establish the validity of the matching process, we test whether characteristics of firms with short incentive horizon are statistically different from
those with long incentive horizon. We then compare various outcomes, for example, insider trading, earnings surprises, and discretionary accruals, for the matched pairs.

Using 1992-2009 ExecuComp data to compute 1992-2006 CEO incentive horizons, we are able to estimate the horizon for 11,137 CEOs. After requiring that a CEO needs to remain in office for the future 3 years, we are left with 10,528 observations. We also remove the CEOs with horizon between 1 and 2 years to create greater dispersion in horizon, and 7,257 observations remain. After requiring the availability of the control variables and the outcome variables, we have 5,445 observations for the abnormal return tests and 5,754 observations for the discretionary accruals test.

Table 1 reports the summary statistics. The average CEO incentive horizon is 2.14 years, and the median is 2.42 years. 32.1% of the CEOs in our sample have an incentive horizon of less than one year. All the other variables appear to have reasonable distribution characteristics.

4 Results

4.1 Abnormal stock returns

A key prediction of the theoretical models that motivate our study is that a short-horizon manager is more likely to attempt to inflate the firm’s stock price. To test this prediction, we form calendar-time portfolios based on incentive horizon and examine the portfolio abnormal returns in periods surrounding the point at which the manager has a short incentive horizon. Recall that the incentive horizon is measured at the end of each fiscal year, which we label as months 1 to 12. We compute abnormal returns for the year leading up to the short-horizon year (months -12 to -1), during the short-horizon year (months 1 to 12), and two years after (months 13 to 36).
The results are in Table 2. The left side of Panel A shows that for the high short-sale constraints subsample, short-horizon firms have a significantly positive alpha of 0.621% per month in months -12 to -1, while long-horizon firms have an alpha of -0.442%. The arbitrage portfolio has a large and positive alpha of 1.063% (p-value = 0.001). During months 1 to 12 and 13 to 36, the arbitrage portfolio alpha turns negative and completely offsets the positive alpha in months -12 to -1. Thus, the evidence is consistent with the prediction that short incentive horizon firms exhibit stock price inflation (positive abnormal returns) followed by correction (negative abnormal returns). We see a similar pattern of alphas for the low short-sale constraints subsample, but the magnitude of the alphas is smaller and the statistical significance is lower. The contrast between the high versus low short-sale constraints subsamples provides further confidence in our interpretation that the observed arbitrage portfolio alphas are the result of mispricing.

In Panel B of Table 2 we zero in on the 1 to 12 months alphas. For the high short-sale constraints subsample, we see that the reversals in the short-horizon portfolio alpha and the arbitrage portfolio alpha occur mainly during months 7-12. That is, it seems that the short-horizon CEOs are able to maintain the stock price inflation for awhile, i.e., during months 1 to 6. For the low short-sale constraints subsample, we again see relatively muted reversals in the short-horizon portfolio alpha and the arbitrage portfolio alpha.

In sum, Table 2 presents evidence that in the presence of higher short-sale constraints, firms with short CEO incentive horizon experience stock price inflation leading up to the short-horizon year, the price inflation persists for several months, and then reverses. Do the short-horizon CEOs exploit the temporary stock price inflation? We examine this question next.
4.2 Insider trading volume and profits

Table 3 compares insider trading dollar volume and dollar trading profits between short-horizon CEOs and long-horizon CEOs. We focus our discussion on the high short-sale constraints subsample because short-sale constraints are a key conditioning characteristic in the various theoretical models that underpin our analysis. As shown in Panel A and for the year leading up to the short-horizon year (year t-1), on an unmatched basis, short-horizon CEOs sell more stock than long-horizon CEOs, but the difference disappears when we apply the propensity-score matching procedure. The average treatment effect on the treated (ATT) has a $t$-stat of 1.02. However, during the short-horizon year (year t), short-horizon CEOs sell significantly more stock than long-horizon CEOs: almost $1.6 million versus $0.9 million with a difference of $642,456 (difference test $t$-stat = 6.34). When we apply the propensity score matching procedure as described in Section 3, we still find that short-horizon CEOs sell significantly more stock than do matched long-horizon CEOs—the difference is $462,581 ($t$-stat = 3.97). The lower half of Panel A repeats the test for the low short-sale constraints subsample. Although without the matching procedure short-horizon CEOs still show more sales, the matching procedure shows no statistical significance in sales between short versus long-horizon CEOs.

The results in Panel A provide two important insights. First, during the short-horizon year, short-horizon CEOs sell significantly more stock (in dollars) than do long-horizon CEOs, but only when short-sale constraints are high. This finding is consistent with the earlier finding of stock price inflation for short-horizon firms with high short-sale constraints. Second, because short-horizon CEOs by definition have more shares available to sell than long-horizon CEOs, the greater sales by short-horizon CEOs might be viewed as driven strictly by the very fact that they
have more stock that can be sold. Importantly, however, short-horizon CEOs having more stock available to sell does not necessarily mean that they must sell more stock—indeed, we do not find more sales by short-horizon CEOs for the low short-sale constraints subsample. Therefore, more sales by short-horizon CEOs is not driven by the definition of short-horizon CEOs. A plausible interpretation, consistent with the abnormal return results reported earlier, is that short-horizon CEOs are able to inflate stock price when short-sale constraints bind, and they take advantage of the inflated stock price to sell more stock.

Not only do short-horizon CEOs sell more stock, they also generate greater abnormal profits through their trading. We show this in Panel B of Table 2. In the year leading up to the short-horizon year, short-horizon CEOs do not generate higher trading profits. During the short-horizon year and when short-sale constraints are high, short-horizon CEOs generate a positive abnormal profit of $47,419 without applying the matching procedure. The difference between short versus long-horizon CEOs is $136,913 (t-stat = 5.33). On a matched basis, the difference in abnormal profit is still large at $93,780 and strongly significant (t-stat = 3.23). In contrast, when short-sale constraints are low, there is no difference in abnormal trading profit between short versus long-horizon CEOs. The abnormal trading profits are consistent with the earlier findings for abnormal stock returns and CEO trading dollar volume.

To summarize the findings so far, firms with short-horizon CEOs experience temporary stock price inflation, and CEOs sell more stock and make greater positive abnormal profits; all of these findings are driven by firms with high short-sale constraints and are consistent with the mispricing interpretation.
4.3 SUE and CAR

Given the stock price inflation and reversals of short-horizon firms and the results showing short-horizon CEOs exploit the mispricing, we next attempt to identify more precisely what drives the mispricing. In particular, we focus on differences in firms’ reported earnings and on abnormal returns surrounding the earnings announcements. Table 4 reports the SUE and CAR tests. We first focus on the results for year t-1, the year leading up to the year when we measure CEO incentive horizon, which is also the year that we find stock price inflation for firms with high short-sale constraints and short-horizon CEOs (as reported in Table 2). To ensure that the surprises and investor responses are truly from the horizon effect and not from the inherent business volatility or information asymmetry, we impose three more matching variables in addition to those discussed in equation 2: analyst forecast dispersion scaled by the median forecast, number of analysts, and standard deviation of sales.

In Panel A of Table 4, we observe that in year t-1 and for firms with high short-sale constraints, those with short-horizon CEOs report significantly higher SUEs than those with long-horizon CEOs. In the propensity score-matched sample, the short-horizon firms report SUEs of 0.29, which is significantly greater than the figure of 0.11 for long-horizon firms (t-stat = 2.41). In contrast, there is no significant difference in SUEs between matched short and long-horizon CEOs when short-sale constraints are low. The contrast mitigates the concern that firms with short-horizon CEOs are merely better performing firms, and that short horizon is merely the result of better performance. The correlation coefficient between SUE and short-sale constraints is negative 0.077, which demonstrates that sorting on short-sale constraints is not effectively sorting on performance.
In Panel B of Table 4, we examine investors’ reaction to SUE by examining the ratio of each earnings announcement abnormal return and its corresponding SUE. In year t-1 and when short-sale constraints are high, the CAR/SUE ratio is significantly greater for firms with short-horizon CEOs (3.79%) than for matched long-horizon firms (2.57%) ($t$-stat = 2.26). Thus, investors react more strongly to earnings surprises by short-horizon firms. In contrast, the difference is insignificant for firms with low short-sale constraints. The findings in Panels A and B are consistent with our interpretation that high short-sale constraints contribute to the stock price inflation. The results indicate that higher SUEs and higher CAR/SUE for short-horizon firms with high short-sale constraints are one contributor to the stock price inflation identified for these firms in Table 2.

Also shown in Table 4, we repeat the SUE and CAR/SUE tests for year t, i.e., the short-horizon year. For that period, we do not find differences in SUE or CAR/SUE across short and long-horizon firms. Thus, the stock price reversals that we show in Table 2 are not driven by significantly lower returns for short-horizon firms surrounding earnings announcements.

4.4 CEO incentive horizon and discretionary accruals

Earnings management through discretionary accruals is well documented in the accounting and finance literature, but the literature has yet to reach a consensus on whether there is a reliable relation between managerial incentives and earnings management (see a thorough review in Armstrong et al. 2010). We next examine whether shorter CEO incentive horizon is related to higher discretionary accruals, which may help explain the stock price inflation and higher SUE for firms with short-horizon CEOs. We again employ a propensity score approach that matches firms with short-horizon CEOs with firms with long-horizon CEOs on many different characteristics. Given our focus on the horizon of CEO incentives, we also match on the
*level* of the equity-based incentives the CEOs face. We essentially ask whether similar firms whose CEOs face the same level of equity-based incentives, but differ on when their CEOs can profit from the incentives, differ in their likelihood of employing income-increasing discretionary accruals. We examine both the likelihood of employing income-increasing discretionary accruals and the magnitudes of the discretionary accruals.

As shown in Table 5, firms with short-horizon CEOs are no more likely to exhibit income-increasing discretionary accruals in the year leading up to the short-horizon year. The insignificance is particularly striking because that is the time period over which we find that short-horizon firms exhibit significantly positive abnormal returns, and greater SUEs and CAR/SUE ratios than matched long-horizon firms. The results imply that short-horizon firms are able to earn significantly positive abnormal returns, driven in part by greater SUEs and CAR/SUEs, without resorting to standard, and arguably easily detectable, discretionary accrual-based earnings management strategies.

Moving to the short-horizon year, we find that short-horizon firms are significantly more likely to exhibit income-increasing discretionary accruals than are matched long-horizon firms. As shown in Table 5, in the high short-sale constraint subsample, 52.9% of short-horizon firms employ income-increasing discretionary accruals which is significantly greater than the 44.6% of long-horizon firms (t-stat = 3.91). We also find that short-horizon firms have a significantly greater magnitude of abnormal discretionary accruals than do matched long-horizon firms (0.10 vs. -1.20, t-stat = 2.93). There are no significant differences across short and long-horizon firms within the low short-sale constraint subsample.
Combining the earning management results with the return results in Table 2 and the SUE and SUE/CAR results in Table 4, we can infer that even though short-horizon firms employ earnings management strategies more aggressively during the short-horizon year than do their matched long-horizon counterparts, they do not provide greater earnings surprises nor do they earn greater announcement period returns or longer-term returns over the short-horizon year. Thus, the more aggressive earnings management actions of short-horizon firms during the short-horizon year have the effect of sustaining already-inflated share prices for the first six months of the year (i.e., zero abnormal returns over those six months), after which correction sets in and the firms exhibit negative abnormal returns. In the year prior to the short-horizon year when short-horizon firms do earn positive abnormal returns, they do not appear to employ accrual-based earnings management strategies. Rather, they seem to employ other subtle and less detectable strategies to provide more positive earnings surprises and induce stronger investor responses to the surprises.

Armstrong et al. (2010) apply the propensity-score matching method and find no significant relation between managerial equity incentive level and accounting irregularities. Their finding challenges earlier studies that do show a positive relation between managerial incentive level and earnings manipulation. Applying the same propensity-score matching technique as in Armstrong et al. except also matching on the level of equity incentives, we find that the horizon of incentives is related to earnings management behavior. Gopalan, et al. (2013) find similar results using a basic regression approach. Our results suggest that future studies may gain additional insights by treating the horizon of equity incentives as an important dimension of managerial incentives.

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7 Note that our results are not necessarily inconsistent with the accrual anomaly (Sloan, 1996) because no study on the accrual anomaly has considered the effect of managerial incentive horizon.
4.5 Matched Pair Sensitivity Tests

When conducting an analysis of matched treatment-control pairs based on observational data, one wants the pairs to be identical except for the presence or absence of the treatment. The possibility that an unobservable characteristic alters the likelihood that an observation is a treatment or control (from a 50%/50% likelihood equivalent to random assignment) and also affects the outcome raises the concern about how this “hidden bias” affects inferences. Rosenbaum (2002) develops a sensitivity analysis to assess how large any deviation from random assignment could be before one’s conclusion about a statistically significant treatment-control difference would be altered. For example, a sensitivity analysis might conclude that a non-zero treatment effect exists even if an unobservable characteristic makes it 50% more likely that an observation is in the treatment group instead of the control group, which would imply a 60%/40% odds ratio of being a treatment vs. control. In this case, the parameter $\Gamma$ that indicates the departure from random assignment would be $1.5 (=60%/40\%)$ vs. a $\Gamma$ of $1.0 (=50%/50\%)$ for random assignment. However, if an unobservable characteristic makes it 60% more likely for an observation to be the treatment group instead of the control group ($\Gamma = 1.6$), the sensitivity analysis might indicate that one could no longer be confident in rejecting the null hypothesis of no treatment effect.

Similar to other statistical analyses, one can consider the power of a sensitivity analysis. The power of a sensitivity analysis is the probability that it rejects a false null hypothesis of no treatment effect allowing for a specified level of non-random assignment to the treatment and control groups. A low power sensitivity analysis has a low probability of rejecting a false null while a higher power sensitivity analysis has a greater likelihood of rejecting a false null for the same level of hidden bias.
In an extension of his 2002 work, Rosenbaum (2011) explores the power of various sensitivity analyses, and concludes that in many situations the Wilcoxon-based sensitivity analysis from his 2002 work has relatively low power compared to an alternative class of sensitivity analyses based on \( u \)-statistics. Briefly, the new tests are based on triples \((m, \underline{m}, \overline{m})\), where \(m\) defines the number of treatment minus control differences in outcomes that are sorted in increasing order based on absolute magnitude. One then counts the number of positive differences among the pairs numbered from \(m\) up to \(\overline{m}\) in the sorted set. By choosing the appropriate triple, one can place less weight on small-magnitude paired differences to increase power, while also controlling the influence of very large magnitude paired differences. We refer the reader to Rosenbaum (2011) for the derivation of the test statistics and other details because there is not a compact way to describe them here.

For our purposes, we note that Rosenbaum (2011) conducts simulation analyses of many different \((m, \underline{m}, \overline{m})\) triples to assess their power under various assumptions. Based on those analyses, Rosenbaum concludes that \((m, \underline{m}, \overline{m}) = (8,5,8)\) or \((8,6,8)\) are “safe choices.” He notes that for short-tailed distributions of matched pair differences like the Normal or the logistic, \((8,7,8)\) is a better choice, whereas with long-tailed distributions of matched pair differences, \((8,6,7)\) is a better choice.

In Table 6, we summarize the resulting \(\Gamma\)’s for the matched pair difference tests that are significant in our earlier analyses. To give readers examples of how the \(\Gamma\)’s can change for different triples, we tabulate the \(\Gamma\)’s for five different triples, the four discussed in the previous paragraph and \((2,2,2)\), which is equivalent to the Wilcoxon-based test from Rosenbaum (2002). The most striking case is the test of whether short-horizon firms are more likely than matched long-horizon firms to employ incoming-increasing discretionary accruals. The \(\Gamma\) of 4.94 for the
(8,5,8) triple indicates that an unobservable characteristic would have to make it 4.94 times more likely that a firm is a treatment (short-horizon firm) than a control (long-horizon firm) before we would fail to reject the null hypothesis of no treatment effect based on concerns about hidden bias. For the (8,6,8) triple, the \( \Gamma \) rises to 8.8 and to 17.5 for the (8,7,8) triple. The results of the sensitivity analyses are somewhat unsurprising given the economically large magnitude of the difference (recall from Table 5 that short-horizon firms have a 52.9% likelihood of employing income-increasing discretionary accruals vs. a 44.7% likelihood for long-horizon firms). Thus, the conclusion that short-horizon firms are more likely to employ income-increasing discretionary accruals is quite robust.

Table 6 also shows that the \( \Gamma \) for the corresponding Wilcoxon-based sensitivity test (the (2,2,2) triple) from Rosenbaum (2002) for the difference in the likelihood of employing income increasing discretionary accruals. The \( \Gamma \) is 2.82, which means one would infer that the rejection of the null of no treatment effect would be in doubt if hidden bias made it 2.8 times more likely for an observation to be in the treatment vs. the control group. The higher power test discussed in the previous paragraph, however, concludes that the nonrandom assignment would have to make it 17.5 times as likely to be a treatment observation before we would alter the inference. This example is a good illustration of the power differences between the two types of Rosenbaum sensitivity tests.

As shown in Table 6, the \( \Gamma \)s for the other difference tests are much lower than the one for the likelihood of employing income increasing discretionary accruals. Whether one is willing to alter the conclusions about the statistical significance for the tests depends upon his or her subjective assessments of how large the effects of unobservable characteristics might be on both the likelihood of assignment to the treatment group and the magnitude of the outcome for
treatment and control observations. For example, the $\Gamma$ for the continuous measure of discretionary accruals is 1.15 for the (8,7,8) triple and 1.23 for the (2,2,2) triple. Importantly, the relatively lower values of $\Gamma$ do not necessarily indicate that there is no true positive effect of short horizon on the continuous accrual measure. In an ideal world, one would know how an unobservable characteristic alters the likelihood that an observation is assigned to the treatment group and how that characteristic affects the outcome being tested. If an unobservable characteristic affects the likelihood of assignment to the treatment group, but it does not affect the outcome, then the original inference remains. Unfortunately, there is no way to measure how much an unobservable characteristic might affect the outcome variable.

5 Conclusion

We find that firms with short-horizon CEO incentives exhibit stock price inflation followed by reversal. We also find evidence that short-horizon CEOs exploit the price inflation by selling relatively more stock and making greater abnormal profits than matched long-horizon CEOs do. Firms with short-horizon CEO incentives provide greater earnings surprises and experience more positive investor reaction to the surprises during the period over which we observe stock price inflation. Short-horizon firms are significantly more likely to employ income-increasing discretionary accruals than are matched long-horizon firms, presumably to sustain the inflated price. The findings are consistent with recent theoretical models in which short-horizon incentives create incentives for CEOs to attempt to inflate stock prices, suggest that they have some success in doing so and that they profit from it. The finding also sheds new light on the role that earnings management plays in sustaining already-inflated stock prices.
Broadly, our findings highlight the importance of CEO incentive horizons in studying the effects of CEO incentive compensation.
References


