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The impact of NASD Rule 2711 and NYSE Rule 472 on analyst behavior: The strategic timing of recommendations issued on weekends

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Abstract: Amendments to NASD Rule 2711 and NYSE Rule 472, enacted in May 2002, mandate that sell-side analysts disclose the distribution of their security recommendations by category of buy, hold, and sell. This regulation enhances the transparency of analysts' information and mitigates the long-recognized optimistic bias in their recommendations. However, we find that analysts are more likely to issue sell recommendations or downgrade revisions on weekends when investors have limited attention after these rule changes. This pattern is more pronounced for prestigious analysts, who are more likely to influence stock prices. Market reaction tests reveal an incomplete immediate response and a greater drift to unfavorable recommendations issued on weekends. Finally, analysts who are more likely to release unfavorable recommendations on weekends exhibit higher future forecast accuracy. Our findings suggest that, while these regulatory changes effectively reduce analysts' optimistic bias, they are also associated with an increased prevalence of a different form of distortion in the capital market.

Keywords: *analyst recommendations; limited attention; market inefficiency; weekend; NASD Rule 2711; NYSE Rule 472*

JEL classifications: G14; G18; G24

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1. INTRODUCTION

Serving as information intermediaries, financial analysts collect, process, and generate information that holds significant value to investors' decision making. However, their vital importance appears jeopardized by their distorted incentives to please management in order to gain enhanced access to management-provided information. Among the various types of information, private managerial information is one of the most important in providing analysts with an informational advantage over their peers (Schipper, 1991; Francis and Philbrick, 1993; Chen and Matsumoto, 2006; and Ke and Yu, 2006). Although Regulation Fair Disclosure (Reg FD) intends to level the playing field for capital market participants by constraining managers from disclosing material information to selected analysts, Mayew (2008) shows that maintaining access to management remains important for analysts after the passage of Reg FD.

The incentive to please management manifests itself in various forms. For example, Francis and Phibrick (1993) show that analysts tend to report optimistic forecasts in an effort to cultivate relationships with management. Chen and Matsumoto (2006) subsequently demonstrate that analysts who issue favorable recommendations gain enhanced access to management and exhibit higher future forecast accuracy than do analysts who issue unfavorable recommendations. Similarly, Ke and Yu (2006) show that to please firm management, analysts issue initial optimistic earnings forecasts followed by pessimistic earnings forecasts. Therefore, analysts' incentive to please the management appears to create biases in their output. These biases have been shown to exist in non-U.S. countries as well, and to vary with institutional quality (Basu et al., 1998; Hope, 2003; Barniv et al., 2010; Bradshaw et al., 2014; and Qi et al., 2014).

However, two regulatory reforms enacted in 2002 mandate analysts to improve the

transparency of their research and, in the process, implicitly force analysts to increase their issuances of unfavorable recommendations. In May 2002, the self-regulatory organizations NASD and NYSE in the U.S. issued amendments to NASD Rule 2711 and NYSE Rule 472, respectively, on sell-side research. The amendments require brokerage firms to disclose, in each research report, the percentage of securities rated "buy," "hold/neutral," or "sell" by their employed analysts. This regulation aims to enhance the transparency of analysts' output and to provide the capital market with more valuable and reliable information (Securities and Exchange Commission, 2002).[1] Predictably, since the passage of the regulation, optimistic recommendations have become less frequent, whereas pessimistic recommendations have become more common (Barber et al., 2006; and Kadan et al., 2009). At first glance, enhanced transparency by analysts appears to have reduced the bias in their recommendations. It therefore becomes interesting and important to examine how analysts can release more unfavorable recommendations without displeasing the management. In this study, we propose and examine the following question: *Do analysts strategically time the release of their unfavorable recommendations on days when investors' attention is low?*

Constrained by limited attention, investors are likely to neglect value-relevant information, particularly when they face more distractions on weekends (DellaVigna and Pollet, 2009). Issuing unfavorable recommendations on weekends can spur a less dramatic market response, while also allowing the analysts to report a reasonable percentage of positive recommendations in the post-regulation period. By doing so, analysts preserve their relationship with management while also complying with the new regulations.

We first obtain a dataset from I/B/E/S consisting of analyst recommendations during the period 1993 - 2011, around the enactment of the amended NASD Rule 2711 and NYSE Rule 472.

[1] Throughout the paper, the term "regulation" refers to the amended NASD Rule 2711 and NYSE Rule 472.

We begin our analyses by computing the distributions of recommendations issued on weekends both before and after the regulation's enactment. We find that the percentage of recommendations issued on weekends increases significantly after 2002. While less than 0.46% of recommendations are issued on weekends before 2002, that percentage rises to 3.63% after 2002. More importantly, the increase is mostly attributable to the surging proportion of sell recommendations issued on weekends. Specifically, of all weekend recommendations prior to 2002, 65.6% are buy recommendations and almost none are sell recommendations.[2] However, after 2002, 38.9% of weekend recommendations are buy recommendations while 15.9% are sell recommendations. The increase in the proportion of sell recommendations on weekends, compared with the decrease in the proportion of buy recommendations on weekends, indicates that analysts increasingly time the release of their recommendations following these regulatory changes.

Our main empirical analyses attempt to identify a causal impact of the regulation on the probability of analysts issuing unfavorable recommendations on weekends. To seek identification, and to preclude potential contamination from concurrent events, we choose to investigate the three years prior to (1999 to 2001), and the three years after (2003 to 2005), the regulation's enactment. Employing a difference-in-differences regression design, we find that analysts are more likely to issue recommendations on weekends after the enactment of the amended NASD Rule 2711 and NYSE Rule 472. More importantly, the change appears more pronounced for sell recommendations. Subsequently, we investigate analyst-level characteristics that can affect the increase in the propensity of analysts to issue recommendations on weekends. We find that the increase is more pronounced for star analysts, experienced analysts, and analysts employed by large brokerage houses. These findings support the contention that prestigious analysts create a

[2] The remaining proportion consists of '*Hold*' recommendations.

greater market impact and are more likely to enter into interplay with management (Stickel, 1992; Jacob et al., 1999; and Ke and Yu, 2006).[3] We find qualitatively similar results when we investigate recommendation *revisions* that are more likely to bring new information to the market and induce share price responses.

To examine the validity of our maintained assumption that investors are less responsive to unfavorable recommendation revisions issued on weekends, we conduct an event study to compare the cumulative abnormal returns (CARs) around unfavorable recommendation revisions, (i.e., downgrades) issued on weekdays and those issued on weekends.[4] We find that the three-day CARs over the [-1, 1] window around a weekday downgrade are, on average, 2.3% smaller than those around a weekend downgrade, a difference that is statistically significant and economically impactful.[5] Furthermore, CARs over a longer window [2, 22] show a significantly larger drift after weekend downgrades, suggesting that investors subsequently correct for their initial under-reactions to weekend downgrades. Aggregated stock returns during the entire event window exhibit no significant differences for weekend and weekday downgrades. Therefore, analysts' strategic timing of unfavorable recommendations appears to delay market responses.

Finally, we determine whether managers reward analysts' strategic timing of unfavorable recommendations, under the assumption that enhanced access to management-provided information results in more accurate forecasts (Chen and Matsumoto, 2006; and Mayew, 2008). Consistent with the notion that analysts curry favor with management to gain better access to management-provided information (Chen and Matsumoto, 2006; and Ke and Yu, 2006), we find

[3] In other words, less influential analysts are unable to generate a market response by issuing recommendations, regardless of whether the issuance occurs on weekdays or weekends. Therefore, they are less likely to engage in strategic timing with management.

[4] Recommendation revisions are more likely to bring news to investors and spur share price responses. Hence, market reaction tests should be based on recommendation revisions (Boni and Womack, 2006; Jegadeesh and Kim, 2010).

[5] There is also evidence of a weaker response to favorable recommendation revisions issued on weekends. However, the difference is less pronounced than that of unfavorable recommendations.

that analysts who issue unfavorable recommendations on weekends exhibit higher future forecast accuracy compared to those who issue unfavorable recommendations on weekdays.

In addition to the current study, a concurrent paper by Rees et al. (2014) shows that analysts strategically time the release of their revisions on weekends to maintain relations with management. Focusing on a sample period after 2002, the authors observe that downgrades appear more often on weekends. Similar to our findings, their results document a smaller immediate response to unfavorable recommendations issued on weekends over a short window. However, the current study differs significantly from that of Rees et al. (2014) in several aspects. First, Rees et al (2014) focus on the short-window market response and do not examine the longer term drift. Second, while Rees et al (2014) implicitly assume that analysts strategically time the release of their revisions to please the management, we attempt to test this assumption and show evidence suggesting that analysts engaging in this strategic timing maintain higher future forecast accuracy. Third, our research questions differ from those in Rees et al (2014) who limit the sample period to years after 2002 and study why analysts issue recommendations on weekends. We include analysts' recommendations both before and after the enactment of the amended NASD Rule 2711 and NYSE Rule 472, and explicitly test whether analysts' tendency to issue unfavorable recommendations on weekends increases after the regulatory changes.

Our study makes the following contributions. First, our findings reveal a new form of interplay between analysts and managers after the enactment of the amended NASD Rule 2711 and NYSE Rule 472. By strategically timing the market and releasing unfavorable recommendations on weekends, analysts comply with the new rules in a manner that minimizes damage to their relationship with firm management. This result addresses the long-standing concern that managers, when disclosing information, favor analysts who hold more favorable

views towards the firm (Chen and Matsumoto, 2006; Ke and Yu, 2006). Despite the regulation enacted to eliminate selective disclosures, our analyses suggest a twist in analysts' behaviors leading to a different form of bias.

Second, our findings support the theory of investors' limited attention (Hirshleifer and Teoh, 2003). As investors are likely to pay more attention to entertainment and family life during weekends, they devote less attention to capital market news. Therefore, recommendation revisions released on weekends are likely to induce a less immediate response and a greater drift, as documented in our study. Our results, in combination with other research (e.g., Peress, 2008; and DellaVigna and Pollet, 2009), outline the role of investors' limited attention in explaining asset pricing anomalies such as under-reactions.

Finally, our results provide regulatory implications. Our study highlights the adverse consequence of analysts' distorted incentive to please the management. This incentive appears to create optimistic biases in analysts' output and prevents efficient information dissemination in the capital market. We suggest that regulators should enforce reforms that effectively constrain the interplay between analysts and the management. Further, evidence is accumulating that analysts' optimistic bias becomes more pronounced in countries with less investor protection, weaker institutional quality, weaker enforcement of disclosure standards and more individual investor participation in the capital market (Hope, 2003; Barniv et al., 2010; Bradshaw et al., 2014; and Qi et al., 2014). Therefore, our suggested regulatory actions can have more profound implications in these countries because the adverse consequence of analysts' distorted incentive is likely to be amplified.

The remainder of the current paper proceeds as follows. Section 2 describes the institutional background of the amendments to NASD Rule 2711 and NYSE Rule 472 and develops our

hypotheses. Section 3 discusses data and preliminary statistics. Section 4 presents our main empirical findings, and Section 5 concludes.

2. INSTITUTIONAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

2.1 Amendments to NASD Rule 2711 and NYSE Rule 472

In February 2002, the National Association of Securities Dealers (NASD) and the New York Stock Exchange (NYSE) proposed amendments to NASD Rule 2711 and NYSE Rule 472, respectively. The two amended rules, approved and enacted in May, 2002, address the conflict of interest to which sell-side analysts are subject when they issue opinions (e.g., forecasts and recommendations) regarding equity securities.[6]

Of particular importance to our study is the requirement that financial analysts enhance the transparency of the information that they produce and disseminate to the public.[7] Specifically, the amended NASD Rule 2711 mandates the following disclosures by analysts (Securities and Exchange Commission, 2002):

> (A) Regardless of the rating system that a member employs, the member must disclose in each research report the percentage of all securities rated by the member to which the member would assign a "buy," "hold/neutral," or "sell" rating.
>
> (B) In each research report, the member must disclose the percentage of subject companies within each of these categories for whom the member has provided investment banking services within the previous 12 months.
>
> (C) The information that is disclosed under paragraphs (h)(5)(A) and (h)(5)(B) must be current as of the end of the most recent calendar quarter (or the second most recent calendar quarter if the publication date is less than 15 calendar days after the most recent calendar quarter).

[6] Most of the amendments to NASD Rule 2711 and NYSE Rule 472 were effective retroactively on April 5, 2002.
[7] The amendments to these two rules also revise provisions to prohibit analysts' trading of equity securities and alter the affiliation of a brokerage house's research and investment banking departments, among other issues. We focus on the mandate regarding the disclosure of the percentage of recommendations in different groups because we interpret this revision as most relevant to the change in the percentage of unfavorable recommendations. We acknowledge that other provisions may also affect analysts' incentives to issue unfavorable recommendations and release them on weekends.

Similar requirements appear in the amendments to NYSE Rule 472. We argue that, by enhancing the transparency of analysts' information released to the capital market, these requirements can deter analysts from issuing predominantly favorable (and likely biased) recommendations, which ultimately lower their credibility. As expected, the percentage of unfavorable recommendations has increased since the passage of these two amended rules (Barber et al., 2006; and Kadan et al., 2009). These regulations motivate us to ask the following question: *If analysts are (implicitly) forced to issue more unfavorable recommendations after the enactment of the amended NASD Rule 2711 and NYSE Rule 472, how can they do so without displeasing management?*

2.2 Hypotheses development

After the enactment of the two amended rules, the proportion of analysts' unfavorable recommendations becomes public information. Consequently, analysts are less likely to issue optimistically biased recommendations after these rule changes. However, unfavorable recommendations will cause a negative share price response, which may damage an analyst's relationship with management. We assert that, since the enactment of these new rules, analysts are more likely to strategically time their recommendations and release unfavorable recommendations on weekends when they expect investors' level of attention to be lower (DellaVigna and Pollet, 2009).

Investors have limited cognitive capacity. Bombarded with a wealth of information, investors must choose which set of information to obtain and utilize, because processing one task draws cognitive resources from another (Hirshleifer and Teoh, 2003; Peress, 2008; and Hirshleifer et al., 2011). Managers with rational expectations can exploit investors' limited attention to avoid sharp price drops during a short time period. Prior literature shows that managers tend to release

unfavorable news, such as earnings decline and dividend cuts, on days when investors' attention is low (Penman, 1987; Bagnoli et al., 2005). Following this line of arguments, we hypothesize that in the face of implicit pressure to increase (reduce) their tendency to issue unfavorable (favorable) recommendations after the passage of the amendments to NASD Rule 2711 and NYSE Rule 472, analysts release more unfavorable recommendations on weekends, when investors' attention is low.

Notably, the enactment of Regulation Fair Disclosure (Reg FD) aims to level the playing field and prohibit managers from selectively disclosing material private information to certain analysts.[8] However, Mayew (2008) finds that managers continue to differentiate analysts by selectively answering questions raised by analysts with favorable opinions toward the firm during conference calls in the years following the enactment of Reg FD. Furthermore, other studies provide consistent evidence verifying this conclusion (Kelly, 2003; Solomon and Frank, 2003; and Chen and Matsumoto, 2006). Therefore, the lack of a completely level playing field allows managers and analysts to engage in the strategic timing interplay. We formulate our first hypothesis below.

Hypothesis 1: *After the passage of the amendments to NASD Rule 2711 and NYSE Rule 472, analysts are more likely to issue unfavorable recommendations on weekends.*

Furthermore, the propensity of analysts to issue recommendations on weekends can vary with analyst attributes. Specifically, we investigate whether the increase in the frequency of weekend recommendations is associated with analyst prestige, proxied by the following analyst characteristics: analyst experience, star status, and the size of the brokerage house employing the analyst. Prior literature indicates that star analysts and experienced analysts care more about their reputation (Graham, 1999), and hence, have a greater incentive to maintain a good relationship

[8] The passage of the amended NASD Rule 2711 and NYSE Rule 472 occurred after the enactment of Regulation Fair Disclosure.

with management, who can grant them enhanced access to private information. Moreover, analysts from large brokerage houses are more likely to depend on private communications with management to form their forecasts and recommendations (Brown et al., 2015). Managers are inclined to cooperate with analysts who can exert a significant impact on investors and therefore influence stock prices. Prior studies demonstrate that prestigious analysts maintain more influence on investors' decisions (Stickel, 1992; Mikhail et al, 1997; and Jacob et al, 1999). Summarizing the arguments, we state the following hypothesis.

Hypothesis 2: *The increased tendency of analysts to issue recommendations on weekends after the enactment of the amended NASD Rule 2711 and NYSE Rule 472 is more pronounced for prestigious analysts.*

Our previous hypotheses are predicated on the assumption that, as investors pay less attention to information disseminated on weekends, unfavorable recommendations released during these days will induce a less dramatic response. This contention is consistent with findings in prior literature. In particular, DellaVigna and Pollet (2009) observe a less immediate (dramatic) response and a greater drift to earnings announcements made on Fridays, when investors are presumably distracted by the coming weekend. Similarly, Peress (2008) finds that earnings announcements accompanied by a relevant media article in the *Wall Street Journal* generate more immediate responses and fewer subsequent drifts.

In our context, investors' limited attention can lead to an incomplete immediate response to unfavorable recommendation revisions released on weekends. Specifically, abnormal stock returns surrounding these recommendation revisions are often of a smaller magnitude in a short window than returns to revisions issued on weekdays. However, as investors revisit their decisions subsequently, they create adjustments and eventually incorporate the information contained in the weekend recommendations into stock prices (DellaVigna and Pollet, 2009),

implying that weekend recommendations will cause a less immediate response and a greater subsequent drift. Our third hypothesis is formulated below.

Hypothesis 3: *Unfavorable recommendation revisions issued on weekends generate a less immediate response and a greater drift than do those issued on weekdays.*

To further investigate whether analysts release unfavorable recommendations on weekends to avoid a sharp price drop and to please management, we examine whether managers reward those analysts by granting them enhanced access to information. Consistent with Chen and Matsumoto (2006) and Mayew (2008), we rely on the premise that an increase in management-provided information will result in an improvement in analysts' future forecast accuracy. We state our fourth hypothesis below.

Hypothesis 4: *Analysts who issue unfavorable recommendations on weekends exhibit higher future forecast accuracy, compared with analysts who issue unfavorable recommendations on weekdays.*

3. DATA AND STATISTICS

We obtain data on analysts' recommendations and forecasts from the I/B/E/S database for the sample period covering 1993 to 2011. Since the amendments to NASD Rule 2711 and NYSE Rule 472 were adopted in 2002, we have a balanced number of years before and after the enactment of the two amended rules. As our analyses require information on analysts' identities, we exclude recommendations issued by anonymous analysts. Further, to preclude contamination from concurrent events, we delete recommendations released within 3 days around earnings announcements.[9]

We first investigate the frequencies of recommendations issued on weekdays and those issued on weekends before and after the rule changes. As shown in Table 1, in the pre-reform

[9] Our empirical results are qualitatively similar if we keep these observations.

period (1993-2001), there are only 0.46% of recommendations made on weekends, and in the post-reform period (2003-2011), there are 3.63% of recommendations made on weekends. Such a difference is statistically significant at 1% level and is also economically sizable. Analyzing the composition of weekend recommendations, we find that the proportion of unfavorable recommendations increases significantly after the regulation, compared with that of favorable recommendations. Specifically, prior to 2002, 65.6% of weekend recommendations are buy recommendations and almost none are sell recommendations. However, after 2002, 38.9% of weekend recommendations are buy recommendations, and 15.9% are sell recommendations. Combined, there is a 42.6% increase (= (15.9%-0)-(38.9%-65.6%)) in the percentage of sell recommendations, compared with the change in the percentage of buy recommendations.

Our analyses above rely on an extended sample period (1993 to 2011) when examining the yearly distributions of analyst recommendations on weekends. Such an empirical choice enables us to verify whether any observed trend in analysts' activities is episodic. However, including years distant from the regulation increases the likelihood that our analyses will be tainted by other events. Therefore, to identify a causal impact of the regulation (NASD Rule 2711 and NYSE Rule 472) on the propensity of analysts issuing recommendations on weekends, we choose three years prior to the regulation (1999 to 2001) and three years after the regulation (2003 to 2005) to conduct our difference-in-differences regression analyses.

Before proceeding to the multivariate regression analyses, we perform a univariate *t*-test on the inter-temporal change in analysts' tendency to issue recommendations on weekends after the enactment of the amended NASD Rule 2711 and NYSE Rule 472. In both periods, we aggregate the incidence of weekend recommendations to either the analyst level (Table 2, Panel A) or the firm level (Table 2, Panel B), we then compare the aggregated ratios. In Table 2, Panel A, results

suggest that the percentage of analysts issuing weekend recommendations increases by 0.025 (t = 6.418) after the enactment of the regulation. In Table 2, Panel B, we find that the percentage of firms with weekend recommendations increases by 0.019 (t = 16.310) after the regulation. Collectively, the preliminary statistics are consistent with the notion that the amendments to NASD Rule 2711 and NYSE Rule 472 give analysts an incentive to issue recommendations on weekends, especially unfavorable recommendations.

[Table 1 and Table 2]

4. EMPIRICAL ANALYSES

Employing multivariate regression analyses, we begin by investigating cross-sectional determinants of the increase in the proportion of weekend recommendations after the passage of amended NASD Rule 2711 and NYSE Rule 472. Our main hypothesis posits that, after the regulation, analysts are more likely to issue unfavorable recommendations on weekends when investors' attention is low. Further, we take the perspective that such a twist in the interplay between analysts and managers can be shaped by both parties' incentives.

As discussed in the development of our hypotheses, the increase in weekend recommendations is more likely to occur for prestigious analysts who can exert a significant impact over investors (Chen and Matsumoto, 2006; and Ke and Yu, 2006). Our proxies for analyst prestige includes: *GenExperience*, *Star*, and *Brokersize*. We define *GenExperience*, our measure of analyst experience, as the number of years an analyst has appeared in the I/B/E/S database. *Star* is an indicator coded one if an analyst is selected as a star analyst and zero otherwise. *Brokersize* measures the size of the brokerage house employing an analyst, defined as the number of analysts employed by the brokerage house. Analysts from large brokerage houses are perceived to be more capable of affecting stock prices. We also control for the task

complexity of an analyst by including the number of firms the analyst follows in each year (*Companies*).

Further, we control for firm-level characteristics that can influence the incentives of managers and analysts to engage in strategic timing of unfavorable recommendations. Our firm-level control variables include institutional ownership (*IO*), measured as the percentage of shares held by institutional owners at the fiscal year end. Since institutional investors can '*vote with their feet*' if they are dissatisfied with management (Parrino et al., 2003), managers might prefer unfavorable news to be released on weekends when the level of institutional ownership is high; firm size (*SIZE*), measured as the natural logarithm of the total assets of a firm at the fiscal year end. Managers of large firms are more concerned about share price drops because of the high level of attention drawn from the capital market. We also control for following variables to address potential omitted variable bias: market-to-book ratio (*MTB*), leverage (*LEV*), and R&D intensity (*R&D*). Firms with a higher market-to-book ratio, greater leverage, and more R&D intensity are likely to exhibit greater uncertainty, providing managers with a stronger informational advantage and a superior ability to collude with analysts (Aboody and Lev, 2000). *MTB* is defined as the ratio between a firm's market capitalization and its book value of equity at the fiscal year end. *Leverage* refers to total liabilities divided by total assets. *R&D* is a firm's research and development expense, deflated by its total assets at the fiscal year end. We estimate the following logistic regression (subscripts omitted for brevity):

$$\begin{aligned} &\textit{Probability}\,(\textit{Weekend\_Rec}=1) \\ &\quad = \beta_0 + \beta_1 \textit{Regulation} + \beta_2 \textit{Bad} + \beta_3 \textit{Regulation*Bad} + \beta_4 \textit{Regulation*GenExperience} \\ &\quad + \beta_5 \textit{Regulation*Brokersize} + \beta_6 \textit{Regulation*Star} + \beta_7 \textit{Regulation*Companies} \\ &\quad + \beta_8 \textit{GenExperience} + \beta_9 \textit{Brokersize} + \beta_{10} \textit{Star} + \beta_{11} \textit{Companies} \\ &\quad + \beta_{12} \textit{Size} + \beta_{13} \textit{IO} + \beta_{14} \textit{R\&D} + \beta_{15} \textit{Leverage} + \beta_{16} \textit{MTB} + \text{Industry Effects} + \varepsilon, \end{aligned} \tag{1}$$

where the dependent variable *Weekend_Rec*, is an indicator coded one if a recommendation is

issued on weekends and zero otherwise. *Bad* is an indicator coded one if a recommendation is a sell or strong sell recommendation and zero otherwise. *Regulation* is an indicator coded one if a recommendation is issued after 2002 and zero otherwise. The interaction term *Regulation*Bad* facilitates a difference-in-differences interpretation. Specifically, we are comparing the change in the frequency of unfavorable *weekend* recommendations to the change in the frequency of unfavorable *weekday* recommendations, around the enactment of the two amended rules. To mitigate concerns over high correlations between interaction terms and the separate variables, we employ a standard demeaning approach. We also include industry fixed effects.[10]

4.1 Does the propensity of analysts to issue negative recommendations on weekends increase after the enactment of amended NASD Rule 2711 and NYSE Rule 472?

We take a stepwise approach to study the impact of the regulation on the tendency of analysts to issue recommendations on weekends and present our estimation results in Table 3. In Model 1, our baseline regression model, we introduce *Regulation*, *Bad*, and other related controls as the independent variables. In Model 2, we add the interaction between *Regulation* and *Bad* to capture the incremental effect of the change in unfavorable recommendations issued on weekends. Thereafter, in Model 3, we further include the interactions between *Regulation* and various analyst characteristics to examine our Hypothesis 2.

We find that the coefficient on *Regulation* is positive and significant in Model 1 (1.886, t = 16.728), suggesting that, after the regulation, analysts are more likely to issue recommendations on weekends. More importantly, we find a reliably positive and significant coefficient on the interaction term *Regulation*Bad* (1.036, t = 2.274 in Model 2), indicating that the increase in the probability of weekend recommendations is more pronounced for unfavorable recommendations,

[10] For a robustness check, we compute t-statistics based on standard errors clustered by analyst. Qualitatively our results are unchange.

supporting Hypothesis 1.

We then analyze whether the change in the frequency of weekend recommendations varies with analysts' incentives. We draw inferences based on the estimated coefficients on interactions between *Regulation* and various analyst-level attributes, including *GenExperience*, *Brokersize* and *Star*. We find that the increased tendency to issue recommendations on weekends after the regulation is more pronounced for analysts with more experience, those employed by large brokerage houses, and star analysts. In Model 3, the coefficient on *Regulation*GenExperience* is positive and significant (0.151, t = 6.827). Further, the coefficient on *Regulation*Brokersize* (0.006, t = 9.059) and that on *Regulation*Star* (2.063, t = 8.521) are both positive and significant. In brief, empirical evidence supports Hypothesis 2 in that, after the enactment of amended NASD Rule 2711 and NYSE Rule 472, prestigious analysts are more likely to increase the frequency of recommendations issued on weekends.

Notably, both preliminary statistics in Section 3 and regression evidence suggest an increased number of favorable recommendations on weekends. This pattern cannot be entirely attributed to the two newly enacted rules and suggests that other forces might be at play. One plausible explanation is that analysts issue both favorable and unfavorable recommendations on weekends to reduce short-term price volatility.[11] When surveyed about their communication with investors, managers expressed concern over share price volatility, which increases perceived risk towards investors (Billings et al., 2014). Recent empirical findings suggest that managers try to engage in efforts to reduce price volatility by issuing earnings announcements in the pre-market and after-market periods and by bundling earnings announcements with voluntary guidance (Billings et al., 2014; and Michaely et al., 2014). For the same reason, analysts are likely to cooperate with

[11] We thank an anonymous reviewer for suggesting this explanation.

management to issue recommendations on weekends when investors pay limited attention to such information. This contention is consistent with Dimpfl and Jank (2016), who show that investors' lower attention, proxied by their internet search queries, is associated with less share price volatility. In unreported analysis, we document that the share price volatility after weekend recommendations is significantly lower than the volatility after weekday recommendations.

[Table 3]

4.2 Does the propensity of analysts to issue negative recommendation revisions on weekends increase after the passage of NASD Rule 2711 and NYSE Rule 472?

In this section, we analyze whether the incidence of weekend recommendation *revisions* increases after the enactment of amended NASD Rule 2711 and NYSE Rule 472. Such a test serves two purposes. First, it presents a robustness analysis since prior literature has also relied on analysts' recommendation revisions, along with recommendation levels, when studying analysts' behavior (Chen and Matsumoto, 2006; and Mayew, 2008). Second, and more importantly, recommendation revisions are more likely to bring new information to the market (Boni and Womack, 2006; and Jegadeesh and Kim, 2010). Our analysis is thus consistent with our subsequent investigation of market reactions, where we focus exclusively on recommendation revisions. A recommendation revision is the action of a particular analyst updating her prior recommendation rating within 180 days. We classify recommendation revisions into three categories: (1) *upgrades*, which are recommendations revised to be more favorable; (2) *downgrades*, which are recommendations revised to be less favorable; and (3) *reiterations*, which are recommendations that remain unchanged.

In unreported analyses, we find that the percentages of both upgrade and downgrade revisions on weekends have increased since the enactment of amended NASD Rule 2711 and

NYSE Rule 472. Moreover, within the category of recommendation revisions released on weekends, the percentage of upgrade revisions has decreased from 40% to 20.9%, while the percentage of downgrade revisions has increased from 29.1% to 33%. Preliminary statistics are therefore consistent with those of recommendation levels and suggest that, after the regulation, analysts are more likely to release unfavorable recommendation revisions on weekends.

We then examine the cross-sectional determinants, both analyst-specific and firm-specific, that affect the increase in the tendency of weekend recommendation revisions. Specifically, we modify Equation (1) and estimate the following logistic regression model:

$$\begin{aligned} &Prob\ (Weekend\_Revision = 1) \\ &= \beta_0 + \beta_1 Regulation + \beta_2 Downgrade + \beta_3 Regulation * Downgrade \\ &+ \beta_4 Regulation * GenExperience + \beta_5 Regulation * Brokersize + \beta_6 Regulation * Star \\ &+ \beta_7 Regulation * Companies + \beta_8 GenExperience + \beta_9 Brokersize + \beta_{10} Star \\ &+ \beta_{11} Companies + \beta_{12} Size + \beta_{13} IO + \beta_{14} R\&D + \beta_{15} Leverage + \beta_{16} MTB + \varepsilon, \end{aligned} \quad (2)$$

Our Model 2 is analogous to Model 1 except that we replace the dependent variable with the indicator, *Weekend_Revision*, coded one for a revision issued on weekends and zero otherwise. Further, we replace *Bad* with the indicator *Downgrade*, coded one for downgrade revisions and zero otherwise. Note that we also make corresponding adjustments for interaction terms involving the *Bad* indicator. We again perform stepwise logistic regressions and report results in Table 4.

Results are similar to those documented in our analyses of analyst recommendation levels. In particular, the positive and significant coefficient on *Regulation* (1.596, t = 8.872 in Model 1) suggests that analysts are more likely to release recommendation revisions on weekends after the enactment of amended NASD Rule 2711 and NYSE Rule 472. The coefficient on *Regulation*Downgrade* is also positive and significant (1.752, t = 6.552 in Model 2), indicating that the increased tendency of weekend recommendation revisions is more pronounced for

downgrade revisions. Both results remain robust in alternative specifications. For analysts' incentives, we find results suggesting that, after the regulation, prestigious analysts are more likely to release recommendation revisions on weekends, reflected by positive and significant coefficients on *Regulation*GenExperience* (0.179, t = 4.621), *Regulation*Brokersize* (0.006, t = 5.603), and *Regulation*Star* (2.097, t = 4.781) in Model 3. Therefore, analyses of analysts' recommendation revisions yield insights that are consistent with those revealed in the analyses of recommendation levels.

[Table 4]

4.3 The market reaction to weekend recommendation revisions

Our previous analyses and interpretations are based on the premise that investors are less attentive on weekends, and their responses to unfavorable recommendation revisions released on weekends will be incomplete. In this section, we verify this assumption. Specifically, we identify the date on which a recommendation revision becomes available to the market. We then draw a 3*2 matrix and assign each recommendation revision to one of six groups on the basis of whether the revision is an upgrade, a downgrade, or a reiteration, and on whether the revision is released on a weekday or weekend. For example, an observation in the group *Downgrade* and *Weekday* represents an unfavorable recommendation revision released on a weekday. Analogously, an observation in the group *Downgrade* and *Weekend* represents an unfavorable recommendation revision released on weekend. Because the amendments to NASD Rule 2711 and NYSE Rule 472 are enacted in 2002, we exclude observations before that year. In total, 16,463 recommendation revisions are classified into the group *Downgrade* and *Weekday*, with 357 classified into the group *Downgrade* and *Weekend*.

We then conduct an event study to examine whether the stock price response to unfavorable

recommendation revisions issued on weekends is smaller than the response to recommendation revisions issued on weekdays. We estimate the cumulative abnormal return (CAR) around each recommendation revision. We employ multiple asset pricing models (e.g., CAPM and Fama-French three factors) and event windows (e.g., [-1, 1] or [-2, 2], with day 0 defined as the recommendation revision date) to mitigate the concern that our results can be driven by some omitted risk factors or mis-specified measurement windows.[12] For recommendation revisions released on weekends, we define day 0 as the first trading day after the revision date.

We report results of market reaction analyses in Table 5. Consistent with Hypothesis 3, the immediate market response to downgrade revisions issued on weekdays is significantly greater in magnitude compared with that to downgrade revisions issued on weekends. Specifically, the cumulative abnormal return during the [-1, 1] window, constructed using the CAPM model, is -0.026 for downgrade revisions issued on weekdays and -0.004 for downgrade revisions issued on weekends, resulting in a significant difference of -0.023 (t = - 11.64).[13] The 2.3% return difference within three days is economically impactful from an investor's perspective. Results using alternative event windows and asset pricing models exhibit consistent evidence.[14]

Arguably, if investors are inattentive on weekends, upgrade revisions may also induce an incomplete response. Our empirical results on abnormal stock returns around upgrade revisions generally support this conjecture. The three-day cumulative abnormal return around an upgrade recommendation issued on weekdays is 0.025 and the response to an upgrade recommendation on weekends is 0.018, resulting in a significant difference of 0.6% (t = 2.64). However, such a

[12] However, our tests are subject to the critique that any market efficiency test is a joint test of market efficiency and the validity of the asset pricing model employed. Therefore, we cannot fully rule out the effect of omitted risk factors. We thank an anonymous reviewer for pointing out this issue.
[13] The -0.023 differs from -0.026-(-0.004) because of rounding.
[14] There is a concern that one type of firms always receives recommendations on weekdays while another type of firms always receives recommendations on weekends. To address this sample selection bias, we re-conduct our analysis on a sample consisting of only firms with at least one weekend recommendation during the year. Qualitatively our results are unchanged.

return difference is smaller than that of downgrade revisions.

If the weaker response to weekend downgrade revisions is due to investors' limited attention, we expect investors to subsequently correct for it (Peress, 2008). We empirically test this conjecture by comparing stock returns during the window [2, 22] after downgrade revision dates.[15] We find that the drift to downgrade revisions on weekends is larger in magnitude compared with that to downgrade revisions on weekdays (-0.020 *vs* -0.001, *diff.* = 0.019, t = 3.86).

To test whether investors completely correct for their initial under-reactions to weekend recommendations, we compute cumulative abnormal returns during the event window [-1, 22] around the issuance of unfavorable recommendations. Specifically, the CAPM-based CAR during [-1, 22] is -0.028 for downgrade revisions issued on weekdays and -0.024 for those issued on weekends, resulting in a difference of -0.004 that is statistically insignificant (t = -0.77). Results using the Fama-French three-factor model exhibit consistent evidence. Therefore, on aggregate, analysts' strategic timing appears to delay investors' responses to unfavorable weekend recommendations.

Finally, we present corroborative graphical evidence on share price response to recommendation revisions on weekdays or weekends. Specifically, we plot the average cumulative abnormal returns for four mutually exclusive groups: weekday downgrades, weekend downgrades, weekday upgrades, and weekend upgrades. Results using CARs estimated from either CAPM or the Fama-French three-factor model suggest an incomplete immediate response and a prolonged drift to weekday revisions (Figure 1).

[Figure 1]
[Table 5]

[15] The numbers 2 and 22 represent trading days, with 22 trading days being approximately one calendar month.

4.4 Weekend recommendations and analysts' future forecast accuracy

If analysts release unfavorable recommendation revisions on weekends that generate a less immediate price drop, managers are likely to reward the analysts by granting them better access to management-provided information (Chen and Matsumoto, 2006; and Ke and Yu, 2006). Our Hypothesis 4 predicts that, for those analysts, their future forecast accuracy will be higher. We perform empirical analyses for the hypothesis in this section.

We employ a research design similar to the one adopted in Chen and Matsumoto (2006) to study whether analysts who issue downgrade revisions on weekends have higher future forecast accuracy. Figure 2 presents the timeline of our empirical strategy. First, we retain the last annual forecast issued by an analyst in a specific year for each firm (e.g., O'Brien 1990; Sinha et al., 1997; Clement, 1999; and Clement and Tse, 2005). We include only forecasts issued no earlier than one year ahead and no later than 30 days before the fiscal year-end following Clement and Tse (2005). Second, we match each forecast with the recommendation file and keep only forecasts with at least one recommendation issued to the same firm by the same analyst within the [-90,-5] window around the analyst forecast date. We keep only the latest recommendation if one analyst issues multiple recommendations (Chen and Matsumoto, 2006). Further, to ensure that the analyst has sufficient time to communicate with management, our research design introduces a five-day window [-4, 0] between the recommendation date and the forecast date. The cutoff point at -90 days ensures recent analyst interest in issuing recommendations.

[Figure 2]

To facilitate comparisons across companies, we deflate forecast errors by the firm's share price two days before the recommendation revision date, and eliminate observations with price-deflated forecast errors that are above 0.40 or below -0.40 (Clement and Tse, 2005). We

further exclude observations with only one analyst following the firm since our analysis compares the forecast accuracy of different analysts covering the same firm. In total, we have 2,571 analyst-firm-year observations with matched recommendations.

We then estimate Equation (3) to examine the impact of issuing unfavorable recommendation revisions on weekends on analysts' future forecast accuracy.

$$\begin{aligned} Accuracy_{ijt} = {} & \beta_0 + \beta_1 Downgrade_{ijt} + \beta_2 Weekend\_Rec_{ijt} + \beta_3 Weekend\_Rec_{ijt} * Downgrade_{ijt} \\ & + \beta_4 Laccuracy_{ijt} + \beta_5 Brokersize_{ijt} + \beta_6 Companies_{ijt} + \beta_7 GenExperience_{ijt} \\ & + \beta_8 FirmExperience_{ijt} + \beta_9 ForHorizon_{ijt} + \beta_{10} Industries_{ijt} + \varepsilon_{ijt}, \end{aligned} \quad (3)$$

where $Accuracy_{ijt}$ is computed as the maximum of absolute forecast error (*AFE*) for all analysts who follow firm *j* in year *t* minus the *AFE* for analyst *i* following firm *j* in year *t*, scaled by the range of *AFE* for all analysts following firm *j* in year *t* (Equation 4). *AFE* is the absolute forecast error deflated by the share price two days earlier. Therefore, $Accuracy_{ijt}$ increases with forecast accuracy.

$$Accuracy_{ijt} = \frac{MaxAFE_{jt} - AFE_{ijt}}{MaxAFE_{jt} - MinAFE_{jt}}, \quad (4)$$

Downgrade is an indicator coded one if the matched recommendation issued by the analyst is a downgrade compared with her previous recommendation and zero otherwise. *Weekend_Rec* is an indicator coded one if the matched recommendation is issued on weekends and zero otherwise. Our variable of interest is the interaction term *Weekend_Rec*Downgrade* which captures the incremental effect of issuing downgrade revisions on weekends on an analyst's future forecast accuracy, compared with issuing downgrade revisions on weekdays.

Following Clement and Tse (2005), we include a vector of characteristics that can affect analyst forecast accuracy. Consistent with their work, we scale each variable to range between

zero and one using a transformation that preserves the relative distance of each characteristic.[16] The scaled independent variables take the following form:

$$Characteristics_{ijt} = \frac{Raw\ \ Characteristics_{jt} - Min\ \ Characteristics_{ijt}}{Max\ \ Characteristics_{jt} - Min\ \ Characteristics_{jt}}, \quad (5)$$

The control variables include *ForHorizon*, measured as the number of days from the forecast date to the fiscal year end; *Laccuracy*, measured as an analyst's forecast accuracy in the prior year*; Brokersize*, measured as the number of analysts employed by the brokerage house of the analyst; *FirmExperience*, measured as the number of years an analyst has issued earnings forecasts for the firm; *GenExperience*, measured as the number of years the analyst has appeared in the I/B/E/S database; *Companies*, measured as the number of companies followed by the analyst in that year; *Industries*, measured as the number of industries that an analyst follows in that year. We identify industries by the two-digit SIC codes.

We present the estimation results in Table 6. In the first column, the coefficient on *Downgrade* is negative and significant (-0.048, t = -2.414), consistent with the notion that issuing downgrade revisions displeases management and reduces an analyst's future forecast accuracy (Chen and Matsumoto, 2006). More importantly, the coefficient on *Weekend_Rec*Downgrade* is positive and significant (0.168, t = 1.681), supporting the contention that analysts issuing downward revisions on weekends obtain better access to management and have higher future forecast accuracy.

In a related study, DellaVigna and Pollet (2009) document that the next-day stock price reaction to earnings surprises is 60% lower for Friday announcements than for non-Friday announcements. They also attribute this under-reaction to investors' inattention on Fridays owing

[16] For a robustness check, we also demean these characteristics on the analyst-firm-year level. Results are qualitatively similar.

to the coming weekend. Acknowledging their findings, we conduct a robustness analysis by re-classifying as weekend recommendation revisions those released on Friday, but after trading hours. We then re-estimate Equation (3) and present the results in Table 6, Column 2. Qualitatively our results are unchanged. The coefficient on *Downgrade* is negative and significant (-0.051, t = -2.545), and the coefficient on *Weekend_Rec*Downgrade* is positive and significant (0.148, t = 1.793). Overall, our empirical findings support Hypothesis 4.

[Table 6]

4.5 Additional analyses - The conditional role of firm characteristics

Our earlier analyses rely on analyst characteristics to explain the alteration in analysts' incentives to release unfavorable recommendations on weekends. One might argue that managerial incentives can also influence analysts' behavior around the regulations examined. Specifically, if our main hypothesis holds, managers who have larger incentives to avoid sharp price decline and to please the shareholders are more likely to enter into the interplay with analysts. In this section, we attempt to shed some lights on this issue.

To capture managerial incentives, we rely on two factors: firm size and institutional ownership. With a broader investor base and greater analyst coverage, large firms' unfavorable information is more likely to spur a dramatic share price response (Peress, 2008). Further, managers of large firms attract more attention from the capital market and are likely more concerned about sharp price drops that will adversely affect their career. In regards to the role of institutional ownership, we consider the influence institutional investors can exert on managers. Parrino et al. (2003) document that institutional investors are more likely to '*vote with their feet*' if they are dissatisfied with management, and institutional stock sales significantly increased the

likelihood of forced CEO turnover. Combined, we conjecture that managers employed by large firms and firms with higher institutional ownership prefer that unfavorable recommendations are issued on weekends.

We perform corroborative analyses to seek related evidence. Specifically, we modify Equation (1) and Equation (2) by adding interaction terms between *Regulation* and our two proxies for managerial incentives: firm size (*SIZE*) and institutional ownership (*IO*). To alleviate the concern that both firm size and institutional ownership are likely to be associated with other firm-level characteristics determining the probability of analysts issuing recommendations on weekends, we also control for interaction terms between *Regulation* and other firm-level attributes including: *R&D, Leverage* and *MTB*. We then re-estimate the logistic regressions and present results in Table 7. In the first column where we consider recommendation levels, the coefficients on *Regulation*Size* (0.214, t = 7.244) and *Regulation*IO* (0.395, t = 2.310) are both positive and statistically significant. Such a result is consistent with the notion that larger firms and firms with a higher institutional ownership are more likely to have recommendations issued on weekends after the regulation. In the second column where we consider recommendation revisions, the coefficient on *Regulation*Size* (0.231, t = 4.635) remains positive and significant. The coefficient on *Regulation*IO* (0.134, t = 0.467), although statistically insignificant, has the predicted sign. Overall, empirical evidence supports our conjecture that when managers have greater incentives to avoid sharp price decline and to please shareholders, analysts are more likely to release recommendations on weekends after the regulation.

[Table 7]

5. CONCLUSION

The amendments to NASD Rule 2711 and NYSE Rule 472 require analysts to disclose the distribution of their recommendations in different categories. We find that, in the face of implicit pressure to issue a higher proportion of unfavorable recommendations, analysts reduce their optimistic bias when issuing recommendations. However, in an effort to please management, analysts strategically time the market and release an increased number of (unfavorable) recommendations on weekends when investors' attention is low, thereby inducing a less dramatic negative response in a short window. Managers appear to reward such strategic timing, as analysts who engage in this strategy maintain higher future forecast accuracy, as compared with analysts who issue unfavorable recommendations on weekdays.

Our study provides both academic and practical implications. First, we document that the two amended rules, designed to improve the transparency of analysts' research, provide a new twist on the reciprocity between analysts and managers. We find that the two groups cater to one another when responding to a regulatory reform. Thus, our findings are complementary to those of Chen and Matsumoto (2006) and Ke and Yu (2006). Second, a less dramatic market response to unfavorable recommendation revisions issued on weekends supports the limited attention theory (Hirshleifer and Teoh, 2003; and Hirshleifer et al., 2011). This result corroborates the findings of DellaVigna and Pollet (2009) and Peress (2008), among others, and suggests that cognitive capacity constrains investors' ability to efficiently process value-relevant information. Third, our study offers regulatory implications. We caution regulators to constrain the interplay between analysts and management as the former can introduce bias into their research to please the latter, increasing the degree of inefficiency of the capital market. Furthermore, such a regulatory action should result in more profound implications in countries with less investor protection, weaker institutional quality, weaker enforcement of disclosure standards and more

individual investor participation because the adverse consequence of analysts' distorted incentive is likely to be amplified in these institutions (Hope, 2003; Barniv et al., 2010; Bradshaw et al., 2014; and Qi et al., 2014).

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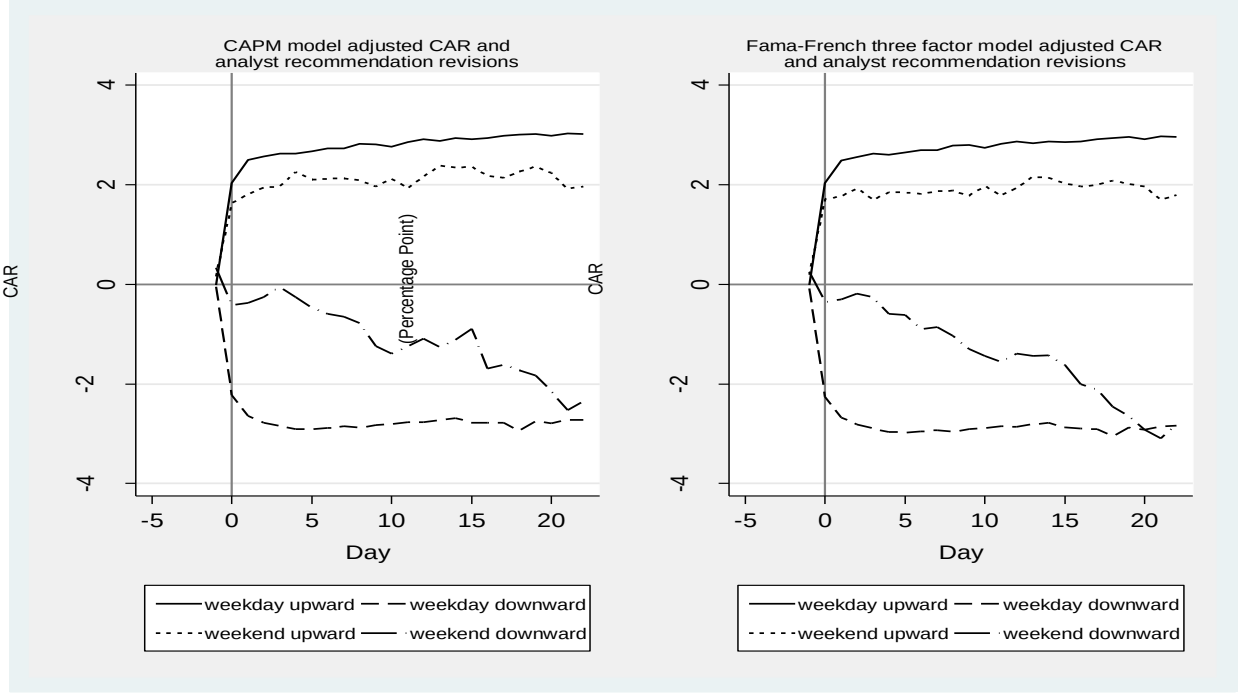
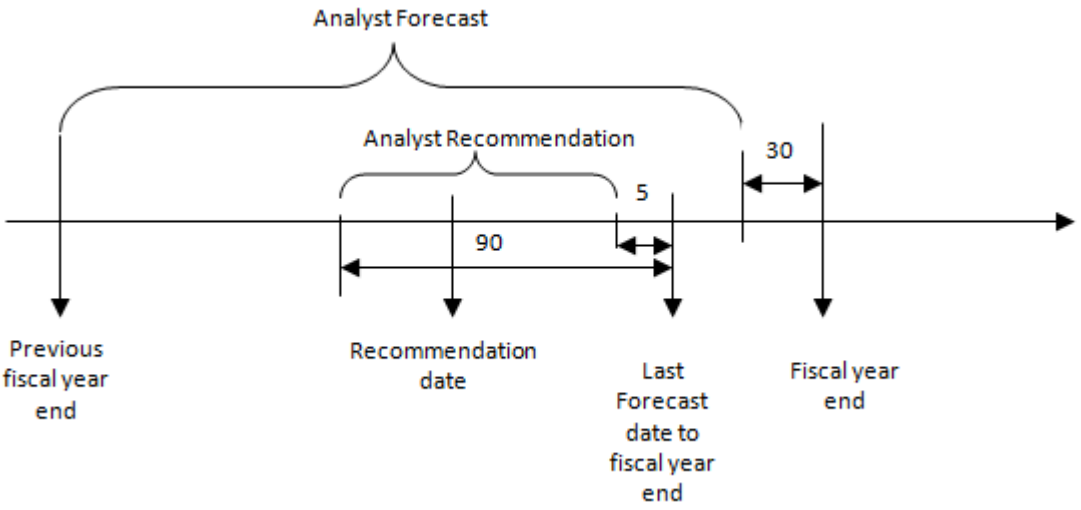
Figure 1: Market Reactions to Recommendation Revisions Issued on Weekdays and Weekends



This figure plots CAPM adjusted cumulative abnormal return (CAR) and Fama-French three factor adjusted CAR during the [-1, 22] windows around analyst recommendation revisions for the sample period covering 2002–2011. The left panel shows the CAPM adjusted CAR. The right panel shows the Fama-French three factor adjusted CAR. Day 0 is the day on which the recommendation revision was made. We identify a recommendation revision as the action of a particular analyst to update his or her prior recommendation rating. An upward revision is identified as an upgrade. A downward revision is identified as a downgrade. Retaining the previous recommendation is identified as a reiteration. In both panels, the horizontal line describes dates around the recommendation revision. The vertical line shows cumulative abnormal return in percentage points (e.g., a value of 4 on the line indicates 4% of abnormal return).

Figure 2: The Timeline of Analysts' Forecasts and Recommendations



This figure shows the timeline of how analysts' recommendation strategies affect their acquisition of management-provided information. We keep only the last forecast of the analyst before the fiscal year end, and require it to be within 30 to 365 days before the fiscal year end. We then match each forecast with a recommendation by the same analyst that was issued within 5 to 90 days prior to the forecast date.

Table 1: Summary Statistics of Recommendations Issued on Weekdays and Weekends

	No. of Recommendations		*No. of Recommendation Dates*	
Year	*Weekday*	*Weekend*	*Weekday*	*Weekend*
1993	654	0	37	0
1994	9,541	0	245	0
1995	8,586	2	244	1
1996	7,682	0	246	0
1997	6,638	12	245	1
1998	7,809	1	245	1
1999	7,159	33	247	19
2000	6,073	7	246	5
2001	7,018	227	239	4
2002	11,643	1,285	250	25
2003	8,324	558	249	53
2004	6,325	111	250	45
2005	5,816	157	250	62
2006	6,442	116	250	56
2007	6,647	348	249	54
2008	7,934	247	251	62
2009	6,474	189	249	48
2010	4,989	130	251	56
2011	5,558	351	251	56

This table presents summary statistics of the number of recommendations and unique recommendation dates, categorized by whether a recommendation was made on weekdays or weekends. In Columns (1) and (2), we report the number of recommendations on weekdays and weekends in each year, respectively. In Columns (3) and (4), we report the number of distinct recommendation dates of weekdays and weekends in each year, respectively.

Table 2: Statistics of The Percentage of Weekend Recommendations around The Enactment of NASD Rule 2711 and NYSE Rule 472

Panel A: Analyst level analyses

Variables	N	Mean Difference	*t-stat*
Percentage of weekend recommendations	480	0.025	6.418***

Panel B: Firm level analyses

Variables	N	Mean Difference	*t-stat*
Percentage of weekend recommendations	1,449	0.019	16.310***

This table reports *t*-test results of the percentage of weekend-recommendations at either the analyst level or the firm level, in both the pre-reform and post-reform periods. We define pre-reform period as year 1999 to year 2001. We define post-reform period as year 2003 to year 2005. *Percentage of weekend recommendations* is computed as the ratio between the number of weekend recommendations and the total number of recommendations. We then test the difference between the pre-reform value and the post-reform value. *, **, *** denote significance at 10%, 5%, and 1% levels using two-tailed *t*-tests, respectively.

Table 3: The Probability of Weekend Recommendations around The Enactment of NASD Rule 2711 and NYSE Rule 472

Variables	(1)	(2)	(3)
Regulation	1.886***	1.937***	2.110***
	(16.728)	(16.760)	(16.536)
Bad	0.054	-0.408*	-0.464**
	(0.866)	(-1.871)	(-2.130)
*Regulation*Bad*		1.036**	1.102**
		(2.274)	(2.418)
*Regulation*GenExperience*			0.151***
			(6.827)
*Regulation*Brokersize*			0.006***
			(9.059)
*Regulation*Star*			2.063***
			(8.521)
Regulation Companies*			-0.030***
			(-7.143)
GenExperience	0.005	0.005	-0.061***
	(0.645)	(0.639)	(-5.683)
Brokersize	0.007***	0.007***	0.006***
	(25.906)	(25.823)	(16.975)
Star	0.096*	0.096*	-0.694***
	(1.850)	(1.852)	(-5.960)
Companies	0.044***	0.044***	0.055***
	(26.510)	(26.498)	(25.875)
Size	0.039***	0.039***	0.037***
	(3.114)	(3.122)	(2.897)
IO	0.178**	0.175**	0.182**
	(2.444)	(2.413)	(2.496)
R&D	0.402	0.402	0.295
	(1.145)	(1.145)	(0.839)
Leverage	-0.055	-0.053	-0.041
	(-0.545)	(-0.527)	(-0.408)
MTB	0.011***	0.011***	0.011***
	(2.672)	(2.656)	(2.679)
CONSTANT	-9.175***	-9.197***	-9.076***
	(-8.748)	(-8.767)	(-8.611)
N	175,901	175,901	175,901
Pseudo R^2	0.126	0.126	0.140

This table presents results of logistic regressions on the association between analyst characteristics, firm characteristics, and the probability of issuing weekend recommendations around the enactment of amended NASD Rule 2711 and NYSE Rule 472. Sample period covers 1999 to 2001, and 2003 to 2005. We estimate the following logistic regression model:

$$\begin{aligned} &Probability\ (Weekend\_Rec = 1) \\ &= \beta_0 + \beta_1 Regulation + \beta_2 Bad + \beta_3 Regulation*Bad + \beta_4 Regulation*GenExperience \\ &+ \beta_5 Regulation*Brokersize + \beta_6 Regulation*Star + \beta_7 Regulation*Companies \\ &+ \beta_8 GenExperience + \beta_9 Brokersize + \beta_{10} Star + \beta_{11} Companies \\ &+ \beta_{12} Size + \beta_{13} IO + \beta_{14} R\&D + \beta_{15} Leverage + \beta_{16} MTB + \text{Industry Effects} + \varepsilon, \end{aligned} \quad (1)$$

where *Weekend_Rec* is an indicator coded one if a recommendation is issued on weekends, and zero otherwise. *Regulation* is an indicator coded one if a recommendation is issued after year 2002, and zero otherwise. *Bad* is an indicator coded one if a recommendation is a sell or strong sell recommendation, and zero otherwise. *GenExperience* is the number of years since an analyst has appeared in the I/B/E/S database. *Brokersize* is the number of analysts employed by the brokerage house. *Star* is an indicator coded one if an analyst is selected as an All-Star analyst, and zero otherwise. *Companies* is the number of companies

followed by an analyst in a year. *Size* is the natural logarithm of total assets. *IO* is the percentage of shares held by institutional owners at the fiscal year end. *R&D* is research and development expense divided by total assets. *Leverage* is total liabilities divided by total assets. *MTB* is the market-to-book ratio, computed as the market capitalization divided by the book value of equity. Industry fixed effect are included in the regression, but not reported in the table for brevity. *, **, *** denote significance at 10%, 5%, and 1% levels using two-tailed *t*-tests, respectively.

Table 4: The Probability of Weekend Recommendation Revisions around The Enactment of NASD Rule 2711 and NYSE Rule 472

Variables	(1)	(2)	(3)
Regulation	1.596***	2.123***	2.216***
	(8.872)	(10.421)	(10.079)
Downgrade	-1.024***	-1.493***	-1.465***
	(-12.824)	(-12.137)	(-11.906)
*Regulation*Downgrade*		1.752***	1.759***
		(6.552)	(6.579)
*Regulation*GenExperience*			0.179***
			(4.621)
*Regulation*Brokersize*			0.006***
			(5.603)
*Regulation*Star*			2.097***
			(4.781)
*Regulation*Companies*			-0.022***
			(-2.713)
GenExperience	-0.003	-0.003	-0.073***
	(-0.243)	(-0.218)	(-4.068)
Brokersize	0.008***	0.008***	0.007***
	(15.589)	(15.837)	(12.796)
Star	-0.155*	-0.144	-0.918***
	(-1.731)	(-1.597)	(-4.599)
Companies	0.043***	0.043***	0.050***
	(12.638)	(12.654)	(11.972)
Size	0.004	0.004	0.001
	(0.184)	(0.170)	(0.047)
IO	0.403***	0.397***	0.436***
	(3.203)	(3.158)	(3.456)
R&D	0.235	0.287	0.150
	(0.403)	(0.492)	(0.257)
Leverage	0.017	0.022	0.003
	(0.101)	(0.132)	(0.017)
MTB	0.022***	0.021***	0.021***
	(3.533)	(3.359)	(3.402)
CONSTANT	-18.971	-20.508	-19.624
	(-0.046)	(-0.026)	(-0.035)
N	53,375	53,375	53,375
Pseudo R^2	0.136	0.141	0.155

This table presents results of logistic regressions on the association between analyst characteristics, firm characteristics, and the probability of issuing weekend recommendation revisions around the enactment of amended NASD Rule 2711 and NYSE Rule 472. Sample period covers 1999 to 2001, and 2003 to 2005. We estimate the following logistic regression model:

$$\begin{aligned} &Prob\ (Weekend\_Revision = 1) \\ &= \beta_0 + \beta_1 Regulation + \beta_2 Downgrade + \beta_3 Regulation^{*}\ Downgrade \\ &+ \beta_4 Regulation^{*} GenExperience + \beta_5 Regulation^{*} Brokersize + \beta_6 Regulation^{*} Star \\ &+ \beta_7 Regulation^{*} Companies + \beta_8 GenExperience + \beta_9 Brokersize + \beta_{10} Star \\ &+ \beta_{11} Companies + \beta_{12} Size + \beta_{13} IO + \beta_{14} R\&D + \beta_{15} Leverage + \beta_{16} MTB + \varepsilon, \end{aligned} \quad (2)$$

where *Weekend_Revision* is an indicator coded one if a recommendation revision is issued on weekends, and zero otherwise. *Regulation* is an indicator coded one if a recommendation is issued after year 2002, and zero otherwise. *Downgrade* is an indicator coded one if the revised recommendation is unfavorable compared with the same analyst's earlier recommendation of the same firm. *GenExperience* is the number of years since an analyst has appeared in the I/B/E/S database. *Brokersize* is the number of analysts employed by the brokerage house. *Star* is an indicator coded one if an analyst is selected as an All-Star

analyst, and zero otherwise. *Companies* is the number of companies followed by an analyst in a year. *Size* is the natural logarithm of total assets. *IO* is the percentage of shares held by institutional owners at the fiscal year end. *R&D* is research and development expense divided by total assets. *Leverage* is total liabilities divided by total assets. *MTB* is the market-to-book ratio, computed as the market capitalization divided by the book value of equity. Industry fixed effect are included in the regression, but not reported in the table for brevity. *, **, *** denote significance at 10%, 5%, and 1% levels using two-tailed *t*-tests, respectively.

Table 5: Market Reactions around Recommendation Revisions Issued on Weekdays and Weekends

CAR	Weekday	Weekend	Weekday-Weekend	*t*-stat
CAPM-CAR[-1,1]				
Upgrades	0.025	0.018	0.006	2.64
Downgrades	-0.026	-0.004	-0.023	-11.64
CAPM-CAR[2,22]				
Upgrades	0.005	0.001	0.004	0.87
Downgrades	-0.001	-0.020	0.019	3.86
CAPM-CAR[-1,22]				
Upgrades	0.030	0.020	0.010	1.92
Downgrades	-0.028	-0.024	-0.004	-0.77
FF3-CAR[-1,1]				
Upgrades	0.025	0.018	0.007	2.85
Downgrades	-0.027	-0.003	-0.024	-12.12
FF3-CAR[2,22]				
Upgrades	0.005	0.000	0.004	0.96
Downgrades	-0.002	-0.025	0.023	4.72
FF3-CAR[-1,22]				
Upgrades	0.029	0.018	0.011	2.07
Downgrades	-0.029	-0.028	-0.001	-0.14

This table presents results of market reactions around weekday and weekend recommendation revisions, and *t*-test results of their differences. The sample period covers 2002 to 2011. We identify a recommendation revision as the action of a particular analyst to update his or her prior recommendation rating. *Upgrades* are recommendations revised to be more favorable. *Downgrades* are recommendations revised to be less favorable. We consider three alternative market reaction windows: [-1, 1], [2, 22], and [-1, 22], where day 0 is the day on which a recommendation revision is released. For recommendation revisions released on weekends, day 0 is set as the first trading day after the weekend. We utilize two alternative asset pricing models when constructing the cumulative abnormal return: the CAPM model and the Fama-French three factor model. CAPM-CAR [-1, 1] denotes the cumulative abnormal return estimated using CAPM model within the [-1, 1] window. FF3-CAR [-1, 1] denotes the cumulative abnormal return estimated using Fama-French three factor model within the [-1, 1] window. Other abnormal returns are defined accordingly.

Table 6: Weekend Recommendations and Future Forecast Accuracy

	Dep. Var = *Accuracy*	
Variables	Weekends excluding Fridays after trading hours	Weekends including Fridays after trading hours
Downgrade	-0.048	-0.051
	(-2.414)**	(-2.545)**
Weekend_Rec	-0.075	-0.094
	(-1.708)*	(-2.377)**
*Weekend_Rec*Downgrade*	0.168	0.148
	(1.681)*	(1.793)*
Laccuracy	0.029	0.029
	(1.511)	(1.481)
Brokersize	0.013	0.015
	(0.645)	(0.729)
Companies	-0.012	-0.012
	(-0.526)	(-0.548)
GenExperience	-0.033	-0.033
	(-1.434)	(-1.425)
FirmExperience	0.071	0.071
	(3.150)***	(3.139)***
ForHorizon	-0.142	-0.141
	(-7.256)***	(-7.236)***
Industries	0.024	0.024
	(1.087)	(1.081)
CONSTANT	0.553	0.556
	(22.971)***	(23.029)***
N	2,574	2,574
Adjusted R^2	0.028	0.029

This table presents results on the association between issuing unfavorable recommendations on weekends and the future forecast accuracy of the same analyst. We match recommendations with forecasts made by the same analyst. We retain only analyst forecasts that have recommendations issued by the same analyst within a window of 5 to 90 days prior to the forecast. We employ the following regression model:

$$Accuracy_{ijt} = \beta_0 + \beta_1 Downgrade_{ijt} + \beta_2 Weekend\_Rec_{ijt} + \beta_3 Weekend\_Rec_{ijt} * Downgrade_{ijt} + \beta_4 Laccuracy_{ijt} + \beta_5 Brokersize_{ijt} + \beta_6 Companies_{ijt} + \beta_7 GenExperience_{ijt} + \beta_8 FirmExperience_{ijt} + \beta_9 ForHorizon_{ijt} + \beta_{10} Industries_{ijt} + \varepsilon_{ijt}, \quad (3)$$

where $Accuracy_{ijt}$ is computed as the maximum *AFE* for all analysts who follow firm *j* in year *t* minus the *AFE* for analyst *i* following firm *j* in year *t*, scaled by the range of *AFE* for all analysts following firm *j* in year *t*. *AFE* is the absolute forecast error deflated by the share price two days earlier. *Downgrade* is coded one for a downward recommendation revision, and zero otherwise. *Weekend_Rec* is coded one if a recommendation revision is issued on weekends, and zero otherwise. In Column (2), we modify the definition of *Weekend_Rec* by including recommendations issued on Fridays after trading hours as weekend recommendations. *Accuracy* and all other characteristics are scaled to range from 0 to 1 within each firm-year. Characteristics controlled include *Laccuracy*, the analyst's prior year absolute forecast accuracy for the firm; *Brokersize*, the number of analysts employed by the analyst's brokerage house in that year; *Companies*, the number of companies followed by the analyst in that year; *GenExperience*, the number of years since the analyst has appeared in the I/B/E/S database; *FirmExperience*, the number of years that the analyst has issued earnings forecasts for the firm; *ForHorizon*, the number of days from the forecast date to the fiscal year-end; and *Industries*, the number of industries followed by the analyst in that year. Figure 2 depicts the time line of the research design. *, **, and *** denote statistical significant of 10%, 5%, and 1% levels using two-tailed *t*-tests, respectively.

Table 7: Conditional Effects of Managerial Incentives in Affecting The Probability of Weekend Recommendation Revisions around The Enactment of NASD Rule 2711 and NYSE Rule 472

Variables	*Recommendation Levels*	*Recommendation Revisions*
Regulation	1.944***	2.123***
	(16.569)	(10.294)
Bad	-0.425*	
	(-1.948)	
*Regulation*Bad*	1.098**	
	(2.405)	
Downgrade		-1.516***
		(-12.304)
*Regulation*Downgrade*		1.837***
		(6.856)
*Regulation*Size*	0.214***	0.231***
	(7.244)	(4.635)
*Regulation*IO*	0.395**	0.134
	(2.310)	(0.467)
*Regulation*R&D*	-1.379**	-1.310
	(-2.181)	(-1.247)
*Regulation*Leverage*	-0.561***	-0.082
	(-2.820)	(-0.245)
*Regulation*MTB*	0.024***	0.034**
	(2.750)	(2.465)
Size	-0.014	-0.045*
	(-0.947)	(-1.789)
IO	0.131	0.442***
	(1.514)	(3.115)
R&D	0.312	0.127
	(0.873)	(0.217)
Leverage	0.054	0.019
	(0.507)	(0.110)
MTB	0.008*	0.017***
	(1.942)	(2.630)
GenExperience	0.004	-0.005
	(0.480)	(-0.384)
Brokersize	0.007***	0.008***
	(25.770)	(16.020)
Star	0.093*	-0.153*
	(1.792)	(-1.699)
Companies	0.043***	0.042***
	(26.043)	(12.382)
CONSTANT	-8.129***	-18.376
	(-7.672)	(-0.042)
N	175,901	53,375
Pseudo R^2	0.129	0.145

This table presents results of logistic regressions on the conditional effects of managerial incentives in affecting the impact of NASD Rule 2711 and NYSE Rule 472 on the probability of analysts issuing recommendations on weekends. We consider two proxies for managerial incentives: firm size (*SIZE*) and institutional ownership (*IO*). Sample period covers 1999 to 2001, and 2003 to 2005. In column 1, the dependent variable is *Weekend_Rec*, an indicator coded one if a recommendation is issued on weekends, and zero otherwise. In column 2, the dependent variable is *Weekend_Revision*, an indicator coded one if a recommendation revision is issued on weekends, and zero otherwise. *Regulation* is an indicator coded one

if a recommendation is issued after year 2002, and zero otherwise. *Downgrade* is an indicator coded one if the revised recommendation is unfavorable compared with the same analyst's earlier recommendation of the same firm. *GenExperience* is the number of years since an analyst has appeared in the I/B/E/S database. *Brokersize* is the number of analysts employed by the brokerage house. *Star* is an indicator coded one if an analyst is selected as an All-Star analyst, and zero otherwise. *Companies* is the number of companies followed by an analyst in a year. *Size* is the natural logarithm of total assets. *IO* is the percentage of shares held by institutional owners at the fiscal year end. *R&D* is research and development expense divided by total assets. *Leverage* is total liabilities divided by total assets. *MTB* is the market-to-book ratio, computed as the market capitalization divided by the book value of equity. Industry fixed effect are included in the regression, but not reported in the table for brevity. *, **, *** denote significance at 10%, 5%, and 1% using two-tailed *t*-tests, respectively.