The Impact of Regulatory Changes on the Information Content of Target Prices

ABSTRACT

We document a significant increase in the reliability of target prices following the implementation of SRO rulings, which were designed to mitigate sell-side analyst conflicts of interest. We test whether the increase is associated with the implementation of the rules' provisions (the regulation effect) or the concurrent migration of most brokerages to three-tier rating systems (the tier effect) by examining differences in the informativeness, optimism, and accuracy of target prices issued with and without recommendations and by utilizing periods before and after the date each brokerage changed to the new tier system. We find evidence in support of the regulation effect but no evidence in support of the tier effect. Our study contributes to the literature on SRO rulings and can help inform regulators as they evaluate the efficacy of past rules in improving the functioning of capital markets.

Keywords: analysts, target prices, recommendations, rating systems, SRO rules

JEL Classification: G14, G20, G24, G28

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"NYSE and FINRA rules now prohibit analysts from offering a favorable research rating or specific price target to induce investment banking business from companies." SEC (2010)[1]

1. INTRODUCTION

The US Securities and Exchange Commission expresses the view that financial analysts promote *"the efficiency of our markets by ferreting out facts and offering valuable insights on companies and industry trends"*(SEC 2010). It is therefore not surprising that a large body of research is devoted to examining the factors associated with the informativeness of analyst research as well as the effectiveness of regulations that aim to increase its reliability.[2] Target prices, which are essentially forecasts of future stock prices, are an important output of analyst research that have been increasing in their prevalence in analyst reports. In 2002, the SEC issued the so-called "Self-Regulatory Organizations (SRO) rulings" to curtail the investment banking incentive that induced analysts to issue optimistic reports. To achieve this objective, the rulings included specific provisions aimed at increasing disclosures related to target prices. In particular, the rulings require the analyst to disclose the valuation model used to derive a specific target price and a chart comparing the target with actual prices. The purpose of this study is to examine whether the SRO rulings increased the informativeness of target prices.

Although prior research examines the effect of SRO rulings on the reliability of other analyst products, i.e., earnings forecasts and stock recommendations, examining their effect on target prices is important for three reasons. First, target prices provide investors with value relevant information that is complementary and incremental to the information reflected in stock recommendations. Anecdotal evidence and the financial press assert that target prices are useful to investors not only because they provide information about the investment decision as ratings do, but also because they help investors to determine the investment's holding period, in setting a stop loss order level, and in identifying the stocks

[1] https://www.sec.gov/tm/reportspubs/investor-publications/investorpubsanalystshtm.html

[2] We use the terms informativeness and value relevance of target prices interchangeably in reference to the association between target prices and stock returns.

that are expected to exhibit the biggest growth potential.[3] As such, target prices can affect the magnitude of investor trading profits because they provide trading information that is not embedded in stock recommendations. Their importance in shaping market expectations is also reflected in the fact that target price revisions are covered by the financial press and target price estimates are regularly quoted in financial media alongside earnings forecasts and recommendations.[4] Academic evidence supports the value relevance of target prices by documenting strong market reactions around target price releases (see, for example, Brav and Lehavy 2003; Asquith, Mikhail, and Au 2005; Bradshaw, Brown, and Huang 2013). The importance of target prices for investment decisions is also indirectly acknowledged by regulators, as the SRO rulings contain specific provisions for target prices, but not for other analyst products other than stock recommendations. This suggests that regulators are concerned by the effect of analyst conflicts of interest on target prices and their resulting optimistic bias (James and Karceski 2006; Bradshaw, Richardson, and Sloan 2006; Bradshaw et al. 2013) and therefore consider target prices as one of the most important elements in analyst reports that justifies the need to ensure that they are estimated reliably. Given the relevance of target prices to the market, examining the effect of SRO rulings on their reliability is of particular importance.

Second, examining the effect of SRO rulings on target prices is necessary because the documented effect of these rulings on stock recommendations cannot be extended reliably to target prices. This is evident from related research suggesting that target prices reflect material information that is not subsumed by the information in recommendations or other analyst products (Brav and Lehavy 2003; Asquith et al. 2005; Bradshaw et al. 2013). Importantly, extant research also suggests that analyst conflicts of interest and incentives for optimistic research have a differential effect on analyst products. Bilinski, Lyssimachou, and Walker (2012), for example, finds that the presence of short-term institutional investors affects the bias in target prices but not earnings forecasts. Similarly, Malmendier

[3] See, for example, an article by *Seeking Alpha*, Jun. 21, 2022 "Price Target: What It Is & How It's Set", https://seekingalpha.com/article/4446055-stock-price-target. See also *Yahoo!Finance*, August 30, 2017 "How To Use Analyst Price Targets To Inform Your Trades", https://finance.yahoo.com/news/analyst-price-targets-inform-trades-152400265.html; and *Investopedia*, updated December 01, 2021 "Target Prices: The Key to Sound Investing", https://www.investopedia.com/investing/target-prices-and-sound-investing/.

[4] See, for example, an article in *Financial Times*, June 19, 2018 "Netflix earns $500 price target as analyst sees 'iron-like strength to grow" and an article by *Reuters*, September 10, 2021 "JPMorgan slashes price target for troubled China property giant Evergrande."

and Shanthikumar (2014) finds that conflicts of interest increase the bias in recommendations but not the bias in earnings forecasts. Chan, Lin, Yu, and Zhao (2018) documents that analyst stock ownership results in more informative recommendations but also more optimistic target prices. Together, this evidence suggests that the effect of regulatory changes on target prices is not necessarily similar to their effect on other types of analyst research.

Third, even if research results on recommendations could be extrapolated to target prices, the inconsistent evidence of the effects of SRO rulings on recommendations would render the attempt to draw any valid conclusions regarding their effect on target prices a rather challenging endeavor. For example, prior research documents a decrease in recommendation optimism (Barber, Lehavy, McNichols, and Trueman 2006; Kadan, Madureira, Wang, and Zach 2009; Guan, Lu, and Wong 2012) and a stronger alignment of recommendations to firm fundamentals (Chen and Chen 2009; Barniv, Hope, Myring, and Thomas 2009), following the SRO rulings. However, Kadan et al. (2009) finds that the "overall informativeness of recommendations has significantly decreased following the regulations" a result the study attributes to the concurrent transition of brokerages to coarser recommendation rating systems. Similarly, Guan et al. (2012) finds that although the optimism of recommendations declines after the regulatory reforms, "…results are consistent with the reforms providing little incremental benefit to investors in terms of more profitable recommendations or more accurate forecasts." Finally, some studies show that the rulings do not uniformly affect firms and that there is substantial cross-sectional variation in their effects, depending for example on whether the brokerage was sanctioned in 2003 or whether the analysts faced stronger conflicts of interest (Ertimur, Sunder, and Sunder 2007; Guan et al. 2012; Corwin, Larocque, and Stegemoller 2017; Tseng and Wilson 2020).

One possible explanation for the inconsistent results of prior research on the effects of SRO rulings on recommendations and other analyst products is the concurrent shift by many brokerages to more discreet recommendation rating systems, generally from five tiers to three. This inherently affects the comparison between the pre- and post-regulation periods because there is no direct mapping in

recommendation levels and changes between the two periods.[5] Importantly, this migration to a three-tier recommendation system, that prompts firms to classify both strong and weaker buy signals in one "Buy" category, can also explain extant research results on decreased recommendation optimism and informativeness. This raises the important question of whether prior research results are attributable to stricter regulations (i.e., the "regulation" effect) or the by-product of a change in tier classification that reduces the informativeness of recommendations (i.e., the "tier" effect). Disentangling the two explanations is important since the effect of the former represents a permanent change in the institutional environment while the effect of the latter also can only last as long as the broker chooses to keep the three-tier rating system. Unlike recommendations, target prices do not suffer from differences in their definitions either between the two periods or across brokerages. Therefore, examining the effects of the SRO rulings on target prices can help us more reliably attribute changes in their informativeness either to the rules' success in mitigating analyst conflicts of interest or to the contemporaneous migration of most brokerages to a three-tier recommendation system.

To examine whether SRO rulings affected the informativeness of target prices, we regress the three-day abnormal stock return around the release of the target price on the implied target price return, *TPER*, which we measure as the difference between the target price and the stock price the day before the announcement, deflated by that price, and various controls.[6] We compare the magnitude of the coefficients on *TPER* in the period before the SRO rulings, November 1, 2000-September 8, 2002, and the period after, September 9, 2002-December 31, 2006. That is, the sample period starts after the enactment of Reg-FD and ends before the onset of the financial crisis. We find a significant increase in the informativeness of target prices in the post-SRO ruling period, as reflected by a statistically significant increase in the *TPER* coefficient across the two periods. The magnitude of the increase is economically significant as well. Specifically, a 10% increase in the target price expected return elicits an abnormal return of 0.569% in the post-regulation period compared to an abnormal return of only 0.176% in the pre-regulation period.

[5] In addition, the SRO's requirement to disclose rating definitions reveals large differences in how brokerages define their buy, hold or sell categories, introducing noise to the model and further confounding results (Kadan et al. 2009; Kadan, Madureira, Wang, and Zach 2020).

[6] We use the terms target price *implied return* and target price *expected return* interchangeably.

We corroborate these results by examining the effect of SRO rulings on target price bias and error. Because the rules explicitly aim at mitigating the influence of investment banking incentives, the enhanced informativeness of target prices should be accompanied by a decrease in bias. In addition, although the new rules do not explicitly aim at increasing the accuracy of target prices, it is possible that the rules' required disclosures that specifically pertain to target prices, may prompt analysts to exert more effort in the derivation of their price targets, thereby increasing their accuracy (Clement 1999). Consistent with these predictions, we find that both target price bias and error are significantly smaller in the post-regulation period. Moreover, our results suggest that target price bias is virtually eliminated in the post-regulation period.

Although these results suggest that the regulations had the desired effect of increasing the informativeness of target prices, the documented increase can be the result of a concurrent loss in the informativeness of stock recommendations stemming from the switch from a five-tier to a three-tier recommendation rating system by most brokerage houses (Kadan et al. 2009). We test this conjecture by partitioning our sample into three subsamples: target prices issued with recommendations (with or without accompanying earnings forecasts), target prices issued with only earnings forecasts, and target prices issued alone ("standalone" target prices). Our results indicate that the value relevance of target prices increased in the post-regulation period for all three subsamples, including target prices that are not issued with a contemporaneous recommendation. We corroborate these results by showing that both target price bias and error are also reduced in the post-regulation period for all three subsamples. Findings from additional tests in which we specifically control for the date the brokerage firms changed their rating systems—to allow us to separate the effects of the regulatory change and the effects of the rating systems change—provide additional evidence that target prices are more informative in the post-regulation period because of the regulatory change. Taken together, these findings provide support for the explanation that the increase in the informativeness of target prices is attributable to the regulation's provisions rather than the concurrent loss of informativeness of stock recommendations.

We perform two additional analyses to address the possibility that our results are attributable to contemporaneous events either in the pre- or post-regulation periods. First, we compare the informativeness of target prices in our post-regulation period, which ends in 2006, with the

informativeness of target prices issued between 2006 and 2017 to ensure that the increased informativeness in our post-regulation period is not period specific and that the documented effect is permanent. Our results do not indicate that there are significant changes in the market reaction to target prices between the two post-regulation periods, alleviating concerns that our inferences are confounded by other unidentified factors present in our original post-regulation period. Second, we compare the informativeness of the target prices issued in the dotcom crisis with those issued during the 2008 financial crisis. Our results indicate that the informativeness of target prices is greater during the financial crisis than during the dotcom crisis. Under the assumption that the effects of the two crises on the value relevance of target prices are similar, this result provides further support to the regulation effect. Finally, we validate our results by documenting a decrease in analyst incentives to bias target prices in the post-regulation period (Dechow and You 2020).

Our study makes a number of contributions to the literature. First, the study contributes to the growing literature that examines the information content of target prices by showing that in addition to the contemporaneous release of other analyst products (Brav and Lehavy 2003; Asquith et al. 2005; Bradshaw et al. 2013), the information content of target prices is affected by the rules that aimed to reduce analyst conflicts of interests. Our study also contributes to the literature that examines the bias and accuracy of target prices. Related research shows that target prices are optimistically biased and that this bias is related to incentives for the generation of brokerage revenues (Asquith et al. 2005; Bradshaw et al. 2006; James and Karceski 2006; Bradshaw et al. 2013; Bradshaw, Huang, and Tan 2019) and to pressures by institutions with short-term investment horizons (Bilinski, Cumming, Hass, Stathopoulos, and Walker 2019). Furthermore, prior research suggests that target price accuracy is associated with accounting disclosure quality (Bilinski et al. 2012), the method used to derive the target price (Demirakos, Strong, and Walker 2010), and the simultaneous release of cash flow forecasts (Hashim and Strong 2018). Our study contributes to this literature by showing that the SRO rules significantly reduced, if not completely eliminated, the bias in target prices and increased the accuracy of price targets. The latter result is particularly notable because increasing target price accuracy was not an explicit objective of the SRO rules.

Finally, our study contributes to the literature that examines the effects of SRO rulings and related regulations that has provided mixed results. In particular, by examining another analyst product that has the important advantage of not being affected by the contemporaneous switch to three-tier rating systems allows us to incorporate a number of analyses to disentangle the regulation effect from the tier effect and measure the direct effects of the rulings on target prices. Disentangling the two explanations is important because the former represents a permanent change in the institutional environment while the latter suggests that the increased reliability of analyst research is industry-driven and can be reversed if brokers revert back to a five-tier rating system.

Thus, the evidence in this study should be especially informative to regulators in their continuous monitoring of the efficacy of the SRO rules. As part of this monitoring effort, the US Government and Accountability Office issued a report assessing the effectiveness of regulations addressing analyst conflicts of interest. The report concludes that "[a]lthough SEC and FINRA have been taking regulatory action to further address conflicts faced by research analysts, additional action is warranted" (U.S. Government Accountability Office 2012, GAO). Thus, our results should be of particular relevance to regulators when assessing whether additional rule changes are needed to curtail analyst conflicts of interest.

2. SRO RULINGS

In the early 2000s, sell-side analysts were heavily criticized by regulatory agencies, politicians, the media, and other capital market participants for misleading investors to benefit themselves and/or their employers.[7] Perhaps the most visible example where investors were misled is the meltdown of Enron. Although Enron's filing for bankruptcy was imminent, 15 out of 17 analysts still had strong buy or buy recommendation ratings in the days before its filing. In 1998, Merrill Lynch even fired an analyst who issued a "neutral" recommendation for Enron and replaced him with another who upgraded the stock.[8]

[7] See, for example, financial press coverage of hearings held by Congress in 2001 on scandals such as Enron, Tyco International plc, and WorldCom, "Analyzing the Analysts", and newspaper headlines e.g., *Fortune,* "Where Mary Meeker Went Wrong", May 14, 2001, pages 68-82; *Wall Street Journal,* "Outlook for Analysts: Skepticism and Blame," June 13, 2001, page C1; *The Financial Times*, "Shoot All the Analysts," March 20, 2001, page 22.
[8] *The New York Times*, "Merrill Replaced Research Analyst Who Upset Enron," Jul. 30, 2002.

After the fact, many expressed the opinion that "… analysts should have seen red flags… as early as two years ago…"[9]

In response to these concerns, and in an effort to address conflicts of interest relating to research analysts, on May 10, 2002, the SEC approved NASD Rule 2711 and the amended NYSE Rule 472, commonly referred to as Self-Regulatory Organizations (SRO) Rulings, with their implementation starting to phase-in on July 9 of the same year. The SRO rules aimed at insulating the research departments of brokerage houses from their investment banking departments, thereby mitigating pressure on analysts to issue optimistic reports to increase investment banking revenues. The rules limit communications between investment bankers and research analysts, block offering favorable research to spawn investment banking business, prohibit investment banking personnel from supervising analysts or approving research reports, and ban tying analyst compensation to investment banking services. The rules also mandate that brokerage firms include, in every research report, definitions of their recommendation rating system as well as the distribution of recommendations that fall in the "buy," "hold," and "sell" categories. The rules further require brokers to disclose whether they have investment banking or other service relations with the covered firms.[10]

The provisions of the SRO rulings that aim at eliminating analyst conflicts of interest also impose a few but important requirements on target prices, specifically. First, the rules require the disclosure of a line chart with the covered firm's daily prices that should indicate the dates on which the brokerage assigned or changed each rating or price target, along with the rating or price target assigned on that date. In addition, research reports that contain target prices must disclose the valuation methods used to determine the price target. The rules also require that price targets must have a reasonable basis and research reports should thus discuss the risks that may impede the achievement of the price target.[11] Overall, the rules impose provisions designed to curtail conflicts of interest arising from the investment banking incentive, reducing in turn the bias in target prices, and require new disclosures to help investors better assess their reliability. Figure 1 presents excerpts from a sample analyst research report,

[9] *The New York Times*, "Wall Street Analysts Faulted on Enron," Feb. 28, 2002.
[10] SEC Release No. 34-48252, https://www.sec.gov/rules/sro/34-48252.htm
[11] See, https://www.finra.org/sites/default/files/NoticeDocument/p003620.pdf

depicting the disclosures required by the rulings for recommendations (panel A) and the disclosures for target prices (panel B).

During the last half of 2002 and the first half of 2003, additional rules and regulations were introduced to further curtail investment banking pressures on analyst research (e.g., the Sarbanes-Oxley Act of 2002, SOX, was enacted on July 30, 2002, and the Global Research Analyst Settlement, GRAS, was reached on April 28, 2003). Although these additional rules and regulations reinforce the provisions of the SRO rulings, their effect is likely marginal, with major changes in the industry being mostly the result of SRO rules that were both the first and the most comprehensive and impactful set of rules. SOX, for example, which was enacted in July 2002, allowed the SEC up until July 30, 2003, to adopt rules to alleviate analyst conflicts of interest. In addition, based on the line of reasoning that GRAS provisions were very similar to those in SRO rules, the banks that were sanctioned by GRAS filed a request with the federal district court to terminate GRAS addendum in its entirety. The court approved all but one of the requested changes, but, as the 2012 GAO report states, the incremental GRAS provisions had not been codified into law by the time of the report's issuance. Thus, consistent with prior studies (e.g., Kadan et al. 2009) we define our pre- and post-regulation periods based on the implementation date of the SRO rulings.

3. RESEARCH DESIGN

3.1. Examining the effect of SRO rulings on the informativeness of target prices

We start our empirical investigation by comparing the market reaction to target price announcements in the pre- and post-regulation periods. We employ the following model, which we estimate separately for the periods before and after the implementation of the SRO rulings. This method does not impose the stationarity assumption on the relation between returns and control variables and hence it is more appropriate when there are substantive changes across the two periods. Because the rules were implemented in phases, we define our pre- and post-regulation periods based on the date that most of the relevant disclosures went into effect, i.e., September 9, 2002 (Barber et al. 2006; Kadan et al. 2009). Our pre-regulation period thus includes target prices issued from November 1, 2000, to September 8, 2002, and our post-regulation period from September 9, 2002, to December 31, 2006. Our

sample period begins after the passage of Reg FD, which significantly affected the informativeness of analyst reports (Gintschel and Markov 2004), and ends before the onset of the financial crisis, with the pre- and post-regulation periods being similar in terms of length.

$$BHAR[-1,+1] = \alpha_0 + \alpha_1 TPER + \beta_i CONTROLS \quad (1)$$

BHAR is the three-day buy-and-hold abnormal return based on the Fama and French four factor (FF4) model (Fama and French 1993; Carhart 1997), centered around the release of the target price. To estimate expected returns and derive the factor loadings we estimate the FF4 model using the 60 monthly returns prior to the release of the target price. Our main variable of interest is the *Target Price Expected Return*, *TPER*, which we compute as follows:

$$TPER_t = \frac{TP_t - Price_{t-1}}{Price_{t-1}}$$

TP_t is the target price issued on day *t* and $Price_{t-1}$ is the stock's price the day before the target price release. In essence, *TPER* reflects the overall return the analyst expects the firm's stock to earn by the end of the next twelve months because target prices are typically issued with a one-year horizon. If the informativeness of target prices is greater in the post-regulation period then we expect the coefficient on *TPER*, α_1, to be greater (i.e., more positive) in the post-regulation compared to the pre-regulation period. We refer to the increase in the informativeness of target prices stemming from the implementation of the SRO rulings as the "regulation" effect.

Confounding our ability to attribute the increase in informativeness of target prices to the regulation effect is the concurrent migration of most brokers to a three-tier rating system. This change in rating systems could enhance investors' reliance on target prices to decipher the information content of recommendations, also increasing the informativeness of target prices. We refer to the increase in the informativeness of target prices stemming from the reduction in recommendation informativeness as the "tier" effect.

Equation (1) includes control variables that prior research shows are associated with stock price reactions around the release of analyst reports. These include the natural logarithm of the book to market ratio, *Book-to-Market,* and the natural logarithm of the firm's market capitalization, *Size,* measured at the end of the quarter prior to the release of the target price. We also include controls for the firm's

price momentum, *Firm_Momentum* (Fama and French 1993; Carhart 1997), and the standard deviation of the firm's returns, *Firm_Volatility* (Frankel, Kothari, and Weber 2006; Amiram, Landsman, Owens, and Stubben 2018), where both variables are based on daily returns, and measured over the last six months and one month respectively, before the announcement of the target price.

We also include controls for firm characteristics that are expected to be related to returns either because they reflect the firm's financial condition or the richness of its information environment. With respect to the former, Equation (1) includes the firm's profitability as reflected by return on assets, *ROA*, measured as the ratio of net income to total assets (Fama and French 2015; Hou, Xue, and Zhang 2014) and firm leverage, *Leverage*, measured as the ratio of total liabilities to stockholders' equity (Dichev 1998; Vassalou and Xing 2004; Penman, Richardson, and Tuna 2007). Both variables are measured as of the last quarter prior to the release of the target price.

With respect to the richness of the firm's information environment, prior research suggests that larger firms with greater analyst following have better information environments (Lang and Lundholm 1996). Thus, Equation (1) includes analyst following, *Analyst_Foll*, measured as the natural log of one plus the number of analysts that have issued at least one earnings forecast for the firm during the announcement quarter; and the firm's institutional ownership, *Inst_Ownership,* based on related literature that documents that institutional ownership is an important firm-monitoring mechanism that can be attributed to institutions' more sophisticated backgrounds (Walther 1997; Jiambalvo, Rajgopal, and Venkatachalam 2002; Cheng, Huang, Li, and Lobo 2010), who prefer to hold stocks with greater information transparency (O'Brien and Bhushan 1990; Healy, Hutton, and Palepu 1999; D'Souza, Ramesh, and Shen 2010). *Inst_Ownership* is measured at the end of the calendar quarter prior to the release of the target price estimate.

Based on research documenting that the informativeness of analyst reports depends on broker and analyst characteristics, Equation (1) also includes the size of the broker's research department, *Broker_Size,* computed as the natural logarithm of one plus the number of analysts employed by the brokerage during the last twelve months, and analyst experience, *Analyst_Exp*, measured as the natural logarithm of one plus the number of quarters the analyst has appeared in IBES. Prior research suggests

that both broker size and analyst experience are associated with the market reaction to recommendation announcements (Mikhail, Walther, and Willis 1997, 2007; Kadan et al. 2009).

Following Kadan et al. (2009), Equation (1) also includes controls for prior market performance and volatility. Market momentum, *MKT_Momentum*, is measured as the cumulative (value-weighted) market return over the six-month period prior to the announcement of the target price and market volatility, *MKT_Volatility*, is the standard deviation of daily returns of the S&P 500 index over the last month. Finally, Equation (1) also includes a control for the concurrent announcement of other events during the three-day analyst report window. *CONF_EVENT* is an indicator variable that equals one if during the return measurement period the firm announced earnings, another recommendation was released, or any other potentially informative corporate event such as credit rating changes or announcements regarding mergers, lawsuits, new products. The latter events are identified through RavenPack.[12]

To mitigate the effects of heteroscedasticity and serial correlation we estimate Equation (1) and equations that follow by clustering errors by quarter-year, firm, and brokerage. Appendix provides a detailed description of all variables used in our analyses.

3.2. The effect of SRO rulings on Target price Bias and Error

Increased informativeness of target prices can be observed if their fundamental quality characteristics are enhanced. We thus examine whether the SRO rules are also associated with increases in target price optimism and error. Specifically, if the informativeness of target prices is related to the regulation's success in mitigating the incentive to optimistically bias reports (regulation effect), then target price bias should be reduced. However, whether the rules will affect target price accuracy is not clear *a priori*. Based on the assumption that reputation matters to analysts and that forecast accuracy is positively related to reputation (Stickel 1992), the additional disclosures, that display clearly analyst error in target prices, should prompt analysts to exert more effort in their derivation increasing in turn their accuracy. Alternatively, the additional required disclosures that pertain to the valuation model used and the underlying assumptions made, may prompt analysts to derive their price targets more rationally,

[12] Removing observations with confounding events does not affect our inferences.

also increasing their accuracy.[13] On the other hand, if reduced conflicts of interest also curb analyst access to management (Lim 2001; Chen and Matsumoto 2006), then the accuracy of analyst target prices should be reduced.[14]

We measure target price bias, *TP_Bias*, as the difference between the analyst's target price and the actual stock price one year from the date of the report, deflated by the price on the day before the issuance of the report. Positive (negative) values of *TP_Bias* thus indicate that the analyst's expectation was optimistic (pessimistic). Target price error, *TP_Error*, is the absolute value of target price bias, with larger values indicating greater analyst forecasting error. To examine the effect of the SRO rulings on target price bias and error we pool observations from the pre- and post-periods and augment Equation (1) with a new indicator variable, *POST*, that equals one if an observation is in the post-SRO period and zero if it is in the pre-SRO period.

It is difficult to predict the impact of the tier effect on target price bias and error. On the one hand, if the concurrent migration of most brokers to a three-tier rating system increases the reliance on target prices to decipher the information content of recommendations, target price bias or error would not necessarily be reduced. On the other hand, it is possible that analysts may respond to the decrease in the information content of their recommendations by exerting more effort in developing their target prices when they are issued with recommendations.[15]

[13] This explanation is consistent with the assertion made in the financial press that the quality of target prices can be more easily ascertained if the analyst report includes the valuation models used to derive the target price and the assumptions used to justify this choice (see footnote 3). This explanation is also consistent with related research that documents a stronger association between stock recommendations and firm intrinsic values or earnings forecast accuracy in the post-regulation period (Ertimur et al. 2007; Chen and Chen 2009; Barniv et al. 2009).

[14] In addition to prior research showing that the investment banking incentive increases analyst optimism (Dugar and Nathan 1995; Lin and McNichols 1998; Michaely and Womack 2015; O'Brien, McNichols, and Hsiou-Wei 2005; Barber et al. 2006; Barber, Lehavy, and Trueman 2007; Ljungqvist, Marston, Starks, Wei, and Yan 2007; Kolasinski and Kothari 2008; Malmendier and Shanthikumar 2014), prior research also shows that analysts issue optimistic research to serve the interests of the brokerage department (Jackson 2005; Cowen, Groysberg, and Healy 2006; Gu, Li, and Yang 2013), and to support the investment bank's prop trading (Charitou and Karamanou 2020), or the positions already taken by mutual funds (Mola and Guidolin 2009). Our predictions are based on the assumption that these other incentives analyst face and, which are not addressed by SRO rulings, are not contemporaneously curtailed by other unknown exogenous factors.

[15] Increasing the quality of target prices to compensate for the loss in the informativeness of recommendations may be the result of analyst incentives to produce research that increases trading commissions (Jackson 2005; Dechow and You 2020) or to enhance analysts' reputation that in turn affects their compensation and career outcomes (Groysberg, Healy, and Maber 2011; Brown, Call, Clement, and Sharp 2015).

3.3. Regulation or the Tier effect?

3.3.1. The informativeness of target prices issued with or without other products

To examine whether changes in the informativeness of target prices are related to the "regulation effect" – i.e., the effect of the SRO rulings, or the "tier effect" – i.e., the effect associated with potential loss of informativeness of recommendations because of a reduction in the number of categories used in analyst reports, we first split the sample into three subsamples, target prices issued with recommendations, target prices issued with earnings forecasts and target prices issued as a standalone product. Target prices can be issued with recommendations only or as part of a full-fledge report that also includes earnings forecasts. We include the latter category in the sample of target prices issued with recommendations because the tier effect can only affect the informativeness of target prices when these are issued simultaneously with recommendations. Following prior research (Brav and Lehavy 2003; Asquith et al. 2005; Bradshaw et al. 2013) we include controls for the effects of the informativeness of other analyst signals simultaneously released with target prices as shown in Equation (2) below:

$$BHAR[-1,+1] = \alpha_1 TPER + \beta_1 UPGR + \beta_2 DNGR + \beta_{3a} REIT\_FAV + \beta_{3b} REIT\_UNFAV + \gamma_1 \Delta EF + \delta_i CONTROLS \quad (2)$$

UPGR (*DNGR*) is an indicator variable that equals one if the analyst upgraded (downgraded) the stock compared to his/her previous recommendation and zero otherwise.[16] The model also includes the variable *REIT_FAV (REIT_UNFAV)* that equals one for reiterations to "buy" and "strong buy" ("hold" and "sell") and zero otherwise. Because the included recommendation variables span all possible categorizations, the intercepts in the models are suppressed.

ΔEF is the earnings forecast revision computed as the difference between the annual earnings forecast released with the target price and the most recent earnings forecast issued by the same analyst for the same firm and period end date, deflated by the absolute value of the previous earnings forecast.

[16] If there is no outstanding prior recommendation within the last two years, *UPGR* equals one for initiations to "Buy" and "Strong buy" and *DNGR* the value of one for initiations to "Hold," "Sell" and "Strong Sell". We also estimate Equation (2) by separating initiations from recommendation revisions with similar inferences.

For this measure we compute the revision in the annual earnings forecast that is common in both reports that has the shortest horizon (IBES FPI code 1 or 2). [17]

We estimate Equation (2) for the subsample of observations for which target prices are released simultaneously with recommendations, with or without earnings forecasts.[18] We estimate a version of Equation (2) separately for the subsample of observations for which target prices are issued with only earnings forecasts by excluding the recommendation related variables. For the subsample relating to standalone target prices, we estimate Equation (1).

The regulation effect is consistent with an increase in the coefficients on *TPER* in the post-period across all three subsamples whereas the tier effect is consistent with an increase only in the group of target prices issued with recommendations. That is, an increase in informativeness of target prices in the post-period for subsamples that do not include the simultaneous release of target prices and recommendations cannot be attributable to a loss of information in recommendations, and thus is not consistent with the tier effect.

3.3.2. Target price Bias and Error for target prices issued with and without recommendations

We next examine whether the effect of the rules on target price bias and error is related to the regulation or the tier effect. If target price bias and error are reduced because of the regulation's success in mitigating analyst conflicts of interest and enhanced disclosure requirements, then this reduction should be evident for target prices issued with or without a contemporaneous recommendation. On the other hand, if target price increased informativeness stems from the loss in the information content of recommendations, following the move to coarser rating systems, then the optimism and error of target prices should either be unaffected or reduced but only for the subsample of target prices issued with recommendations.

[17] Untabulated findings from estimations in which we measure earnings surprise based on the consensus earnings forecast yield the same inferences as those based on tabulated findings.

[18] When the target price is released with a stock recommendation only, ΔEF is set to zero. We also estimated Equation (2) using four groups by splitting the sample of target prices issued with recommendations into target prices issued with recommendations only and target prices in full-fledged reports. i.e., issued with both recommendations and earnings forecasts. Untabulated findings reveal the same inferences as those based on three groups.

To disentangle the regulation from the tier effect on analyst target price bias and error we estimate Equation (3) in which we pool observations from the pre- and post-periods together and interact *POST* with two additional indicator variables. The first, *With_REC*, equals one if the target price is issued along with a recommendation and zero otherwise, and the second, *With_EF*, equals one if the target price is issued along with an earnings forecast (but without a recommendation) and zero otherwise:

$$TP\_Bias(or\ TP\_Error) = \alpha_0 + \alpha_1 POST + \alpha_{2a} POST \times With\_EF$$
$$+\alpha_{2b} POST \times With\_REC + \alpha_{3a} With\_EF + \alpha_{3b} With\_Rec + \beta_i CONTROLS \quad (3)$$

If the regulation effect is present, α_1, $\alpha_1 + \alpha_{2a}$ and $\alpha_1 + \alpha_{2b}$ are less than zero. In contrast, if the tier effect is present only α_{2b} is less than zero.

3.3.3 Restricted Samples

To provide more direct evidence on the differential effects, if any, of the regulation and the tier effect on the informativeness of target prices, we further partition our sample into smaller groups utilizing the date, if any, that each brokerage changed its recommendation rating system. To assess whether the regulation effect is present, we restrict our post-regulation sample of target prices to those issued by brokers that did not change their recommendation rating systems or to those issued before the broker's transition date to the new rating system and re-estimate Equation (2). This design allows us to eliminate the effects that stem from the change in the tier system and isolate the regulation effect. If the documented increase in target price informativeness is related to the regulation effect then the value relevance of target prices issued in the post-regulation period and before the switch to a three-tier system should be greater than the value relevance of target prices in the pre-regulation period. Importantly this increase should be observed for target prices issued with and without a stock recommendation. To match better the pre- and post-regulation samples we restrict the sample to target prices issued by brokerages that appear in both periods.[19]

[19] The short period of time that typically elapses between the passage of the rule and the switch to a three-tier system, the number of observations in the post-regulation period for this analysis is relatively smaller compared to the sample used for our main analyses without the imposed restriction. As a result, it is possible that the composition of the pre- and post-regulation samples may be substantially different, thereby confounding our inferences.

To examine whether the increase in the informativeness of target prices is the result of the migration to a three-tier rating system, we restrict our sample to target prices issued in the post-regulation period by brokerages that switched to the new recommendation rating system following the implementation of the rules.[20] Because the tier effect only relates to target prices issued in the post-regulation period, any change in the value relevance of target prices around the brokerage's rating system change can only be attributed to the tier effect. If the tier effect is present, only target prices that are issued along with stock recommendations should exhibit greater value relevance in the post-tier period.

4. SAMPLE AND DATA

We conduct our tests using all available target prices on IBES for the period November 1, 2000, to December 31, 2006. We begin our sample period in November 2000 to avoid changes in the informativeness of analyst reports relating to the passage of Reg FD. Because the implementation of the rules was in three phases, July 9, 2002, September 9, 2002, and November 6, 2002, we follow related research and assign September 9, 2002, as the beginning of our post-period because most relevant changes and disclosures had to be carried out starting on this date (Barber et al. 2006; Kadan et al. 2009). We end the sample period in December of 2006 to avoid potential confounding effects of the financial crisis and to ensure that the pre- and post-regulation periods are comparable in terms of length.[21]

We obtain analyst recommendations, target prices, earnings forecasts, and analyst following from the Institutional Brokers Estimate System (IBES), stock prices, returns, and market data from the Center for Research in Security Prices (CRSP), and institutional ownership information from Thomson Reuters (13F) Institutional Holdings, and accounting data from COMPUSTAT North America. We discern the rating systems of each broker and the date of the switch (if any) to a three-tier system by retrieving analyst reports from Thomson Reuters' EIKON.

[20] This is necessary to ensure the comparability of the two samples, because of the small number of target prices issued in the post-regulation period before the switch to a three-tier system.

[21] We also conducted our tests removing all observations in the period from July 9, 2002, the beginning of regulatory reforms, to April 28, 2003, the end of regulatory reforms, and redefining our post-period to start after the last regulatory reform marked by the Global Settlement. Untabulated findings from tests based on this sample yield the same inferences as those based on tabulated findings.

Table 1, Panel A shows our sample construction procedure. Our initial sample of 338,877 target prices comprises of all target prices with a twelve-month horizon, which are not issued for closed-end funds, investment trusts and unit exchange trade funds, and those that accompany recommendations that are re-issued after the change to a new recommendation rating system (Ljungqvist, Malloy, and Marston 2009; Kadan et al. 2009).[22] Following related research we include target prices issued by brokerage firms with more than 400 recommendations issued in our entire sample period. Data requirements to compute abnormal returns on the announcement of the target price further reduce the sample to 261,695 observations. We further impose the restriction that *TPER* is less than or equal to 1, to mitigate the influence of extreme observations (1.748% of the sample). Additional data requirements to compute the control variables result in a final sample of 216,613 observations. We winsorize continuous control variables at the 1% and 99% levels.

Panel B presents the distribution of target prices across report types. For the entire period, 15.3% of our sample target prices are issued with recommendations, 30.5% are issued as standalone, while the majority are issued with contemporaneous earnings forecasts (54.1%). There is a shift in the post-period of less standalone target prices (47.3% in the pre- vs. 25.8% in the post-period) and an equivalent increase to target prices issued with earnings forecasts (38.8% in the pre- vs. 58.4% in the post-period). Because prior research shows that more accurate contemporaneous earnings forecasts are associated with more accurate target prices (Gleason, Bruce Johnson, and Li 2013), the increase in the proportion of target prices issued with earnings forecasts in the post-regulation period is consistent with the expectation that the SRO rules increased the reliability of target prices.

Table 2 presents descriptive statistics for all variables used in the analyses separately for the pre- and post-regulation sub-periods. The table also presents differences in the means and medians of each variable across the two periods along with their statistical significance. Although the statistics indicate a significant increase in the informativeness of target prices based on means, the median difference suggests a decrease in informativeness, albeit weaker. Results in this table also suggest a significant decrease in both target price bias and error in the post-period. The effect of the rules on target price bias

[22] Consistent with prior research we find that most brokers transitioned to a three-tier system in 2002.

is more striking as the evidence suggests that bias is virtually eliminated in the post-period, with a negative mean value of target price bias and a median of zero. Together these results provide preliminary support for the success of the rules in reducing analyst conflicts of interest.

The statistics also suggest that in the post-period firms exhibit lower leverage and higher book-to-market ratios, ROA, and levels of institutional ownership. In addition, market momentum is significantly greater and market volatility is significantly lower in the post-regulation period.

5. RESULTS

5.1. The effect of SRO rulings on target price informativeness, bias and error

Table 3 presents regression summary statistics from estimating Equation (1). As expected in both the pre- and post-regulation period the coefficient on *TPER* is positive and statistically significant, suggesting that the market reacts more positively when analysts expect a greater increase in the firm's price. Most importantly, the evidence also indicates that the informativeness of target prices is significantly higher in the post-regulation period, as evidenced by the significantly positive difference between the post- and pre-period *TPER* coefficients.[23] This difference is economically significant as well, with the coefficient on *TPER* in the post-period being more than four times the respective coefficient in the pre-period. Specifically, whereas a 10% percent increase in *TPER* increases the abnormal return by 0.176% in the pre-period, the same increase in the post-period increases abnormal returns by 0.569%.

Regarding the control variables, findings in Table 3 indicate that firm momentum, book-to-market, and *ROA* are positively associated with event returns in both periods. In addition, target prices issued by larger brokerages and for firms with more positive market momentum elicit higher returns but only in the post-regulation period. Analyst following, institutional ownership, and firm size coefficients are not statistically significant in any period.

Panel B presents results when the dependent variable is target price bias and error. The coefficient on *POST* is negative and statistically significant in both models suggesting that in the post-regulation period target prices are both less optimistically biased and more accurate. Consistent with the univariate

[23] Throughout we use a five percent significance level under a two-sided alternative.

evidence in Table 2, the *F*-tests indicate that in the post-period the bias in target prices is eliminated. Together the evidence in Table 3 suggests that reliability of target prices increased in the post-regulation period.

5.2. Is increased informativeness related to the regulation or tier effect?

5.2.1. Target prices issued with and without recommendations

Table 4, Panels A and B, present regression summary statistics from estimation of Equations (2) and (3). Results in Panel A, indicate that there is an increase in the informativeness of target prices in the post-regulation period for all three different subsamples of target prices. The difference in the *TPER* coefficients is not only statistically significant in all three sub-samples but economically significant as well. For example, when target prices are issued with recommendations they are twice as informative in the post- than the pre-regulation period. These results are consistent with the regulation effect. However, this evidence does not rule out the possibility that the tier effect may still be partially responsible for the documented increase in the informativeness of target prices issued with recommendations. We address this possibility in section 5.2.2.

Results also suggest that earnings forecasts also exhibit greater value relevance in the post-regulation period but this result is obtained when they are released with target prices but not in the presence of stock recommendations. Interestingly, recommendation revisions do not exhibit changes in their informativeness across the two periods. This result is inconsistent with the findings in Kadan et al. (2009), which documents that favorable (unfavorable) recommendations exhibit increased (decreased) informativeness. We address this inconsistency in section 6.3.

To corroborate the above evidence, we next examine the effect of the regulation on target price bias and error across our three sub-samples by estimating Equation (3). Results in Panel B suggest that the decrease in target price bias and error is significant for all three sub-samples. Specifically, the negative and statistically significant coefficient on *POST* suggests that bias and error are reduced in the post-regulation period for standalone target prices. The insignificant coefficients on the interactions of *POST* with *With_EF* and *With_REC* suggest that the effect of the regulation on target prices issued with

earnings forecasts or recommendations is not different from its effect on target prices issued alone.[24] These results are supported by the significant *F*-statistics on the sum of *POST* and its interactions. Because the decrease in target price bias and error is also present for the subgroups of target prices not issued with recommendations, we conclude that our results are not consistent with the tier effect. Instead, our results suggest that the SRO rulings were successful in reducing analyst conflicts of interest, increasing target price informativeness, and reducing their bias and error, all of which support the regulation effect. The latter result is especially worth noting given that increasing the accuracy of target prices was not an explicit objective of the rules.

5.2.2. Isolating the regulation from the tier effect

Although Table 4 results provide strong support for the regulation effect, the documented increase in informativeness and reduction in bias and error for target prices not issued with recommendations can still be affected, at least to some extent, by the tier effect. To better isolate the regulation from the tier effect we re-estimate Equation (2) separately for the regulation (Table 5, Panel A) and the tier sample (Table 5, Panel B).[25] Results presented in Panel A of Table 5 reveal an increase in the informativeness of target prices issued in the post-regulation before the brokerages' switch to a three-tier system for all three sub-groups, providing further support for the regulation effect. In contrast, results presented in Panel B do not provide any evidence to support that target prices, issued in the post-regulation period, are more informative when they are issued under a coarser rating system (*TIER3*=1). Taken together, Table 5 results provide support for the regulation effect but not for the tier effect.

6. ADDITIONAL ANALYSES

6.1. Sensitivity analyses

To reduce the likelihood that our results are affected by other contemporaneous events either in our pre- or post-regulation periods, we perform two additional analyses. First, to ensure that the documented increase in informativeness of target prices is not affected by other confounding events in

[24] We also estimated the bias and error regressions separately for the two sub-periods for each of the three target–price groups, comparing the difference in the models' intercepts. Untabulated findings reveal the same inferences as those based on tabulated findings.

[25] Due to the short period of time that typically elapses between the passage of the rule and the switch to a three-tier system and the need to ensure the comparability of the samples the number of observations for these analyses is small and results should be interpreted with caution.

the post-regulation period, we extend our sample period to 2017 and compare the relation between *TPER* and returns between our original post-regulation period (*RECENT* = 0) with that for the more recent period of 2007–2017 (*RECENT* = 1).[26] If the increased informativeness of target prices is not permanent, it is likely that their informativeness will decline in the most recent period. Table 6 presents results separately for all three target price subsamples. The evidence suggests that there is no statistical difference in the relation between *TPER* and returns between the two periods, thereby increasing our confidence that our inferences are not confounded by factors present in our original post-regulation period for which we were not able to account.

Second, because our pre-regulation period largely coincides with the dotcom crisis period, and although our estimations include controls for market volatility and momentum, there is a possibility that the increased informativeness we document is the result of the lower informativeness in our pre-regulation period (Bradshaw 2009). Ideally, we would eliminate the dotcom bubble period from our sample and re-conduct our tests. However, doing so would essentially eliminate our pre-regulation sample. As an alternative, we compare the informativeness of target prices issued during the dotcom crisis (pre-regulation) and the 2008 financial crisis (post-regulation period), under the assumption that the effects of the two crises on the value relevance of target prices are similar. We define the dotcom downturn period from March 2001 to the end of our pre-regulation period, (*Crisis_Post* = 0)[27] and the financial crisis period from December 2007 to June 2009 (*Crisis_Post* = 1)[28]. Results from estimations of Equation (1) presented in Table 7 show that the *TPER* coefficient is statistically more positive in the financial than the dotcom crisis. Untabulated findings based on using all of our pre-regulation sample results in similar inferences.

Finally, we estimate various specifications of Equation (1) using a number of different return metrics to assess the robustness of our inferences. Specifically, we estimate our regressions (i) using CRSP size-adjusted returns, (ii) using cumulative abnormal returns (CARs), (iii) removing observations

[26] For this analysis we remove observations in the financial crisis, i.e., from December 1st, 2007 to June 30th, 2009.
[27] According to NBER the dotcom downturn originally spanned the months of March to November 2001, but although the market indices subsequently recovered, they started declining again in March 2002 with sharp declines in July and August, 2002. (https://www.nber.org/research/data/us-business-cycle-expansions-and-contractions).
[28] National Bureau of Economic Research (NBER) https://www.nber.org/cycles.html

with confounding events, (iv) separating initiations from recommendation revisions, (v) splitting the recommendations sample into target prices issued in full-fledged reports from target prices issued only with stock recommendations, (vi) replacing *ΔEF* with the difference between the earnings forecast and the consensus forecast, (vii) removing the regulation transition period i.e. from July 9, 2002, to April 28, 2003, from the post-regulation period, (viii) setting the post-regulation period to start on the first date of the phase-in implementation, i.e., on July 9, 2002, (ix) adding year and analyst fixed effects, or year and broker fixed effects in the models, (x) keeping the same firm-analyst pairs in both periods and (xi) shortening the post-period to the end of 2004 to match better with the pre-period. Untabulated findings from these estimations yield the same inferences as those based on Table 3 findings.

Taken together, our results provide strong and consistent evidence that the increased informativeness of target prices in the post-regulation period can be attributed to the specific provisions of the SRO rulings and related regulations that insulated the research from the investment banking department and required a number of additional disclosures in analyst reports, increasing in turn the reliability of analyst research.

6.2. Further validation analysis

Our results show that the reliability of target prices increases following the implementation of the SRO rules. In addition, our evidence overwhelmingly supports the inference that the increased reliability of target prices is associated with the implementation of the SRO rules and not the result of the tier effect. In this section, we provide additional evidence in support of this conclusion by examining whether analyst conflicts of interest are indeed reduced in the post-SRO period. Following Dechow and You (2020), we use three proxies for analyst incentives to bias target prices: (a) the firm's need for external financing (*Ext_Fin*) that is associated with investment banking pressures for optimism, (b) firm trading volume (*Volume*) that influences the ability of the brokerage to earn trading commissions, and (c) firm institutional ownership (*Inst_Ownership*) that reflects analyst reputation, mitigating the incentive to bias target prices.

Following Chen and Chen (2009) and Dechow and You (2020), we collapse our observations at the firm level.[29] At the end of each month, we compute the monthly consensus target price for each firm as the average of target prices issued during that month, *Mean_TPER*. We then estimate the following (pooled) regression model:

$$\begin{aligned} Mean\_TPER = {} & \alpha_0 + \beta_0 POST + \beta_{1a} Ext\_Fin + \beta_{1b} Ext\_Fin \times POST \\ & + \beta_{2a} Volume + \beta_{2b} Volume \times POST + \beta_{3a} Inst\_Ownership \\ & + \beta_{3b} Inst\_Ownership \times POST + \delta_i Controls \end{aligned} \quad (4)$$

where, *Ext_Fin* is external financing in the most recent fiscal year ending before the consensus *TPER* date and *Volume* is the standardized measure of ranked dollar volume over the last 12 months (see the Appendix for a detailed definition of these variables). Following Dechow and You (2020), we expect analysts to optimistically bias target prices when they anticipate investment banking business from firms seeking external financing. However, we expect this conflict of interest to be weakened following the implementation of the SRO rulings, which explicitly targeted this incentive. Thus, we predict $\beta_{1a} > 0$ and $\beta_{1b} < 0$. We have no predictions regarding the effects of the SRO rulings on *Volume* and *Inst_Ownership*. The remaining variables are as defined earlier.

Regression results for Equation (4) appear in Table 8. Column (1) shows the model without the interaction of the incentive variables with *POST* and results are similar to those in Dechow and You (2020). Importantly, the coefficient on *POST* is negative and significant, indicating that optimism in the consensus value of *TPER* is smaller after the implementation of SRO rulings. Column (2) presents results after interacting the job-related incentives with *POST*. The coefficient on *POST* is significantly negative, indicating less optimism in target prices after the SRO rulings. Importantly, as predicted, the effect of the financing incentive is smaller in the post-SRO period as reflected by the significantly negative *Ext_Fin* × *POST* coefficient.[30] We also find that the monitoring role of institutional investors decreases in the post-SRO period, as reflected by the significantly positive coefficient on

[29] Chen and Chen (2009) examines external financing and trading incentives with regards to recommendations before and after the SRO rules.

[30] Chen and Chen (2009) measures external financing at the first fiscal year after the estimation of consensus recommendation date, so that it is as a proxy for the expected future net external financing. Inferences based on untabulated findings from analyses in which we measure external financing as in Chen and Chen (2009) reveal that future external financing is positively related to consensus *TPER* and that this relation is weakened after the implementation of SRO rulings.

Inst_Owneship × *POST*, consistent with reduced analyst conflicts rendering monitoring by institutional owners less relevant in the post-regulation period.

6.3. Revisiting the change in the informativeness of recommendations

In this section we examine whether our inability to document any change in the informativeness of stock recommendations—a result that is inconsistent with the findings in Kadan et al. (2009)—is sample-, period-, and model- specific. Using the Kadan et al. (2009) measure of returns and explanatory variables (including levels instead of changes in recommendations), we replicate the increase (decrease) in the informativeness of favorable (neutral) recommendations, but not the decrease in the informativeness of unfavorable recommendations (untabulated). Importantly, we also find that controlling for the contemporaneous release of target prices completely subsumes the effect of favorable recommendations, while the inclusion of more control variables in the model also diminishes the significance of neutral recommendations. Our evidence thus suggests that results of prior research may be sensitive to not controlling for the effect of contemporaneously released target prices. Based on these findings, we conclude that, at least for our sample, the increase (decrease) in the informativeness of favorable (neutral) recommendations in the post-regulation period is not robust to different model specifications. Notably, in all these alternative specification models we continue to document a significant increase in the informativeness of target prices, providing further assurance for the validity of our main results.

7. CONCLUSIONS

This study examines the impact of the SRO rulings, (NASD Rule 2711 and NYSE Rule 472) on the informativeness of target prices. These rules are intended to mitigate analyst conflicts of interest by insulating the research from the investment banking department and by imposing additional disclosure requirements for analyst reports, including explicit provisions pertaining to target prices. Although related research examined the effect of these rules on stock recommendations, their effect on target prices has not been examined. This is an important research question given the increasing relevance of target prices in shaping investor trading strategies and market expectations, and given that the effect of the rules on the information content of target prices cannot be inferred from their effect on stock

recommendations or other analyst products. Examining the effect of the SRO rulings on target prices also allows us to examine directly whether any increase in target price informativeness is related to the implementation of the rules themselves (the *regulation* effect), or the concurrent migration of most brokerages to a coarser rating system (the *tier* effect). This is important because disentangling the two effects for stock recommendations is not possible, suggesting that previous research results cannot be unequivocally attributed to the regulation effect.

Our findings suggest that in the port-regulation period target prices exhibit a statistically and economically significant increase in their value relevance. We corroborate this finding by providing evidence that in the post-SRO period the bias in target prices is reduced, if not completely eliminated. We also find a reduction in target price forecast error, suggesting that the additional disclosure requirements resulted in an important, albeit, unintended benefit. We also perform a series of tests to examine which of the two effects is a more likely explanation for our results. Our results provide strong and consistent evidence in support of the regulation effect but we do not find evidence in support of the tier effect. This is an important result because it suggests that the documented increase in target price reliability represents a permanent change in the regulatory environment that cannot be reversed if brokers decide to revert back to a five-tier rating system. Thus, the evidence in this study should be of particular importance to regulators as they evaluate the efficacy of past rules in improving the functioning of capital markets.

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APPENDIX

This table presents variable definitions and sources of data

Dependent Variable	Variable Name	Variable Description and Data Sources
BHAR	*Buy-and-Hold Abnormal Returns*	Buy-and-hold returns are calculated over the three-day window $[-1,+1]$ for a firm *j* where day zero is the report release date. Abnormal returns are estimated based on the four-factor Fama and French model (FF4-returns). Estimation period is 60 monthly returns in the period $[-60,-1]$. Data Source: CRSP
$TP\_Bias = \frac{TP_t - Price_{t+365}}{Price_{t-1}}$	*Target price Bias*	Is the difference between the analyst's target price (TP) and the stock price (Price) a year after the issuance of the target price deflated by the stock price one day before the release of the target price. Data Sources: IBES, CRSP
$TP\_Error = \lvert TP\_Bias \rvert$	*Target price Error*	Is the absolute value of target price bias Data Sources: IBES, CRSP
Main Independent Variable	**Variable Name**	**Variable Description and Data Sources**
$TPER = \frac{TP_t - Price_{t-1}}{Price_{t-1}}$	*Target Price Expected Return*	The target price (TP) estimate reflects the analyst's opinion about the price level the stock is likely to achieve during the subsequent 12-month period. $Price_{t-1}$ is the closing price of the stock the day before the release of the target price. Data Sources: IBES, CRSP
$\Delta EF = \frac{EF_t - EF_{t-1}}{EF_{t-1}}$	*Change in Earnings Forecast*	Is the difference between the annual earnings per share forecast, EF_t, and the previous earnings per share forecast, EF_{t-1}, issued by the same analyst for the same firm and the same period end date (IBES FPI code 1 or 2). In the subsample of target prices with recommendations, if *ΔEF* is missing then it is set to zero. Data Source: IBES
UPGR / DNGR / REIT_FAV / REIT_UNFAV	*Recommendation Upgrades / Downgrades / Favorable Reiterations / Unfavorable Reiterations*	Indicator variables that take the value 1 if the recommendation is an upgrade or initiation to a favorable rating/ a downgrade or initiation to neutral or unfavorable ratings / a reiteration to a favorable rating / reiteration to unfavorable rating, and 0 otherwise. Data Source: IBES
Control Variable	**Variable Name**	**Variable Description and Data Sources**
Analyst_Foll	*Analyst Following*	Natural log of one plus the number of analysts that issued at least one earnings forecast for the firm during the quarter prior to the release of the target price. Data Source: IBES
Firm_Momentum	*Firm Momentum*	The six month buy-and-hold abnormal return (FF4) prior to the event i.e., $[-125.-2]$ trading days (day 0 the event day). Data Source: CRSP
Firm_Volatility	*Firm Volatility*	The standard deviation of abnormal (FF4) returns measured over the period $[-22.-2]$ trading days (day 0 the event day). Data Source: CRSP
Inst_Ownership	*% of institutional ownership*	Percentage of shares held by institutional shareholders measured at the end of the last calendar quarter before the release of the target price. Data Source: Thomson Reuters

Size	*Log Market Capitalization*	The natural logarithm of the firm market value of equity at the end of the last fiscal quarter prior to the release of the target price. Data Source: Compustat
Book-to-Market	*Log Book to Market*	The natural logarithm of the book value of equity divided by its market value at the end of the last quarter before the event. Data Source: Compustat
ROA	*Return on Assets*	The ratio of net income to total assets at the end of the last fiscal quarter prior to the release of the target price. Data Source: Compustat
Leverage	*Leverage*	The ratio of total liabilities to owners' equity at the end of the last fiscal quarter prior to the release of the target price. Data Source: Compustat
MKT_Momentum	*Market Momentum*	The cumulative value-weighted market return six months prior to the release of the target price. Data Source: CRSP
MKT_Volatility	*Market volatility*	The standard deviation of the S&P 500 index daily returns one month prior to the release of the target price. Data Source: CRSP
Broker_Size	*Broker Size*	The natural logarithm of one plus the number of analysts employed by the brokerage firm in the last 12-month period. Data Source: IBES
Analyst_Exp	*Analyst Experience*	The natural logarithm of one plus the number of quarters the analyst has appeared in IBES. Data Source: IBES

Indicator Variable	**Variable Name**	**Variable Description and Data Sources**
POST	*Post-regulation period*	Takes the value 1 if the target price is announced in September 9, 2002 – December 31, 2006, and the value 0 if in November 1, 2000 – September 8, 2002.
TIER3	*3-Tier Rating System*	Takes the value 1 if the broker's recommendation system at the time when target price is issued is a 3-Tier rating system, and 0 if a 4 or 5-tier system.
Conf_Event	*Confounding Events*	Takes the value 1 if within the event window $[-1, +1]$ there is another firm-specific event and 0 otherwise. Data Source: Compustat, IBES, RavenPack
With_REC	*Has recommendation indicator*	Takes the value 1 if the target price is issued with a recommendation, or a recommendation and earnings forecasts, and 0 otherwise.
With_EF	*Has earnings forecast indicator*	Takes the value 1 if the target price is issued with earnings forecasts (without a recommendation), and 0 otherwise.
RECENT	*Recent period*	Takes the value 1 if the period is from January 1, 2007, to December 31, 2017 (excluding the financial crisis period i.e., December 1, 2007, to June 30, 2009), and 0 if from September 9, 2002, to December 31, 2006.
Crisis_Post	*Crisis Period*	Takes the value 1 if the period is from December 1, 2007, to June 30, 2009, and the value 0 if from March 1, 2001, to September 8, 2002.

Monthly Regression	**Variable Name**	**Variable Description and Data Sources**
Mean_TPER	*Monthly consensus TPER*	Estimated at the end of each month as the simple average of all *TPER* (defined above) issued during that month. Data Source: IBES
Volume	*Trading Volume*	The dollar trading volume over the past 12 months, sorted into 100 percentiles (NYSE/AMEX and NASDAQ separately) and

		standardized to range from 0 to 1; as calculated by Dechow and You (2020). Data Source: CRSP
Ext_Fin	*External Financing*	External financing of the most recent fiscal year that ends before the current month and calculated as the amount of external financing scaled by assets, specifically using COMPUSTAT variables 2(SSTK – PRSTKC – DV + DLTIS – DLTR + DLCCH) / (AT + lagged AT); as in Bradshaw et al. (2006) and Dechow and You (2020). Data Source: Compustat annual

Figure 1: Typical disclosure items required by the SRO rulings

This figure provides an excerpt from an analyst report about the required disclosure items after the implementation of the new rules. The typical forecasts that may be included in an analyst's report are a recommendation, a target price, and an EPS estimate.

Panel A: The SRO rulings require disclosure on each report of the recommendation definitions and their distribution in each of three categories

CREDIT SUISSE

DTE Energy (DTE)

INITIATION

Motown Mojo

Rating	**NEUTRAL**
Price (20-Jan-17, US$)	98.40
Target price (US$)	102.00
52-week price range (US$)	100.10 - 81.70
Market cap (US$ m)	17,656

Target price is for 12 months.

- **Initiating at Neutral:** We initiate coverage of DTE with a Neutral rating and $102 target price, emphasizing above-average 5-7% long-term EPS growth, 7% dividend growth through 2019, a solid balance sheet, and favorable regulation in Michigan (now largely priced in). The Pipeline and Gathering segment (15% of earnings) is targeting a 12.5% earnings CAGR with upside from relatively low-capital expansions and is strategically located in the heart of the Marcellus/Utica shales with access to Northern and Southern markets.
- **Estimates and Valuation:** We forecast FY 2016-18 EPS of $5.28, $5.32, and $5.68, respectively. Our $102 target price equates to a 17.9x 2018 P/E multiple, representing an implied upside of 4% and an implied yield of 2.9%.

As of December 10, 2012 Analysts' stock rating are defined as follows:

Outperform (O) : The stock's total return is expected to outperform the relevant benchmark* over the next 12 months.
Neutral (N) : The stock's total return is expected to be in line with the relevant benchmark* over the next 12 months.
Underperform (U) : The stock's total return is expected to underperform the relevant benchmark* over the next 12 months.

**Relevant benchmark by region: As of 10th December 2012, Japanese ratings are based on a stock's total return relative to the analyst's coverage universe which consists of all companies covered by the analyst within the relevant sector, with Outperforms representing the most attractive, Neutrals the less attractive, and Underperforms the least attractive investment opportunities. As of 2nd October 2012, U.S. and Canadian as well as European ratings are based on a stock's total return relative to the analyst's coverage universe which consists of all companies covered by the analyst within the relevant sector, with Outperforms representing the most attractive, Neutrals the less attractive, and Underperforms the least attractive investment opportunities. For Latin American and non-Japan Asia stocks, ratings are based on a stock's total return relative to the average total return of the relevant country or regional benchmark; prior to 2nd October 2012 U.S. and Canadian*

Global Ratings Distribution

Rating	Versus universe (%)	Of which banking clients (%)
Outperform/Buy*	45%	(63% banking clients)
Neutral/Hold*	38%	(60% banking clients)
Underperform/Sell*	15%	(54% banking clients)
Restricted	3%	

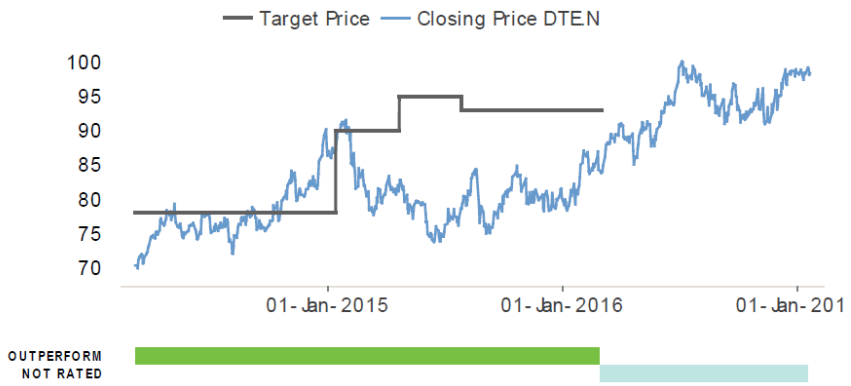
**For purposes of the NYSE and NASD ratings distribution disclosure requirements, our stock ratings of Outperform, Neutral, and Underperform most closely correspond to Buy, Hold, and Sell, respectively; however, the meanings are not the same, as our stock ratings are determined on a relative basis. (Please refer to definitions above.) An investor's decision to buy or sell a security should be based on investment objectives, current holdings, and other individual factors.*

Panel B: The SRO rulings require disclosure on each report of a chart depicting historical stock prices and target prices as well as the valuation model used to arrive to the target price estimate

3-Year Price and Rating History for DTE Energy (DTE.N)

DTE.N	Closing Price	Target Price	
Date	(US$)	(US$)	Rating
07-Mar-14	70.33	78.00	O *
13-Jan-15	87.22	90.00	
22-Apr-15	81.92	95.00	
28-Jul-15	78.62	93.00	
02-Mar-16	84.06		NR

** Asterisk signifies initiation or assumption of coverage.*



Target Price and Rating
Valuation Methodology and Risks: (12 months) for DTE Energy (DTE.N)

Method: We arrive at our $102 price target for DTE using a 2018 P/E multiple relative to the group average. We value the Detroit Edison (Electric business) using a 18.0x 2018 P/E multiple, representing a 1.5x premium to the group to reflect the upside opportunities in the business along with the constructive regulatory environment in the state. We value the MichCon (Gas) business using a 20x 2018 P/E multiple, representing a 1.5x premium to the broader gas LDC group to reflect the upside capex opportunity along with the strong legislative and regulatory backdrop for the company. We also value the non-utility businesses on an EV/EBITDA basis, assigning a premium to the gas storage and pipelines segment, with a 9x 2018 EV/EBITDA multiple. Our Neutral rating for DTE reflects a forecasted total return in line with the group average.

Risk: Risks to our $102 price target and Neutral rating for DTE are 1) oil and gas industry risk in the Marcellus/Utica, 2) implementation risk around the recently passed Michigan legislation, 3) FERC approval of MISO capacity auction reform, 4) regulatory risk, 5) commodity risk, 6) derivative risk, 7) load growth risk, 8) weather risk, 9) environmental and climate change risk, 10) physical infrastructure and cyber security risk

Table 1: Sample Selection

Panel A presents our sample construction process. Panel B presents the distribution of our final sample of target prices across four groups: Target prices issued only with earnings forecasts (*With Earnings Forecasts*), target prices issued only with a stock recommendation (*With Recommendations*), target prices issued with a stock recommendation and earnings forecasts (*With Recommendations and Earnings Forecasts*) and target prices issued alone (*Standalone*). *POST* takes the value 0 if the target price was released in the pre-regulation period and 1 in the post-regulation period.

Panel A: Subsamples of analyst recommendations based on the inclusion of target prices and/or earnings forecasts

	Full Sample		**POST=0**		**POST=1**	
Analysts' Reports Items	**N**	**%**	**N**	**%**	**N**	**%**
Initial sample of target prices in the period	338,877	100.0%	79,867	100.0%	259,010	100.0%
Data from brokers with more than 400 recommendations	311,363	91.9%	76,272	95.5%	235,091	90.8%
With return data	261,695	77.2%	58,951	73.8%	202,744	78.3%
With TPER <1	257,121	75.9%	56,362	70.6%	200,759	77.5%
With IBES data to compute related variables	237,633	70.1%	52,338	65.5%	185,295	71.5%
With Compustat data to compute related variables	217,548	64.2%	47,484	59.5%	170,064	65.7%
With Institutional Ownership data	216,613	63.9%	47,442	59.4%	169,171	65.3%
Final sample	**216,613**		**47,442**		**169,171**	

Panel B: Distribution of Target Price sample per report type

Standalone	66,152	30.5%	22,430	47.3%	43,722	25.8%
With Earnings Forecasts	117,230	54.1%	18,409	38.8%	98,821	58.4%
With Recommendations	11,076	5.1%	3,025	6.4%	8,051	4.8%
With Recommendations and Earnings Forecasts	22,155	10.2%	3,578	7.5%	18,577	11.0%
Final sample	**216,613**		**47,442**		**169,171**	

Table 2: Descriptive Statistics

This table provides descriptive statistics for the variables used in this study separately for the pre- and post-regulation periods along with the difference in means and medians across the two periods, tested for statistical significance based on a t-test and the Wilcoxon test, respectively. *POST* takes the value 0 if the target price was released in the pre-regulation period and 1 in the post-regulation period. *BHAR* is the three-day buy-and-hold abnormal return based on the Fama-French four factor model, centered around the release of the target price. *TP_Bias* is the difference between the target price issued on day t and the actual stock price on t+365 deflated by the stock price on t-1. *TP_Error* is the absolute value of *TP_Bias*. *TPER* is the difference between the target price issued on day t and the price of the stock on t-1, deflated by the price at t-1. *ΔEF* is the revision of the analyst's earnings forecast. *Firm_Momentum* is the six month buy-and-hold abnormal return prior to the event. *Firm_Volatility* is the standard deviation of abnormal returns in the month prior to the event. *Inst_Ownership* is the percentage of shares held by institutional investors. *Analyst_Foll* is the natural log of one plus the number of analysts following the firm. *Size* is the natural log of the market value of equity. *Book-to-Market* is the natural log of the book value of equity divided by market value. *ROA* is net income divided by total assets. *Leverage* is total liabilities divided by owners' equity. *MKT_Momentum* is cumulative market return six months prior to the event. *MKT_Volatility* is the standard deviation of market returns one month prior to the event. *Broker_Size* is the natural log of the one plus the number of analysts employed by the brokerage in the last twelve months. *Analyst_Exp* is the natural log of one plus the number of quarters the analyst appeared in IBES. Refer to Appendix for more detailed definitions of variable measurements. *, **, *** denote significance at the 10%, 5% and 1% level, respectively.

	POST = 0						POST = 1						Mean	Median
Variable Name	**N**	**Mean**	**Std Dev**	**25th Pctl**	**Median**	**75th Pctl**	**N**	**Mean**	**Std Dev**	**25th Pctl**	**Median**	**75th Pctl**	**Diff**	**Diff**
BHAR	47,442	-0.004	0.080	-0.035	0.001	0.035	169,171	0.000	0.069	-0.028	0.001	0.031	0.003***	-0.001*
TP_Bias	46,116	0.309	0.430	0.046	0.291	0.578	162,366	-0.026	0.404	-0.220	0.000	0.210	-0.335***	-0.291***
TP_Error	46,116	0.426	0.340	0.158	0.343	0.613	162,366	0.297	0.283	0.096	0.215	0.404	-0.129***	-0.129***
TPER	47,442	0.242	0.220	0.112	0.207	0.342	169,171	0.150	0.185	0.045	0.139	0.236	-0.091***	-0.069***
Firm_ Momentum	47,442	-0.027	0.306	-0.194	-0.019	0.139	169,171	-0.051	0.249	-0.185	-0.045	0.080	-0.024***	-0.027***
Firm_Volatility	47,442	0.029	0.016	0.018	0.025	0.036	169,171	0.019	0.010	0.012	0.016	0.023	-0.010***	-0.009***
Analyst_Foll	47,442	2.547	0.627	2.197	2.639	3.045	169,171	2.547	0.632	2.197	2.639	3.045	0.001	0.000
Inst_Ownership	47,442	0.640	0.202	0.515	0.665	0.792	169,171	0.691	0.226	0.567	0.730	0.850	0.051***	0.066***
Size	47,442	8.087	1.702	6.850	8.019	9.214	169,171	8.016	1.624	6.840	7.958	9.178	-0.070***	-0.061***
Book-to-Market	47,442	-1.069	0.709	-1.511	-0.988	-0.580	169,171	-0.997	0.619	-1.363	-0.936	-0.568	0.073***	0.052***
ROA	47,442	0.007	0.032	0.002	0.009	0.021	169,171	0.013	0.026	0.003	0.013	0.025	0.006***	0.004***
Leverage	47,442	1.117	1.879	0.142	0.556	1.219	169,171	0.995	1.850	0.086	0.443	1.029	-0.122***	-0.113***
MKT_Momentum	47,442	-0.078	0.083	-0.114	-0.077	-0.037	169,171	0.054	0.084	0.022	0.062	0.098	0.131***	0.139***
MKT_ Volatility	47,442	0.014	0.005	0.010	0.012	0.017	169,171	0.008	0.004	0.006	0.007	0.009	-0.006***	-0.005***
Broker_Size	47,442	4.625	0.880	3.951	4.875	5.375	169,171	4.056	0.938	3.367	4.043	4.868	-0.569***	-0.832***
Analyst_Exp	47,442	2.916	0.696	2.565	3.178	3.434	169,171	3.210	0.618	2.944	3.332	3.664	0.293***	0.154***

Table 3: The effect of SRO rulings on the informativeness of target prices

This table presents regression results on target price informativeness (Panel A) and bias and error (Panel B). In Panel A the dependent variable, *BHAR*, is the three-day buy-and-hold abnormal return based on the Fama-French four factor model, centered around the release of the target price (event). In Panel B the dependent variables are *TP_Bias* and *TP_Error*. *TP_Bias* is the difference between the target price issued on day t and the actual stock price on t+365 deflated by the stock price on t-1. *TP_Error* is the absolute value of *TP_Bias*. *POST* takes the value 0 if the target price was released in the pre-regulation period and 1 if in the post-regulation period. *TPER* is the difference between the target price issued on day t and the price of the stock on t-1, deflated by the price at t-1. *Firm_Momentum* is the six month buy-and-hold abnormal return prior to the event. *Firm_Volatility* is the standard deviation of abnormal returns in the month prior to the event. *Analyst_Foll* is the natural log of one plus the number of analysts following the firm. *Inst_Ownership* is the percentage of shares held by institutional investors. *Size* is the natural log of the market value of equity. *Book-to-Market* is the natural log of the book value of equity divided by market value. *ROA* is net income divided by total assets. *Leverage* is total liabilities divided by owners' equity. *MKT_Momentum* is cumulative market return six months prior to the event. *MKT_Volatility* is the standard deviation of market returns one month prior to the event. *Broker_Size* is the natural log of the one plus the number of analysts employed by the brokerage in the last twelve months. *Analyst_Exp* is the natural log of one plus the number of quarters the analyst appeared in IBES. *Conf_Event* takes the value 1 if there is another firm specific event in the three-day period around the event and 0 otherwise. Refer to Appendix for more detailed definitions of variable measurements. The *p*-value column displays the *p*-values of tests of differences between the coefficients in the pre- and post-periods. Standard errors (in parentheses) are robust, clustered at quarter-year, firm, and brokerage levels. *, **, *** denote statistical significance at 10%, 5% and 1% respectively.

Panel A: Comparing the informativeness of target prices in the pre- and post-SRO periods

	(1)	(2)	
	BHAR	***BHAR***	**Difference**
VARIABLES	***POST* = 0**	***POST* = 1**	**(*p*-value)**
TPER	0.0176***	0.0569***	0.0393***
	(0.0027)	(0.0057)	(0.0000)
Firm_Momentum	0.0216***	0.0241***	
	(0.0054)	(0.0047)	
Firm_Volatility	-0.1661	-0.1537*	
	(0.0973)	(0.0897)	
Analyst_Foll	0.0008	-0.0012	
	(0.0024)	(0.0009)	
Inst_Ownership	-0.0023	-0.0026	
	(0.0042)	(0.0022)	
Size	-0.0010	-0.0002	
	(0.0011)	(0.0004)	
Book-to-market	0.0064***	0.0031***	
	(0.0014)	(0.0009)	
ROA	0.1532***	0.1937***	
	(0.0312)	(0.0185)	
Leverage	0.0013***	0.0004*	
	(0.0004)	(0.0002)	
MKT_Momentum	0.0171	0.0655***	
	(0.0132)	(0.0105)	
MKT_Volatility	-0.3916	-0.1372	
	(0.2622)	(0.2608)	
Broker_Size	0.0001	0.0012***	
	(0.0007)	(0.0004)	
Analyst_Exp	0.0007	-0.0006*	
	(0.0008)	(0.0003)	
Conf_Event	-0.0061***	-0.0011	
	(0.0015)	(0.0014)	
Constant	0.0175***	-0.0024	
	(0.0059)	(0.0050)	
Observations	47,442	169,171	
Adj. R-sq.	0.0223	0.0375	

Panel B: Comparing target price bias and error in the pre- and post-SRO periods

VARIABLES	(1) TP BIAS	(2) TP ERROR
POST	-0.4397***	-0.0626**
	(0.0420)	(0.0247)
Firm_Momentum	-0.1135***	-0.0588***
	(0.0373)	(0.0194)
Firm_Volatility	3.0753**	7.4059***
	(1.2120)	(0.3306)
Analyst_Foll	-0.0342*	0.0179*
	(0.0168)	(0.0087)
Inst_Ownership	0.0780***	0.0097
	(0.0249)	(0.0217)
Size	0.0254***	-0.0185***
	(0.0088)	(0.0053)
Book-to-market	-0.0631***	-0.0142**
	(0.0122)	(0.0064)
ROA	-1.2519***	-1.0944***
	(0.2377)	(0.1471)
Leverage	-0.0067**	-0.0018
	(0.0027)	(0.0018)
MKT_Momentum	0.1429	0.0425
	(0.1208)	(0.0623)
MKT_Volatility	-18.3122***	-1.8091
	(4.0671)	(2.4078)
Broker_Size	-0.0278***	0.0019
	(0.0069)	(0.0037)
Analyst_Exp	0.0040	-0.0079**
	(0.0052)	(0.0030)
Conf_Event	0.0041	0.0090***
	(0.0068)	(0.0025)
Constant	0.3790***	0.3392***
	(0.0920)	(0.0409)
***F*-tests**		
Const + *POST* = 0	-0.0607	0.2766***
Observations	208,482	208,482
Adj. R-sq.	0.1689	0.1641

Table 4: The effect of SRO rulings on target prices issued with or without stock recommendations

This table presents results on the informativeness of target prices (Panel A) and target price bias and error (Panel B) separately for target prices issued with either a recommendation, with or without earnings forecasts (columns 1-2), target prices issued only with earnings forecasts (columns 3-4) and standalone prices (columns 5-6). In Panel A, the dependent variable, *BHAR*, is the three-day buy-and-hold abnormal return based on the Fama-French four factor model, centered around the release of the target price (event). In Panel B the dependent variables are *TP_Bias* and error, *TP_Error*. *TP_Bias* is the difference between the target price issued on day t and the actual stock price on t+365 deflated by the stock price on t-1. *TP_Error* is the absolute value of *TP_Bias*. *POST* takes the value 0 if the target price was released in the pre-regulation period and 1 if in the post-regulation period. *With_EF* takes the value 1 if the target price was issued with earnings forecasts, but not recommendations, and 0 otherwise. *With_REC* takes the value 1 if the target price was either issued with a stock recommendation or a stock recommendation and earnings forecasts, and 0 otherwise. *TPER* is the difference between the target price issued on day t and the price of the stock on t-1, deflated by the price at t-1. *ΔEF* is the revision of the analyst's earnings forecast. *UPGR* takes the value 1 if the analyst upgraded the stock and 0 otherwise. *DNGR* takes the value 1 if the analyst downgrades the stock and 0 otherwise. *Reit_Fav* (*Reit_Unfav*) takes the value 1 if the analyst reiterated a favorable (unfavorable) recommendation and 0 otherwise. The control variables included in the model are: *Firm_Momentum* is the six month buy-and-hold abnormal return prior to the event. *Firm_Volatility* is the standard deviation of abnormal returns in the month prior to the event. *Analyst_Foll* is the natural log of one plus the number of analysts following the firm. *Inst_Ownership* is the percentage of shares held by institutional investors. *Size* is the natural log of the market value of equity. *Book-to-Market* is the natural log of the book value of equity divided by market value. *ROA* is net income divided by total assets. *Leverage* is total liabilities divided by owners' equity. *MKT_Momentum* is cumulative market return six months prior to the event. *MKT_Volatility* is the standard deviation of market returns one month prior to the event. *Broker_Size* is the natural log of the one plus the number of analysts employed by the brokerage in the last twelve months. *Analyst_Exp* is the natural log of one plus the number of quarters the analyst appeared in IBES. *Conf_Event* takes the value 1 if there is another firm specific event in the three-day period around the event and 0 otherwise. Refer to Appendix for more detailed definitions of variable measurements. The *p*-value columns display the *p*-values of tests of differences between the coefficients in the pre- and post-periods. Standard errors (in parentheses) are robust, clustered at quarter-year, firm, and brokerage levels. *, **, *** denote statistical significance at 10%, 5% and 1% respectively.

Panel A: Comparing the informativeness of target prices in the pre- and post-SRO periods

	With Recommendations			**With Earnings Forecasts**			**Standalone**		
	(1)	**(2)**		**(3)**	**(4)**		**(5)**	**(6)**	
	BHAR	***BHAR***		***BHAR***	***BHAR***		***BHAR***	***BHAR***	
VARIABLES	***POST* = 0**	***POST* = 1**	***p*-values**	***POST* = 0**	***POST* = 1**	***p*-values**	***POST* = 0**	***POST* = 1**	***p*-values**
TPER	0.0416***	0.1019***	**0.0003**	0.0012	0.0330***	**0.0000**	0.0043	0.0197***	**0.0045**
	(0.0104)	(0.0101)		(0.0027)	(0.0039)		(0.0033)	(0.0040)	
ΔEF	0.0322***	0.0416***	0.1497	0.0469***	0.0759***	**0.0001**			
	(0.0055)	(0.0030)		(0.0055)	(0.0035)				
UPGR	0.0463***	0.0240***	0.2032						
	(0.0160)	(0.0055)							
DNGR	-0.0279*	-0.0296***	0.9147						
	(0.0145)	(0.0066)							
REIT_FAV	0.0213	-0.0084	0.0794						
	(0.0146)	(0.0067)							
REIT_UNFAV	0.0159	0.0040	0.4903						
	(0.0156)	(0.0060)							
Control Variables	YES			YES			YES		
Observations	6,603	26,628		18,409	98,821		22,430	43,722	
Adj. R-sq.	0.1981	0.2797		0.0709	0.1001		0.0064	0.0097	

Panel B: Comparing target price bias and error in the pre- and post-SRO periods

VARIABLES	(1) TP BIAS	(2) TP ERROR
POST	-0.4364***	-0.0647**
	(0.0443)	(0.0261)
POST × With_EF	-0.0062	0.0032
	(0.0134)	(0.0086)
POST × With_REC	-0.0072	0.0050
	(0.0134)	(0.0088)
With EF	0.0097	-0.0020
	(0.0121)	(0.0070)
With REC	-0.0112	-0.0046
	(0.0126)	(0.0079)
Firm_Momentum	-0.1144***	-0.0589***
	(0.0374)	(0.0195)
Firm_Volatility	3.0894**	7.4066***
	(1.2102)	(0.3307)
Analyst_Foll	-0.0343*	0.0179*
	(0.0168)	(0.0087)
Inst_Ownership	0.0774***	0.0097
	(0.0248)	(0.0217)
Size	0.0255***	-0.0185***
	(0.0088)	(0.0053)
Book-to-market	-0.0631***	-0.0142**
	(0.0122)	(0.0064)
ROA	-1.2581***	-1.0951***
	(0.2375)	(0.1467)
Leverage	-0.0067**	-0.0018
	(0.0027)	(0.0018)
MKT_Momentum	0.1438	0.0427
	(0.1207)	(0.0623)
MKT_Volatility	-18.2909***	-1.8050
	(4.0523)	(2.4061)
Broker_Size	-0.0281***	0.0019
	(0.0069)	(0.0037)
Analyst_Exp	0.0036	-0.0079**
	(0.0052)	(0.0030)
Conf_Event	0.0025	0.0089***
	(0.0066)	(0.0029)
Constant	0.3797***	0.3405***
	(0.0933)	(0.0412)
***F*-tests**		
POST + POST × With_EF	-0.4425***	-0.0615**
POST + POST × With_REC	-0.4435***	-0.0597**
Observations	208,482	208,482
Adj. R-sq.	0.1691	0.1641

Table 5: Isolating the regulation and the tier effects

In this table we examine the informativeness of target prices for two sub-samples. In Panel A the post-regulation sample consists of all target prices issued after the implementation of the rules but before the brokerage switch, if any, to a three-tier recommendation system and the pre-regulation sample consists of target prices issued in the pre-regulation period only by the brokerages present in the post-regulation period. In Panel B the sub-sample consists of all target prices issued in the post-regulation period only by brokerages that switched to a three-tier recommendation system. Results are presented separately for target prices issued with either a recommendation, with or without earnings forecasts (columns 1-2), target prices issued only with earnings forecasts (columns 3-4) and standalone prices (columns 5-6). The dependent variable, *BHAR*, is the three-day buy-and-hold abnormal return based on the Fama-French four factor model, centered around the release of the target price (event). *POST* takes the value 0 if the target price was released in the pre-regulation period and 1 if in the post-regulation period. *TIER3* takes the value 1 if the target price was issued in the post-regulation period after the switch to a three-tier recommendation system and 0 if the target price was issued in the post-regulation period under a five-tier system. *TPER* is the difference between the target price issued on day t and the price of the stock on t-1, deflated by the price at t-1. *ΔEF* is the revision of the analyst's earnings forecast. *UPGR* takes the value 1 if the analyst upgraded the stock and 0 otherwise. *DNGR* takes the value 1 if the analyst downgrades the stock and 0 otherwise. *Reit_Fav* (*Reit_Unfav*) takes the value 1 if the analyst reiterated a favorable (unfavorable) recommendation and 0 otherwise. The control variables included in the model are: *Firm_Momentum* is the six month buy-and-hold abnormal return prior to the event. *Firm_Volatility* is the standard deviation of abnormal returns in the month prior to the event. *Analyst_Foll* is the natural log of one plus the number of analysts following the firm. *Inst_Ownership* is the percentage of shares held by institutional investors. *Size* is the natural log of the market value of equity. *Book-to-Market* is the natural log of the book value of equity divided by market value. *ROA* is net income divided by total assets. *Leverage* is total liabilities divided by owners' equity. *MKT_Momentum* is cumulative market return six months prior to the event. *MKT_Volatility* is the standard deviation of market returns one month prior to the event. *Broker_Size* is the natural log of the one plus the number of analysts employed by the brokerage in the last twelve months. *Analyst_Exp* is the natural log of one plus the number of quarters the analyst appeared in IBES. *Conf_Event* takes the value 1 if there is another firm specific event in the three-day period around the event and 0 otherwise. Refer to Appendix for more detailed definitions of variable measurements. The *p*-value columns display the *p*-values of tests of differences between the coefficients in the pre- and post-periods. Standard errors (in parentheses) are robust, clustered at quarter-year, firm, and brokerage levels. *, **, *** denote statistical significance at 10%, 5% and 1% respectively.

Panel A: Regulation effect

	With Recommendations			**With Earnings Forecasts**			**Standalone**		
	(1)	**(2)**		**(3)**	**(4)**		**(5)**	**(6)**	
VARIABLES	***BHAR*** ***POST* = 0**	***BHAR*** ***POST* = 1**	***p*-values**	***BHAR*** ***POST* = 0**	***BHAR*** ***POST* = 1**	***p*-values**	***BHAR*** ***POST* = 0**	***BHAR*** ***POST* = 1**	***p*-values**
TPER	0.0455***	0.0772***	**0.0307**	-0.0043	0.0227***	**0.0025**	0.0004	0.0185***	**0.0109**
	(0.0100)	(0.0105)		(0.0056)	(0.0065)		(0.0046)	(0.0058)	
ΔEF	0.0326***	0.0465***	0.3208	0.0462***	0.0725***	**0.0050**			
	(0.0105)	(0.0070)		(0.0064)	(0.0053)				
UPGR	0.0420***	0.0256	0.3712						
	(0.0132)	(0.0155)							
DNGR	-0.0312**	-0.0330**	0.9344						
	(0.0134)	(0.0153)							
REIT_FAV	0.0169	-0.0092	0.2099						
	(0.0140)	(0.0158)							
REIT_UNFAV	0.0178	0.0065	0.5959						
	(0.0132)	(0.0173)							
Control Variables	YES			YES			YES		
Observations	3,116	7,372		7,649	22,231		9,813	12,742	
Adj. R-sq.	0.1950	0.2627		0.0683	0.0886		0.0075	0.0113	

Panel B: Tier effect

	With Recommendations			With Earnings Forecasts			Standalone		
	(1)	(2)		(3)	(4)		(5)	(6)	
	BHAR	*BHAR*		*BHAR*	*BHAR*		*BHAR*	*BHAR*	
VARIABLES	***TIER3* = 0**	***TIER3* = 1**	***p*-values**	***TIER3* = 0**	***TIER3* = 1**	***p*-values**	***TIER3* = 0**	***TIER3* = 1**	***p*-values**
TPER	0.0969***	0.1257***	0.1450	0.0436***	0.0379***	0.5953	0.0146	0.0239***	0.3359
	(0.0195)	(0.0187)		(0.0109)	(0.0093)		(0.0109)	(0.0071)	
ΔEF	0.0528***	0.0376***	0.1093	0.0717***	0.0787***	0.3374			
	(0.0088)	(0.0044)		(0.0069)	(0.0057)				
UPGR	0.0488	0.0321**	0.5956						
	(0.0370)	(0.0141)							
DNGR	-0.0205	-0.0174	0.9183						
	(0.0327)	(0.0125)							
REIT_FAV	0.0137	0.0023	0.6804						
	(0.0328)	(0.0139)							
REIT_UNFAV	0.0348	0.0103	0.4556						
	(0.0356)	(0.0123)							
Control Variables	YES			YES			YES		
Observations	1,422	5,721		3,712	23,388		1,940	9,782	
Adj. R-sq.	0.3034	0.3112		0.0990	0.1079		0.0114	0.0117	

Table 6: Comparing the informativeness of target prices between the post- and a more recent period

In this table we examine the informativeness of target prices for target prices issued in our post-regulation period (*RECENT* = 0) and target prices issued after the end of our post-regulation period to the end of 2017 (*RECENT* = 1). Results are presented separately for target prices issued with either a recommendation, with or without earnings forecasts (columns 1-2), target prices issued only with earnings forecasts (columns 3-4) and standalone prices (columns 5-6). The dependent variable, BHAR, is the three-day buy-and-hold abnormal return based on the Fama-French four factor model, centered around the release of the target price (event). *TPER* is the difference between the target price issued on day t and the price of the stock on t-1, deflated by the price at t-1. *ΔEF* is the revision of the analyst's earnings forecast. *UPGR* takes the value 1 if the analyst upgraded the stock and 0 otherwise. *DNGR* takes the value 1 if the analyst downgrades the stock and 0 otherwise. *Reit_Fav* (*Reit_Unfav*) takes the value 1 if the analyst reiterated a favorable (unfavorable) recommendation and 0 otherwise. The control variables included in the model are: *Firm_Momentum* is the six month buy-and-hold abnormal return prior to the event. *Firm_Volatility* is the standard deviation of abnormal returns in the month prior to the event. *Analyst_Foll* is the natural log of one plus the number of analysts following the firm. *Inst_Ownership* is the percentage of shares held by institutional investors. *Size* is the natural log of the market value of equity. *Book-to-Market* is the natural log of the book value of equity divided by market value. *ROA* is net income divided by total assets. *Leverage* is total liabilities divided by owners' equity. *MKT_Momentum* is cumulative market return six months prior to the event. *MKT_Volatility* is the standard deviation of market returns one month prior to the event. *Broker_Size* is the natural log of the one plus the number of analysts employed by the brokerage in the last twelve months. *Analyst_Exp* is the natural log of one plus the number of quarters the analyst appeared in IBES. *Conf_Event* takes the value 1 if there is another firm specific event in the three-day period around the event and 0 otherwise. Refer to Appendix for more detailed definitions of variable measurements. The p-value columns display the p-values of tests of differences between the coefficients in the pre- and post-periods. Standard errors (in parentheses) are robust, clustered at quarter-year, firm, and brokerage levels. *, **, *** denote statistical significance at 10%, 5% and 1% respectively.

	With Recommendations			**With Earnings Forecasts**			**Standalone**		
	(1)	**(2)**		**(3)**	**(4)**		**(5)**	**(6)**	
VARIABLES	***BHAR*** ***RECENT* = 0**	***BHAR*** ***RECENT* = 1**	***p*-values**	***BHAR*** ***RECENT* = 0**	***BHAR*** ***RECENT* = 1**	***p*-values**	***BHAR*** ***RECENT* = 0**	***BHAR*** ***RECENT* = 1**	***p*-values**
TPER	0.1019***	0.1117***	0.4391	0.0330***	0.0319***	0.8129	0.0197***	0.0258***	0.1870
	(0.0100)	(0.0108)		(0.0038)	(0.0041)		(0.0039)	(0.0034)	
ΔEF	0.0416***	0.0211***	**0.0000**	0.0759***	0.0449***	**0.0000**			
	(0.0029)	(0.0021)		(0.0035)	(0.0027)				
UPGR	0.0240***	0.0146*	0.2984						
	(0.0054)	(0.0076)							
DNGR	-0.0296***	-0.0216***	0.3445						
	(0.0063)	(0.0069)							
REIT_FAV	-0.0084	-0.0120	0.7117						
	(0.0064)	(0.0081)							
REIT_UNFAV	0.0040	0.0041	0.9961						
	(0.0058)	(0.0072)							
Control Variables	YES			YES			YES		
Observations	26,628	50,474		98,821	352,205		43,722	84,917	
Adj. R-sq.	0.2797	0.2040		0.1001	0.0657		0.0097	0.0146	

Table 7: Comparing the Informativeness of target prices in crisis periods

In this table we compare the informativeness of target prices for target prices issued during the dotcom crisis period in our pre-regulation period (*Crisis_Post* = 0) and target prices issued during the financial crisis (*Crisis_Post* = 1). Results are presented separately for target prices issued with either a recommendation, with or without earnings forecasts (columns 1-2), target prices issued only with earnings forecasts (columns 3-4) and standalone prices (columns 5-6). The dependent variable, *BHAR*, is the three-day buy-and-hold abnormal return based on the Fama-French four factor model, centered around the release of the target price (event). *TPER* is the difference between the target price issued on day t and the price of the stock on t-1, deflated by the price at t-1. *ΔEF* is the revision of the analyst's earnings forecast. *UPGR* takes the value 1 if the analyst upgraded the stock and 0 otherwise. *DNGR* takes the value 1 if the analyst downgrades the stock and 0 otherwise. *Reit_Fav* (*Reit_Unfav*) takes the value 1 if the analyst reiterated a favorable (unfavorable) recommendation and 0 otherwise. The control variables included in the model are: *Firm_Momentum* is the six month buy-and-hold abnormal return prior to the event. *Firm_Volatility* is the standard deviation of abnormal returns in the month prior to the event. *Analyst_Foll* is the natural log of one plus the number of analysts following the firm. *Inst_Ownership* is the percentage of shares held by institutional investors. *Size* is the natural log of the market value of equity. *Book-to-Market* is the natural log of the book value of equity divided by market value. *ROA* is net income divided by total assets. *Leverage* is total liabilities divided by owners' equity. *MKT_Momentum* is cumulative market return six months prior to the event. *MKT_Volatility* is the standard deviation of market returns one month prior to the event. *Broker_Size* is the natural log of the one plus the number of analysts employed by the brokerage in the last twelve months. *Analyst_Exp* is the natural log of one plus the number of quarters the analyst appeared in IBES. *Conf_Event* takes the value 1 if there is another firm specific event in the three-day period around the event and 0 otherwise. Refer to Appendix for more detailed definitions of variable measurements. The *p*-value columns display the *p*-values of tests of differences between the coefficients in the pre- and post-periods. Standard errors (in parentheses) are robust, clustered at quarter-year, firm and brokerage levels. *, **, *** denote statistical significance at 10%, 5% and 1% respectively.

	With Recommendations			**With Earnings Forecasts**			**Standalone**		
	(1)	**(2)**		**(3)**	**(4)**		**(5)**	**(6)**	
	BHAR	***BHAR***		***BHAR***	***BHAR***		***BHAR***	***BHAR***	
VARIABLES	***Crisis_Post* = 0**	***Crisis_Post* = 1**	***p*-values**	***Crisis_Post* = 0**	***Crisis_Post* = 1**	***p*-values**	***Crisis_Post* = 0**	***Crisis_Post* = 1**	***p*-values**
TPER	0.0413***	0.0901***	**0.0237**	-0.0010	0.0213***	**0.0057**	0.0035	0.0210***	**0.0258**
	(0.0110)	(0.0159)		(0.0029)	(0.0062)		(0.0040)	(0.0067)	
ΔEF	0.0313***	0.0184***	0.0846	0.0449***	0.0284***	**0.0292**			
	(0.0058)	(0.0034)		(0.0060)	(0.0038)				
UPGR	0.0478**	0.0297***	0.3797						
	(0.0187)	(0.0073)							
DNGR	-0.0267	-0.0409***	0.5111						
	(0.0171)	(0.0105)							
REIT_FAV	0.0222	-0.0092	0.1559						
	(0.0176)	(0.0095)							
REIT_UNFAV	0.0187	0.0029	0.4727						
	(0.0175)	(0.0106)							
Control Variables	YES			YES			YES		
Observations	5,771	10,369		16,558	55,211		19,872	12,164	
Adj. R-sq.	0.2038	0.2057		0.0737	0.0334		0.0068	0.0087	

Table 8: The effect of SRO rulings on analyst conflicts of interest

In this table we examine the effect of SRO rulings on the monthly consensus target price expected returns (*TPER*) optimism and three job related incentives, namely external financing (*Ext_Fin*), trading volume (*Volume*) and institutional ownership (*Inst_Ownership*). For this test we collapse observations at the firm level. *Mean_TPER* is estimated at the end of each month as the simple average of all *TPER* issued during that month, where *TPER* is the difference between the target price issued on day t and the price of the stock on t-1, deflated by the price at t-1. *POST* takes the value 0 if the target price was released in the pre-regulation period and 1 if in the post-regulation period. *Ext_Fin* is the firm's external financing of the most recent fiscal year that ends before the calculation of *Mean_TPER* as calculated by Bradshaw et al. (2006). *Volume* is the dollar trading volume over the past 12 months, sorted into 100 percentiles (NYSE/AMEX and NASDAQ separately) and scaled to range from 0 to 1. *Inst_Ownership* is the percentage of shares held by institutional investors. *Firm_Momentum* is the six month buy-and-hold abnormal return prior to the current month. *Firm_Volatility* is the standard deviation of abnormal returns in the month prior to the current month. *Analyst_Foll* is the natural log of one plus the number of analysts following the firm. *Size* is the natural log of the market value of equity. *Book-to-Market* is the natural log of the book value of equity divided by market value. *ROA* is net income divided by total assets. *Leverage* is total liabilities divided by owners' equity. *MKT_Momentum* is cumulative market return six months prior to the current month. *MKT_Volatility* is the standard deviation of market returns one month prior to the current month. Refer to Appendix for more detailed definitions of variable measurements. Standard errors (in parentheses) are robust, clustered at month-year and firm levels. *, **, *** denote statistical significance at 10%, 5% and 1% respectively.

	(1)	(2)
VARIABLES	***Mean_TPER***	***Mean_TPER***
Constant	0.2543***	0.3364***
	(0.0252)	(0.0297)
POST	-0.0530***	-0.1530***
	(0.0124)	(0.0287)
Ext_Fin	0.1468***	0.2133***
	(0.0153)	(0.0313)
Ext_Fin × POST		-0.1100***
		(0.0342)
Volume	0.0603**	0.0230
	(0.0229)	(0.0380)
Volume × POST		0.0387
		(0.0328)
Inst_Ownership	-0.0328***	-0.1241***
	(0.0099)	(0.0257)
Inst_Ownership × POST		0.1139***
		(0.0267)
Firm_Momentum	-0.0772***	-0.0774***
	(0.0074)	(0.0076)
Firm_Volatility	4.4922***	4.4491***
	(0.3206)	(0.3162)
Analyst_Foll	-0.0280***	-0.0281***
	(0.0043)	(0.0043)
Size	-0.0113***	-0.0111***
	(0.0025)	(0.0025)
Book-to-market	-0.0120***	-0.0129***
	(0.0037)	(0.0037)
ROA	-0.5441***	-0.5586***
	(0.0781)	(0.0798)
Leverage	-0.0029**	-0.0031**
	(0.0013)	(0.0013)
MKT_Momentum	-0.2308***	-0.2293***
	(0.0450)	(0.0451)
MKT_Volatility	1.2352	1.3272
	(1.2746)	(1.2741)
Observations	72,966	72,966
Adj. R-sq.	0.2343	0.2378