Analyst Reports and Capital Markets

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A. Introduction and summary

Sell-side financial analysts working for large brokerage houses, investment banks or independent research firms play a fundamental role in nowadays financial markets. In essence, their job is to collect, aggregate and process information on listed companies in order to prepare comprehensive reports on these companies. These analyst reports usually contain a set of quantitative and qualitative information, including a recommendation on whether to buy, hold or sell a particular stock, a forecast of the respective company's earnings as well as an estimate of what the reasonable stock price, or target price, for a given forecast horizon is. There is ample evidence that market participants act upon sell-side research and analysts' advice. In fact, it is mostly institutional investors, such as investment trusts, financial services companies or larger corporations that buy sell-side analyst research and use it for their decision making processes on capital markets. Sell-side analysts therefore can have a material influence on the asset allocation within an economy, thereby also affecting general welfare.

This role of financial analysts raises a variety of important questions. For instance, is analyst research really reliable and worth trading on? Do analysts state matter-of-fact opinions and estimates based on a neutral assessment of facts? If an analyst works for a brokerage house or investment bank that has business relationships with the company subject to a report, how does she deal with potential conflicts of interest and how does that affect the quality of her research output? Do such conflicts of interest affect the way investors make use of analyst reports?

The first paper of this thesis contributes to answering some of these questions. Using a unique dataset of conflicts of interest reported by a large investment bank, we examine the relationship between conflicts of interests and sell-side analysts' behavior in setting target prices and stock recommendations. We demonstrate that the aggregate number of simultaneous business ties with a subject company is positively associated with optimism in target prices and recommendations. Furthermore, the results provide some indication that stocks for which conflicts of interests exist earn lower risk-adjusted returns than unconflicted stocks. However, we find no evidence that investors discount the value of sell-side analysts' research with respect to the prevailing level of conflicts.

Another interesting question is to what extent the informativeness of analyst research depends on external factors such as the quality of the general information environment of a company. We argue that the information environment determines the reliability of corporate

information and, ultimately, analyst research. Although it is mutually accepted that analyst research can have investment value to the customer, it is not clear ex ante whether it is particularly valuable from an investor's point of view when the information environment is rather good or bad. On the one hand, one could argue that in a good information environment analyst research is based on high-quality input so that the resulting reports contain high-quality recommendations and forecasts as well. In such a situation, investors would face only limited risk in relying on analyst research. On the other hand, it could also be that financial analysts are particularly valuable when the information environment is bad because in such a situation investors might be incapable of obtaining or assessing first-hand information themselves and therefore put a lot of trust in the expert opinion of financial analysts.

The information environment of a company arguably depends on a large number of factors. Prior research has shown that regulation and governance play a major role in determining the reliability of both corporate information and the accuracy of analyst research. We point out, however, that despite these striking results the link between the regulatory setting and the information value of analyst research from the investors' point of view has not been made. In the second paper, we therefore examine whether the informativeness of sell-side analyst reports depends on the strength of the regulatory environment of a country and the regulatory background of the institutional investors of a company. Our analyses are based on more than 600,000 analyst reports from 2005 through 2010 from eight leading capital markets (the U.S., the EU5, Switzerland and Japan). Based on both measures that we use to proxy for the informativeness of analyst research (i.e., short-term market reaction and forecast errors with respect to corporate earnings and target prices), our results show that the information value of research increases as the level of investor protection increases. This finding is robust to different specifications of investor protection. We further demonstrate that analyst forecasts are more (less) valuable when the majority of institutional investors are from strong (weak) investor protection countries.

Lastly, we highlight that most academic research on the behavior and importance of sell-side analysts has been conducted based on data from fairly stable market environments. However, a similar line of argumentation as outlined for the regulation impact above can also be applied to the economic cycle. In volatile times the information environment of capital markets in general and individual stocks in particular is arguably worse than in stable times. Yet it is not easy to predict whether the information value of analyst research is higher during financial crises than in non-crisis times or vice versa because analysts

themselves and, consequently, the quality of the output they produce, are subject to changing information environments. The third paper of this thesis provides empirical evidence in this respect. In particular, we explore how the 2008 financial crisis impacted sell-side analysts' research as well as the market reactions to the publication of such research. Based on over 350,000 analyst reports from 2005 to 2010, we find that during the crisis analysts only disproportionately adapted their expectations, relative to the stock market development. Overall, they maintained a positive view towards corporate performance and stock returns. Consequently, analysts' accuracy with respect to target prices and earnings forecasts significantly deteriorated during the sub-period October 2007 to March 2009, leaving their research output (ex-post) less reliable to investors. Strikingly though, investors' responses to target price and earnings forecast revisions were significantly stronger and more persistent during than outside the crisis. We conclude that investors relied most on analysts when they should have done so least.

B. Sell-side analyst research and reported conflicts of interest

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Sell-Side Analyst Research and Reported Conflicts of Interest

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Abstract

Using a unique dataset of conflicts of interest reported by a large investment bank, we examine the relationship between conflicts of interests and sell-side analysts' behaviour in setting target prices and stock recommendations. We demonstrate that the aggregate number of simultaneous business ties with a subject company is positively associated with optimism in target prices and recommendations. Furthermore, the results provide some indication that stocks for which conflicts of interests exist earn lower risk-adjusted returns than unconflicted stocks. However, we find no evidence that investors discount the value of sell-side analysts' research with respect to the prevailing level of conflicts.

Keywords: *target prices*, *stock recommendations*, *conflicts of interest*, *bias*, *regulation*

JEL Classification: *G*14, *G*15

1. Introduction

This paper investigates the association between analysts' target prices, stock recommendations and the level of conflicts of interests that analysts face. If analysts issue biased research in the presence of business or personal ties with the subject company, then any failure on the investors' side to correctly quantify and adjust for this bias will negatively impact their buying and selling decisions. To shed light on this important question, we examine the relationship of conflicts of interest that exist between a leading global investment bank and its covered companies and the optimism of that bank's analysts when issuing target prices or stock recommendations. We further analyse whether a potential optimism in analysts' target prices and stock recommendations is warranted and how market participants' reactions to such analyst output depend upon conflicts of interest.

We thank an anonymous referee for valuable comments and suggestions. Furthermore, we thank Andreas Walter, Hannes Wagner and seminar participants at the 2011 Conference of the German Finance Association (DGF), the Annual Congress 2011 of the Verein für Socialpolitik, the IFABS 2011 Conference in Rome, and the 2012 Campus for Finance Research Conference, for helpful comments. Correspondence: Alexander G. Kerl.

This paper adds to the existing research in two ways. First, in contrast to prior contributions, our study measures the severity of conflicts of interests using first-hand information on the business ties that truly and simultaneously exist between the issuer of the report and the covered company. In 2002/2003, the SEC approved NASD Rule 2711 ('Communication to the Public'), as well as amendments to NASD Rule 2711 and NYSE Rule 472 ('Research Analysts and Research Reports') that define concretely and in detail what specific types of conflicts investment banks are required to disclose. As there is no database that provides such information on a large scale, we hand-collect data from analysts' reports of one large global investment bank that ranks among the top 10 in terms of global investment-banking revenue and was part of the Global Research Settlement in 2003.[1] Second, we extend prior research (e.g., Kadan *et al*., 2009; Ljungqvist *et al*., 2007) by focusing not only on the relationship between conflicts of interests and the optimism of stock recommendations but by additionally analysing the association between such conflicts of interest and the optimism in analysts' target prices. As various published studies have concluded that target prices contain higher information value than recommendations and earnings forecasts (e.g., Asquith *et al*., 2005), the question arises of whether target prices are also tainted when analysts face such conflicts of interests.

In a first set of analyses, we analyse if optimism in analysts' target prices and stock recommendations is associated with the prevailing level of conflicts of interest. We begin from a bank-specific perspective, considering the cross-section of the target prices and stock recommendations set by our reference bank on a stand-alone basis. We model conflicts of interest in two different ways. First, we assess how the *intensity* of conflicts of interest, measured as the sum of the simultaneous business ties or personal links between our reference bank and individual target companies, is related to analysts' optimism with respect to these two summary measures. Second, we provide insights on the association between different *types* of conflicts of interest and the level of analysts' target prices and stock recommendations. We subsequently introduce a relative view and repeat our analyses to explain the distance of individual target prices and stock recommendations from the prevailing consensus.

Our results show that a larger number of different conflicts of interest is related to significantly more optimistic target prices, as measured by both the implied return forecast that results from a comparison of the target price with the concurrent stock price, as well as the stock recommendation. With respect to target prices, analysts' implied return forecasts are approximately two percentage points higher for every unit increase in the number of conflicts. Given the fact that the simultaneous occurrence of three or even more different types of conflicts is a common phenomenon in our sample, we consider the magnitude of this effect to be economically material.[2] Interestingly, the specific type of the prevalent conflicts of interests is of only minor importance in most of our models. Hence, the number of different conflicts is a better proxy for analyst affiliation than the

[1] It is not our intention to draw individualised conclusions from the behaviour of the analysts affiliated with a particular investment bank, nor do we intend to be judgmental of a specific financial intermediary, regardless of the results obtained herein. Instead, we use data from only one specific investment bank for feasibility reasons because no common database is available. We therefore refrain from disclosing the name or any other identifying information regarding our focus bank.

[2] Our results are robust to an alternative specification where we model the intensity of conflicts of interests taking the natural logarithm of the sum of simultaneous business ties.

explicit types of existing conflicts. Our results hold when controlling for company and stock characteristics, including size, growth, momentum and volatility. These results are also robust to considering the excess implied return or stock recommendation measured net of the concurrent consensus on a particular stock rather than the stand-alone implied return or stock recommendation from our focus bank.

Given these results, the question arises of whether such differences in analyst optimism are warranted. For instance, target prices and recommendations on stocks for which conflicts of interest exist could be more optimistic simply because these firms actually possess better growth prospects going forward. In this case, analysts from a conflicted broker may have an information advantage over analysts from an independent research provider that allows the former set of analysts to better assess the future development of those companies. To shed light on this issue, we sort stocks of similar forecasts (in terms of implied return and recommendation level) into different portfolios, depending on the level of prevailing conflicts of interests. For these portfolios, we compute daily risk-adjusted abnormal returns based on a Fama-French three-factor model. Our results show that the portfolios of affiliated stocks do not outperform the portfolios of unaffiliated stocks. Indeed, there is some weak evidence that daily abnormal returns are negatively associated with conflict intensity. Based on these results, we conclude that the positive association between conflicts of interest and analysts' optimism regarding target prices and stock recommendations does not stem from fundamental differences between firms or proprietary information possessed by affiliated analysts.

Finally, we perform a third set of analyses to evaluate how market reactions to analysts' target prices and stock recommendations change with respect to conflicts of interest. Our results reveal no evidence for any association between the extent to which market participants respond to stock recommendation or target price revisions contained in analyst reports and the number of conflicts of interest. Hence, although analysts are forced to publish the individual conflicts of interests (following NASD Rule 2711 and NYSE Rule 472) to which they are subject when issuing their reports, investors appear to be either unaware of these conflicts or reluctant to question the information value of research issued by affiliated analysts. In any case, as a consequence, they fail to factor in conflicts of interest.

Although our results are generally consistent and robust, we are aware of several limitations that suggest directions for future research to confirm and further elaborate upon our initial findings. First, our analyses are based on a static one-period model, which raises the question of whether our findings hold when a longer time period is considered. In particular, comparisons of pre- and post-regulation data would facilitate the drawing of more precise inferences regarding the effectiveness and shortcomings of recent regulatory changes. Second, our sample of conflicts of interest is from only one investment bank. It would be interesting to analyse whether these results hold for a broader sample containing numerous market players once such data are readily available through standard databases. However, our results in Section 4.4 already support the notion that our focus bank behaves consistently with its peers in terms of its recommendations and target price forecasts issued for a variety of different types of stocks.

The remainder of this paper is organised as follows. Section 2 summarises prior research with respect to analysts' forecasts in the light of conflicts of interests. Section 3 describes our dataset. Our major empirical results with respect to the association between target prices, stock recommendations and conflicts of interest are described and discussed in Section 4. Section 5 investigates the performance of investment portfolios constructed based on analysts' recommendations and target prices in the light of such conflicts.

Section 6 then addresses the association between conflicts of interests and market reactions to analyst reports. Section 7 concludes the paper.

2. Prior Research

Conflicts of interest have received increasing attention from academic researchers and regulators in recent years, and prior research has shown that such conflicts indeed are associated with overly optimistic stock recommendations or earnings forecasts by analysts. This observation applies to a variety of business ties between the issuing bank and the subject company, such as an underwriting relationship in an IPO or SEO setting (e.g., Lin and McNichols, 1998; Dechow *et al*., 2000; O'Brien *et al*., 2005; Barber *et al*., 2007; McKnight *et al*., 2010) or the bank's involvement in M&A transactions (e.g., Kolasinski and Kothari, 2008). Additional insights are presented by Malmendier and Shanthikumar (2009) who show that affiliated analysts behave strategically in issuing overly optimistic recommendations whereas their earnings forecasts tend to be more negative. Unaffiliated analysts, in contrast, do not show such strategic behaviour. With respect to market making as a potential form of conflict, related research has revealed a positive association with analyst following (Chung and Cho, 2005). Madureira and Underwood (2008) show that sharing information between the research and the market making arm of investment banks positively impacts liquidity and price discovery on secondary markets. Several other contributions take an investors' perspective, analysing the post-recommendation performance of conflicted vs. unconflicted analysts' research (e.g., Lin and McNichols, 1998; Michaely and Womack, 1999; Barber *et al*., 2007; Bessler and Stanzel, 2009) or assessing the value of correcting for analysts' over-optimism in stock recommendations (Balboa *et al*., 2009). These studies focus exclusively on stock recommendations and typically report an underperformance of buy recommendations issued by conflicted analysts. Finally, there is mixed evidence regarding how investors react to conflicted analyst research (e.g., Michaely and Womack, 1999; Agrawal and Chen, 2008). For instance, Bradley *et al*. (2008) suggest that market participants do not adequately discount underwriter stock recommendations, whereas Malmendier and Shanthikumar (2007) find that large traders – contrary to small investors – adjust their trading behaviour with respect to underwriting affiliation.

The evidence of optimism in analyst research in the light of conflicts of interest has led to a series of major regulatory initiatives, especially in the USA (see NASD Rule 2711 and NYSE Rule 472). However, several recent contributions suggest that, despite the partial success of such regulatory efforts, too optimistic analyst opinions remain an issue of concern. The NASD and NYSE (2005) conclude from various press articles (e.g., Gasparino, 2004; Smith, 2005) that regulatory reforms have mitigated, but not eliminated, the relevance of conflicts of interest. Recent empirical research supports this assertion. For instance, Kadan *et al*. (2009) report that, even after the passage of NASD Rule 2711, NYSE Rule 472, and the Global Settlement, analysts affiliated with an underwriter in a recent equity offering of a company remained reluctant to issue pessimistic recommendations for that subject company. For the European market, Dubois *et al*. (2011) find that following the passage of the Market Abuse Directive (MAD), recommendations remain positively affected by conflicts that are older than 12 months and thus not subject to MAD disclosure requirements and that the effectiveness of such EU-wide regulatory actions is a function of local enforcement practices. Furthermore, the authors find no evidence that US regulations, such as

NASD Rule 2711 and NYSE Rule 472, mitigate analysts' over-optimism when conducting research on European companies.

Whereas prior research has largely focused on the relevance of conflicts of interest for stock recommendations and earnings forecasts, the association between conflicts of interests and target price forecasts remains poorly investigated and has only recently received some academic attention. Lyssimachou *et al*. (2009) provide initial evidence on the importance of conflicts of interest for analysts' target price setting. They show that, compared with unaffiliated analysts, affiliated analysts provide more optimistic target prices and are more (less) likely to issue a positive (negative) target price when the consensus target price relative to the concurrent stock price is negative (positive). Yet, in contrast to our study, in which we consider a whole set of different types of potential conflicts of interests, Lyssimachou *et al*. (2009) only focus on potential conflicts arising from the fact that an analyst works for the official corporate broker of a company.

3. Data Sample and Summary Statistics

3.1 *Data sources*

Using analyst report data from FactSet Research Systems Inc., we compile a list of companies analysed by the research department of one of the world's leading investment banks as of August 2010. Our focus bank ranks among the top 10 in terms of global investment banking revenue and was part of the Global Analyst Research Settlement in 2003. We include all stocks for which FactSet reports an outstanding target price from this bank, along with the corresponding target price date and the contemporaneous stock price. For each of these stocks, if available, we further obtain stock recommendations and the corresponding stock recommendation date from the same database. To be able to benchmark our focus bank's target prices and stock recommendations against the general market consensus, we require at least two research entities other than our focus broker to have contributed a target price or stock recommendation, respectively, on the same subject company in the 100 days prior to the date our focus bank's research report is issued. Through this procedure, we identify 2,047 individual stocks with complete target price information, of which 1,851 have contemporaneous stock recommendations outstanding. The majority of this sample of 2,047 stocks are from the USA, Japan, Hong Kong and the UK.[3]

We then make use of the fact that NYSE Rule 472(k)(1) and NASD Rule 2711(h) require research analysts to disclose the types of conflicts of interest that exist between their employer and every single company on which they conduct research. For each company in our list, we read the published disclosure section as per the corresponding report date to identify detailed information regarding the bank's conflicts of interest. We perform this time-consuming task manually to identify, on a company-by-company basis, whether and which conflicts exist between the bank and a specific company. This detailed approach goes far beyond the procedures employed in the majority of studies on this topic, which either use proxy measures for the level of conflicts of interest or specifically focus only on selected types of conflicts. To analyse the relationship of conflicts of interests and the level of optimism analysts convey through their target prices

[3] Overall, our sample includes stocks from 47 different countries. Among theses, stocks from the USA represent the largest group (24.9% of the total sample).

and stock recommendations, we merge our hand-compiled conflict database with the corresponding analyst report information. Additional company-specific information used as control variables in our regressions is obtained from FactSet Research Systems Inc.

For our analyses of portfolio performance and short-term market reactions, we further obtain daily stock return data and MSCI global benchmark portfolio returns from Datastream. We use the MSCI World and country specific indices as market proxies and daily returns of a 1-month US T-bill as the risk-free rate of return.

3.2 *Description of conflicts of interest and other core variables*

Because the conflicts of interest listed under NYSE Rule 472(k)(1) and NASD Rule 2711(h) are not mutually exclusive, we aggregate them as follows. If the focus bank (i) managed or co-managed a public offering of securities for the subject company in the past twelve months; (ii) received compensation for investment banking services from the subject company in the past twelve months; (iii) expects to receive or intends to seek compensation for investment banking services from the subject company in the next three months; or (iv) currently has or had during the past twelve months an investment banking services client relationship with the subject company, we record an investment-banking-related conflict, labelled **IB_Client**.

If, instead, the bank (i) received compensation for non-investment banking services from the subject company in the past twelve months; (ii) currently has or had during the past twelve months a non-investment banking securities-related services client relationship with the subject company; or (iii) currently has or had during the past twelve months a non-securities services client relationship with the subject company, we record a non-investment banking-related conflict, labelled **non_IB_Client**.

If the issuing bank has direct stock holdings of 1% or more of common equity securities of the subject company or if it serves as the market maker for that company's securities, we record these conflicts as separate categories, just as they appear in the disclosures under the rules mentioned above. We label these conflicts **Ownership** and **MktMaker**, respectively.

The remaining types of conflicts that must be explicitly disclosed under NYSE Rule 472(k)(1) or NASD Rule 2711(h), such as whether the analyst or one of her household members serves as an officer, director or board member of the subject company, are aggregated in the category **Other** due to their limited individual relevance in terms of the number of occurrences in our sample. The described procedure produces five different categories of conflicts of interest.[4]

We further define the variable **Conflict_score** as the aggregate number of conflict categories that simultaneously apply to a company and calculate it for every observation (=firm) in our sample. As an alternative, we also compute the natural logarithm of Conflict_score. Whereas the original variable Conflict_score assumes that each additional conflict contributes an equal amount to the overall measure (linear model), its logarithm acknowledges a decreasing marginal effect of each additional conflict.

The described methodology yields a total of 3,631 individual conflicts of interest for the 2,047 companies for which full target price information is available and 3,323 individual conflicts of interest for the subset of companies with contemporaneous stock

[4] An overview of the disclosure requirements in their original wording, including the respective categorisation, can be found in the Appendix.

recommendations. These company-conflict-target-price combinations and company-conflict-stock-recommendation combinations are summarised in Table 1.

To ensure comparability across firms, target prices are considered relative to the previous day's stock price. Therefore, we henceforth speak of 'implied return' (**Implied_return**). With respect to stock recommendations, we define the variable **Rec_level**, coded equal to 1 if the recommendation is 'sell', 2 if it is 'hold' and 3 if it is 'buy', so that a higher number implies a more optimistic recommendation level.

Panel A of Table 1 gives an overview of the distribution of Conflict_score, Implied_return and Rec_level across our sample. As columns (1) through (7) show, of the 2,047 companies with full target price information, 325 (15.9%) do not feature any differentiating conflicts of interest with the focus investment bank. The maximum number of different conflicts of interest is five, although four is the last category with a reasonably large number of observations (136 firms, corresponding to 6.6% of the total). The mean implied returns range from 14.5% for companies associated with no conflicts of interest to 23.8% if the number of conflicts is four or above.

Columns (8) through (12) present very comparable insights for the subsample of 1,851 firms with valid stock recommendations. We point out that the distribution of stock recommendations becomes more optimistic as Conflict_score increases. More precisely, the percentage of sell recommendations decreases from 14.1% for companies associated with zero conflicts of interest to 8.5% if the level of conflicts is four. At the same time, the proportion of buy recommendations increases from 47.7% for zero conflicts to 67.8% for four simultaneous conflicts.

We present a formal analysis and interpretation of the figures in the next section, but it can be readily observed that both the implied returns and the level of stock recommendations tend to increase with the number of conflicts of interest.

Panel B of Table 1 describes how the 3,631 individual conflicts for the target price sample and the 3,323 conflicts for the companies with concurrent stock recommendations (indicated in parentheses) break down into the different conflict categories. The most frequent conflict is IB_Client, which applies to 1,477 (1,357) different firms, whereas 882 (820) observations feature a non_IB_Client conflict. Ownership and MktMaker are less frequent, with 557 (513) and 422 (413) occurrences, respectively. In contrast to the breakdown by Conflict_score (Panel A), no obvious pattern concerning the distribution of implied returns and stock recommendations is observable across the different types of conflicts of interest, although it should be noted that target prices and stock recommendations for companies with *any* type of conflict are consistently more optimistic than for companies with no conflicts of interest.

3.3 *Description of control variables*

In the multivariate analyses in Section 4.2 of this paper, and again in Section 6, we include various control variables. As is common in previous studies, we control for the natural logarithm of market capitalisation, measured in millions of Euros (**Market_cap**)[5] and the company's price-to-book ratio (**Price_Book**). Market capitalisation is often considered a valid proxy for the information environment of a company (e.g., Stickel, 1995), whereas

[5] Whereas our regression analyses in Tables 4 through 6 and Table 8 use the logarithm of the market capitalisation, the descriptive statistics in Table 2 are based on the original values of market capitalisation (in millions of US dollars).

Table 1
Summary statistics

This table presents the distribution of Implied_return and Rec_level for different levels of Conflict_score (Panel A) and for different individual types of conflicts (Panel B). Implied_return is the ratio of a stock's target price, scaled by the concurrent stock price. Rec_level is the stock recommendation level coded equal to 1 if the recommendation is 'sell', 2 if it is 'hold' and 3 if it is 'buy', respectively. In Panel A, Conflict_score is the number of simultaneous conflicts of interest. In Panel B, IB_Client, non_IB_Client, Ownership, MktMaker and Other are the conflict categories constructed from disclosures in accordance with NASD Rule 2711(h) and NYSE Rule 472(k)(1), as defined in the Appendix.

Panel A: Distribution of stand-alone implied returns and recommendation levels by number of different conflicts of interest

Conflict_	Implied_return						Rec_level				
score #	N	% of total	Min	Mean	Median	Max	N	% of total	% Sell	% Hold	% Buy
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
0	325	15.9%	−90.6%	14.5%	13.3%	207.9%	277	15.0%	14.1%	38.3%	47.7%
1	552	27.0%	−51.3%	16.6%	13.7%	284.7%	493	26.6%	17.4%	38.3%	44.2%
2	591	28.9%	−45.0%	18.9%	16.8%	300.0%	557	30.1%	13.5%	37.9%	48.7%
3	431	21.1%	−35.7%	20.6%	17.6%	105.9%	397	21.4%	10.3%	37.5%	52.1%
4	136	6.6%	−37.0%	23.8%	20.0%	131.4%	118	6.4%	8.5%	23.7%	67.8%
5	12	0.6%	−8.1%	24.3%	22.7%	83.7%	9	0.5%	11.1%	11.1%	77.8%
Total	2,047	100.0%	−90.6%	18.3%	15.8%	300.0%	1,851	100.0%	13.6%	37.0%	49.4%

Table 1
Continued.

Panel B: Distribution of stand-alone implied returns and recommendation levels by type of conflict

Type of conflict	Implied_return						Rec_level				
	N	% of total	Min	Mean	Median	Max	N	% of total	% Sell	% Hold	% Buy
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
None	n/a	n/a	−90.6%	14.5%	13.3%	207.9%	n/a	n/a	14.1%	38.3%	47.7%
IB_Client	1,477	40.7%	−51.3%	19.5%	16.7%	300.0%	1,357	40.8%	12.2%	37.4%	50.3%
non_IB_Client	882	24.3%	−45.0%	20.1%	17.9%	131.4%	820	24.7%	10.0%	37.9%	52.1%
Ownership	557	15.3%	−38.2%	19.2%	17.2%	131.4%	513	15.4%	15.2%	33.3%	51.5%
MktMaker	422	11.6%	−37.0%	22.0%	19.4%	133.3%	413	12.4%	15.3%	28.1%	56.7%
Other	293	8.1%	−37.0%	21.0%	17.0%	300.0%	220	6.6%	6.8%	34.5%	58.6%
Total	3,631	100.0%	−90.6%	18.3%	15.8%	300.0%	3,323	91.5%	13.6%	37.0%	49.4%

the price-to-book ratio is a common indicator for whether a stock is a growth or a value stock.

Based upon the methodology in Ljungqvist *et al*. (2007), we further account for the coverage intensity as the logarithm of the total number of analysts, other than those from our focus bank, that provide target prices or, analogously, stock recommendations, for a specific stock within the 100-day window prior to the target price or stock recommendation date of our focus bank (**Coverage_intensity**)[6]. We posit that the number of analysts covering a stock is a proxy for the attention the stock receives from analysts and investors.

It is reasonable to assume that the historic performance of a stock can influence analyst opinions (e.g., Kadan *et al*., 2009; Dubois *et al*., 2011). We therefore consider a stock's total return realised in the year prior to the date that our focus bank issued the corresponding target price or stock recommendation (**Hist_performance**) in our analyses. In addition, we argue that the volatility of a stock is another driver of analyst optimism. We therefore include the annualised one-year historic standard deviation of daily stock returns (**Volatility**) within all regressions.

Table 2 summarises the control variables for all levels of Conflict_score (Panel A) and all individual conflicts (Panel B), based on the full sample of companies featuring valid target price information.[7] As shown in Panel A, company size and coverage intensity rise with an increase in Conflict_score. In contrast, the price-to-book ratio, momentum and volatility display a decreasing trend as Conflict_score increases. These observations indicate that conflicts of our focus bank are more frequent with larger companies, value stocks and firms that attract analysts' attention.

4. Conflicts of Interest and Analyst Optimism

4.1 *Univariate analyses*

For a first impression of the relationship between conflicts of interest and analysts' target price setting and stock recommendation behaviour, we compare the mean and median values of implied returns and recommendation levels across different levels of conflicts of interests. Whereas Panel A of Table 3 focuses on implied returns, the results with respect to recommendation levels can be found within Panel B.

In Panel A of Table 3, column (5) illustrates the difference between the average implied return for Conflict_score levels one through five and the corresponding mean for the group of companies with no conflicts (Conflict_score = 0), which serves as our reference group, featuring a mean (median) implied return of 14.5% (13.3%). For Conflict_score = 2, the mean (median) implied return is 18.9% (16.8%), which is

[6] Table 2 displays descriptive statistics based upon the original values. With respect to the multivariate regression analyses, we proceed as follows to account for the fact that the number of analysts following a specific company and that company's size are interrelated: We first regress the natural logarithm of the number of target price or recommendation inputs on the natural logarithm of the US dollar market capitalisation. For our estimations in Table 4 through 6 and Table 8, we then use the residuals as a proxy for analyst attention that is not explained by firm size.

[7] The summary statistics remain virtually unchanged if displayed for the sub-sample of stocks for which both target price and recommendation are available.

Table 2

Company and stock characteristics

This table presents mean and median values of major company and stock characteristics for different levels of Conflict_score (Panel A) and for different individual types of conflicts (Panel B). Market_Cap is the company's market capitalisation in millions of US dollars. Price_Book is the price-to-book ratio as per the last fiscal year end. Coverage_intensity is the number of analysts other than the one from the focus bank with an outstanding target price on the same company. Volatility is the annualised standard deviation of daily stock returns of the company. Hist_performance is the cumulative historic one-year stock return. In Panel A, Conflict_score is the number of simultaneous conflicts of interest. In Panel B, IB_Client, non_IB_Client, Ownership, MktMaker and Other are the conflict categories constructed from disclosures in accordance with NASD Rule 2711(h) and NYSE Rule 472(k)(1), as defined in the Appendix.

Panel A: Average company characteristics by number of different conflicts of interest

Conflict_ score #	Total comp. N	Market_cap (USDm)			Price_Book			Coverage_intensity			Volatility			Hist_performance		
		Mean	Median	N	Mean	Median	N	Mean	Median	N	Mean	Median	N	Mean	Median	N
0	325	5,102	2,022	323	3.7	2.6	314	9.9	8.0	325	0.39	0.37	324	0.60	0.50	315
1	552	6,674	3,028	550	3.2	1.9	535	11.8	10.0	552	0.37	0.36	552	0.48	0.38	537
2	591	11,835	5,268	588	2.8	1.8	570	13.2	12.0	591	0.35	0.33	591	0.39	0.32	556
3	431	22,768	9,046	429	2.8	1.6	417	15.4	15.0	431	0.33	0.32	431	0.37	0.31	420
4	136	28,565	15,290	136	2.4	1.7	134	17.3	16.0	136	0.32	0.30	136	0.36	0.32	134
5	12	28,547	9,102	12	2.4	1.8	11	13.4	14.5	12	0.30	0.29	12	0.41	0.37	12
Total	2,047	12,891	4,696	2,038	3.0	1.9	1,981	13.1	12.0	2,047	0.36	0.34	2,046	0.44	0.35	1,974

Panel B: Average company characteristics by type of conflict

Type of conflict	Total CoI N	Market_cap (USDm)			Price_Book			Coverage_intensity			Volatility			Hist_performance		
		Mean	Median	N	Mean	Median	N	Mean	Median	N	Mean	Median	N	Mean	Median	N
None	n/a	5,102	2,022	n/a	3.7	2.6	n/a	9.9	8.0	n/a	0.39	0.37	n/a	0.60	0.50	n/a
IB_Client	1,477	15,872	6,414	1,470	2.7	1.8	1,430	14.0	13.0	1,477	0.34	0.33	1,477	0.40	0.32	1,415
non_IB_Client	882	21,068	8,911	877	2.6	1.6	861	15.1	14.0	882	0.34	0.32	882	0.37	0.31	860
Ownership	557	16,126	5,931	556	3.2	2.0	540	14.9	13.0	557	0.35	0.33	557	0.40	0.32	547
MktMaker	422	16,212	6,647	422	3.6	2.0	402	13.0	12.5	422	0.33	0.31	422	0.39	0.34	398
Other	293	22,352	10,107	292	2.2	1.6	284	15.7	15.0	293	0.34	0.32	293	0.40	0.32	285
Total	3,631	12,891	4,696	2,038	3.0	1.9	1,981	13.1	12.0	2,047	0.36	0.34	2,046	0.44	0.35	1,974

Table 3

Univariate analyses of differences in implied returns and stock recommendations (stand-alone)

This table presents stand-alone mean and median values of Implied_return (Panel A) and Rec_level (Panel B) for different levels of Conflict_score, as well as univariate tests of differences between these values across the different levels of Conflict_score. In Panel A, Implied_return is the ratio of a stock's target price, scaled by the concurrent stock price. In Panel B, Rec_level is the stock recommendation level coded equal to 1 if the recommendation is 'sell', 2 if it is 'hold' and 3 if it is 'buy', respectively. Conflict_score is the number of simultaneous conflicts of interest. Column (5) shows differences between the respective group mean for each Conflict_score > 0 (column (3)) and the mean of the reference group with Conflict_score = 0. The corresponding significance levels and t-statistics (column (6)) are based on a two-sided t-test. Column (7) shows differences between the respective group median for Conflict_score > 0 (column (4)) and the median of the reference group with Conflict_score = 0. The corresponding significance levels and z-statistics (column (8)) are based on a Wilcoxon-signed-rank test on equality of distributions. Differences are in percentage points (pp). ***, ** and * denote statistical significance at the 1%, 5% and 10% level (two-tailed), respectively.

Panel A: Implied returns by number of different conflicts of interest

Conflict_ score #	Total comp. N	Implied_return		Group difference vs. Conflict_score=0 (in pp)			
		Mean	Median	Diff. Mean	t-value	Diff. Median	z-value
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
0	325	14.5%	13.3%	n/a	n/a	n/a	n/a
1	552	16.6%	13.7%	2.1	1.2	0.5	0.7
2	591	18.9%	16.8%	4.5***	2.7	3.5***	3.2
3	431	20.6%	17.6%	6.1***	3.8	4.3***	4.3
4	136	23.8%	20.0%	9.4***	3.8	6.8***	4.3
5	12	24.3%	22.7%	9.8	1.4	9.4	1.6
Total	2,047	18.3%	15.8%				

Panel B: Stock recommendations by number of different conflicts of interest

Conflict_ score #	Total comp. N	Rec_level		Group difference vs. Conflict_score=0 (in pp)			
		Mean	Median	Diff. Mean	t-value	Diff. Median	z-value
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
0	277	2.3	2	n/a	n/a	n/a	n/a
1	493	2.3	2	−0.1	−1.2	0	−1.2
2	557	2.4	2	0.0	0.3	0	0.3
3	397	2.4	3	0.1	1.5	1	1.4
4	118	2.6	3	0.3***	3.4	1***	3.6
5	9	2.7	3	0.3	1.4	1	1.5
Total	1,851	2.4	2				

approximately 4.5 (3.5) percentage points (pp) larger than the average of the reference group. The mean difference further increases to 6.1 pp or 9.4 pp for companies that have three or four different types of conflicts with our focus bank, respectively.[8] All

[8] We ignore a Conflict_score level of five in our discussions due to the limited number of observations.

three differences are significantly different from 0 at the 1% level. We consider the magnitude of the spread up to 9.4 pp economically material, given that more than 28% of the companies in our sample possess three or more conflicts of interest with the bank under consideration.

Panel B of Table 3 confirms these results with respect to the level of stock recommendations. In particular, Wilcoxon signed-rank tests demonstrate that stock recommendations are significantly more optimistic when Conflict_score is equal to four, compared with the no-conflicts reference group.

4.2 *Multivariate analyses*

We now apply multivariate regression techniques to further assess the relationship between conflicts of interests and sell-side analysts' target prices and stock recommendations. To facilitate the interpretation of the results, we run different regressions with a stepwise inclusion of our set of control variables. Columns (1) through (3) of Table 4 contain regression estimates from an ordinary least-squares model, with Implied_return as the dependent variable. In columns (4) through (6), the dependent variable is Rec_level, and we use ordered probit regressions to account for the ordinal scale of Rec_level. Using ordered probit allows us to consider all three different recommendation levels that our database contains. This acknowledges the fact that analysts started issuing more hold and sell recommendations following recent regulatory reforms, such as NASD Rule 2711 (see, e.g., Barber *et al*., 2006). Historically, they only reluctantly issued sell recommendations and their overall share war almost negligible.[9]

In the base models (columns (1) and (4)), we regress Implied_return and Rec_level on Conflict_score as the only independent variable. Based on this generic model, we then include a set of company-specific controls, namely, Market_cap, Price_Book Coverage_intensity, Hist_performance and Volatility in the regressions in columns (2) and (5).[10]

Finally, we complete our models by considering the relationship of Market_cap, Price_Book and analysts' behaviour in the presence of conflicts of interest. It is reasonable to assume that larger companies or companies with higher growth expectations have a higher need for brokerage and investment banking services. Therefore, they might be subject to higher levels of conflicts of interests. Consequently, it could be that the strength of the association between an analyst's optimism and the number of conflicts of interest relates to the subject company's size and growth prospects.[11] In columns (3) and (6) of Table 4, we consequently include the interaction terms of Conflict_score with

[9] As a robustness check, we follow the methodology of Barber *et al*. (2006) and use a probit model that compares buy recommendations with all other recommendations (both hold *and* sell recommendations). The results remain qualitatively unchanged.

[10] The values for Coverage_intensity used in the regressions are the estimation residuals obtained from regressing Coverage_intensity on Market_cap (see the discussion in Section 3.3).

[11] In this section, we do not posit that optimism is a consequence of conflicts of interest. We only argue that *if* analyst optimism is unwarranted and a sign of conflict-induced bias, then the extent to which this is the case is likely to vary with the size and growth prospects of the subject company.

Table 4

Regression of stand-alone implied return (OLS) and recommendation level (ordered probit) on conflict intensity

This table presents regression results of Implied_return and Rec_level on Conflict_score and various control variables. Implied_return is the ratio of a stock's target price, scaled by the concurrent stock price. Rec_level is the stock recommendation level coded equal to 1 if the recommendation is 'sell', 2 if it is 'hold' and 3 if it is 'buy', respectively. Conflict_score is the number of simultaneous conflicts of interest. Market_Cap is the natural logarithm of the company's market capitalisation in millions of US dollars. Price_Book is the price-to-book ratio as per the last fiscal year end. Coverage_intensity is estimated as the residual from a regression of the natural logarithm of the number of analysts other than the one from the focus bank with an outstanding target price on the same company on the natural logarithm of the company's market capitalisation in millions of US dollars. Volatility is the annualised standard deviation of daily stock returns of the company. Hist_performance is the cumulative historic one-year stock return. Models (1) through (3) are estimated using ordinary least squares, while models (4) through (6) are estimated using ordered probit regression. All regression models use Huber/White robust standard errors; corresponding t-values (z-values) are in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% level (two-tailed), respectively.

	Implied_return			Rec_level		
	(1)	(2)	(3)	(4)	(5)	(6)
Conflict_score	2.168***	2.323***	2.173***	0.097***	0.076***	0.071***
	(4.968)	(4.327)	(4.002)	(4.177)	(2.859)	(2.685)
Market_cap		−0.019	−0.037		0.100***	0.102***
		(−0.031)	(−0.059)		(3.887)	(3.970)
Price_Book		−0.116**	−0.124*		0.005	0.008
		(−2.223)	(−1.882)		(1.284)	(1.177)
Conflict_score x Market_cap			1.001***			0.039**
			(2.803)			(2.141)
Conflict_score x Price_Book			0.067			0.013*
			(1.069)			(1.689)
Coverage_intensity		−3.291***	−3.148***		−0.121**	−0.116**
		(−2.828)	(−2.715)		(−2.051)	(−1.966)
Volatility		0.534***	0.536***		0.010***	0.011***
		(7.590)	(7.639)		(3.438)	(3.541)
Hist_performance		−0.110***	−0.110***		0.002***	0.002***
		(−7.331)	(−7.390)		(2.750)	(2.834)
Constant	18.305***	3.982*	3.264			
	(35.060)	(1.915)	(1.572)			
N	2,047	1,939	1,939	1,851	1,752	1,752
Adj. R^2/Pseudo R^2	1.1%	9.5%	9.9%	0.5%	1.5%	1.8%
F/Chi^2	24.68	19.06	16.81	17.44	52.54	56.87

Market_cap and Price_Book.[12] A positive coefficient of either interaction term would indicate an even stronger association between the Conflict_score and implied return, or

[12] Market_cap and Price_Book are centered around their respective means. Based on this procedure, the base coefficients displayed reflect the effect of Conflict_score on Implied_return and Rec_level, conditional on Market_cap and Price_Book taking their respective average values.

stock recommendation, in case of high market capitalisation or price-to-book ratio of the company in question, and vice versa.

We calculate Huber-White robust standard errors (Huber, 1967; White, 1980) throughout our multivariate analyses.

The results in Table 4 have several interesting implications. First, the results consistently show that analysts' implied returns and stock recommendations increase in the number of simultaneous conflicts of interest, all significant at the 1% level. For example, the 2.17 from model (3) indicates that, for a company that is 'average' with respect to Market_cap and Price_Book, every unit increase in the number of conflicts of interest is associated with an average increase in implied return forecast of approximately 2.17 pp. Given that Conflict_score ranges from zero to four in our sample and that 28% of the companies in our sample are associated with a Conflict_score of three or higher, these results are not only statistically significant but also economically material.[13]

Second, the coefficient on the interaction term of Conflict_score with Market_cap is positive and significant at the 1% (5%) level with respect to the implied return (column (3)) and recommendation level (column (6)). The result suggests that the positive association between the optimism in analysts' target prices and stock recommendations and conflict intensity is more pronounced for larger companies. With respect to the price-to-book ratio, the coefficient of the interaction term is also positive across both model specifications, although only significant at the 10% level for the recommendation level model (column (6)).

Turning towards the set of control variables, Market_cap is significant and positively associated with the stock recommendation level whereas Price_Book, on the contrary, is negatively associated with an analyst's implied return. Concerning Coverage_intensity (Volatility), Table 4 reveals a significant negative (positive) association with analysts' optimism overall. Finally, the coefficient on Hist_performance shows a negative (positive) association with the implied return (recommendation level). The latter result is in line with previous studies (see, e.g., Jegadeesh and Kim, 2006) which report a higher past performance for stock recommendation upgrades than for downgrades, suggesting that analysts tend to follow a momentum logic.

For robustness reasons, we perform two sets of additional analyses within unreported regressions. First, we use the natural logarithm of Conflict_score instead of Conflict_score itself in order to capture a potentially decreasing marginal effect of an additional conflict. The results for this alternative specification are qualitatively identical to those presented within Table 4. Hence, our overall results do not seem to depend on how conflict intensity is actually measured. In the remainder of the text, we will use the linear form of Conflict_score.

Second, we perform all regressions based on the sub-sample of US companies of our data (24.9% of the total sample). Although this reduces the number of observations that are used within the regression considerably, the main result of the coefficient of Conflict_score being significantly positively associated with Impl_ret and Rec_level still holds across all different model specifications.

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[13] The major results in Table 4 remain qualitatively unchanged when we deploy individual types of conflicts of interest, as they are disclosed under NYSE Rule 472(k)(1) and NASD Rule 2711(h), instead of the aggregate categories IB_Client and non_IB_Client. In that case, Conflict_score ranges from zero to nine.

4.3 *Individual conflicts of interest*

In the previous section, we accounted for the relevance of conflicts of interests via a proxy that evaluates the severity of such conflicts by measuring the number of different conflicts that coexist, irrespective of their nature (Conflict_score). We now run additional regressions of Implied_return and Rec_level on dummy variables indicating the presence of each individual type of conflict. The results are displayed in Table 5.

With respect to the regressions of Implied_return on each single type of conflict in columns (1) through (4), all conflict-specific coefficients are positive, with absolute values ranging from 1.43 for Ownership to 4.80 for MktMaker. Statistical significance is most pronounced for IB_Client and MktMaker (p-value < 0.01), whereas the coefficient of non_IB_Client is significant at the 5% level. This pattern directionally persists when all types of conflicts are considered simultaneously, although IB_Client and MktMaker remain the only single conflicts that are significantly associated with implied return forecasts at the 10% and 1% level, respectively (column (5)). The coefficient estimates concerning all other variables that we control for are in line with our prior results from Table 4. One potential explanation for the high significance of MktMaker could be that this conflict frequently occurs jointly with one of the other types of conflict. This would lead to a misspecification of the model as we would be incorporating two different variables that measured the same effect. However, this is not actually a major issue, as MktMaker has only moderate correlations of 0.16 with IB_Client and 0.17 with non_IB_Client, respectively, whereas the correlation with Ownership is even lower. Nevertheless, we run additional regressions for Table 4 where we exclude MktMaker, or any other individual type of conflict, from the calculation of Conflict_score to control for a potentially dominating effect of one single type of conflict. Untabulated results show that our key findings, including a highly significant Conflict_score coefficient, remain qualitatively unchanged.

The right part of Table 5 (columns (6) through (10)) suggests that non_IB_Client is the only individual conflict positively associated with analysts' research output when considering stock recommendations. In contrast to the results regarding implied returns, IB_Client and MktMaker are statistically insignificant. Thus, these findings support our argumentation that no single type of conflict plays a dominating role in our sample.

Overall, we conclude from the results in Tables 4 and 5 that although each individual type of conflict is positively associated with analysts' target prices and stock recommendations, considering just one conflict explicitly often captures only a part of this effect. The aggregate number of different conflicts that coexist between a stock researcher and the subject companies appears to be a better proxy for the extent to which an analyst is conflicted than whether specific types of conflicts exist individually. We conjecture that a higher number of simultaneous conflicts could imply that not just one but different departments of the issuing bank or brokerage house are affiliated with the subject company.

4.4 *Target prices and recommendation levels vs. consensus*

Thus far, we have limited our analyses to the implied return forecasts and stock recommendations issued by our focus bank on a stand-alone basis. We now extend our analyses by replacing the stand-alone measures with their respective differences from the prevailing consensus. The consensus target price is measured as the arithmetic mean of all outstanding target prices issued by stock researchers other than our focus

Table 5

Regression of stand-alone implied return (OLS) and recommendation level (ordered probit) on individual conflicts

This table presents regression results of Implied_return and Rec_level on the different types of conflicts of interest and various control variables. Implied_return is the ratio of a stock's target price, scaled by the concurrent stock price. Rec_level is the stock recommendation level coded equal to 1 if the recommendation is 'sell', 2 if it is 'hold' and 3 if it is 'buy', respectively. IB_Client, non_IB_Client, Ownership, MktMaker and Other are the conflict categories constructed from disclosures in accordance with NASD Rule 2711(h) and NYSE Rule 472(k)(1), as defined in the Appendix. Market_Cap is the natural logarithm of the company's market capitalisation in millions of US dollars. Price_Book is the price-to-book ratio as per the last fiscal year end. Coverage_intensity is estimated as the residual from a regression of the natural logarithm of the number of analysts other than the one from the focus bank with an outstanding target price on the same company on the natural logarithm of the company's market capitalisation in millions of US dollars. Volatility is the annualised standard deviation of daily stock returns of the company. Hist_performance is the cumulative historic one-year stock return. Models (1) through (5) are estimated using ordinary least squares, while models (6) through (10) are estimated using ordered probit regression; corresponding t-values (z-values) are in parentheses. All regression models use Huber/White robust standard errors; corresponding t-values (z-values) are in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% level (two-tailed), respectively.

	Implied_return					Rec_level				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
IB_Client	3.585***				2.698*	0.035				0.000
	(2.725)				(1.957)	(0.522)				(0.002)
non_IB_Client		2.579**			1.485		0.132**			0.119**
		(2.264)			(1.273)		(2.239)			(1.962)
Ownership			1.430		1.202			0.016		0.016
			(1.331)		(1.115)			(0.262)		(0.253)
MktMaker				4.802***	4.164***				0.105	0.083
				(3.902)	(3.379)				(1.469)	(1.142)

Table 5
Continued.

	Implied_return					Rec_level				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Market_cap	0.471	0.470	0.811	0.770	0.197	0.123***	0.106***	0.126***	0.125***	0.106***
	(0.809)	(0.792)	(1.489)	(1.424)	(0.317)	(5.008)	(4.235)	(5.311)	(5.267)	(4.140)
Price_Book	−0.117**	−0.130**	−0.144**	−0.157**	−0.129**	0.005	0.005	0.004	0.004	0.005
	(−2.022)	(−2.240)	(−2.291)	(−2.573)	(−2.362)	(1.080)	(1.221)	(1.005)	(0.963)	(1.159)
Coverage_intensity	−2.995***	−2.916**	−2.966**	−2.870**	−3.140***	−0.104*	−0.108*	−0.105*	−0.110*	−0.114*
	(−2.579)	(−2.504)	(−2.558)	(−2.475)	(−2.705)	(−1.768)	(−1.835)	(−1.778)	(−1.869)	(−1.936)
Volatility	0.538***	0.529***	0.533***	0.546***	0.543***	0.010***	0.010***	0.010***	0.011***	0.010***
	(7.615)	(7.495)	(7.580)	(7.703)	(7.593)	(3.438)	(3.328)	(3.419)	(3.497)	(3.375)
Hist_performance	−0.113***	−0.113***	−0.116***	−0.115***	−0.111***	0.002**	0.002***	0.002**	0.002**	0.002***
	(−7.588)	(−7.391)	(−7.594)	(−7.592)	(−7.293)	(2.482)	(2.684)	(2.471)	(2.464)	(2.672)
Constant	1.418	3.170	3.849*	2.809	−0.035					
	(0.576)	(1.502)	(1.871)	(1.305)	(−0.014)					
N	1,939	1,939	1,939	1,939	1,939	1,752	1,752	1,752	1,752	1,752
Adj. R^2/Pseudo R^2	8.9%	8.7%	8.5%	9.1%	9.4%	1.3%	1.5%	1.3%	1.4%	1.5%
F/Chi^2	16.22	18.15	16.85	17.60	13.41	43.10	47.19	43.06	47.38	50.73

broker in the 100-day window preceding the date when the stand-alone target price was issued. We consider all consensus inputs as valid and up-to-date target prices of the respective issuers per the date on which our focus bank disseminated its estimate. This assumption allows us to calculate the consensus implied return by simply dividing the consensus target price by the stock price on the estimate day of the focus bank's target price. The difference between the stand-alone and consensus implied returns is shown in percentage points. We call this alternative dependent variable **Excess_implied_return**.

The consensus recommendation is measured as the median recommendation level of all outstanding stock recommendations issued by institutions other than our focus broker in the 100-day window preceding the date when the stand-alone recommendation was issued. Consequently, the difference is simply the difference between the stand-alone recommendation and the consensus, ranges from -2 to $+2$ and is scaled ordinally. We call this variable **Rec_Diff**.

Because individual business ties, as published by our focus broker, exist between the bank and the corresponding company but not necessarily between other banks and that company, Conflict_score is the only variable that potentially differentiates our focus bank from its peers. With regard to all other variables of the model (such as company size, historic performance or volatility), our focus bank and all other banks will base their research on exactly the same set of information and firm characteristics. Departing from the model specifications in Table 4, it is therefore reasonable to expect that the number of conflicts is the only relevant factor in explaining Excess_implied_return and Rec_Diff. Nonetheless, it is unclear to what extent this is the case because a higher Conflict_score for a company in our sample might accompany a higher likelihood of the consensus being subject to conflicts of interest with the same company as well because, for instance, the respective company is simply larger.[14]

Table 6 displays the results from regression models analogous to those in Table 4. The main results for Excess_implied_return (columns (1) through (3)) resemble those for the stand-alone models, for which Implied_return served as the dependent variable. As expected, Conflict_score is the only variable that is significantly associated with analysts' relative target price optimism when implied returns are considered net of consensus because it is the only variable that measurably differentiates our focus bank from its peers.[15]

Similar evidence with respect to Conflict_score can be observed in models (4) through (6), for which Rec_Diff serves as the dependent variable. Compared with the stand-alone recommendation level, most control variables become insignificant, which is in accordance with our prediction. We interpret these observations as an indication that Conflict_score is, in fact, unique to our focus bank.

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[14] In fact, larger companies establish investment banking relations with a number of different investment banks. For example, an IPO is likely to be managed by a lead underwriter and several co-underwriters. Hence, for companies that feature a high level of conflicts of interest with our focus bank, one can reasonably assume that a number of other banks are also subject to conflicts of interests with that firm. This would lower the influence of Conflict_score within the model that considers the target price setting and stock recommendation behaviour of our focus bank versus the consensus from the market as a whole.

[15] Again, the results hold when we do not aggregate conflicts of interest into the main categories IB_Client and non_IB_Client so that Conflict_score ranges from zero to nine.

Table 6

Regression of implied return (OLS) and recommendation level (ordered probit) difference vs. consensus on conflict intensity

This table presents regression results of Excess_implied_return and Rec_Diff on Conflict_score and various control variables. Excess_implied_return is the percentage point difference between the focus bank's implied return for a stock and the mean consensus implied return for the same company, where the implied return is the ratio of a stock's target price, scaled by the concurrent stock price. Rec_Diff is the difference between the focus bank's stock recommendation level and the median consensus stock recommendation level, each coded equal to 1 if the recommendation is 'sell', 2 if it is 'hold' and 3 if it is 'buy', respectively. Conflict_score is the number of simultaneous conflicts of interest. Market_Cap is the natural logarithm of the company's market capitalisation in millions of US dollars. Price_Book is the price-to-book ratio as per the last fiscal year end. Coverage_intensity is estimated as the residual from a regression of the natural logarithm of the number of analysts other than the one from the focus bank with an outstanding target price on the same company on the natural logarithm of the company's market capitalisation in millions of US dollars. Volatility is the annualised standard deviation of daily stock returns of the company. Hist_performance is the cumulative historic one-year stock return. Models (1) through (3) are estimated using ordinary least squares, while models (4) through (6) are estimated using ordered probit regression. All regression models use Huber/White robust standard errors; corresponding t-values (z-values) are in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% level (two-tailed), respectively.

	Excess_implied_return			Rec_Diff		
	(1)	(2)	(3)	(4)	(5)	(6)
Conflict_score	1.385***	1.224***	1.242***	0.047**	0.045*	0.043*
	(2.982)	(2.951)	(2.881)	(2.312)	(1.930)	(1.843)
Market_cap		0.108	0.116		0.018	0.019
		(0.204)	(0.216)		(0.838)	(0.865)
Price_Book		−0.046	−0.048		0.008**	0.007*
		(−1.277)	(−1.103)		(2.520)	(1.831)
Conflict_score x Market_cap			−0.144			0.005
			(−0.266)			(0.341)
Conflict_score x Price_Book			0.001			0.002
			(0.018)			(0.573)
Coverage_intensity		−0.179	−0.201		−0.113**	−0.112**
		(−0.135)	(−0.156)		(−2.101)	(−2.084)
Volatility		−0.030	−0.030		0.004	0.004
		(−0.506)	(−0.507)		(1.585)	(1.602)
Hist_performance		0.006	0.007		−0.001	−0.001
		(0.328)	(0.340)		(−1.011)	(−0.983)
Constant	−0.637	0.156	0.256			
	(−1.320)	(0.079)	(0.118)			
N	2,047	1,939	1,939	1,851	1,752	1,752
Adj. R^2/Pseudo R^2	0.5%	0.2%	0.1%	0.1%	0.2%	0.2%
F/Chi^2	8.89	2.71	2.08	5.35	16.43	23.50

5. Conflicts of Interest and Portfolio Performance

The results presented thus far raise the question of whether the positive association between the number of simultaneous conflicts of interest and analysts' expectations concerning firm performance, as expressed via implied returns or stock recommendations, is warranted. In fact, there are alternative possible explanations for the results presented in Section 4. On the one hand, it is conceivable that the companies with which the broker or analyst issuing the research report is affiliated through conflicts of interest merit more optimistic recommendations and target price forecasts because they are fundamentally better or relatively more undervalued than other companies. One could also imagine that analysts are more optimistic with respect to specific companies that they cover because they have access to private information as part of performing tasks such as IPOs or other investment banking services. Analyst research reports that are optimistic due to preferential access to novel information would thus be justified in these cases, and investors could profit from following the advice from analysts with such access.

On the other hand, analysts are often suspected of being subject to misaligned incentives. If, for example, an analyst holds an equity stake in the subject company, she will profit from issuing favourable research leading to stock price increases. Alternatively, if the brokerage house or investment bank for which an analyst works has a business relationship with the subject company, the departments involved in this relationship could exert pressure on the analyst to publish favourable research, e.g., in order to curry management favour and tighten the client relationship (see, e.g., Ertimur *et al*., 2007).

If such circumstances relate strongly to analysts' optimism, research from an affiliated analyst should not be any more valuable from an investor's perspective than research from an unaffiliated analyst, and following an affiliated analyst's advice could even be detrimental to the investor's wealth.

To address this issue, we analyse whether risk-adjusted returns differ between stocks featuring conflicts of interests and those that are free from any conflict. In the case of Implied_return, we partition our sample into terciles of high, medium, or low implied return forecast. Within each of these terciles, we then split our sample according to the level of Conflict_score (zero to five), yielding 18 different portfolios in total. Analogously, if we base the portfolio selection on Rec_level, we first classify the sample into buy, hold and sell recommendations and then, within each category, differentiate between the different levels of Conflict_score. Again, this results in 18 different portfolios.

All portfolios are formed as of August 2010, which represents the date as of which the list of companies that are covered by our focus bank was compiled (see Section 3.1). For our analysis, we assume a holding period of 12 months and equal weights of the stocks constituting each portfolio. During the holding period, we measure daily abnormal performance of each portfolio based on a risk-adjusted three-factor model as suggested by Fama and French (1993). As we have companies from different countries in our sample, we obtain the market returns as well as the returns to the Fama-French benchmark portfolios based on the MSCI World index from Datastream. We use the daily yield of a one-month US Treasury bill as the risk-free rate of return.[16]

[16] MSCI index data have been used by various authors to implement factor-model analysis on an international scale (see, e.g., Lundgren and Olsson, 2010). Datastream offers return

Panel A of Table 7 shows the (12 months holding period) intercept estimates from regressing daily portfolio returns in excess of the risk-free rate on the market premium and the two Fama-French factors (i.e., SMB and HML) for each of the 18 portfolios based on Implied_return (the left part of the table) and on Rec_level (the right part of the table). In each cell, the first figure is the coefficient estimate (i.e., daily abnormal return), the figure below is the corresponding t-value, and the third figure is the number of stocks allocated to the portfolio. Panel B displays the difference between each portfolio's return and the return of the unconflicted portfolio (Conflict_score = 0).

Focusing on Panel A first we observe that portfolios with stocks accounting for two or three conflicts of interests earn significantly negative abnormal returns, whereas for portfolios of stocks with zero and one conflict of interest daily abnormal returns are not significantly different from zero. With respect to portfolio results of positive forecasts (buy recommendations and high implied returns), we interpret the results as weak evidence that conflicts of interest relate negatively to the investment value of analyst research, with portfolio returns lower than that what one would expect after controlling for the three Fama-French factors. Abnormal returns of portfolios of stocks that are subject to four conflicts of interests are also negative, although not statistically significant. One reason for this could be the much lower number of observations as compared to all portfolios based on fewer numbers of conflicts of interests (zero to three). Nevertheless, although the evidence for a significant underperformance across all portfolios is somewhat limited, we can at least conclude that (for positive recommendations) affiliated analysts do not seem to base their recommendations on private information that leads to a consistent outperformance. Consistent with the results in Panel A, Panel B directionally suggests that conflicted stocks underperform unconflicted stocks to some extent. However, the statistical significances are admittedly weak.

With respect to the least optimistic forecasts, in particular those with a sell recommendation, the significantly negative intercept estimates of a portfolio of stocks subject to a higher number of conflicts of interests (Conflict_score = 2 and Conflict_score = 3) imply that the analyst's opinion is indeed valuable to investors (see Panel A).[17] In particular, if the analyst's outlook is pessimistic, there is some evidence that stocks featuring conflicts of interest earn significant abnormal returns on average. Again, the results are in line with Panel B. If even an affiliated analyst cannot avoid issuing pessimistic research, however, problems at the respective company are obvious and serious, leading to poor stock performance. From an investment perspective, such (negative) information is particularly reliable.[18]

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data on small growth stocks, small value stocks, large growth stocks and large value stocks within the MSCI World index, from which we calculate the Fama-French factors SMB (return difference of small minus big companies) and HML (return difference of high minus low book-to-market companies).

[17] For four simultaneous conflicts the intercept estimates are also negative, though statistically insignificant, which we attribute to the small number of observations of only 10.

[18] As a robustness check, we alternatively assume a holding period of just 3 months and perform the identical analyses. The results remain directionally identical compared to the 12 months holding period.

Table 7

Fama-French daily abnormal returns to portfolios based on implied return and recommendation level (12 months holding period)

This table presents daily abnormal return estimates from Fama-French three-factor models for different portfolios, based on (i) analyst optimism with respect to Implied_return or Rec_level and (ii) Conflict_score. In the case of Implied_return, stocks are clustered into terciles; in the case of Rec_level, stocks are clustered according the stock recommendation level (sell, hold or buy). Conflict_score is the number of simultaneous conflicts of interest. Fama-French estimations make use of the MSCI World index as market proxy, as well as benchmark portfolios based on the MSCI World index. The daily return of a 1-month US Treasury bill is the risk-free rate of return. Portfolios are constructed as per August 2010 and held over a period of 12 months. Panel A shows the abnormal returns for each individual portfolio. In each cell, the first figure is the coefficient estimate. The second figure is the corresponding t-value from the regression. The third figure is the number of stocks allocated to the respective portfolio. Panel B displays the difference between the coefficient estimate for a portfolio of 1, 2, 3, 4 or 5 conflicts of interest and the coefficient estimate for a portfolio with no conflicts of interest but in the same implied return or stock recommendation cluster. In each cell, the first figure is the abnormal return difference. The second figure is the F-statistic from a Wald test of equality of coefficients. All regression models use Huber/White robust standard errors. ***, ** and * denote statistical significance at the 1%, 5% and 10% level (two-tailed), based on a standard t-test (Panel A) or a Wald test (Panel B), respectively.

Panel A: Abnormal returns by Conflict score

Conflict_ score #	Portfolio formation criterion					
	Implied_return			Rec_level		
	Low	Medium	High	Sell	Hold	Buy
0	−0.013	−0.013	−0.039	−0.004	−0.030	−0.005
	(−0.465)	(−0.456)	(−1.170)	(−0.128)	(−1.083)	(−0.165)
	136	100	89	39	106	132
1	−0.029	−0.016	−0.056*	−0.025	−0.020	−0.033
	(−1.129)	(−0.628)	(−1.794)	(−1.103)	(−0.614)	(−1.167)
	223	171	158	86	189	218
2	−0.032	−0.041**	−0.037*	−0.036**	−0.035	−0.038**
	(−1.574)	(−2.287)	(−1.939)	(−1.976)	(−1.566)	(−2.152)
	177	209	205	75	211	271
3	−0.018	−0.037**	−0.048***	−0.041**	−0.025	−0.039***
	(−1.257)	(−2.357)	(−2.605)	(−2.089)	(−1.495)	(−2.610)
	115	150	166	41	149	207
4	−0.025	−0.004	−0.024	−0.002	−0.016	−0.016
	(−1.451)	(−0.242)	(−1.085)	(−0.054)	(−0.933)	(−0.838)
	30	47	59	10	28	80
5	−0.023	−0.023	−0.053	−0.068	−0.158	−0.025
	(−0.442)	(−0.584)	(−0.994)	(−0.717)	(−1.368)	(−0.548)
	2	5	5	1	1	7

Table 7
Continued.

Panel B: Abnormal return differences by Conflict score (benchmark: Conflict_score = 0)

Conflict_score #	Portfolio formation criterion					
	Implied_return			Rec_level		
	Low	Medium	High	Sell	Hold	Buy
1–0	−0.016	−0.003	−0.017	−0.021	0.010	−0.028
	(0.410)	(0.020)	(0.290)	(0.850)	(0.100)	(0.980)
2–0	−0.019	−0.028	0.002	−0.032*	−0.005	−0.033*
	(0.900)	(2.430)	(0.010)	(3.080)	(0.050)	(3.510)
3–0	−0.005	−0.024	−0.009	−0.037*	0.005	−0.034**
	(0.140)	(2.330)	(0.230)	(3.550)	(0.110)	(5.190)
4–0	−0.012	0.009	0.015	0.002	0.014	−0.011
	(0.510)	(0.220)	(0.470)	(0.000)	(0.670)	(0.340)
5–0	−0.010	−0.010	−0.014	−0.064	−0.128	−0.020
	(0.040)	(0.060)	(0.070)	(0.460)	(1.230)	(0.200)

These results are consistent with the majority of earlier contributions, including Lin and McNichols (1998), who find no long-term return advantage of recommendations issued by analysts affiliated with a lead underwriter compared with those from unaffiliated analysts. Michaely and Womack (1999) and Bessler and Stanzel (2009) even find that underwriter buy recommendations earn significantly lower long-run returns than unaffiliated buys. Similarly, Barber *et al*. (2007) report a significant underperformance of investment banks' buy recommendations, along with an outperformance of their sell recommendations, compared with recommendations issued by independent research firms.

6. Market Reactions to Analyst Reports in the Light of Conflicts of Interest

Finally, we address the question of whether market participants appropriately account for the level of conflicts of interests that each analyst is subject to. The relevance of the finding that conflicts of interests and optimism in both target prices and recommendations are positively associated depends upon how investors react to conflicted vs. unconflicted research. If investors adequately discount analysts' opinions in the presence of conflicts of interest, overly optimistic recommendations and target price forecasts would not represent a problem for capital markets.

To analyse investor reactions to analyst reports, we calculate daily abnormal returns, based on a market model and standard event-study methodology, within the three-day [−1;+1] and five-day [−2;+2] windows around the publication date of each analyst report in our sample.[19] With respect to target price revisions, we follow Asquith *et al*. (2005) and others and define a variable **TP_Rev**, which is equal to the percentage change between the previous and current target prices issued by our focus investment bank for

[19] We estimate OLS parameters in the estimation period [−250] through [−11] and use country-specific MSCI market returns from Datastream for each stock.

each covered company. With respect to stock recommendations, we define two dummy variables, labeled **Rec_Up** and **Rec_Down**, which are equal to one if the current stock rating is above or below the previous level, respectively, and zero otherwise.

In addition to the requirement that we have information on both target price revision as well as recommendation changes, we discard the extreme top and bottom 1% of cumulative abnormal returns as well as target price revisions to mitigate the potentially distorting effect of outliers or data errors in the sample.

Table 8 is set up as follows. In columns (1) to (4) we use the three-day abnormal returns from day [−1] to [+1], relative to the analyst report date, as the dependent variable. In columns (5) to (8), we instead use abnormal returns from day [−2] to [+2]. Within the first model of each event-window (columns (1) and (5)), we regress abnormal returns on recommendation upgrades (Rec_Up), downgrades (Rec_Down), target price revisions (TP_Rev). At the same time, we include Conflict_score, as well as its interactions with Rec_up, Rec_Down and TP_Rev, as additional regressors in models (1) and (5) to control for a potential adjustment of market reactions with respect to conflicts of interest.

Additionally, we include the full set of control variables as well as country dummies to control for country-specific effects on market reactions. Concerning stock recommendation revisions, the results show that analyst reports trigger significant abnormal stock returns. Similarly, there is a strong average market reaction to changes in an analyst's target price. We note that these results are consistent with those reported in the prior literature, suggesting that target price changes provide information in addition to that conveyed through stock recommendations (e.g., Brav and Lehavy, 2003; Asquith *et al*., 2005). Concerning Conflict_score and its interactions with Rec_up, Rec_Down and TP_Rev, we find no evidence that investors consider conflicts of interest when trading on stock recommendations or target prices as all corresponding coefficients are statistically insignificant.

Within further sets of analyses (columns (2) to (4) for the three-day event-window and columns (6) to (8) for the five-day event-window) we follow Barber *et al*. (2006) and additionally report regressions for the sub-samples focusing only on upgrades, reiterations and downgrades. This acknowledges the fact that control variables might behave differently with respect to each type of recommendation.[20] Again, based on the results of these sub-samples, we find no evidence that investors discount the value of sell-side analysts' research with respect to the prevailing level of conflicts when following analysts' target price and recommendation revisions. Hence, it seems as if investors are either unaware of these conflicts or reluctant to question the information value of research issued by affiliated analysts.

The prior literature reports mixed results regarding this aspect. Bradley *et al*. (2008), for example, conclude that investors are unable to discount affiliated analysts' stock recommendations. In contrast to their conclusion, though, Agrawal and Chen (2008) and Malmendier and Shanthikumar (2007) find that the intensity of conflicts of interest does have a mitigating effect on market reactions to recommendation changes. However, neither of the references cited in this context control for target price changes which, among others, Asquith *et al*. (2005) prove to be even more important to investors than stock recommendations.

[20] One drawback of splitting the sample in this fashion is the reduced number of observations that fall in the upgrade (55) and downgrade (51) sub-samples.

Table 8

Regression of cumulative abnormal returns on changes to analysts' stock recommendations, target prices and conflict intensity

This table presents regression results of CAR(−1;+1) and CAR(−2;+2) on Conflict_score, Rec_Up, Rec_Down, TP_Rev and various control variables. CAR(−1;+1) is the 3-day cumulative abnormal return, and CAR(−2;+2) is the 5-day cumulative abnormal return, around the publication date of the analyst report. Conflict_score is the number of simultaneous conflicts of interest. Rec_Up and Rec_Down are dummy variables equal to 1 if the current stock recommendation is an upgrade or a downgrade of the previous recommendation, respectively, and 0 otherwise. TP_Rev is the percentage change between the previous and the current target price of a company. Market_Cap is the natural logarithm of the company's market capitalisation in millions of US dollars. Price_Book is the price-to-book ratio as per the last fiscal year end. Coverage_intensity is estimated as the residual from a regression of the natural logarithm of the number of analysts other than the one from the focus bank with an outstanding target price on the same company on the natural logarithm of the company's market capitalisation in millions of US dollars. Volatility is the annualised standard deviation of daily stock returns of the company. Hist_performance is the cumulative historic one-year stock return. All regression models use Huber/White robust standard errors; corresponding t-values are in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% level (two-tailed), respectively. All models are estimated allowing for country fixed effects. Standard errors are clustered by country cluster.

	CAR(−1;+1)				CAR(−2;+2)			
	All	Upgrade	Reiteration	Downgrade	All	Upgrade	Reiteration	Downgrade
Rec_Up	1.192***				1.655***			
	(2.970)				(3.452)			
Rec_Down	−2.218***				−2.525***			
	(−5.500)				(−4.397)			
TP_Rev	3.253**	0.810	3.722**	5.027	4.686**	3.305	5.374**	4.514
	(2.323)	(0.137)	(2.206)	(0.735)	(2.462)	(0.513)	(2.354)	(0.440)
Conflict_Score	0.017	−0.852	0.025	−0.425	0.116	−0.906	0.128	−0.168
	(0.155)	(−1.460)	(0.231)	(−0.423)	(0.900)	(−1.408)	(0.969)	(−0.119)
Rec_Up x Conflict_Score	−0.398				−0.523			
	(−0.927)				(−1.144)			
Rec_Down x Conflict_Score	−0.001				−0.015			
	(−0.003)				(−0.029)			
TP_Rev x Conflict_Score	0.645	1.815	1.266	0.513	1.485	2.367	2.114	5.612
	(0.458)	(0.572)	(0.762)	(0.058)	(0.846)	(0.581)	(0.995)	(0.480)

Table 8
Continued.

	CAR(−1;+1)				CAR(−2;+2)			
	All	Upgrade	Reiteration	Downgrade	All	Upgrade	Reiteration	Downgrade
Market_cap	0.002	−0.476	0.022	1.051	−0.063	−0.710	−0.036	1.314
	(0.022)	(−0.886)	(0.258)	(1.175)	(−0.628)	(−1.002)	(−0.344)	(1.365)
Price_Book	0.000	0.367	−0.001	−0.165	−0.005	−0.005	−0.006	0.104
	(−0.029)	(1.216)	(−0.168)	(−0.693)	(−0.584)	(−0.014)	(−0.624)	(0.316)
Coverage_intensity	−0.176	−2.680	−0.088	0.683	−0.085	−3.113	0.038	−2.487
	(−0.728)	(−1.302)	(−0.351)	(0.343)	(−0.290)	(−1.408)	(0.125)	(−0.968)
Volatility	−0.005	−0.023	−0.002	−0.129	−0.010	−0.018	−0.008	−0.006
	(−0.472)	(−0.411)	(−0.199)	(−1.364)	(−0.746)	(−0.221)	(−0.594)	(−0.048)
Hist_performance	0.000	−0.007	0.000	0.010	0.000	−0.011	0.001	−0.033
	(0.097)	(−0.456)	(0.151)	(0.572)	(0.081)	(−0.665)	(0.263)	(−0.929)
Constant	−0.059	3.879*	−0.177	2.197	−0.063	4.087	−0.165	−0.367
	(−0.146)	(1.832)	(−0.415)	(0.490)	(−0.131)	(1.401)	(−0.324)	(−0.062)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,463	55	1,357	51	1,457	55	1,351	51
Adj. R^2	2.2%	−1.8%	−0.1%	39.7%	2.5%	10.1%	0.3%	43.0%
F	4.87	1.47	0.77	1.09	4.52	1.80	1.04	1.72

7. Conclusion

Based on a novel measure for the severity of conflicts of interest, we analyse the relationship between prevailing conflicts of interests and sell-side analysts' behaviour with respect to target prices and stock recommendations. To address this issue, we make use of the fact that conflicts of interest must be disclosed under NYSE Rule 472(k)(1) and NASD Rule 2711(h). Our results show a positive association between the optimism in analysts' recommendations and target prices and the prevailing level of personal or business ties with a subject company. The aggregate number of different conflicts that simultaneously apply to a subject company better explains this association than do indicators of individual conflicts. Furthermore, the results also hold when our focus bank's target prices and stock recommendations are considered relative to the market consensus, although statistical significances slightly decline in the latter setting. Overall, we conclude that the number of different conflicts of interest relates positively to target prices and stock recommendations. In this context, we confirm prior research (e.g., Kadan *et al*., 2009; Dubois *et al*., 2011) on analyst stock recommendations.

Based on these results, we further analyse whether this association between conflicts of interest and analyst optimism is warranted or not. Risk-adjusted daily abnormal returns from Fama-French portfolio analysis suggest that affiliated analysts are not better stock forecasters than unaffiliated analysts. Indeed, our results even show some (limited) evidence for an underperformance of stocks that receive favourable research from an analyst who is subject to conflicts of interest. Again, our findings are in line with earlier contributions (e.g., Lin and McNichols, 1998; Barber *et al*., 2007) that focus on stock recommendations.

Finally, we do not find any evidence that investors take conflicts of interests into account when trading on stock recommendations and target prices. Hence, investors appear to be either unaware of these conflicts or reluctant to question the information value of research issued by affiliated analysts.

Appendix

Overview and categorisation of conflicts of interest

	Disclosure requirements according to NYSE Rule 472(k)(1) (simplified)	Corresponding section in NASD Rule 2711(h)	Conflict category
(i)	A member or member organisation must disclose in research reports:		
	a. if the member or member organisation or its affiliates:		
	1. has managed or co-managed a public offering of securities for the subject company in the past twelve (12) months;	(2) (A) (ii) a.	IB_Client
	2. has received compensation for investment banking services from the subject company in the past twelve (12) months; or	(2) (A) (ii) b.	IB_Client
	3. expects to receive or intends to seek compensation for investment banking services from the subject company in the next three (3) months.	(2) (A) (ii) c.	IB_Client
	b. if the member or member organisation is making a market in the subject company's securities at the time the research report is issued;	(8)	MktMaker
	c. if, as of the last day of the month immediately preceding the date the publication (or the end of the second most recent month if the publication is less than ten (10) calendar days after the end of the most recent month), the member or member organisation or its affiliates beneficially own 1% or more of any class of common equity securities of the subject company. (. . .)	(1) (B)	Ownership
	d. if, as of the last day of the month immediately preceding the date of publication of the research report (or the end of the second most recent month if the publication date is less than thirty (30) calendar days after the end of the most recent month):		
	1. the subject company currently is a client of the member or member organisation or was a client of the member or member organisation during the twelve (12)-month period preceding the date of distribution of the research report (. . .) (. . .[The] the types of services provided to the subject company may be described as investment banking services, non-investment banking-securities related services, and non-securities services.);	(2) (A) (iii) b.	IB_Client & non_IB_Client
	2. the member or member organisation received any compensation for products or services other than for investment banking services from the subject company in the past twelve (12) months.	(2) (A) (iii) a.	non_IB_Client
(. . .)			

Appendix
Continued.

Disclosure requirements according to NYSE Rule 472(k)(1) (simplified)	Corresponding section in NASD Rule 2711(h)	Conflict category
(iii) A member or member organisation must include the following disclosures in research reports:		
a. if a research analyst received any compensation:		
1. from the subject company in the past twelve (12) months;	(2)(A)(i) a.	Other
2. that is based upon (among other factors) the member's or member organisation's overall investment banking revenues.	(2)(A)(i) b.	Other
b. if, to the extent the research analyst or an employee of the member or member organisation with the ability to influence the substance of a research report, knows:		
1. the subject company currently is a client of the member or member organisation or was a client of the member or member organisation during the twelve (12)-month period preceding the date of distribution of the research report. (. . .) (. . .[The] the types of services provided to the subject company may be described as investment banking services, non-investment banking-securities related services, and non-securities services.). (. . .)	(2)(A)(iii) b.	IB_Client & non_IB_Client
2. that the member, member organisation or any affiliate thereof, received any compensation for products or services other than investment banking services from the subject company in the past twelve (12) months.	(2)(A)(iii) a. & (2)(A)(iv)	non_IB_Client
(iii) A research analyst and a member or member organisation must disclose in research reports:		
a. if, to the extent the research analyst or member or member organisation has reason to know, an affiliate of the member or member organisation received any compensation for products or services other than investment banking services from the subject company in the past twelve (12) months; (. . .)	(2)(A)(v)	non_IB_Client
b. if the research analyst or a household member has a financial interest in the securities of the subject company, and the nature of the financial interest, including, without limitation, whether it consists of any option, right, warrant, futures contract, long or short position;	(1)(A)	Ownership
c. if the research analyst or a household member is an officer, director, or advisory board member of the subject company;	(3)	Other
d. any other actual, material conflict of interest of the research analyst, or member or member organisation, of which the research analyst knows, or has reason to know, at the time the research report is published or otherwise distributed.	(1)(C)	Other

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C. When do sell-side analyst reports really matter? Shareholder protection, institutional investors and the importance of equity research

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When do sell-side analyst reports really matter? Shareholder protection, institutional investors and the importance of equity research

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Abstract

We examine whether the informativeness of sell-side analyst reports depends on the strength of the regulatory environment of a country and the regulatory background of the institutional investors of a company. Our analyses are based on more than 600,000 analyst reports from 2005 through 2010 from eight leading capital markets (the U.S., the EU5, Switzerland and Japan).

Based on both measures that we use to proxy for the informativeness of analyst research (i.e., short-term market reaction and forecast errors with respect to corporate earnings and target prices), our results show that the information value of research increases as the level of investor protection increases. This finding is robust to different specifications of investor protection. We further demonstrate that analyst forecasts are more (less) valuable when the majority of institutional investors are from strong (weak) investor protection countries.

Keywords: *shareholder protection, institutional investors, analyst reports, regulation*
JEL Classification: *G14; G15; G18; G24; G3*

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1. Introduction

This paper addresses the question to what extent the informativeness of sell-side analyst research depends on the prevailing regulatory environment. On the one hand, the previous literature considers the information environment, such as the regulatory and institutional background of a company, and the informativeness of analyst research as substitutes (see, e.g., Subramanyam, 1996). That is, analysts are more relevant to the stock market when other sources of information are scant. Loh and Stulz (2011), for example, find that analysts' recommendations are more likely to be influential on stock prices in the case of small companies with only low analyst following. Similarly, Lang et al. (2004) report a positive valuation effect of analyst coverage in the case of poor internal and weak country level external governance.

On the other hand, other studies suggest that the general information environment of a company and the informativeness of analyst research are complements. Francis et al. (2002), for example, find a positive relation between abnormal returns and the information contained in both earnings information and analyst reports. The authors do not find that the informativeness of earnings announcements is reduced by the simultaneous publication of analyst reports. In line with this result, Frankel et al. (2006) explicitly state that the information value of analyst research and financial statements are complements and that analyst report informativeness increases with institutional ownership.

Within this paper, we follow the latter view and argue that better shareholder protection leads to a higher quality of financial reporting and corporate disclosure that ultimately translates into better inputs for analyst research and, hence, more valuable forecasts. We thus add to the literature that has primarily used the legal environment and ownership structure of a company to explain analysts' incentives to produce analyst research and to cover certain stocks.[1] The previous research has found plenty of evidence in regard to the regulatory and institutional environment's positive influence on the quality of financial reporting (see, e.g., La Porta et al., 2000; Ball et al., 2000). Leuz et al. (2003) reveal that earnings management decreases in investor protection. DeFond et al. (2007) further show that annual earnings announcements are more informative in countries in which insider trading laws are better enforced. Similarly, Haw et al. (2012) find that in countries with strong investor protection, greater financial disclosure and higher-quality earnings are

[1] Bushman et al. (2005), for example, find that the strength of the legal environment is positively associated with the number of analysts issuing research on a company. Similarly, Bhushan (1989) argues that analyst following increases in institutional ownership. This finding could be related to the fact that institutional investors are the main consumers of analyst research.

associated with more informative stock prices about future earnings. With respect to the shareholder structure of a company, Yeo et al. (2002) and Velury and Jenkins (2006) demonstrate that the quality of reported earnings increases with institutional ownership. This finding is consistent with large external stockholders assuming a monitoring role in corporations (see, e.g., Shleifer and Vishny, 1986; Chen et al., 2007).

Following this evidence, our study contributes to the existing literature by analyzing whether the regulatory environment influences the informativeness of analyst research because analysts directly depend on the quality of information available to them as inputs. Based on the assumption that the quality of financial reporting and the information value of analysts' forecasts are complements, we analyze whether the informativeness of analysts' research is affected by (i) the overall level of investor protection within a country and (ii) the regulatory background of the institutional investors of a company. To measure the informativeness of forecasts, we use two different approaches. First, we follow Frankel et al. (2006) by focusing on the short-term market reaction in response to the publication of an analyst report. Under the assumption of efficient capital markets in which any new information instantaneously influences stock prices, the market reactions following the revision of analysts' forecasts serve as a valid proxy for the information value that market participants attribute to new information. Second, we also compute report-specific target price and earnings forecast errors. By comparing, for example, the actual reported earnings with the previously issued earnings forecast, it is possible to identify which forecasts were more accurate and therefore contained more information value.

Before describing our results, we would like to comment on the measures that we use to identify the level of investor protection. Because different shareholder protection and regulatory enforcement measures have been suggested within the previous literature (e.g., La Porta et al., 1998; Djankov et al., 2008; Jackson and Roe, 2009), we deploy a set of conceptually different approaches in this context. These measures cover formal indicators of the strength of the applicable shareholder rights law as well as enforcement proxies that estimate the degree to which individuals and institutions can rely on norms and regulations being put into effect and the intensity with which wrongdoing is being prosecuted.

With respect to the first measure of forecast informativeness, namely, the short-term market reaction, our results reveal that the value of analyst reports depends significantly on the country-specific level of investor protection. For analysts' target price and earnings

forecast revisions[2], we find a material increase in information value as the level of investor protection increases. However, our results also show that recommendation upgrades are not considered valuable within strong investor protection countries, whereas this is the case in weak investor protection environments. One possible explanation for this finding is that strong investor protection markets such as the U.S. are characterized by more sophisticated market participants who properly discount the value of potentially biased recommendations. All our results are robust to the different specifications of investor protection that we apply.

We further refine our analyses and find that the information value of analysts' forecasts also depends on the investor-specific regulatory background. In particular, our results suggest that the informativeness of analysts' forecasts increases (decreases) in line with the percentage of institutional investors from strong (weak) investor protection countries. For example, in the subset of companies located in strong investor protection environments such as the U.S., those companies with a high percentage of foreign institutional ownership (and, hence, an increased likelihood of institutional shareholders being located in less regulated countries) presumably are characterized by worse governance and a lower quality of financial reporting. This scenario consequently leads to analyst forecasts that are of reduced information value. Analogously, we find that companies located in weak investor protection environments benefit from a high percentage of foreign institutional ownership (and, hence, an increased likelihood of institutional shareholders being located in more regulated countries). This result could be attributed to better governance, which positively affects a company's information environment and ultimately results in analyst research of higher information value. Our results therefore support the previous findings of Aggarwal et al. (2011) who have shown that in weak shareholder protection countries improvements in governance are predominantly initiated by foreign institutions from high regulation countries.

With respect to the second measure of forecast informativeness, namely, the report-specific earnings and target price forecast error, our results are directly in line with our previous findings. We show that earnings and target price errors are significantly lower in strong investor protection environments. This finding supports previous studies revealing that the accuracy of earnings forecasts is positively related to a company's information environment. For instance, Lang and Lundholm (1996) provide evidence that analysts' earnings forecasts are more accurate when better disclosure policies are in place. In addition,

[2] For the purpose of this paper, "revisions" in terms of analysts' stock recommendations, target prices and earnings forecasts include both changes and reiterations of the prior forecast levels.

Hope (2003) explicitly shows that strong accounting standard enforcement improves analysts' earnings forecast accuracy.

Based on the general result that analysts' earnings forecast accuracy is also positively associated with institutional ownership (see Ljungqvist et al., 2007), we again refine our analyses to better understand the role that the regulatory background of institutional investors of a company plays with regard to analyst forecast accuracy. Our results show that forecasts are more (less) accurate when the institutional investors of a company are likely to be from strong (weak) investor protection countries. Particularly for high-protection countries, we find that earnings and target price forecast errors are significantly lower when domestic institutional ownership is high, whereas foreign institutional ownership (likely stemming from less regulated backgrounds) is positively associated with forecast errors.

Overall, with respect to the informativeness of analyst research, our findings are robust to both measures for the information value of analysts' forecasts (namely, the short-term market reaction and the forecasting error). Hence, we provide evidence that the level of the prevailing regulatory environment and the regulatory background of the institutional investors are closely related to analysts' forecast informativeness. Our results might therefore help regulators and investors alike assess the impact of regulation, both directly and indirectly (via the ownership structure of a company), on the information value of financial research. It could be advisable for regulators to establish and guard strong investor protection environments because these environments not only translate into a higher quality of financial disclosures but also into more valuable information published by sell-side analysts.

The paper continues as follows. Section 2 describes our data and research design. Section 3 focuses on the impact of the regulatory environment on market reactions to the dissemination of analyst research. Section 4 elaborates on the influence of the regulatory environment on forecast accuracy. Finally, Section 5 provides concluding remarks.

2. Data sample

2.1. Analyst report and stock information

Our dataset is based on a panel of analyst reports from eight major stock markets for the period 2005 through 2010. The countries included are the U.S., the EU5 (i.e., France, Germany, Italy, Spain and the U.K.), Switzerland and Japan. These markets account for

approximately 56% of the world's total market capitalization[3] and represent the majority of financial and economic hubs, while at the same time featuring different regulatory characteristics and company shareholder structures.

We obtain analyst report data such as earnings forecasts, target prices and stock recommendations from FactSet.[4] Along with I/B/E/S, FactSet is one of the leading data providers for the financial academic community and practitioners[5] and is used by virtually all major global investment banks and 95 of the top 100 asset managers (Heston and Sadka, 2010). A number of recent analyst-related academic studies also rely on FactSet data, particularly when stocks from different countries are considered (see, e.g., Balboa et al., 2008, 2009; Bessler and Stanzel, 2009).

For a company to be included in our sample, we require a minimum coverage by three or more different analysts in at least one calendar year within our sample period. For each report, we define dummy variables indicating whether the stock recommendation represents an upgrade (UP), a reiteration ($REIT$) or a downgrade ($DOWN$) compared to the same analyst's previous rating on the same stock, as well as variables measuring the percentage change in an individual analyst's target price (TP_REV) or earnings forecast (EPS_REV) on a given stock.[6] To avoid a distorting effect of stale information in our sample, we only calculate these revisions if the previous stock recommendation, target price or earnings forecast was issued within 90 days prior to the current report. For our main analyses, we further require that information on all three summary measures, namely stock recommendation, target price and earnings forecast, is jointly available in the current and preceding report. In addition to recommendations, target prices and earnings forecast revisions, our dataset further includes the research date of each report as well as the corresponding concurrent stock price in the same currency as the target price and earnings forecast reported by the analyst.

To measure abnormal stock returns around the issuing date of an analyst report, we obtain concurring stock return data from Datastream. We calculate abnormal returns from a standard market model based on daily returns (see, e.g., Brown and Warner, 1985; MacKinlay, 1997) in which the estimation period ranges from day -250 until day -11 relative

[3] According to Bloomberg as per June 2010.

[4] FactSet typically receives its analyst report information via data transfer/interfaces. Hence, this information does not necessarily represent written reports but should be considered as a data feed to FactSet.

[5] According to Nomura, FactSet offers major company and stock metrics on an even larger number of companies than I/B/E/S does (see Fraser-Jenkins et al., 2009).

[6] TP_REV is calculated as $(TP_t - TP_{t-1})/TP_{t-1}$, while EPS_REV is calculated as $(EPS_t - EPS_{t-1})/|EPS_{t-1}|$. An overview of variable definitions and sources is provided in the Appendix.

Table 1: Number of analyst reports by country and year

This table shows the number of analyst reports with relevant recommendations, target price and earnings forecast revisions by country and year. The data are based on a panel of analyst reports on companies from the U.S., the EU5, Switzerland and Japan over the period 2005 through 2010.

Country	2005	2006	2007	2008	2009	2010	Total
France	8,407	7,681	6,996	7,462	9,949	19,849	60,344
Germany	4,384	5,239	6,032	6,481	9,757	19,520	51,413
Italy	2,139	1,731	1,862	2,606	3,851	8,919	21,108
Japan	1,244	1,749	3,281	5,776	8,483	17,941	38,474
Spain	2,712	2,118	2,024	2,247	3,625	7,662	20,388
Switzerland	4,234	3,834	3,989	4,809	6,152	9,401	32,419
United Kingdom	8,453	8,972	9,688	10,997	15,236	29,083	82,429
United States	26,313	35,335	40,041	52,068	80,755	146,694	381,206
Total	57,886	66,659	73,913	92,446	137,808	259,069	687,781

to the research date of the analyst report. Following Asquith et al. (2005) and other studies, we aggregate the daily abnormal returns over the five-day window surrounding the analyst reports in our sample ($CAR(-2;+2)$).[7] In line with previous studies (see, e.g., McKnight and Todd, 2006), we drop observations from our sample if the stock price on the research date is less than or equal to USD 1.00 to ensure that our results are not influenced by small, illiquid stocks or extremely large bid-ask spreads.

In our market reaction analyses, we further ignore observations that represent the 1% and 100% percentiles of target price and earnings forecast revisions, respectively, to eliminate potential outliers. This step is taken because extreme revisions are potentially linked to coding errors in either current or prior forecasts.[8]

The described procedure yields 687,781 analyst reports on 4,789 different companies. Table 1 gives an overview of our sample, indicating the number of observations per country and year. Approximately 45% of our observations are from countries other than the U.S., which is similar to the approximately 42% of firm-year earnings forecasts for non-U.S. companies in Barniv et al.'s (2005) study on 33 different countries and to Jegadeesh and Kim's (2006) article in which non-U.S. companies account for nearly 41% of recommendation revisions from the G7 countries. The increase in observations between 2005 and 2010 is in large part attributable to an increase in the number of brokers submitting report information to FactSet and to an increase in the number of reports per broker and year.

[7] The five-day window allows for early information leakage and post-announcement drift in abnormal stock returns associated with the publication of analyst research. We point out that our findings are robust to using alternative event windows. In particular, we perform our analyses using the eleven-day cumulative abnormal returns ($CAR(-5;+5)$) and the one-day abnormal returns ($AR(0)$) on the analyst report date only.

[8] See, among others, Frankel et al. (2006) and Chan et al. (2007) for a similar approach to control for potential outliers.

Table 2: Summary of analyst report information by country

This table shows summary statistics for the revisions published within our sample of relevant analyst reports. The data are based on a panel of analyst reports on companies from the U.S., the EU5, Switzerland and Japan over the period 2005 through 2010. The first three columns show how recommendation revisions break down into downgrades, reiterations and upgrades. The next columns show the mean, median and standard deviation of earnings forecast and target prices revisions, respectively.

	Distribution of recommendation changes			Average revision magnitude						
	DOWN	REIT	UP	EPS_REV			TP_REV			
				mean	median	sd	mean	median	sd	No. Reports
France	5.2%	89.8%	5.0%	1.1%	0.0%	19.7%	0.7%	0.0%	8.7%	60,344
Germany	5.7%	88.9%	5.4%	1.4%	0.0%	25.2%	1.0%	0.0%	9.5%	51,413
Italy	5.5%	89.3%	5.2%	0.1%	0.0%	20.6%	-0.1%	0.0%	8.6%	21,108
Japan	5.0%	90.0%	4.9%	1.3%	0.0%	30.9%	-0.4%	0.0%	10.0%	38,474
Spain	5.0%	89.8%	5.2%	1.0%	0.0%	21.4%	0.4%	0.0%	8.3%	20,388
Switzerland	3.1%	93.6%	3.2%	0.5%	0.0%	18.6%	0.5%	0.0%	8.1%	32,419
United Kingdom	5.5%	89.1%	5.4%	1.4%	0.0%	15.9%	1.0%	0.0%	8.6%	82,429
United States	3.5%	93.6%	2.9%	0.6%	0.0%	22.0%	0.8%	0.0%	9.3%	381,206
Total	4.2%	91.9%	3.8%	0.9%	0.0%	21.8%	0.7%	0.0%	9.1%	687,781

Table 2 provides information on the distribution of stock recommendation revisions and summary statistics for target price and earnings forecast revisions. In all countries, approximately 90% of the recommendations represent a reiteration of the prior analyst opinion. In contrast to previous studies that have shown more frequent recommendation changes (see, e.g., Asquith et al., 2005), we attribute our finding to the high and increasing number of analyst reports, particularly in recent years (see Table 1). Because recommendations are the most visible assessment of a company, analysts who regularly cover a stock refrain from changing stock recommendations too frequently. With respect to target prices and earnings forecasts, analysts issue updated forecasts on either one of the two variables in 91.4% of all reports in our sample. Hence, the majority of reports contain new information on these two forecast measures. The average target price revision ranges from -0.4% in Japan to 1.0% in the U.K. and Germany. The average earnings forecast revision is lowest in Italy at 0.1% and, again, largest in the U.K. and Germany at 1.4%.[9]

2.2. **Measures of investor protection**

Previous academic research has proposed a plethora of different investor protection proxies, and there has been extensive controversy and discussion regarding the adequate measurement of shareholder rights. We therefore deploy several widely accepted and conceptually different investor protection indicators, all measured at the country level and taken from the previous literature. We first use a dummy variable ($COMMON$) indicating the legal origin (common law versus civil law) of a country, building on the notion that common law countries have, on average, stronger investor protection rights than civil law ones (La Porta et al., 1998). Our next measure is the anti-self dealing index ($ASDI$) from Djankov et al. (2008), which was developed as a more accurate and more theoretically grounded alternative to La Porta et al.'s (1998) anti-director rights index of investor protection.[10] The anti-self dealing index focuses on a country's regulations that outline the rules of private enforcement mechanisms available to minority shareholders, based on a stylized transaction that would expropriate investors. In addition to the improved quality of the anti-self dealing

[9] In comparison to former studies (see, e.g., Asquith et al., 2005), average earnings and target price revisions across all countries appear to be lower on average. However, whereas forecast revisions in Asquith et al. (2005) stem from 1997 to 1999 and, hence, a bull market with mainly positive forecast revisions, revisions within our study stem from different market phases in the period from 2005 to 2010. Consequently, mean forecast revisions that contain both positive and negative revisions are lower on average.

[10] Djankov et al.'s (2008) anti-self dealing index effectively addresses a number of shortcomings of La Porta et al.'s (1998) anti-director rights index that have been revealed by the literature. See Djankov et al. (2008) for a detailed discussion on the methodology and the advantages of their index.

index as compared to the anti-director rights index, the former is based on more recent regulation (2003) than its predecessor (approximately 1993).[11]

However, Durnev and Kim (2005) and Sun (2009) argue that measures based on formal rules and regulations are merely *de jure* indicators that might not appropriately capture the strength of investor protection if law enforcement is ineffective. This notion is empirically supported by DeFond and Hung (2004), who report a positive governance impact of strong law enforcement institutions, but not of investor protection laws. Therefore, we further include two *de facto* measures of law enforcement. We follow Leuz et al. (2003) and include as our third variable a legal enforcement proxy ($PUBL\_ENF$), defined as the mean of the following three variables also documented in La Porta et al. (1998): the efficiency of the judicial system, the rule of law, and the level of corruption.[12] The final measure that we deploy is the number of the securities regulator's staff members, divided by the country's population in millions ($STAFF\_ENF$). This resource-based indicator of public enforcement is taken from Jackson and Roe (2009) and can be considered a proxy for a regulator's power to deter and prosecute wrongdoing in capital markets. Jackson and Roe (2009) acknowledge that their resource-based approach is not the panacea to the question of how investor protection can be adequately measured. However, they point out some of this approach's advantages over more formal protection clauses: *"Regulatory independence and high levels of agency authority are of little value to effective enforcement if the agency's budget is minuscule and its staffing thin. And conversely, a not-very-independent regulator with a high budget and strong staffing indicates that political and market authorities have given the agency the go-ahead to enforce financial rules. Similarly, a well-staffed and well-funded agency can, even if it has only limited formal sanctioning authority, make good use of the sanctions that it has."*

Table 3 provides an overview of the investor protection variables used in this paper. For each measure, a higher value indicates a higher level of investor protection based on the specific definition. For instance, the number of enforcement staff per 1 million inhabitants ($STAFF\_ENF$) is much higher in the U.S. (23.75) and the U.K. (19.04), compared to the other European countries (between 4.43 and 8.50), Switzerland (8.87) and Japan (4.32), which suggests comparably strong investor protection in the U.S. and the U.K. according to this measure.

[11] However, the original anti-director rights index developed by La Porta et al. (1998) is very popular and has been used extensively in the related literature (see, e.g., DeFond and Hung, 2004, 2007; Durnev and Kim, 2005). We therefore repeat all estimations in this paper that relate to the strength of investor protection with this original index. Our major results remain qualitatively unchanged.

[12] Note that the enforcement proxy suggested by Leuz et al. (2003) has also received much attention in the recent literature and is the law enforcement measure of choice in numerous studies (see, e.g., DeFond and Hung, 2007; Sun, 2009).

Table 3: Investor protection and institutional ownership by country

This table shows summary statistics for different investor protection and corporate ownership measures at the country level. The data are based on a panel of analyst reports on companies from the U.S., the EU5, Switzerland and Japan over the period 2005 through 2010. COMMON indicates whether a country has a common-law legal origin. ASDI is the anti-self dealing index from Djankov et al. (2008). PUBL_ENF is the legal enforcement index used in Leuz et al. (2003). STAFF_ENF is the resource-based enforcement measure proposed by Jackson and Roe (2009). For each measure, a higher value indicates a higher level of investor protection based on the specific definition. With respect to institutional ownership, IO_DOM represents holdings by institutions from the same country in which the stock is listed. IO_FOR represents holdings by institutions from a different country than the country in which the stock is listed. All ownership variables are measured as per the end of the calendar quarter prior to the analyst report date and expressed as a fraction of market capitalization. All figures represent sample averages at the country level.

	Investor protection and enforcement				Institutional ownership	
Country	COMMON	ASDI	PUBL_ENF	STAFF_ENF	IO_DOM	IO_FOR
France	Civil	0.38	8.68	5.91	9.7%	17.9%
Germany	Civil	0.28	9.05	4.43	6.3%	23.9%
Italy	Civil	0.42	7.07	7.25	1.7%	16.9%
Japan	Civil	0.50	9.17	4.32	7.1%	11.9%
Spain	Civil	0.37	7.14	8.50	3.0%	13.0%
Switzerland	Civil	0.27	10.00	8.87	6.5%	24.1%
United Kingdom	Common	0.95	9.22	19.04	42.1%	26.0%
United States	Common	0.65	9.54	23.75	69.3%	5.8%
Mean		0.48	8.73	10.26	43.7%	12.7%
Median		0.40	9.11	7.88	49.9%	8.3%

2.3. **Institutional ownership**

Apart from the overall regulatory environment of a country, we additionally aim to measure whether the regulatory background of a company's institutional investors affects the informativeness of analysts' forecasts. To measure institutional holdings for each company, we use data from the FactSet/LionShares database.[13] For each company included in our data, we obtain on a quarterly basis the percentage of domestic institutional ownership, i.e., the percentage of holdings attributable to institutions based in the same country in which the stock is listed (IO_DOM) alongside the percentage of foreign institutional ownership (IO_FOR).[14] These alternative measures of the ownership structure of a company are also used by Aggarwal et al. (2011), among others.[15]

[13] See Ferreira and Matos (2008) and Aggarwal et al. (2011) for a thorough explanation of the primary sources used by FactSet/LionShares to compile ownership data, as well as several arguments asserting the quality and acceptance of this data provider.

[14] Table 3 displays descriptive statistics based upon original values. With respect to multivariate regression analyses, we proceed as follows. We first regress institutional ownership on the natural logarithm of the U.S. dollar market capitalization (i.e., company size). This pre-estimation is performed for both domestic and foreign ownership. For our estimations in Table 5 to Table 9, we use the residuals as a proxy for institutional ownership that is not explained by company size.

[15] In some cases, FactSet/LionShares reports institutional ownership of more than 100%. FactSet/LionShares names several potential reasons for this occurrence. Such reasons include, for instance, double-counting in certain short transactions when both borrower (or buyer) and lender of stocks report the same equity stake, as well as double-counting of the same institution's holdings because of a name change. We treat these observations as if institutional ownership data were missing.

Table 4: Average values of control variables by country

This table shows summary statistics for a set of control variables at the company level. The data are based on a panel of analyst reports on companies from the U.S., the EU5, Switzerland and Japan over the period 2005 through 2010. MKTCAP is the market capitalization in million U.S. dollars (in our regression analyses, we use logarithmic values). PTBV is the price-to-book ratio. PRIOR_PERF is the stock-specific cumulative stock return over the three months prior to the abnormal return window. PRIOR_EVENT represents the fraction of analyst reports preceded by a general meeting, an earnings release call or a sales/revenue release by the subject company within the five days prior to the publication date of an analyst report.

	MKTCAP	PTBV	PRIOR_PERF	PRIOR_EVENT
France	18,004	2.0	1.9%	27.5%
Germany	16,683	2.2	2.6%	29.7%
Italy	17,347	1.9	-0.2%	30.4%
Japan	11,792	1.7	-1.9%	28.5%
Spain	21,681	2.9	0.8%	20.2%
Switzerland	35,739	3.2	1.3%	21.1%
United Kingdom	25,779	5.3	3.2%	22.1%
United States	14,492	3.7	1.4%	38.5%
Total	17,468	3.4	1.5%	32.9%

We match our analyst report and ownership data using the ownership information for the subject company as per the end of the calendar quarter prior to the research date of the analyst report. For the indicators of institutional ownership, Table 3 provides average values across our analyst report sample by country. Domestic institutional ownership is most important in the U.S. and the U.K., with average values of 69.3% and 42.1%, respectively. Spain and Italy feature the lowest values, with 3.0% and 1.7%, respectively. Whereas foreign institutional ownership is quite low in the U.S. (5.8%), countries such as Germany (23.9%), Switzerland (24.1%) and the U.K. (26.0%) feature high foreign ownership. The figures displayed in Table 3 are in line with those reported in Aggarwal et al. (2011) and Ferreira et al. (2010).

2.4. **Control variables**

We include several control variables measured at the company level in our analyses. First, we include the natural logarithm of the market capitalization measured in U.S. dollars (LOG_MKTCAP) and the price-to-book ratio ($PTBV$), both on the research date of the analyst report. The source for these variables is Datastream. In rare cases, the price-to-book ratio is smaller than or equal to zero; in those cases, we drop these observations from the sample. We further include the three-month prior performance ($PRIOR\_PERF$) as received from Datastream.[16] Additionally, we obtain information about concurrent news and events from

[16] We alternatively use other specifications of prior performance such as the one-month and six-month performance, which do not alter our results.

FactSet. Namely, we include a dummy variable ($PRIOR\_EVENT$) that equals one if the publication of a report from our sample was preceded by a general meeting, an earnings release call or a sales/revenue release by the subject company within the five days prior to the publication date.

3. Investor protection, institutional ownership and the informativeness of analyst reports

3.1. Specification of regression analyses

In this section, we analyze the effect of the intensity of investor protection on the information value of analyst research. Analogous to Frankel et al. (2006), we consider the abnormal market reaction to the dissemination of sell-side analyst research a valid proxy for analyst report informativeness. Throughout this section, our dependent variable is the five-day cumulative abnormal return ($CAR(-2;+2)$) around the research date of an analyst report. Our independent variables include the dummy variables that capture whether the current stock recommendation represents an upgrade (UP) or a downgrade ($DOWN$) relative to the previous rating as well as the percentage change in target price (TP_REV) and earnings forecast (EPS_REV). Most importantly, we further include in our regression models the interactions between these forecast revision variables and our different investor protection measures because our main interest is to assess whether and to what extent the level of information value of analyst research depends on the regulatory environment. For example, we not only include the variable TP_REV but additionally include $TP\_REV \times COMMON$ to identify whether markets react differently to target price revisions in common law countries compared to civil law countries.

The company level control variables defined in the previous section extend the set of regressors. All regressions are estimated using a fixed effects model, in which we allow for cross-sectional and time dependence in our data by including analyst-company and year dummies in the regression models. Following Petersen (2009), we calculate robust standard errors clustered by analyst-company.

3.2. The impact of investor protection on analyst report informativeness

The first set of regressions aims at disentangling the relationship between investor protection and the informativeness of analyst reports. Our results are displayed in Table 5, which is set up as follows: models (1) to (3) use $COMMON$ as an investor protection measure and display the regressions including each of the three forecast measures (i.e.,

recommendation changes, target price and earnings forecast revisions), along with their respective interactions, individually. Model (4) uses all three different forecast measures jointly to identify potentially different market reactions to analysts' forecasts in common versus civil law countries. Models (5) to (7) replicate model (4), substituting $COMMON$ with the alternative investor protection measures $ASDI$, $PUBL\_ENF$ and $STAFF\_ENF$.[17]

Before looking at the interaction coefficients revealing potential differences in market reactions between, for example, common and civil law countries, we point out that the new information that is included within the revisions of the three analyst measures contains information value for capital markets.[18] As the corresponding base coefficients across all models suggest, even the stock market in countries with weak investor protection significantly reacts to updated information within analyst reports. Whereas the market reaction is positively associated with recommendation upgrades as well as target price and earnings forecast revisions, it shows a negative association with recommendation downgrades. These results are consistent with previous research such as Asquith et al. (2005).

Turning to the interactions between the investor protection indicator (i.e., $COMMON$ in models (1) to (4)) and changes in analysts' opinions, Table 5 reports several interesting results.[19] Whereas model (1) does not reveal strong differences between common and civil law countries with respect to market reactions to upgrades (or downgrades), models (2) and (3) individually suggest that the information value of target price and earnings forecast revisions, as measured by the respective stock price reactions, is positively associated with investor protection. Hence, target price and earnings forecast revisions are of higher information value in common law countries compared to civil law countries. Correlation analyses further show that forecast revision measures are only weakly correlated. The highest correlation can be found between target price and earnings forecast revisions with 20%. We therefore pool all forecast measures in one regression, similar to Asquith et al. (2005), to examine whether our results still hold when all measures are considered simultaneously. The results in model (4) support our previous findings for target price and earnings revisions. A comparison of the interaction coefficients with the base coefficients

[17] Similar to models (1) to (3) that use $COMMON$ to measure investor protection, we also run the reduced regressions that only focus on one forecast measure within each model for $ASDI$, $PUBL\_ENF$ and $STAFF\_ENF$ as well. The untabulated results from these analyses are comparable to those from models (1) to (3).

[18] Please note that the investor protection indicators $ASDI$, $PUBL\_ENF$ and $STAFF\_ENF$ are centered around their mean values; i.e., base coefficients of UP, $DOWN$, TP_REV and EPS_REV are for a country that is average with respect to the investor protection variable considered.

[19] The stand-alone coefficients of investor protection are omitted because these are measured at the country level and therefore do not display any variation within an analyst-company cluster.

Table 5: Market reaction to analyst reports and the impact of investor protection

This table shows the regression results of five-day cumulative abnormal returns around the analyst report date on various analyst revisions and the impact of investor protection. The data are based on a panel of analyst reports on companies from the U.S., the EU5, Switzerland and Japan over the period 2005 through 2010. COMMON indicates whether a country has a common-law legal origin. ASDI is the anti-self dealing index from Djankov et al. (2008). PUBL_ENF is the legal enforcement index used in Leuz et al. (2003). STAFF_ENF is the resource-based enforcement measure proposed by Jackson and Roe (2009). UP is a dummy variable indicating whether a stock recommendation is an upgrade relative to the same analyst's previous rating on the same stock, whereas DOWN is a dummy variable indicating whether a stock recommendation is a downgrade. TP_REV and EPS_REV measure the percentage change in an analyst's target price or earnings forecast revision, respectively. Investor protection is a placeholder for the investor protection variable indicated in the column headers. LOG_MKTCAP is the natural logarithm of the market capitalization (in millions of U.S. dollars), and PTBV is the price-to-book value of the subject company on the analyst report research date. PRIOR_PERF is the stock-specific cumulative stock return over the three months prior to the abnormal return window. PRIOR_EVENT is a dummy variable equal to one in case a report was preceded by a general meeting, an earnings release call or sales/revenue release within the five days prior to the publication. ASDI, PUBL_ENF and STAFF_ENF are centered around their mean values; i.e., the base coefficients of UP, DOWN, TP_REV and EPS_REV are for a country that is "average" with respect to the investor protection variable considered. All models are estimated allowing for analyst-company and time fixed effects. Standard errors are clustered by analyst-company and reported in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

	Measure for investor protection						
	COMMON	COMMON	COMMON	COMMON	ASDI	PUBL_ENF	STAFF_ENF
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
UP	0.014 ***			0.003 ***	0.001 *	0.001 *	0.002 ***
	(21.6)			(5.4)	(1.8)	(1.8)	(4.7)
DOWN	-0.017 ***			-0.009 ***	-0.009 ***	-0.008 ***	-0.009 ***
	(-25.8)			(-14.2)	(-16.2)	(-16.0)	(-17.5)
TP_REV		0.130 ***		0.120 ***	0.162 ***	0.147 ***	0.138 ***
		(59.9)		(53.6)	(90.3)	(83.1)	(76.7)
EPS_REV			0.018 ***	0.012 ***	0.023 ***	0.020 ***	0.018 ***
			(24.3)	(16.6)	(38.3)	(32.6)	(32.1)
UP x Investor protection	0.001			-0.004 ***	-0.007 ***	-0.001 *	-0.000 ***
	(0.6)			(-4.7)	(-3.3)	(-1.7)	(-4.4)
DOWN x Investor protection	-0.002 *			0.001	0.002	-0.001	0.000
	(-1.9)			(0.5)	(0.8)	(-1.6)	(0.2)
TP_REV x Investor protection		0.084 ***		0.078 ***	0.100 ***	0.050 ***	0.005 ***
		(29.2)		(26.5)	(12.6)	(24.6)	(28.2)
EPS_REV x Investor protection			0.032 ***	0.025 ***	0.047 ***	0.013 ***	0.001 ***
			(27.1)	(22.2)	(14.8)	(17.3)	(22.8)

Table 5 (continued)

	Measure for investor protection						
	COMMON	COMMON	COMMON	COMMON	ASDI	PUBL_ENF	STAFF_ENF
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
LOG_MKTCAP	0.011 ***	0.006 ***	0.009 ***	0.005 ***	0.005 ***	0.005 ***	0.005 ***
	(17.5)	(9.8)	(14.2)	(7.9)	(8.1)	(8.4)	(7.9)
PTBV	0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.2)	(-0.1)	(-0.1)	(-0.3)	(-0.2)	(-0.3)	(-0.4)
PRIOR_PERF	-0.028 ***	-0.061 ***	-0.033 ***	-0.061 ***	-0.060 ***	-0.061 ***	-0.061 ***
	(-32.1)	(-66.1)	(-38.8)	(-66.1)	(-65.5)	(-65.9)	(-66.3)
PRIOR_EVENT	0.002 ***	0.001 **	0.001 **	-0.001 **	-0.000 **	-0.000 **	-0.001 ***
	(8.8)	(2.5)	(2.4)	(-2.5)	(-2.0)	(-2.1)	(-2.6)
Constant	-0.090 ***	-0.049 ***	-0.072 ***	-0.039 ***	-0.040 ***	-0.041 ***	-0.039 ***
	(-17.3)	(-9.9)	(-14.0)	(-7.9)	(-8.1)	(-8.4)	(-7.9)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Analyst-company fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	628,361	628,361	628,361	628,361	628,361	628,361	628,361
Adj. R^2	5.4%	10.9%	6.6%	11.9%	11.6%	11.7%	11.9%
F	281.47	1,249.07	423.89	948.69	915.44	916.67	955.61

reveals that the information value of target price and earnings forecast revisions is significantly higher in common law countries than in civil law countries. We consider this effect also economically significant because common law origin raises the coefficient of target price revisions by as much as 7.8 percentage points on average (model (4)). Compared to a civil law country, this corresponds to a factor of 1.65 ((0.12+0.078)/0.12). That is, the information value of target price changes, as proxied by stock price reactions, is approximately 65% higher in common law countries. For earnings forecast revisions, we observe an even stronger increase of information value in common law versus civil law countries.

Interestingly, model (4) further suggests that the market positively reacts to recommendation upgrades in civil law countries, whereas such an effect cannot be observed in common law countries. In fact, the interaction coefficient of $UP \times COMMON$, a significant -0.004, more than compensates for the base coefficient of UP of 0.003.[20] Hence, it appears that in countries that are regulated to a lesser extent, investors follow stock recommendation upgrades at face value, whereas in highly regulated markets, investors attribute less information value to upgrades. Based on the fact that stock recommendations are often subject to over-optimism because of conflicts of interests (see, e.g., Lin and McNichols, 1998; and Michaely and Womack, 1999), recommendation upgrades might generally only contain limited information value. Depending on the sophistication of each market participant, investors might react to such information in different ways. Malmendier and Shanthikumar (2007), for example, report that small investors follow recommendations directly, whereas large investors discount potential conflicts of interest. Similarly, investors within regulated markets and strong investor protection environments may be more sophisticated and more skeptical toward overly optimistic forecasts such as recommendation upgrades.

Overall, our general findings from model (4), in which we use $COMMON$ as the investor protection measure, are consistent across all alternative measures of investor protection (the anti-self dealing index (model (5)) and both *de facto* measures of law enforcement, $PUBL\_ENF$ and $STAFF\_ENF$ (models (6) and (7)). Within all models, the information value of target price and earnings forecast revisions, as proxied by the level of market reaction, increases with the level of investor protection. These results complement

[20] Within untabulated analyses, we alternatively split the sample into common and civil law countries to regress the market reaction on all three forecast measures for each sub-sample. Whereas stock prices are positively influenced by recommendation upgrades in civil law countries, we do not find such a result in common law countries.

the findings of Jegadeesh and Kim (2006), who report the highest information value of recommendation revisions for U.S. stocks. According to the authors, the most likely explanation is that U.S. analysts are more skilled than their peers from other countries. As the figures in Table 5 suggest, another reason for the high informativeness of recommendations on U.S. stocks could be that forecast revisions issued on U.S. companies are of higher value because of better and more effective investor protection rules. Leuz et al. (2003) show that companies in countries with developed equity markets and strong investor rights are less likely to engage in earnings management. Consequently, we interpret our results as an indication that strong investor protection not only leads to higher quality earnings, but that this effect translates into more informative analyst research.

Thus far in our short-term market reaction analyses, we use the analyst-company combination to define clusters in which we allow for fixed effects. Although the analyst-company level is the most granular level we can cluster on and despite the fact that preliminary analyses suggest the use of a fixed-effects model, we re-run our major regressions using a set of alternative methods.

Table 6 displays the results from these alternative specifications, applied to the investor protection analyses from Table 5. Again, we choose $COMMON$ as an investor protection measure. Columns (1) and (2) show regression results allowing for analyst fixed effects and company fixed effects, respectively. Column (3) contains estimates from an analyst-company random effects model estimated via generalized least squares. Fama-MacBeth estimators from quarterly regressions allowing for analyst-company fixed effects are displayed in column (4). As Table 6 reveals, our results are also robust to these alternative estimation methods. Irrespective of the model we use, our results show that the value of analyst reports significantly depends on the country-specific level of investor protection.

3.3. The impact of institutional investors' regulatory background on analyst report informativeness

With respect to the shareholder structure of a company, several previous studies show that high institutional ownership is also associated with a greater informativeness of analyst research. This association occurs mainly because analysts are less biased and more diligent when covering stocks with high institutional ownership because institutional investors are the main consumers of analyst research. Ljungqvist et al. (2007) show that analysts' recommendations (relative to the consensus) are less optimistic when institutional

Table 6: Market reaction to analyst reports and the impact of investor protection - alternative models

This table shows the regression results of five-day cumulative abnormal returns around the analyst report date on various analyst revisions and the impact of investor protection, proxied by COMMON, which indicates whether a country has a common-law legal origin. The data are based on a panel of analyst reports on companies from the U.S., the EU5, Switzerland and Japan over the period 2005 through 2010. UP is a dummy variable indicating whether a stock recommendation is an upgrade relative to the same analyst's previous rating on the same stock, whereas DOWN is a dummy variable indicating whether a stock recommendation is a downgrade. TP_REV and EPS_REV measure the percentage change in an analyst's target price or earnings forecast revision, respectively. LOG_MKTCAP is the natural logarithm of the market capitalization (in millions of U.S. dollars), and PTBV is the price-to-book value of the subject company on the analyst report research date. PRIOR_PERF is the stock-specific cumulative stock return over the three months prior to the abnormal return window. PRIOR_EVENT is a dummy variable equal to one in case a report was preceded by a general meeting, an earnings release call or sales/revenue release within the five days prior to the publication. ASDI, PUBL_ENF and STAFF_ENF are centered around their mean values; i.e., the base coefficients of UP, DOWN, TP_REV and EPS_REV are for a country that is "average" with respect to the investor protection variable considered. In models (1) and (2), standard errors are clustered by analyst and company cluster, respectively. In models (3) and (4), standard errors are clustered by analyst-company cluster. The Fama-MacBeth estimators in model (4) are based on quarterly regressions allowing for analyst-company fixed effects. Standard errors are reported in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

	Analyst-fixed effects	Company-fixed effects	Analyst-company-random effects	Fama-MacBeth
	(1)	(2)	(3)	(4)
UP	0.003 ***	0.003 ***	0.003 ***	0.008 ***
	(4.6)	(4.7)	(5.3)	(0.0)
DOWN	-0.009 ***	-0.009 ***	-0.009 ***	-0.009 ***
	(-14.2)	(-13.1)	(-15.4)	(-0.0)
TP_REV	0.126 ***	0.124 ***	0.124 ***	0.062 ***
	(52.1)	(33.3)	(61.1)	(0.1)
EPS_REV	0.012 ***	0.012 ***	0.012 ***	0.011 ***
	(18.1)	(11.4)	(19.2)	(0.0)
COMMON	0.001 ***		-0.001 ***	0.000
	(3.4)		(-3.9)	(0.0)
UP x COMMON	-0.004 ***	-0.005 ***	-0.004 ***	-0.002
	(-4.9)	(-4.9)	(-5.1)	(-0.0)
DOWN x COMMON	0.001	0.000	0.000	-0.002
	(0.6)	(0.4)	(0.5)	(-0.0)
TP_REV x COMMON	0.078 ***	0.076 ***	0.078 ***	0.054 ***
	(22.8)	(15.7)	(29.1)	(0.1)
EPS_REV x COMMON	0.026 ***	0.025 ***	0.026 ***	0.017 ***
	(22.1)	(14.4)	(25.3)	(0.0)
LOG_MKTCAP	0.001 ***	0.001	0.001 ***	0.184 ***
	(9.7)	(1.2)	(10.9)	(0.2)
PTBV	-0.000	-0.000	-0.000	0.001 ***
	(-0.8)	(-0.7)	(-0.7)	(0.0)
PRIOR_PERF	-0.051 ***	-0.053 ***	-0.054 ***	-0.239 ***
	(-55.7)	(-34.3)	(-70.9)	(-0.2)
PRIOR_EVENT	-0.001 ***	-0.001	-0.001 ***	0.001
	(-2.7)	(-1.6)	(-3.2)	(0.0)
Constant	-0.009 ***	-0.008	-0.007 ***	-1.586 ***
	(-10.9)	(-1.3)	(-10.1)	(-1.6)
Year dummies	Yes	Yes	Yes	No
N	628,361	628,361	628,361	628,361
Adj. R^2/Overall GLS R^2	8.4%	10.0%	7.8%	-
F/Wald	560.14	310.07	19,727.57	-

investors are present. At the same time, the authors find that earnings forecasts are more accurate and re-ratings are more timely in cases of high institutional ownership. Frankel et al. (2006) also acknowledge that the demand for analyst research increases in institutional ownership. Following O'Brien and Bhushan (1990), this connection could be attributed to fiduciary reasons; in other words, institutional investors require such information as part of their investment decision process. Consequently, analyst following increases with institutional ownership to fulfill the increased demand for information (see Bhushan, 1989).

Another aspect is that the information value of analyst reports also depends on the quality of inputs that analysts use. The previous literature (see, e.g., Yeo et al., 2002; and Velury and Jenkins, 2006) has shown that the quality of reported earnings increases in institutional ownership because of better monitoring by institutional investors. Consequently, Frankel et al. (2006) state that the informativeness of analyst research and financial statements are complements and, additionally, that the information value of analyst reports increases with institutional ownership.

Based on these findings, we acknowledge that the institutional environment, proxied by the ownership structure of a company, might also play an important role in the information value of analyst research. Because regulatory and institutional environments cannot be analyzed separately, we use institutional ownership as a refined classification of investor protection. Analyst research could be of higher information value, for example, if most shareholders of a company are from strong rather than weak investor protection countries. One might argue that investors from highly regulated markets perform monitoring tasks more effectively, thus facilitating better analyst research of higher information value. Aggarwal et al. (2011) argue that U.S. institutions and institutions from highly regulated countries are engaged in improving corporate governance levels in less regulated markets, whereas similar efforts cannot be shown for institutions from countries with weak investor protection. Table 7 is therefore set up as follows: in models (1) and (2), we focus on the sub-sample of observations from civil law countries, whereas in models (3) and (4), we use observations from common law countries. For both sub-samples, we take into account domestic (IO_DOM) and foreign (IO_FOR) institutional ownership, as defined previously. By using domestic and foreign institutional ownership within the sub-sample of either strong investor protection (such as common law countries) or weak investor protection (such as civil law countries), we can proxy for the regulatory background of investors. Assume that we focus on the sub-sample of companies from common law countries, which basically consists of U.S. and U.K. companies. In this case, the variable

Table 7: Market reaction to analyst reports and the regulatory background of institutional investors

This table shows the regression results of five-day cumulative abnormal returns around the analyst report date on various analyst revisions and the impact of institutional ownership in different investor protection environments, proxied by COMMON, which indicates whether a country has a common-law legal origin. The data are based on a panel of analyst reports on companies from the U.S., the EU5, Switzerland and Japan over the period 2005 through 2010. Whereas models (1) and (2) are based on the sub-sample of civil law countries (COMMON=0), models (3) and (4) are based on the sub-sample of common law countries (COMMON=1). IO_DOM represents holdings by institutions from the same country in which the stock is listed. IO_FOR represents holdings by institutions from a different country than the country in which the stock is listed. UP is a dummy variable indicating whether a stock recommendation is an upgrade relative to the same analyst's previous rating on the same stock, whereas DOWN is a dummy variable indicating whether a stock recommendation is a downgrade. TP_REV and EPS_REV measure the percentage change in an analyst's target price or earnings forecast revision, respectively. Institutional ownership is a placeholder for the institutional ownership variable indicated in the column headers. LOG_MKTCAP is the natural logarithm of the market capitalization (in millions of U.S. dollars), and PTBV is the price-to-book value of the subject company on the analyst report research date. PRIOR_PERF is the stock-specific cumulative stock return over the three months prior to the abnormal return window. PRIOR_EVENT is a dummy variable equal to one in case a report was preceded by a general meeting, an earnings release call or sales/revenue release within the five days prior to the publication. IO_DOM and IO_FOR are centered around their company-quarter means; i.e., base coefficients of UP, DOWN, TP_REV and EPS_REV are for a company that is "average" with respect to the subject company's ownership variable considered. All models are estimated allowing for analyst-company and time fixed effects. Standard errors are clustered by analyst-company and reported in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

	COMMON = 0 (civil law)		COMMON = 1 (common law)	
	IO_DOM	IO_FOR	IO_DOM	IO_FOR
	(1)	(2)	(3)	(4)
UP	0.004 ***	0.005 ***	0.000	0.000
	(7.0)	(7.1)	(0.1)	(0.3)
DOWN	-0.011 ***	-0.011 ***	-0.011 ***	-0.011 ***
	(-16.1)	(-16.2)	(-13.6)	(-13.6)
TP_REV	0.109 ***	0.109 ***	0.187 ***	0.187 ***
	(46.6)	(46.5)	(80.5)	(80.7)
EPS_REV	0.011 ***	0.012 ***	0.036 ***	0.035 ***
	(16.0)	(15.9)	(37.4)	(36.8)
Institutional ownership	-0.020 **	-0.025 ***	-0.028 ***	-0.017 ***
	(-2.1)	(-5.7)	(-9.4)	(-3.8)
UP x Institutional ownership	0.001	-0.006	-0.004	0.003
	(0.1)	(-1.1)	(-1.3)	(0.6)
DOWN x Institutional ownership	-0.011	-0.003	-0.007 **	0.015 ***
	(-0.9)	(-0.5)	(-2.1)	(2.8)
TP_REV x Institutional ownership	0.092 **	0.098 ***	0.091 ***	-0.150 ***
	(2.3)	(5.5)	(9.1)	(-8.2)
EPS_REV x Institutional ownership	0.005	0.011 *	0.018 ***	-0.055 ***
	(0.4)	(1.7)	(4.3)	(-7.3)
LOG_MKTCAP	0.005 ***	0.005 ***	0.004 ***	0.003 ***
	(5.0)	(5.2)	(5.6)	(4.4)
PTBV	0.000	0.000	-0.000	-0.000
	(0.5)	(0.5)	(-0.9)	(-1.0)
PRIOR_PERF	-0.047 ***	-0.047 ***	-0.063 ***	-0.063 ***
	(-30.9)	(-31.2)	(-53.2)	(-53.3)
PRIOR_EVENT	-0.001 ***	-0.001 ***	0.000	0.000
	(-3.0)	(-3.0)	(0.5)	(0.7)
Constant	-0.038 ***	-0.041 ***	-0.040 ***	-0.030 ***
	(-4.9)	(-5.2)	(-5.9)	(-4.5)
Year dummies	Yes	Yes	Yes	Yes
Analyst-company fixed effects	Yes	Yes	Yes	Yes
N	197,374	197,374	351,192	351,192
Adj. R^2	9.0%	9.1%	12.4%	12.4%
F	227.06	228.76	561.62	557.13

capturing domestic institutional ownership (IO_DOM) measures the percentage of investors who are also from the U.S. (for U.S. companies) or the U.K. (for U.K. companies) and therefore stem from a strong investor protection country as well. In contrast, when measuring foreign institutional ownership (IO_FOR) within the sub-sample of common law countries, U.S. institutions or U.K. institutions are excluded by definition. Consequently, foreign institutional investors will likely be from countries with weaker investor protection.

First, we focus on domestic ownership (IO_DOM) for the two sub-samples of companies from civil law countries (model (1)) and companies from common law countries (model (3)).[21] For civil law countries, we only find weak evidence of an impact of domestic ownership on the information value of analyst research because the interaction with target price revision is significant at the 5% level only, whereas the interaction with earnings revision is insignificant. This result changes completely when focusing on common law countries; our results in model (3) show that the information value of target price revisions, earnings revisions and recommendation downgrades increases with domestic institutional ownership, with the majority of significance levels at 1% or above. We explain these differential results between civil and common law countries as follows: for the sub-sample of common law countries, domestic investors stem from a highly regulated background (namely the U.S. or the U.K.). Because of their background, these investors add to the governance and the quality of the financial reporting of a company, which consequently leads to the higher informativeness of analyst reports. In contrast, in the sub-sample of civil law countries, domestic investors are by definition most likely not from the U.S. or U.K. and therefore stem from less regulated countries. Hence, they add less to the governance, the reporting quality and ultimately the information value of analyst research.

Second, we focus on foreign ownership (IO_FOR) for the two sub-samples of companies from civil law countries (model (2)) and those from common law countries (model (4)). With respect to companies from civil law countries, the interaction coefficients show that foreign institutional ownership is positively associated with both target price and earnings revisions. From the perspective of civil law countries, foreign ownership is likely to be synonymous with a strong regulation background of shareholders, which appears to lead to improved governance and affects the information environment of a company positively. This scenario ultimately increases the information value of analyst research. On the contrary,

[21] Please note that IO_DOM and IO_FOR are centered around their company-quarter means; i.e., the base coefficients of UP, $DOWN$, TP_REV and EPS_REV are for a company that is average with respect to the ownership variable considered. Because institutional ownership is measured at the company level, the base coefficients show variation within an analyst-company cluster and are displayed.

while focusing on the sub-sample of common law countries, an increase in the percentage of foreign holdings accompanies a significant decrease in the information value of target price revisions, earnings forecast revisions and recommendation downgrades (model (4)). For companies from common law countries (the U.S. and U.K.), foreign institutional investors are likely to stem from weaker investor protection countries, leading to worse governance and a lower quality of financial reporting.

Within unreported analyses, we also compute identical regressions based on sub-samples in which high and low regulation environments are derived from our alternative regulation measures $ASDI$, $PUBL\_ENF$ and $STAFF\_ENF$.[22] Our results are again robust to the deployment of these alternative measures.

Overall, our results contribute to the recent findings by Ferreira et al. (2010) and Aggarwal et al. (2011) that also suggest that the overall quality of corporate governance and institutional ownership are interrelated. In particular, both studies provide evidence that domestic institutions play a dominant role in improving the governance of firms located in countries in which strong investor protection rules are in place. In contrast, in weak shareholder protection countries, governance improvements can mainly be attributed to foreign institutions, especially those from countries with strong shareholder protection.

4. Investor protection, institutional ownership and forecast accuracy

4.1. The impact of investor protection on forecast accuracy

In the last section, we have argued that the information value of analyst reports can be proxied by the short-term market reaction to analyst recommendation changes, target price and earnings forecast revisions (see also Frankel et al., 2006). This argument assumes that capital markets are efficient and that each piece of new information (such as an analyst forecast revision) is instantaneously impounded into prices. Hence, by measuring the direct stock price impact of each new analyst forecast (relative to the previous forecast), it is possible to measure the amount of new, relevant information and, hence, the informativeness of analyst research. However, one could also argue that analyst research adds only a small amount of new information in cases of a very transparent information environment and high-quality financial reporting. If this holds true, the stock prices of companies in countries with strong investor protection environments would efficiently adjust to new information, reducing the added value of analyst research. As Loh and Stulz

[22] For this purpose, we separate our sample of analyst reports based on the country medians for each of our investor protection variables $ASDI$, $PUBL\_ENF$ and $STAFF\_ENF$.

(2011) point out, "*It is harder for an analyst to have an influential recommendation when more analysts follow a firm…*". Consequently, analysts should matter most when the information environment of a company is most uncertain (see, e.g., Lang et al., 2004). Based on this reasoning, abnormal returns around the publication of analysts' forecasts might not be useful for measuring the quality and information value of analyst research. As an alternative to our previous analyses, we therefore use two additional measures of analyst research quality, namely, earnings and target price forecast errors, to measure the informativeness of analyst research.

Our objective is to assess whether the differential market reactions to analyst reports as a function of investor protection are justified by superior analyst performance (i.e., lower forecast errors in terms of earnings and target prices). For this purpose, we measure an individual analyst's earnings forecast error as the absolute value of the difference between an annual earnings forecast and the actual reported earnings per share for the same fiscal year, scaled by the actual reported earnings (EPS_ERROR_abs).[23] Equivalently, our measure of target price forecast error is the difference between the target price and the 12-months-ahead stock price, scaled by the 12-months-ahead stock price (TP_ERROR_abs). Again, this percentage deviation is measured in absolute values because we want to measure the error regardless of whether it overestimates or underestimates the true stock price. Similar to the market reaction models in Section 3, we ignore the 1% and 100% percentiles with respect to earnings and target price forecast error to account for potential outliers.

Within this section, we regress each of the two forecast error variables on investor protection to analyze whether the regulatory environment has an impact on analysts' forecast errors. This approach is therefore analogous to our analyses from the previous section in which we applied a similar setup but used the short-term market reaction as the dependent variable. As before, we include the same set of control variables at the company level and year dummies. In contrast to the market reaction models in which we accounted for analyst-company fixed effects, we now deploy an analyst fixed effects model and cluster standard errors accordingly.[24] The results are displayed in Table 8. Whereas in models (1) to (4) we focus on earnings forecast errors, target price forecast errors are used as the dependent variable in models (5) to (8). Within these two sets of models, the analyses only

[23] This measure quantifies the error at the end of each fiscal year, regardless of whether the actual reported earnings are above or below their forecasts.

[24] With analyst-company or company fixed effects, we would be unable to estimate the investor protection coefficient because there is no variation in this variable within an analyst-company cluster.

Table 8: Earnings and target price forecast errors of analyst reports and the impact of investor protection

This table shows the regression results of analysts' earnings forecast errors and target price errors on investor protection. The data are based on a panel of analyst reports on companies from the U.S., the EU5, Switzerland and Japan over the period 2005 through 2010. EPS_ERROR_abs is the absolute percentage earnings forecast errors. TP_ERROR_abs is the absolute percentage target price errors. COMMON indicates whether a country has a common-law legal origin. ASDI is the anti-director rights index from Djankov et al. (2008). PUBL_ENF is the legal enforcement index used in Leuz et al. (2003). STAFF_ENF is the resource-based enforcement measure proposed by Jackson and Roe (2009). LOG_MKTCAP is the natural logarithm of the market capitalization (in millions of U.S. dollars), and PTBV is the price-to-book value of the subject company on the analyst report research date. PRIOR_PERF is the stock-specific three months return prior the publication of a report. PRIOR_EVENT is a dummy variable that equals one in case a report was preceded by a general meeting, an earnings release call or sales/revenue release within the five days prior to the publication. All models are estimated allowing for analyst and time fixed effects. Standard errors are clustered by analyst cluster and reported in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

	EPS_ERROR_abs				TP_ERROR_abs			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
COMMON	-0.101 ***				-0.066 ***			
	(-8.3)				(-7.6)			
ASDI		-0.164 ***				-0.139 ***		
		(-8.9)				(-9.2)		
PUBL_ENF			0.019 **				0.013 **	
			(2.5)				(2.2)	
STAFF_ENF				-0.008 ***				-0.004 ***
				(-8.2)				(-6.7)
LOG_MKTCAP	-0.050 ***	-0.050 ***	-0.049 ***	-0.050 ***	-0.043 ***	-0.043 ***	-0.043 ***	-0.043 ***
	(-27.5)	(-27.4)	(-27.0)	(-27.4)	(-26.1)	(-26.2)	(-25.9)	(-26.1)
PTBV	-0.000	-0.000	-0.000	-0.000	0.000 **	0.000 **	0.000 **	0.000 **
	(-0.9)	(-1.0)	(-1.3)	(-0.9)	(2.2)	(2.2)	(2.0)	(2.2)
PRIOR_PERF	-0.126 ***	-0.126 ***	-0.127 ***	-0.126 ***	-0.047 ***	-0.047 ***	-0.048 ***	-0.047 ***
	(-16.1)	(-16.1)	(-16.3)	(-16.1)	(-3.7)	(-3.7)	(-3.8)	(-3.7)
PRIOR_EVENT	0.006 ***	0.005 ***	0.006 ***	0.006 ***	-0.007 ***	-0.007 ***	-0.007 ***	-0.007 ***
	(2.9)	(2.8)	(3.0)	(2.9)	(-3.3)	(-3.4)	(-3.2)	(-3.3)
Constant	0.713 ***	0.663 ***	0.629 ***	0.701 ***	0.668 ***	0.639 ***	0.613 ***	0.654 ***
	(35.7)	(36.9)	(34.8)	(36.1)	(40.5)	(41.7)	(39.5)	(40.5)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Analyst fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	410,886	410,886	410,886	410,886	486,134	486,134	486,134	486,134
Adj. R^2	15.7%	15.7%	15.6%	15.7%	24.7%	24.7%	24.6%	24.7%
F	253.76	254.76	250.67	254.26	622.27	623.32	621.50	621.20

differ with respect to the four investor protection measures we deploy, namely, $COMMON$, $ASDI$, $PUBL\_ENF$ and $STAFF\_ENF$.[25]

With regard to Table 8, the results across the two different forecast measures and the different investor protection proxies show quite uniformly that analysts' forecasts are significantly more accurate in strong protection environments. For almost all models, the forecast errors are negatively associated with the respective investor protection measure and highly significant at the 1% level.[26] Our results show, taking as an example model (1) of Table 8, that the earnings forecast error within common law countries is about 10 percentage points lower compared to the forecast error in civil law countries. In unreported analyses, we additionally enlarged our forecast error models by broker- and analyst-level control variables such as broker size, local broker, star-analyst and additional variables measuring the analyst-specific effort in terms of the number of companies and countries that each analyst must cover. All results are robust to this alternative model setup.

4.2. **The impact of institutional investors' regulatory background on forecast accuracy**

Comparable to Table 7 that uses market reactions to measure the information value of analyst research, we similarly examine whether the regulatory background of institutional investors of a company matters to the informativeness of forecasts (in terms of accuracy). Analysts' forecasts might be of higher accuracy and higher information value if most investors are from strong rather than weak investor protection countries. We therefore refine our investor protection classification based on institutional ownership. Table 9 focuses on earnings forecast errors (models (1) to (4)) and target price forecast errors (models (5) to (8)). For simplicity, we describe the model setup for earnings forecast errors, displayed in columns (1) to (4). Whereas models (1) and (2) are based on the civil law sub-sample, models (3) and (4) are based on the common law sub-sample.[27] Based on each sub-sample, we regress the forecast error on either domestic (IO_DOM) or foreign (IO_FOR) institutional ownership, respectively. As before, by using both domestic and foreign ownership within either strong or weak investor protection environments, we can proxy for the regulatory background of investors. Whereas domestic investors in strong investor protection countries

[25] The number of observations in these models is slightly smaller than in the market reaction models because of data constraints at the end of the chosen period. With regard to earnings forecast accuracy, we include all observations for which actual earnings were available as per December 2010. With regard to target price accuracy, we include all relevant observations using research data until July 2010 because we obtained the latest stock price information as of July 2011.

[26] This result is supported by six out of eight models. Only the coefficient on $PUBL\_ENF$ is not negatively associated with forecast errors.

[27] The target price models (models (5) to (8)) are organized correspondingly.

are by definition likely to stem from strong protection environments as well, foreign investors are likely to be located in less regulated backgrounds. An analogous reasoning applies to weak investor protection countries.

Describing our results, we again refer for simplicity to models (1) to (4), which focus on earnings forecast errors. First, we concentrate on domestic ownership (IO_DOM) for both sub-samples (model (1) for civil law countries and model (3) for common law countries). Whereas model (1) reveals that in weak protection countries, high domestic ownership is positively associated with earnings forecast errors, model (3) contrarily shows that in strong protection countries, forecast errors are lower when domestic ownership is high. We interpret this result as follows. Within common law countries, domestic investors add to governance and the quality of financial reporting because of their strong investor protection backgrounds, which ultimately leads to more accurate forecasts. On the contrary, domestic investors within civil law countries do not exercise such an added value in terms of governance and, hence, do not positively affect forecast accuracy. Barniv et al. (2005) state that whereas analysts provide highly accurate forecasts in common law countries, the demand for earnings information and consequently the accuracy of earnings forecasts is lower in civil law countries because of weaker governance mechanisms and a lower quality of financial reporting.

Second, we concentrate on foreign ownership (IO_FOR) for both sub-samples (model (2) for civil law countries and model (4) for common law countries). Quite interestingly, model (4) reveals that foreign investors within strong investor protection countries lead to higher forecast errors. This result could be linked to the regulatory background of these investors, which most likely stem from less regulated countries because they are by definition not from the U.S. or U.K. Similar results can be found when concentrating on models (5) to (8), in which target price errors are used as dependent variables.[28]

With regard to the accuracy of analysts' forecasts, our results overall are in line with those for the short-term market reactions. Hence, the informativeness of analyst research as proxied by these two measures depends on the overall regulatory environment of a country and the investor-specific regulatory background.

[28] Please note that we also perform additional analyses in which we split the total sample into sub-samples based on the alternative investor protection variables $ASDI$, $PUBL\_ENF$ and $STAFF\_ENF$. Results are similar to those presented based on a split into common and civil law countries.

Table 9: Earnings and target price forecast errors of analyst reports and the regulatory background of institutional investors

This table shows the regression results of analysts' earnings forecast errors and target price errors on institutional ownership in different investor protection environments, proxied by COMMON, which indicates whether a country has a common-law legal origin. The data are based on a panel of analyst reports on companies from the U.S., the EU5, Switzerland and Japan over the period 2005 through 2010. Models (1) to (4) use the absolute percentage earnings forecast error as dependent variable, whereas models (5) to (8) use the absolute percentage target price error as dependent variable. Models (1) and (2) and models (5) and (6), respectively, are based on the sub-sample of civil law countries. The remaining models ((3), (4), (7) and (8)) are based on the sub-sample of common law countries. IO_DOM represents holdings by institutions from the same country in which the stock is listed. IO_FOR represents holdings by institutions from a different country than the country in which the stock is listed. LOG_MKTCAP is the natural logarithm of the market capitalization (in millions of U.S. dollars), and PTBV is the price-to-book value of the subject company on the analyst report research date. PRIOR_PERF is the stock-specific cumulative stock return over the three months prior to the abnormal return window. PRIOR_EVENT is a dummy variable equal to one in case a report was preceded by a general meeting, an earnings release call or sales/revenue release within the five days prior to the publication. All models are estimated allowing for analyst and time fixed effects. Standard errors are clustered by analyst cluster and reported in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

	EPS_Error_abs				TP_Error_abs			
	COMMON = 0 (civil law)		COMMON = 1 (common law)		COMMON = 0 (civil law)		COMMON = 1 (common law)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
IO_DOM	0.292 ***		-0.054 ***		0.101		-0.049 ***	
	(3.0)		(-3.9)		(1.4)		(-3.1)	
IO_FOR		-0.030		0.050 **		0.217 ***		0.099 ***
		(-0.7)		(2.2)		(6.8)		(3.4)
LOG_MKTCAP	-0.041 ***	-0.041 ***	-0.051 ***	-0.051 ***	-0.035 ***	-0.035 ***	-0.043 ***	-0.043 ***
	(-10.4)	(-10.3)	(-22.4)	(-22.3)	(-11.1)	(-11.3)	(-20.1)	(-20.0)
PTBV	-0.013 ***	-0.013 ***	-0.000	-0.000	0.014 ***	0.014 ***	0.000	0.000
	(-6.2)	(-6.3)	(-0.7)	(-0.7)	(3.5)	(3.5)	(1.0)	(1.0)
PRIOR_PERF	-0.099 ***	-0.097 ***	-0.113 ***	-0.114 ***	-0.117 ***	-0.116 ***	0.018	0.018
	(-5.4)	(-5.3)	(-12.6)	(-12.7)	(-6.8)	(-6.7)	(1.0)	(1.0)
PRIOR_EVENT	0.017 ***	0.017 ***	0.003 *	0.003	0.002	0.002	-0.010 ***	-0.010 ***
	(3.8)	(3.8)	(1.6)	(1.6)	(0.6)	(0.5)	(-3.9)	(-3.9)
Constant	0.632 ***	0.627 ***	0.629 ***	0.635 ***	0.516 ***	0.528 ***	0.614 ***	0.620 ***
	(16.2)	(15.9)	(29.1)	(28.9)	(18.2)	(18.7)	(32.0)	(32.1)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Analyst fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	126,092	126,092	230,832	230,832	154,752	154,752	275,130	275,130
Adj. R^2	18.3%	18.2%	15.3%	15.3%	28.8%	28.9%	24.8%	24.8%
F	95.57	95.14	167.99	167.82	225.93	226.30	392.18	391.45

5. Conclusion

This paper addresses the question to what extent the regulatory environment of a company determines the informativeness of sell-side analyst reports. Based on the previous literature showing that the prevailing level of investor protection is positively associated with the quality of financial reporting (see, e.g., La Porta et al., 2000; Ball et al., 2000; and Leuz et al., 2003) we follow Frankel et al.'s (2006) argument that analyst research and financial statements are complements. This association may be linked to the fact that analysts directly depend on the quality of information available to them when publishing research. In our paper, we analyze whether the informativeness of analyst research is affected by (i) the overall level of investor protection of a country and (ii) the regulatory background of the institutional investors of a company. To measure the information value of analyst research, we apply two different methods. First, we focus on the short-term market reaction around the publication of an analyst report. Hence, we assume that markets are efficient and prices adjust to each new piece of information, such as an update of analysts' forecasts. By measuring the amount of price reaction around the publication of an analyst report, one can proxy the information value of new information. Second, we use report-specific forecast errors (in terms of earnings and target price forecasts) to identify which forecasts are, ex post, more accurate and therefore contain more information value.

To measure the regulatory environment, we use different measures of protection at the country level to proxy for the overall trustworthiness of the financial system. Investor protection is evaluated based on four different measures, including the common versus civil law classification, the anti-self dealing index of Djankov et al. (2008), and two *de facto* measures of law enforcement from Leuz et al. (2003) and Jackson and Roe (2009).

With respect to our first measure of informativeness, namely the short-term market reaction, our results show an increase in the information value of analysts' target prices and earnings forecasts as the level of investor protection increases. We further show that the informativeness of analyst research also depends on the regulatory background of institutional investors. Our results suggest that the information value of forecasts increases (decreases) if most institutional investors stem from strong (weak) investor protection countries as governance efforts and the quality of financial reporting increases (decreases). This scenario ultimately leads to an increased (decreased) information value of analysts' forecasts. Aggarwal et al. (2011) have just recently shown that U.S. institutions and institutions from countries with high regulatory environments are primarily responsible for

improvements in governance, whereas this is not the case for institutions from countries with weak investor protection environments.

With respect to the second measure of informativeness, namely the report-specific forecast error, our findings are qualitatively comparable. In particular, our results reveal that earnings and target price forecast errors are significantly lower in strong protection countries than in weak protection countries. This result further supports prior findings showing that strong accounting standard enforcement leads to more accurate earnings forecasts (see, e.g., Hope, 2003). Furthermore, within refined analyses, we show that forecasts are more (less) accurate when institutional investors are likely to stem from strong (weak) investor protection countries. The regulatory background of investors again appears to translate into governance efforts, the quality of financial reporting and, finally, the information value of forecasts.

Overall, we show that the informativeness of analyst research depends on the regulatory environment of a company and the regulatory background of investors. Our results might motivate regulators to establish and guard strong investor protection environments because these environments lead to a higher quality of financial disclosure and a higher informativeness of analyst research, which ultimately helps investors.

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Table A1: Variable definitions and sources

Variable		Definition	Source
Analyst report and market reaction variables			
Recommendation upgrade	UP	Dummy variable equal to 1 if the stock recommendation is an upgrade, compared to the previous recommendation by the same analyst on the same stock, and 0 otherwise; calculated only if the previous recommendation is no older than 90 days	FactSet
Recommendation reiteration	REIT	Dummy variable equal to 1 if the stock recommendation is a reiteration, compared to the previous recommendation by the same analyst on the same stock, and 0 otherwise; calculated only if the previous recommendation is no older than 90 days	FactSet
Recommendation downgrade	DOWN	Dummy variable equal to 1 if the stock recommendation is a downgrade, compared to the previous recommendation by the same analyst on the same stock, and 0 otherwise; calculated only if the previous recommendation is no older than 90 days	FactSet
Target price revision	TP_REV	Percentage change in target price by a given analyst on a given stock: $(TP_t-TP_{t-1})/TP_{t-1}$; calculated only if the previous target price is no older than 90 days	FactSet
Earnings forecast revision	EPS_REV	Percentage change in earnings forecast price by a given analyst on a given stock: $(EPS_t-EPS_{t-1})/\|EPS_{t-1}\|$; calculated only if the previous earnings forecast is no older than 90 days	FactSet
Cumulative abnormal return	CAR	Five-day cumulative abnormal return around the research date of the analyst report; abnormal return calculations based on a market model	Datastream
Investor protection variables			
Legal origin	COMMON	Dummy variable equal to 1 if the stock is from a common law country	La Porta et al. (1997, 1998)
Anti-self dealing	ASDI	Anti-self dealing index	Djankov et al. (2008)
Legal enforcement (ADRI)	PUBL_ENF	Legal enforcement measure defined as the mean of (1) the efficiency of the judicial system, (2) the rule of law, and (3) the level of corruption, all documented in La Porta et al. (1998)	Leuz et al. (2003)
Legal enforcement (Staff)	STAFF_ENF	Legal enforcement measure, defined as the number of regulator staff per 1,000,000 inhabitants	Jackson and Roe (2009)

Table A1 (continued)			
Institutional ownership variables			
Domestic institutional ownership	IO_DOM	Quarter-end stock holdings by institutional investors domiciled in the same country where the stock is listed, in percent of market capitalization	FactSet/LionShares
Foreign institutional ownership	IO_FOR	Quarter-end stock holdings by institutional investors domiciled in a different country from where the stock is listed, in percent of market capitalization	FactSet/LionShares
Control variables at company-level			
Market capitalization	LOG_MKTCAP	Natural logarithm of the market capitalization (in million U.S. dollars) as per the day prior to the research date of the analyst report	Datastream
Price-to-book ratio	PTBV	Price-to-book ratio as per the day prior to the research date of the analyst report	Datastream
Prior performance	PRIOR_PERF	Stock-specific three months return prior to the publication of a report	Datastream
Prior event	PRIOR_EVENT	Dummy variable equal to 1 if a report was preceded by a general meeting, an earnings release call or sales/revenue release within the five days prior to the publication	FactSet

D. Analyst research and investor reactions: Evidence from the 2008 financial crisis

This paper is currently not under review with an academic journal; submission planned.

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Analyst research and investor reactions: Evidence from the 2008 financial crisis

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This version: January, 2013

Abstract

In this paper we explore how the 2008 financial crisis impacted sell-side analysts' research as well as the market reactions to the publication of such research. Based on over 350,000 analyst reports from 2005 to 2010, we find that during the crisis analysts only disproportionately adapted their expectations, relative to the stock market development. Overall, they maintained a positive view towards corporate performance and stock returns. Consequently, analysts' accuracy with respect to target prices and earnings forecasts significantly deteriorated during the sub-period October 2007 to March 2009, leaving their research output (ex-post) less reliable to investors. Strikingly though, investors' responses to target price and earnings forecast revisions were significantly stronger and more persistent during than outside the crisis. We conclude that investors relied most on analysts when they should have done so least.

Keywords: *financial crisis, analyst reports, forecast accuracy, abnormal returns*
JEL Classification: *G01; G14; G24*

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1. Introduction

It is widely accepted in the prior literature that the dissemination of sell-side analysts' research reports generally triggers significant market reactions (see Stickel, 1995; Womack, 1996; Brav and Lehavy, 2003 and Asquith et al., 2005, among others). It is reasonable to assume, however, that the incremental information investors can derive from analyst reports depends on the information environment and, therefore, on the stock market cycle.[1] It could well be, for example, that in times of stable market conditions and high predictability with respect to corporate performance, stock price movements and overall economic conditions, investors are rather confident to make investment decisions with only limited external advice so that market reactions to analyst research are only modest. On the contrary, when markets are volatile, stock returns display unexpected patterns and insecurity is high, investors are likely to be in desperate need for valuable information and could therefore be forced to put relatively more weight on expert opinions published, for instance, via analyst reports.

Yet in such situations of high insecurity, the quality of analyst research is questionable for a variety of reasons. First, analysts themselves depend on the validity of corporate information and the predictability of industry or country specific market developments as well as global macro-economic trends when deriving earnings estimates or assessing the return prospects of stocks. If they lack confidence in what is going to happen, their research is going to be of worse quality compared to times during which they have a good feeling for the short- and mid-term behavior of capital markets. In line with this argumentation Loh and Mian (2003) report the largest earnings forecast errors by Singaporean analysts during the 1997/98 Asian economic crisis. Consistently, Sidhu and Tan (2011) show that sell-side analysts' forecast accuracy for U.S. and Australian companies significantly deteriorated during the 2008 global financial crisis. Moreover, analysts might be particularly prone to issue overly favorable research in order to curry management favor when the demand for high-quality research is extraordinarily high. Empirical support in this direction comes from Das et al. (1998) and Lim (2001) who provide evidence that analysts issue particularly optimistic views on firms the earnings of which are difficult to predict. Second, analysts have been shown to overreact to positive information but to underreact to negative information (Easterwood and Nutt, 1999). Remarkably, Loh and Mian (2003)

[1] Frankel et al. (2006) report that analyst research is more informative when uncertainty among investors is high, whereas it turns out to be less informative when the provision of private information is particularly costly. In particular, regarding corporate financial information as a major input to analyst research, the authors state that "the informativeness of analyst research and informativeness of financial statements are complements."

demonstrate that this was actually the case during, but not before, the 1997/98 Asian economic crisis. In addition, they find that analysts' earnings forecasts during the crisis displayed a systematic upside bias.

These considerations and empirical findings illustrate the potential dilemma in which investors might be caught in times of volatile market conditions. They presumably depend most heavily on reliable information from external sources when sell-side research, one of the major sources of investment advice, runs a high risk of being of particularly poor quality.[2] Does that mean that investors are caught between the devil and the deep blue sea?

The latest global economic crisis that shook the markets between late 2007 and early 2009 and which culminated in the insolvency of Lehman Brothers in September 2008 provides a natural and up-to-date setting that allows addressing several aspects concerning the quality and market impact of analyst reports in different market environments empirically. We define October 10, 2007 as the starting point of the financial crisis because this is the day on which the Dow Jones total return index started to decline after reaching its peak the day before. Analogously, March 09, 2009 marks the end of the crisis period since the index reached its nadir on that day. Figure 1 provides an illustration of the development of the stock market during the entire sample period with respect to the Dow Jones index value (solid line) and its return volatility, measured as the standard deviation over the previous 30 trading days (dashed line).

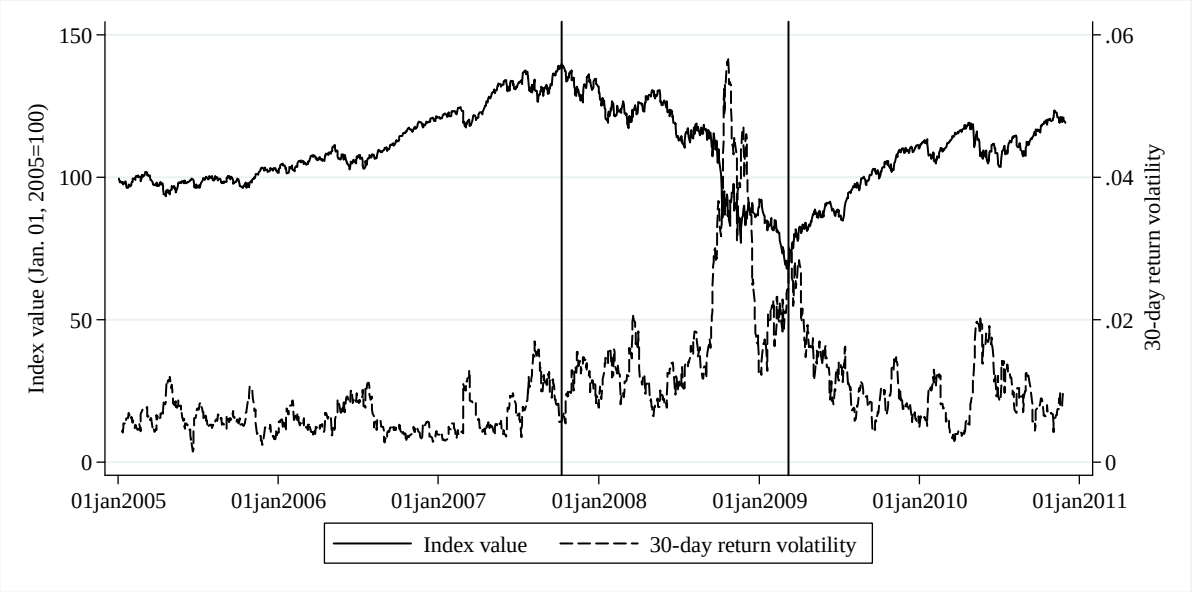
This paper adds to the literature in two major ways. First, we provide insights on how analysts' target price and earnings forecast accuracy as well as the optimism inherent to their forecasts during the downturn differed from the times before and after the crisis. Second, we address the question whether and to what extent the strength of investor reactions to analyst research depends on the economic cycle. Answering these two questions simultaneously will allow us to draw initial conclusions on whether investors were aware of potential crisis-induced differences in the quality of analyst research.

Concerning the first contribution of this paper (analysts' performance), the results suggest that analysts generally did react to the 2008 financial crisis by nominally adjusting their expectations downward. In particular, they issued relatively fewer buy and more sell recommendations, along with negative earnings forecast and target price revisions, during the crisis. Before and after the crisis the proportion of buy recommendations was higher and average earnings and target price revisions had a positive sign. These insights draw an

[2] In fact, Ryan and Taffler (2004) document that analysts' output is one of the most important factors associated with abnormal stock price movements and trading volumes.

Figure 1: Dow Jones total return index 2005-2010

This figure illustrates how the Dow Jones total return index evolved over the sample period (January 01, 2005 to November 30, 2010). The index value is indexed to 100 on the first day of the sample period. On each day, the 30-day volatility is the standard deviation of index returns over the previous 30 trading days. The vertical lines mark the beginning (October 10, 2007) and the end (March 09, 2009) of the financial crisis period as defined in this paper.



incomplete picture, however. Despite the downward adjustments of their expectations, analysts' accuracy with respect to target prices and earnings forecasts deteriorated significantly during the crisis. Consequently, the average decline in stock prices and corporate earnings must have been even larger than analysts had expected. Furthermore, although analysts' systematically overestimated both stock prices and earnings during the entire sample period, the magnitudes of the average target price and earnings forecast errors were much larger during than outside the crisis. That is, analysts were apparently too optimistic overall, but particularly so when markets tumbled. These findings are consistent with those reported by, e.g., Loh and Mian (2003) and Sidhu and Tan (2011).

With respect to the second aspect (stock market reactions), we strikingly find that the cumulative abnormal returns in response to stock recommendation downgrades as well as analysts' target price and earnings forecast revisions were significantly higher during the crisis than in non-crisis times, implying that investors relied significantly more on external advice when insecurity about the stock market was high. Moreover, analyses on the post-announcement stock price performance suggest that the market reactions to revisions of both target prices and earnings forecasts in times of crisis were permanent and increased gradually. That is, these revisions conveyed new information to the market, although the market was not fully efficient in assimilating the new information into stock prices. During

non-crisis times, in contrast, the initial market reactions were lower and even partly reversed subsequent to the publication of the report, suggesting that some of the short-term reaction was due to investors' overreaction.[3]

The bottom line of our results is that sell-side analysts had the strongest and longest-lasting impact on stock returns during the crisis, that is, when the quality of their reports was lowest. It seems that investors were desperately longing for reliable investment advice during the crisis.

The paper proceeds as follows. Section 2 provides an overview of the data sources and variables used. Empirical results concerning the crisis impact on analysts' behavior and performance are presented in Section 3. Section 4 evaluates whether investor reactions to analyst research during the crisis differed from the reactions in non-crisis times. Section 5 concludes.

2. Data sample

2.1. Data sources and definition of variables

Our study is based on analyst report information on U.S. companies from January 2005 to November 2010, obtained from FactSet Research Systems, Inc. We include all companies that received forecasts from at least three different analysts in at least one of the calendar years in the sample period. For each analyst report in the sample we obtain basic report information including the report date, the analyst's name (if available) and the name of the issuing broker, along with the stock recommendation level, the target price, the forecasted earnings per share for the upcoming fiscal year end and the stock price as of the trading day prior to the report date.[4] If a report was published within 90 days after the same analyst's previous report on the same company, we further check whether the current stock recommendation represents an upgrade ($UPGRADE$), a reiteration ($REITERATION$) or a downgrade ($DOWNGRADE$).[5] We also calculate the percentage changes in an analyst's target

[3] We emphasize that we do not intent to judge on whether market reactions to the dissemination of analyst reports during or outside the crisis represented rational behavior or not. Our aim is to draw an ex-post picture in order to better understand how different market environments affect market participants' behavior.

[4] To ensure consistency we consider all stock recommendations with a FactSet rating equal to 1 (typically a strong buy) or 1.5 (typically a buy) as buy recommendations (BUY). Similarly, if the FactSet recommendation is 2.5 (typically a sell) or 3 (typically a strong sell), we record these as sell recommendations ($SELL$). Finally, a 2 is considered a hold recommendation ($HOLD$).

[5] We follow the recent literature standard (e.g., Asquith et al., 2005) and use dummy variables to code stock recommendation revisions because the different recommendation levels are not uniformly defined across brokerage houses.

price (TP_REV) and earnings forecast (EPS_REV), subject to the same 90-day constraint.[6] Further, we scale the analyst's current target price and earnings forecast, respectively, by the concurrent stock price to measure the analyst's expectations with regard to future stock returns ($IMPL\_RET$) and earnings yield (EPS_YIELD) as implicitly assumed in her forecasts. To assess whether and to what extent analysts over- or underestimated future stock returns and future earnings, we also calculate the ex-post percentage errors in an analyst's target price ($TP\_\%ERROR\_REL$) and earnings forecast ($EPS\_\%ERROR\_REL$).[7] Finally, the absolute values of these deviations ($TP\_\%ERROR\_ABS$ and $EPS\_\%ERROR\_ABS$) measure an analyst's accuracy, irrespective of the direction of the errors. For a report to be included in our analyses we require that the revision variables on all summary measures (i.e., $UPGRADE/REITERATION/\ DOWNGRADE$, TP_REV and EPS_REV) are available.

Using daily stock and market returns from Datastream, we calculate abnormal stock returns around the issuance of an analyst report based on a standard market model (see, e.g., Brown and Warner, 1985; MacKinlay, 1997) where the estimation period lasts from day -250 until day -11, relative to the research date of the analyst report. $CAR(-2;+2)$ is the cumulative abnormal return for event days -2 to +2 and serves as a measure for the initial market reaction around the dissemination of an analyst report. The cumulative abnormal returns for alternative event windows, $CAR(-2;+20)$ and $CAR(+3;+20)$, are defined accordingly. Consistent with prior studies on analyst research and capital markets (e.g., Hugon and Muslu, 2010), we drop observations if the stock price on the research date is less than or equal to USD 1.00. In order to account for potential outliers, we also ignore observations that represent the 1% and 100% percentiles of either TP_REV, EPS_REV, $IMPL\_RET$, EPS_YIELD, $TP_\%ERROR_REL$or $EPS\_\%ERROR\_REL$ because extreme values in these variables are potentially due to coding errors in the current (or previous) forecasts. Lastly, the 1% and 100% percentiles of $CAR(-2;+20)$ are ignored to mitigate the effect of potential outliers with respect to stock returns.

To control for a company's size and growth potential, we next obtain, also from Datastream, a company's market capitalization in million U.S. dollars ($MKTCAP$) and the price-to-book ratio ($PTBV$) at the time of the analyst report.[8] Observations with a negative

[6] TP_REV is calculated as $(TP_t - TP_{t-1})/TP_{t-1}$, whereas EPS_REV is calculated as $(EPS_t - EPS_{t-1})/|EPS_{t-1}|$. TP_t (TP_{t-1}) and EPS_t (EPS_{t-1}) are the current (previous) target price and earnings per share forecast, respectively.

[7] Similar to TP_REV and EPS_REV, the variable $TP\_\%ERROR\_REL$ is calculated as $(TP_t - P_{actual})/P_{actual}$, whereas $EPS\_\%ERROR\_REL$ is calculated as $(EPS_t - EPS_{actual})/|EPS_{actual}|$, where P_{actual} and EPS_{actual} are the actual stock price after 12 months and the actual earnings per share in the current (i.e., non-reported) fiscal year as per the report date, respectively.

[8] Consistent with the prior literature (e.g., Barber et al., 2006), we use LOG_MKTCAP, which is the natural logarithm of $MKTCAP$, as independent variable in the multivariate analyses.

price-to-book ratio are ignored. From FactSet's analyst report data we further measure broker size by counting the number of different companies followed by the issuing broker within a calendar year ($BROKER\_SIZE$). On the analyst level, the number of different companies followed by an individual analyst ($ANALYST\_COMP$) and the number of different countries represented by these companies ($ANALYST\_COUNTR$) serve as proxies for the analyst's workload. Our final dataset consists of 363,779 individual analyst reports of which 67,045 (18.4%) were published during the crisis period.

2.2. **Descriptive statistics**

Table 1 provides an overview of the final dataset. As Panel A shows, 58.8% of all recommendations belonged to the category BUY, whereas $SELL$ accounted for only 5.3%. A comparable imbalance of disproportionately many buys is also documented in Malmendier and Shanthikumar (2007) and Barber et al. (2007, 2010). Relative to the prior rating, $UPGRADE$ and $DOWNGRADE$ accounted for 2.3% and 3.0% of the recommendation changes, respectively. From Panel B it follows that analysts revised their target prices upward by 0.8% on average. The resulting target prices suggested an expected stock price increase, $IMPL\_RET$, of 16.1% over the forecasting horizon. The mean of 32.7% with respect to $TP\_\%ERROR\_REL$ suggests that actual the stock prices after 12 months, on average, fell about one third short of analysts' price expectations. This is consistent with Bonini et al.'s (2010) finding that target prices are upwardly biased. Regardless of the sign of the error, the absolute error $TP\_\%ERROR\_ABS$ was, on average, as high as 48.9%. As Panel C reveals, the distribution of the variables related to analysts' earnings forecasts was very similar. EPS_REV, EPS_YIELD, $EPS\_\%ERROR\_REL$ and $EPS\_\%ERROR\_ABS$ were all positive on average, although generally lower in absolute terms. For instance, the mean scaled relative and absolute earnings forecast errors ($EPS\_\%ERROR\_REL$ and $EPS\_\%ERROR\_ABS$) were 9.2% and 23.7%, respectively. Again, these figures are in line with those presented in prior research and are almost identical to those in Loh and Mian (2006), who report 10.13% and 22.69%, respectively, for identically defined variables.[9]

Lastly, Panel D of Table 1 provides summary statistics for the set of the above-mentioned control variables measured at the company and broker/analyst level.

[9] The number of observations for the error variables based on analysts' target prices and earnings forecasts are smaller than those for the revision and return variables due to data constraints at the end of the sample period. Concerning earnings forecast accuracy we include all observations for which actual earnings were available as of December 2010. Concerning target price accuracy we include all relevant observations with a research date until July, 2010, because we obtained the latest stock price information as of July, 2011.

Table 1: Data sample

This table shows summary statistics for the final data sample. Panel A lists the absolute and relative frequencies for each stock recommendation level and revision category. Panels B and C list summary statistics for variables related to analysts' target prices and earnings forecasts, respectively. Similarly, Panel C lists summary statistics for a set of company and broker/analyst characteristics. BUY, HOLD and SELL are dummy variables indicating whether a stock recommendation is a buy, a hold or a sell. UPGRADE is a dummy variable indicating whether a stock recommendation is an upgrade relative to the same analyst's previous rating on the same stock, while DOWNGRADE is a dummy variable indicating whether a stock recommendation is a downgrade. REITERATION is a dummy variable indicating that the current recommendation level represents no change to the analyst's prior recommendation. TP_REV and EPS_REV measure the percentage change in an analyst's target price or earnings forecast revision. IMPL_RET and EPS_YIELD are the current target price and earnings forecast scaled by the concurring stock price. TP_%ERROR_REL and EPS_%ERROR_REL are the ex-post percentage errors of analysts' target price and earnings forecasts. The target price error is calculated on the basis of a 12-months forecasting horizon, while the earnings forecast error is calculated based on actual earnings in the corresponding fiscal year. TP_%ERROR_ABS and EPS_%ERROR_ABS are the absolute values of TP_%ERROR_REL and EPS_%ERROR_REL, respectively. MKTCAP is the market capitalization in million U.S. dollars. PTBV is the price-to-book ratio. BROKER_SIZE is the number of companies followed by a broker in a calendar year and serves as a proxy for broker size/reputation. ANALYST_COMP and ANALYST_COUNTR are the number of companies followed by an analyst, and the countries represented by them, in a calendar year and serve as proxies for the complexity of an analyst's research portfolio.

Panel A: Distribution of stock recommendation revisions

	Obs.	% of total	Median	StDev	Min	Max
Recommendation levels						
All recommendations	363,779	100.0%				
BUY	213,998	58.8%	-	-	-	-
HOLD	130,379	35.8%	-	-	-	-
SELL	19,402	5.3%	-	-	-	-
Recommendation revisions						
All recommendation revisions	363,779	100.0%				
UPGRADE	8,508	2.3%	-	-	-	-
REITERATION	344,451	94.7%	-	-	-	-
DOWNGRADE	10,820	3.0%	-	-	-	-

Panel B: Target prices

	Obs.	Mean	Median	StDev	Min	Max
TP_REV	363,779	0.8%	0.0%	9.4%	-41.6%	47.1%
IMPL_RET	363,779	16.1%	15.1%	18.1%	-46.0%	91.3%
TP_%ERROR_REL	284,118	32.7%	8.5%	90.7%	-64.9%	921.9%
TP_%ERROR_ABS	284,118	48.9%	24.1%	83.1%	0.0%	921.9%

Panel C: Earnings forecasts

	Obs.	Mean	Median	StDev	Min	Max
EPS_REV	363,779	0.5%	0.0%	22.2%	-187.0%	171.0%
EPS_YIELD	363,779	5.5%	6.0%	5.4%	-42.0%	19.6%
EPS_%ERROR_REL	240,900	9.2%	-0.7%	52.1%	-187.5%	465.0%
EPS_%ERROR_ABS	240,900	23.7%	8.0%	47.3%	0.0%	465.0%

Panel D: Company and broker/analyst fundamentals

	Obs.	Mean	Median	StDev	Min	Max
Company fundamentals						
MKTCAP	363,779	14,758	3,660	34,282	11.1	518,242
PTBV	357,955	2.9	2.2	2.5	0.1	21.8
Broker/analyst charateristics						
BROKER_SIZE	363,779	799.6	559.0	612.3	1.0	1,923.0
ANALYST_COMP	363,779	15.6	14.0	8.5	1.0	93.0
ANALYST_COUNTR	363,779	1.1	1.0	0.5	1.0	7.0

3. The impact of the financial crisis on analysts' behavior and performance

Although there is probably little doubt that the stock market crash between late 2007 and early 2009, along with an increase in return volatility, had a material impact on financial experts' behavior and performance, we provide some detailed and novel insights on analysts' optimism and accuracy in different market environments. To shed light on the question how the financial crisis affected sell-side research, we partition the data sample into reports issued during the financial crisis and reports issued outside the crisis. Recall that we define October 10, 2007 to March 09, 2009 as the crisis period because this is exactly the time window when the U.S. stock market fell from its maximum to its minimum value over the entire sample period.

Looking at stock recommendation levels first, Panel A of Table 2 demonstrates that the distribution of recommendations was significantly more favorable outside than it was during the crisis. In particular, the proportion of buy recommendations fell from 60.0% to 53.8%, whereas the proportion of hold and sell recommendations increased from 34.9% to 40.0% and from 5.1% to 6.3%, respectively. Note that these figures are in line with stock recommendation distributions reported for economic expansions and recessions by Hess et al. (2012). All inter-temporal differences in proportions are significant at the 1% level. With respect to recommendation changes, the figures further reveal that during the financial crisis analysts changed their prior rating levels more often than they did outside the crisis period, relative to the total number of reports issued, since the proportion of reiterations went down from 95.0% to 93.2%. At the same time, the proportion of upgrades increased from 2.2% to 2.9%, whereas the number of downgrades increased from 2.8% to 3.9%. Again, all proportions are significantly different during versus outside the crisis at the 1% level. A likely explanation for the increase in the proportion of recommendation upgrades and downgrades is that during the crisis analysts themselves were subject to increased insecurity so that it was particularly challenging for them to derive valid recommendations at all. Moreover, note that the increase in downgrades was considerably larger than the increase in upgrades. Thus, downgrades became relatively more prevalent, which is consistent with a more prudent distribution of stock recommendations during the crisis.

With respect to target prices, Panel B of Table 2 reveals that during the crisis analysts adjusted their expectations downward by -3.5% on average, whereas in non-crisis times, they increased their prior estimates by 1.7%. This suggests that analysts responded to the downward trend in stock prices by adjusting their target prices in the same direction. Remarkably, though, these adjustments seem to have been disproportionate and lower than

Table 2: Analysts' expectations and performance in crisis and non-crisis times

This table shows univariate tests of differences in analysts' expectations and performance between crisis and non-crisis times. In Panel A, the proportions of the different recommendation levels and revisions are compared. In Panels B and C, the mean values of the variables related to analysts' target prices and earnings forecasts are compared. BUY, HOLD and SELL are dummy variables indicating whether a stock recommendation is a buy, a hold or a sell. UPGRADE is a dummy variable indicating whether a stock recommendation is an upgrade relative to the same analyst's previous rating on the same stock, while DOWNGRADE is a dummy variable indicating whether a stock recommendation is a downgrade. REITERATION is a dummy variable indicating that the current recommendation level represents no change to the analyst's prior recommendation. TP_REV and EPS_REV measure the percentage change in an analyst's target price or earnings forecast revision. IMPL_RET and EPS_YIELD are the current target price and earnings forecast scaled by the concurring stock price. TP_%ERROR_REL and EPS_%ERROR_REL are the ex-post percentage errors of analysts' target price and earnings forecasts. The target price error is calculated on the basis of a 12-months forecasting horizon, while the earnings forecast error is calculated based on actual earnings in the corresponding fiscal year. TP_%ERROR_ABS and EPS_%ERROR_ABS are the absolute values of TP_%ERROR_REL and EPS_%ERROR_REL, respectively. Based on a t-test (z-test), ***, ** and * (+++, ++ and +) denote statistical significance at the 1%, 5% and 10% level, respectively.

Panel A: Distribution of stock recommendation revisions

	Full sample		No Crisis		Crisis		No Crisis - Crisis
	Obs.	% of total	Obs.	% of total	Obs.	% of total	% of total
Recommendation levels							
All recommendations	363,779		296,734		67,045		
BUY	213,998	58.8%	177,959	60.0%	36,039	53.8%	6.2% +++
HOLD	130,379	35.8%	103,590	34.9%	26,789	40.0%	-5.0% +++
SELL	19,402	5.3%	15,185	5.1%	4,217	6.3%	-1.2% +++
Recommendation revisions							
All recommendation revisions	363,779		296,734		67,045		
UPGRADE	8,508	2.3%	6,582	2.2%	1,926	2.9%	-0.7% +++
REITERATION	344,451	94.7%	281,940	95.0%	62,511	93.2%	1.8% +++
DOWNGRADE	10,820	3.0%	8,212	2.8%	2,608	3.9%	-1.1% +++

Panel B: Target prices

	Full sample		No Crisis		Crisis		No Crisis - Crisis
	Obs.	Mean	Obs.	Mean	Obs.	Mean	Mean
TP_REV	363,779	0.8%	296,734	1.7%	67,045	-3.5%	5.2% ***
IMPL_RET	363,779	16.1%	296,734	15.2%	67,045	20.3%	-5.1% ***
TP_%ERROR_REL	284,118	32.7%	218,678	16.2%	65,440	87.5%	-71.3% ***
TP_%ERROR_ABS	284,118	48.9%	218,678	34.1%	65,440	98.6%	-64.5% ***

Panel C: Earnings forecasts

	Full sample		No Crisis		Crisis		No Crisis - Crisis
	Obs.	Mean	Obs.	Mean	Obs.	Mean	Mean
EPS_REV	363,779	0.5%	296,734	1.3%	67,045	-3.1%	4.5% ***
EPS_YIELD	363,779	5.5%	296,734	5.3%	67,045	6.6%	-1.3% ***
EPS_%ERROR_REL	240,900	9.2%	174,675	5.1%	66,225	19.9%	-14.8% ***
EPS_%ERROR_ABS	240,900	23.7%	174,675	21.0%	66,225	30.8%	-9.8% ***

the decline in stock prices, as the average implied return during the crisis (20.3%) was significantly higher than outside the crisis (15.2%).[10] Consequently, although analysts generally lowered their target prices during the financial crisis in absolute terms, they implicitly communicated more optimistic return expectations to the market. This finding is

[10] Recall that the return forecast *IMPL_RET* is calculated as the analyst's target price scaled by the concurrent stock price. Hence, an increase in *IMPL_RET* despite downward target price revisions suggests that the corresponding stock price decline must have been even larger in magnitude.

further substantiated by the fact that target prices that were issued during the crisis overshot the actual stock prices twelve months later by as much as 87.5%, while the average over-optimism before or after the crisis was only 16.2%. In absolute terms as well, analyst's target prices were significantly farther away from the actual stock price 12 months later when the target was issued during the crisis. All differences between the crisis and non-crisis averages in the variables related to an analyst's target price are statistically significant at the 1%-level.[11]

Panel C of Table 2 provides very comparable results concerning analysts' earnings forecasts. The average revision was 1.3% outside the crisis but -3.1% during the downturn. At the same time, the average earnings yield was 6.6% during the crisis, which is 1.3 percentage points higher than the corresponding value from the non-crisis period. Thus, analysts became even more optimistic in relative terms, which is consistent with the finding on target prices and stock return expectations discussed above.[12] Finally, the scaled relative and absolute earnings forecast errors increased from 5.1% to 19.9% and from 21.0% to 30.8%, respectively, during the crisis. Again, all crisis versus non-crisis differences are highly significant.

The results thus far demonstrate that the 2008 financial crisis had a substantial effect on the quality of sell-side analyst research. Although analysts adjusted their expectations downward in terms of recommendation level, target price or earnings forecast, the return prospects inherent to their expectations grew even higher in times of economic turmoil. At the same time, their forecast accuracy with respect to target prices and earnings per share declined significantly. Hence, analysts were either unable or unwilling to assess the full impact of the world economic crisis. Admittedly, one can argue that economic downturns are, by their very nature, typically accompanied by an increase in return volatility so that it is hardly surprising that analysts were less accurate during the crisis. However, the prior literature provides several other arguments which help explain the fact that during the crisis analysts' forecast accuracy not only deteriorated in absolute terms, but that they were systematically more optimistic. First, Das et al. (1998) and Lim (2001) demonstrate that

[11] Our sample contains observations which could have a distorting effect on the target price error variables, due to the 12-months forecasting horizon. In particular, there are instances where the research date on which a target price was issued is before (during) the crisis, whereas the errors are calculated based on actual stock prices during (after) the crisis. In untabulated results we therefore exclude analyst reports issued between October 07, 2006 and October 06, 2007 (the year before the start of the crisis) or between March 10, 2008 and March 09, 2009 (the last year of the crisis). With this alternative specification, our results remain qualitatively unchanged.

[12] Since *EPS_YIELD* is calculated as the outstanding earnings forecast scaled by the concurrent stock price, an increase in *EPS_YIELD*, given a downward revision of the earnings forecasts, must be explained by an even larger decline of the concurring stock price.

information uncertainty concerning corporate earnings is a driver of analysts' optimism. Not only was the crisis characterized by an increased volatility of stock returns and earnings. Companies might also have contributed to this uncertainty by responding to the 2008 turmoil with a more restrictive release of valuable information such as interim earnings guidance. Exemplarily, in early 2009 Unilever decided to stop publishing financial targets due to the volatile market environment in those days (see, e.g., The Economist, 2009; Rigby and Wiggins, 2009). It could be that analysts had incentives to be particularly optimistic during that time in order to foster management relationships and gain access to private information. A second argument stems from the behavioral finance literature and stipulates that financial analysts are subject to behavioral biases. According to Easterwood and Nutt (1999), analysts overreact to good news, whereas they underreact to bad news. Applying this logic to the 2008 economic crisis, the collapse of the stock market and negative earnings surprises can be considered bad news that led to disproportionate adjustments of analysts' expectations. What is remarkable in this context is that analysts are thought of as very sophisticated financial intermediaries with a significant impact on investment decisions. As Loh and Mian (2003) point out, "*professional security analysts, arguably amongst the most astute of market participants, exhibit systematic biases in forming their expectations during periods of heightened economic uncertainty. This calls into question the classical assumption about the rationality of the marginal investor.*"

4. The impact of the financial crisis on stock market reactions to analyst research

4.1. Univariate analysis of short-term abnormal returns

The results presented thus far give rise to the question whether investors reacted differently to the dissemination of analyst research, depending on the market phase in which this research was published. On the one hand, analyst research during the crisis was, from an ex-post perspective, of poorer quality. It could have therefore been recommendable for investors to rely less on analyst reports in those days. On the other hand, investors themselves were also subject to the financial market turmoil, so it was arguably particularly challenging for them to draw reliable inferences on the returns prospects of firms and stocks. As a consequence, they might have been in desperate need for external advice. Hence, there are two contrarian effects: The reduced quality of analysts' forecasts, conditional on investors being aware of this loss of quality, could have mitigated the market reactions in response to the dissemination of analyst research, whereas a potentially higher demand for

Table 3: Average cumulative abnormal returns in crisis and non-crisis times

This table shows univariate tests of differences in five-day cumulative abnormal returns around the analyst report date between crisis and non-crisis times for different levels and changes in major analyst report measures. BUY, HOLD and SELL are dummy variables indicating whether a stock recommendation is a buy, a hold or a sell. UPGRADE is a dummy variable indicating whether a stock recommendation is an upgrade relative to the same analyst's previous rating on the same stock, while DOWNGRADE is a dummy variable indicating whether a stock recommendation is a downgrade. REITERATION is a dummy variable indicating that the current recommendation level represents no change to the analyst's prior recommendation. TP_REV and EPS_REV measure the percentage change in an analyst's target price or earnings forecast revision. Based on a t-test, ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

	Full sample	No Crisis	Crisis	No Crisis - Crisis
Recommendation levels				
BUY	0.1% ***	0.1% ***	0.1% **	0.0%
HOLD	-0.4% ***	-0.3% ***	-0.7% ***	0.3% ***
SELL	-0.9% ***	-0.7% ***	-1.3% ***	0.6% ***
Recommendation revisions				
UPGRADE	1.8% ***	1.9% ***	1.5% ***	0.4% **
REITERATION	-0.1% ***	-0.0% ***	-0.2% ***	0.1% ***
DOWNGRADE	-3.0% ***	-2.7% ***	-4.1% ***	1.4% ***
Target price revisions				
TP_REV>0	2.0% ***	1.9% ***	3.1% ***	-1.2% ***
TP_REV=0	-0.1% ***	-0.2% ***	0.3% ***	-0.5% ***
TP_REV<0	-3.1% ***	-3.4% ***	-2.7% ***	-0.7% ***
Earnings forecast revisions				
EPS_REV>0	1.4% ***	1.2% ***	2.3% ***	-1.1% ***
EPS_REV=0	0.1% ***	0.1% ***	-0.5% ***	0.6% ***
EPS_REV<0	-2.0% ***	-1.9% ***	-2.1% ***	0.2% ***

external advice during the crisis could have led to more emphasized market reactions in the direction of the analysts' opinions.[13]

Table 3 provides initial insights how the 2008 financial crisis impacted short-term stock price reactions to analyst reports. We contrast the cumulative abnormal returns over the (-2;+2) window during the crisis versus the non-crisis period for different levels of analysts' stock recommendations as well as recommendation changes and revisions to their target prices and earnings forecasts.

The table reveals that in either market environment the short-term market reactions $CAR(-2;+2)$ to positive news (buy recommendations, recommendation upgrades and positive target price or earnings forecast revisions) were positive, whereas the cumulative abnormal returns to pessimistic analyst opinions (sell recommendations, recommendation downgrades and negative change in target price or earnings forecasts) were negative.

Moreover, the average market reactions were stronger during the crisis for the majority of variables considered. The average $CAR(-2;+2)$ were particularly strong when

[13] Hess et al. (2012) use a similar argument when interpreting their findings of stronger short-term abnormal returns to stock recommendations during economic recessions compared to economic expansions. In particular, they attribute this observation to the "heightened volatility and general uncertainty during these times."

sell recommendations, recommendation downgrades, positive target price revisions or positive or negative earnings forecast revisions were issued during the crisis. For example, the $CAR(-2;+2)$ for recommendation downgrades was -2.7% in non-crisis times but -4.1% during the crisis. These crisis versus non-crisis differences are statistically significant at 5% or above. Although the findings on negative target price revisions are an exception which contradicts these initial results, the overall picture presented in Table 3 provides evidence that the intensity of the market reactions to the dissemination of analyst reports depends on the overall economic conditions in a sense that stock market reactions to such reports are more pronounced in times of crisis.

4.2. **Multivariate analysis of short-term abnormal returns**

Prior research has shown that analysts' recommendation changes, target price and earnings forecast revisions all have incremental and simultaneous impact on abnormal stock returns (e.g., Asquith et al., 2005). In order to separate the crisis impact on each individual type of analyst revision and to draw valid inferences on market responses to analyst research in different economic environments, we present additional results from standard OLS regressions with $CAR(-2;+2)$ as the dependent variable in Table 4. Following the recent market reactions literature, we include $UPGRADE$, $DOWNGRADE$, TP_REV and EPS_REV as the typical analyst research-related measures that have been shown to drive abnormal stock returns (see, e.g., Francis and Soffer, 1997; Brav and Lehavy, 2003; Asquith et al., 2005). We also include LOG_MKTCAP, $PTBV$, $BROKER\_SIZE$, $ANALYST\_COMP$ and $ANALYST\_COUNTR$ as control variables at the company and broker/analyst level in order to capture any effect that is not associated with any of the analyst report metrics listed above.[14] Column 1 of Table 4 contains the regression results for the sub-sample of analyst reports that were published outside the 2007-2009 financial crisis, whereas the results for the crisis sub-sample are displayed in column 2. Lastly, column 3 is based on the entire sample of analyst reports. Here, we further include the interaction terms of $UPGRADE$, $DOWNGRADE$, TP_REV and EPS_REV with $CRISIS$, a dummy variable that is equal to 1 if an analyst report was issued between October 10, 2007 and March 09, 2009, and 0 otherwise, in order systematically assess the differential impact the crisis had on market responses to analyst reports. Whereas the stand-alone coefficients for these variables in column 3 are to be interpreted as the effect of the respective variable on abnormal stock returns in non-crisis

[14] The use of control variables at the company and broker/analyst level is becoming ever more common in the market reactions literature (see Barber et al., 2006; Barniv et al., 2010 and Hugon and Muslu, 2010, among others).

Table 4: Short-term market reactions to analyst reports and financial crisis impact

This table shows regression results of five-day cumulative abnormal returns around the analyst report date on various analyst measures and the impact of the 2008 financial crisis, defined as the period from October 10, 2007 to March 09, 2009. Results for the sub-sample of reports published outside the crisis are shown in column (1), whereas results for the sub-sample of reports published during the crisis are shown in column (2). The full sample results are shown in column (3). UPGRADE is a dummy variable indicating whether a stock recommendation is an upgrade relative to the same analyst's previous rating on the same stock, whereas DOWNGRADE is a dummy variable indicating whether a stock recommendation is a downgrade. TP_REV and EPS_REV measure the percentage change in an analyst's target price or earnings forecast revision. CRISIS is a dummy variable indicating whether an analyst report was published during the crisis. LOG_MKTCAP is the natural logarithm of the market capitalization (in millions of U.S. dollars), and PTBV is the price-to-book value, of the subject company on the analyst report research date. BROKER_SIZE is the number of companies followed by a broker in a calendar year. ANALYST_COMP and ANALYST_COUNTR are the number of companies followed by an analyst, and the countries represented by them, in a calendar year. All models are estimated allowing for analyst-company fixed effects. Standard errors are clustered by analyst-company and reported in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

	No Crisis	Crisis	Full sample
	(1)	(2)	(3)
UPGRADE	0.006 ***	0.008 ***	0.005 ***
	(6.10)	(2.62)	(5.88)
DOWNGRADE	-0.016 ***	-0.025 ***	-0.016 ***
	(-15.91)	(-9.71)	(-16.00)
TP_REV	0.145 ***	0.149 ***	0.147 ***
	(66.48)	(27.83)	(68.12)
EPS_REV	0.030 ***	0.043 ***	0.031 ***
	(34.03)	(16.21)	(34.46)
CRISIS			0.008 ***
			(16.50)
UPGRADE x CRISIS			0.001
			(0.49)
DOWNGRADE x CRISIS			-0.010 ***
			(-4.41)
TP_REV x CRISIS			0.011 **
			(2.38)
EPS_REV x CRISIS			0.012 ***
			(5.25)
LOG_MKTCAP	-0.003 ***	-0.005 *	-0.005 ***
	(-3.97)	(-1.84)	(-7.29)
PTBV	0.000	-0.001	-0.000
	(0.25)	(-1.10)	(-1.18)
BROKER_SIZE	0.000	-0.000 *	0.000
	(0.51)	(-1.79)	(0.80)
ANALYST_COMP	0.000	0.000 *	0.000 **
	(0.99)	(1.90)	(2.08)
ANALYST_COUNTR	-0.000	0.004	-0.000
	(-0.44)	(1.13)	(-0.06)
Constant	0.019 ***	0.045 **	0.035 ***
	(3.25)	(2.12)	(6.47)
Analyst-company fixed effects	Yes	Yes	Yes
N	292,075	65,880	357,955
Adj. R^2	11.1%	11.9%	10.1%
F	777.53	161.77	655.81

times, the interaction coefficients render the incremental crisis effect of the respective analyst report metric on abnormal returns.

Concerning stock recommendation upgrades, the table reports statistically significant but economically small coefficients of 0.006 for the non-crisis subsample (column (1)) and 0.008 for the crisis subsample (column (2)). The extended model in column (3) does not provide any evidence that there is a significantly larger stock price reaction associated with $UPGRADE$ during the crisis, as the interaction coefficient for $UPGRADE \times CRISIS$ is insignificant.

With respect to stock recommendation downgrades, the short-term abnormal stock returns are generally stronger, with coefficients ranging from -0.016 in non-crisis times (column (1)) to -0.025 during the crisis (column (2)), which corresponds to an increment of almost 60%. The full sample results in column (3) confirm a statistically significant incremental crisis impact of roughly -0.010, as can be observed from the coefficient on the interaction variable $DOWNGRADE \times CRISIS$. These results suggest that the average short-term market reaction to stock recommendation downgrades was significantly more pronounced during the crisis than it was in non-crisis times. This is consistent with Hess et al. (2012), who report significantly larger excess returns during the first three trading days after stock recommendation downgrades (and also upgrades) issued during an economic recession compared to those issued during an expansion.

Concerning target price revisions, the marginal effect of TP_REV on $CAR(-2;+2)$ ranged from 0.145 in non-crisis to 0.149 during crisis times. In column (3), the base coefficient is 0.147 with a crisis interaction coefficient of 0.011, significant at the 5% level. Although these figures, again, suggest that stock price reactions to analyst research were more pronounced during the crisis, we do not put too much emphasis on these results for now as the crisis impact seems to be comparatively low in economic terms, at least as far as this short-term event window (-2;+2) is concerned. We refer to the next section for an investigation of longer event windows.

Finally, the coefficient of EPS_REV is 0.030 for the non-crisis sub-sample (column (1)) but 0.043 during the crisis (column (2)). That is, the coefficient estimate during the crisis is approximately 40% larger than the non-crisis coefficient. The full sample analysis of column (3) confirms this result with a base coefficient of 0.031 and an interaction coefficient of 0.012, both significant at the 1% level.

The multivariate results presented thus far provide further evidence that stock price reactions during the crisis could have been stronger than stock price reactions outside the

crisis. From the interactions of the four analyst report metrics with the dummy variable $CRISIS$ it follows that the incremental effect the financial crisis had on the corresponding coefficients was either significantly positive, as was the case for stock recommendation downgrades, earnings forecast revisions and (although with economically limited relevance) target price revisions, or it was statistically insignificant, as was the case for recommendation upgrades. In contrast, there is no evidence at all that the crisis could have led to even weaker investor reactions. We conclude that there is some evidence that investors relied considerably more on analysts' opinions during the crisis. This is consistent with reliable information from other sources being scarce during that time. However, we recall our results from Section 3, where we demonstrated that during the crisis analysts – not surprisingly – provided comparably inaccurate research in terms of forecast accuracy, at least from an ex-post perspective. That given, our results from Table 4 suggest that investors relied most on analyst research when they should have done so least.

4.3. **Multivariate analysis of mid-term abnormal returns**

The results from the previous section show a clear tendency yet are not entirely consistent as the results for recommendation upgrades and target price revisions were weaker than those for downgrades and earnings forecast revisions. It could be that the larger coefficients on $DOWNGRADE$ and EPS_REV during the crisis and the corresponding significantly positive interaction coefficients in Table 4 can be attributed to short-term overreaction. If this were the case, we should expect the cumulative abnormal returns to revert to their non-crisis levels subsequent to the publication date of the analyst report.

It could also be that the effects are persistent, and that $UPGRADE$ and TP_REV show a similar and economically relevant pattern which is simply not captured by the estimation window for which we calculate cumulative abnormal returns, which is somewhat arbitrary.[15]

We address these considerations by decomposing the short-term cumulative abnormal returns $CAR(-2;+2)$ into a mid-term effect starting at day -2 relative to the publication date of the analyst report and lasting until 20 trading days after the publication ($CAR(-2;+20)$) and a post-announcement effect capturing the stock market returns from day +3 until day +20, that is, the cumulative abnormal returns subsequent to the publication

[15] Initial evidence on stock recommendations comes from Hess et al. (2012) who report short-term excess-returns for buy and sell recommendations, as well as for upgrades and downgrades, if these were issued during economic recession. However, only recession sells and downgrades continue to outperform their expansion period peer groups in the long run, whereas buys and upgrades underperform over a six-months investment horizon, which implies that short-term excess returns are attributable to a market overreaction.

Table 5: Mid-term market reactions to analyst reports and financial crisis impact

This table shows regression results of cumulative abnormal returns over two different time windows around the analyst report date on various analyst measures and the impact of the 2008 financial crisis, defined as the period from October 10, 2007 to March 09, 2009. In columns (1) through (3) the dependent variable is the cumulative abnormal returns from day -2 to day +20 relative to the publication of the analyst report. In columns (4) through (6) the dependent variable is the cumulative abnormal returns from day +3 to day +20 relative to the publication of the analyst report. Results for the sub-sample of reports published outside the crisis are shown in columns (1) and (4), whereas results for the sub-sample of reports published during the crisis are shown in column (2) and (5), respectively. The full sample results are shown in column (3) and (6). UPGRADE is a dummy variable indicating whether a stock recommendation is an upgrade relative to the same analyst's previous rating on the same stock, whereas DOWNGRADE is a dummy variable indicating whether a stock recommendation is a downgrade. TP_REV and EPS_REV measure the percentage change in an analyst's target price or earnings forecast revision. CRISIS is a dummy variable indicating whether an analyst report was published during the crisis. LOG_MKTCAP is the natural logarithm of the market capitalization (in millions of U.S. dollars), and PTBV is the price-to-book value, of the subject company on the analyst report research date. BROKER_SIZE is the number of companies followed by a broker in a calendar year. ANALYST_COMP and ANALYST_COUNTR are the number of companies followed by an analyst, and the countries represented by them, in a calendar year. All models are estimated allowing for analyst-company fixed effects. Standard errors are clustered by analyst-company and reported in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

	CAR(-2;+20)			CAR(+3;+20)		
	No Crisis	Crisis	Full sample	No Crisis	Crisis	Full sample
	(1)	(2)	(3)	(4)	(5)	(6)
UPGRADE	0.006 ***	0.006	0.006 ***	0.000	-0.002	0.000
	(4.19)	(1.34)	(3.96)	(0.26)	(-0.49)	(0.14)
DOWNGRADE	-0.018 ***	-0.026 ***	-0.018 ***	-0.002 *	-0.002	-0.002 **
	(-12.50)	(-7.05)	(-12.82)	(-1.78)	(-0.56)	(-2.12)
TP_REV	0.108 ***	0.159 ***	0.111 ***	-0.037 ***	0.010	-0.036 ***
	(34.58)	(21.11)	(36.19)	(-16.37)	(1.62)	(-16.00)
EPS_REV	0.027 ***	0.044 ***	0.027 ***	-0.004 ***	0.001	-0.004 ***
	(20.04)	(11.96)	(20.45)	(-3.85)	(0.30)	(-3.58)
CRISIS			0.008 ***			0.000
			(9.53)			(0.23)
UPGRADE x CRISIS			-0.002			-0.003
			(-0.46)			(-1.01)
DOWNGRADE x CRISIS			-0.007 **			0.003
			(-2.12)			(1.12)
TP_REV x CRISIS			0.060 ***			0.049 ***
			(9.01)			(8.95)
EPS_REV x CRISIS			0.018 ***			0.006 **
			(5.54)			(2.28)
LOG_MKTCAP	-0.049 ***	-0.066 ***	-0.052 ***	-0.047 ***	-0.061 ***	-0.047 ***
	(-32.49)	(-15.16)	(-41.15)	(-35.62)	(-16.59)	(-44.13)
PTBV	-0.006 ***	-0.003 ***	-0.006 ***	-0.006 ***	-0.003 ***	-0.005 ***
	(-16.79)	(-2.90)	(-17.65)	(-19.68)	(-3.10)	(-21.12)
BROKER_SIZE	0.000 ***	0.000 **	0.000 ***	0.000 ***	0.000 ***	0.000 ***
	(6.86)	(2.58)	(6.89)	(8.19)	(4.36)	(7.86)
ANALYST_COMP	0.000	0.001 *	0.000 **	-0.000	0.000	0.000
	(0.45)	(1.79)	(1.96)	(-0.11)	(0.82)	(1.06)
ANALYST_COUNTR	-0.000	-0.001	-0.001	-0.000	-0.004	-0.001
	(-0.35)	(-0.16)	(-0.55)	(-0.18)	(-0.98)	(-0.66)
Constant	0.410 ***	0.534 ***	0.429 ***	0.391 ***	0.488 ***	0.394 ***
	(32.95)	(15.15)	(41.78)	(36.73)	(16.40)	(45.42)
Analyst-company fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	292,075	65,880	357,955	292,075	65,880	357,955
Adj. R^2	9.4%	11.0%	8.0%	7.8%	8.6%	6.8%
F	417.59	105.02	404.84	363.76	71.61	331.53

($CAR(+3;+20)$). Table 5 displays the results for the regression analyses with these alternative cumulative abnormal returns as the dependent variable. The results for $CAR(-2;+20)$ are shown in the left part of Table 5, whereas the results for $CAR(+3;+20)$ can be found in the right part. We report subsample results for the non-crisis and crisis periods in columns (1) and (4) and in columns (2) and (5), respectively, whereas the full sample results including the interactions of $UPGRADE$, $DOWNGRADE$, TP_REV and EPS_REV with $CRISIS$ are in column 3 (6).

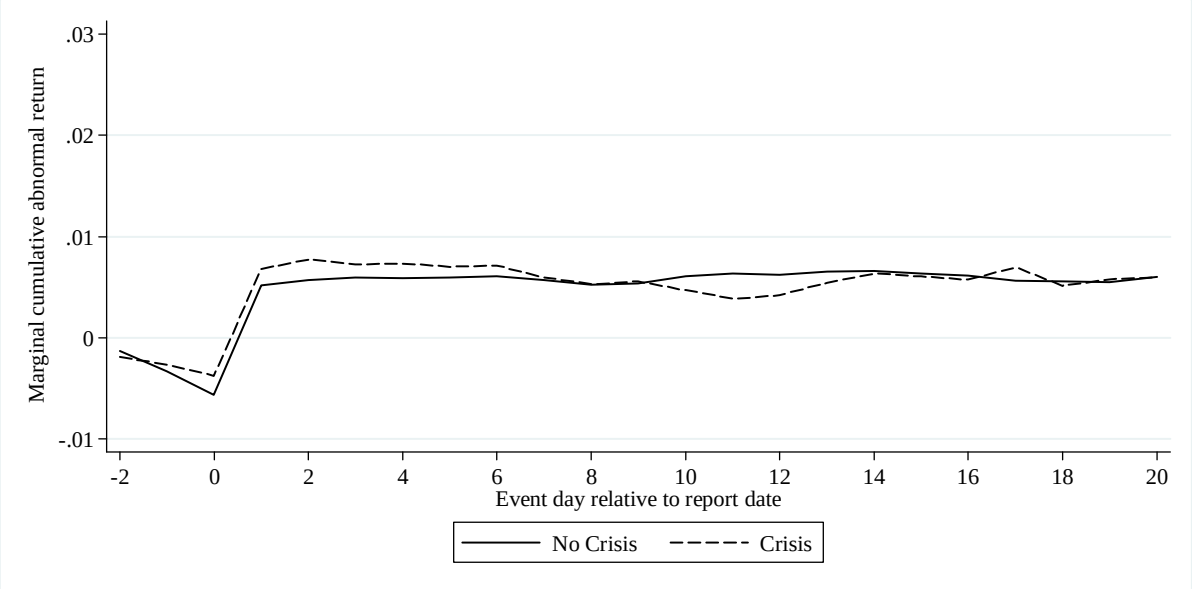
Concerning stock recommendation upgrades, Table 5 reveals that the mid-term market reactions CAR(-2;+20) were fairly small (0.006) and not any different during versus outside the crisis. The interaction coefficient on $UPGRADE \times CRISIS$ is virtually zero and statistically insignificant, so there is no evidence of significantly different (mid-term) market reactions to stock recommendation upgrades in crisis versus non-crisis times. Moreover, the coefficients on $UPGRADE$ for $CAR(-2;+20)$ are comparable in size to the short-term reactions reported in Table 4. Accordingly, the coefficients on $UPGRADE$ for the post-announcement period (+3;+20) in columns (4) through (6) as well as the coefficient for $UPGRADE \times CRISIS$ are all statistically undistinguishable from zero. These results are complemented by Figure 2, which provides an illustration of how stock prices assimilate the information conveyed through recommendation upgrades. Based on the coefficients of $UPGRADE$ in Table 4 as well as additional untabulated regressions the chart illustrates how the coefficient of $UPGRADE$ evolves as the event window increases by steps of one day.[16] We point out that the magnitude of regression coefficients on $UPGRADE$ displayed in the figure as well as in Table 5 suggests that recommendation upgrades generally had a very limited incremental impact on stock returns in absolute terms, regardless of the economic cycle.[17] This is consistent with earlier studies which find only little informational value in stock recommendation upgrades once analysts' target price and earnings forecast revisions are controlled for (e.g., Asquith et al., 2005).

In response to stock recommendation downgrades, Table 5 reports mid-term abnormal returns of -0.018 over the entire 23-day period (-2;+20) for analyst reports issued during non-crisis times (column (1)). For reports issued during the crisis the coefficient is -0.026 (column (2)), which corresponds to a difference of roughly 40%. The interaction coefficient on $DOWNGRADE \times CRISIS$ in the full-sample model in column (3) confirms that

[16] Each value in Figure 2 represents the slope coefficient on $UPGRADE$ from a regression where the dependent variable is $CAR(-2;-2)$, then $CAR(-2;-1)$, and so forth, to finally reach $CAR(-2;+20)$.
[17] For the non-crisis sub-sample, the maximum marginal effect is 0.007 reached on day +14; for the crisis sub-sample, it is 0.008, reached on day +2.

Figure 2: Cumulative abnormal return to analysts' stock recommendation upgrades, by event day

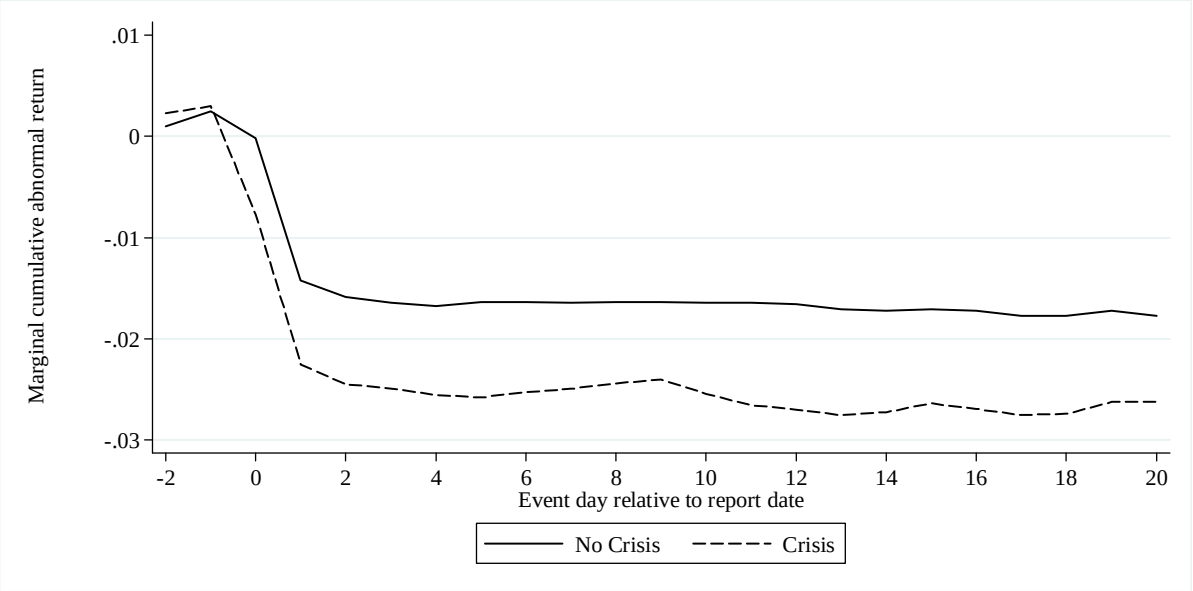
This figure illustrates how the marginal impact of analysts' stock recommendation upgrades on the cumulative abnormal return evolved as the length of the event window increases.



the incremental market reaction during the crisis is statistically significant at the 5%-level. Recalling that the short-term market reactions $CAR(-2;+2)$ to $DOWNGRADE$ displayed a similar difference between non-crisis and crisis times, these results suggest that the initial market reaction was not generally due to investor overreaction. In fact, the post-publication effects associated with $DOWNGRADE$, as displayed in columns (4) through (6) of Table 5, confirm that there is no material reversion effect in the case of stock recommendation downgrades. The coefficients are economically small (-0.002 for both sub-samples considered) and statistical significances are generally weak. In addition, there is no noticeable difference between these post-publication abnormal returns in crisis versus non-crisis times, as the interaction coefficient for $DOWNGRADE \times CRISIS$ in column (6) is not statistically significant at ordinary levels. We interpret these results as evidence that the particularly strong market reactions to stock recommendation downgrades that were published during the crisis persisted for at least 20 trading days after the publication and were not due to investor overreaction. This picture is further corroborated by the illustration in Figure 3. The figure confirms that the short-term cumulative abnormal returns to downgrades were particularly strong during the crisis, and that this excess market reaction did not revert within the 20 trading days after the recommendation. Our results on the post-publication returns in response to recommendation downgrades are in line with those

Figure 3: Cumulative abnormal return to analysts' stock recommendation downgrades, by event day

This figure illustrates how the marginal impact of analysts' stock recommendation downgrades on the cumulative abnormal return evolved as the length of the event window increases.

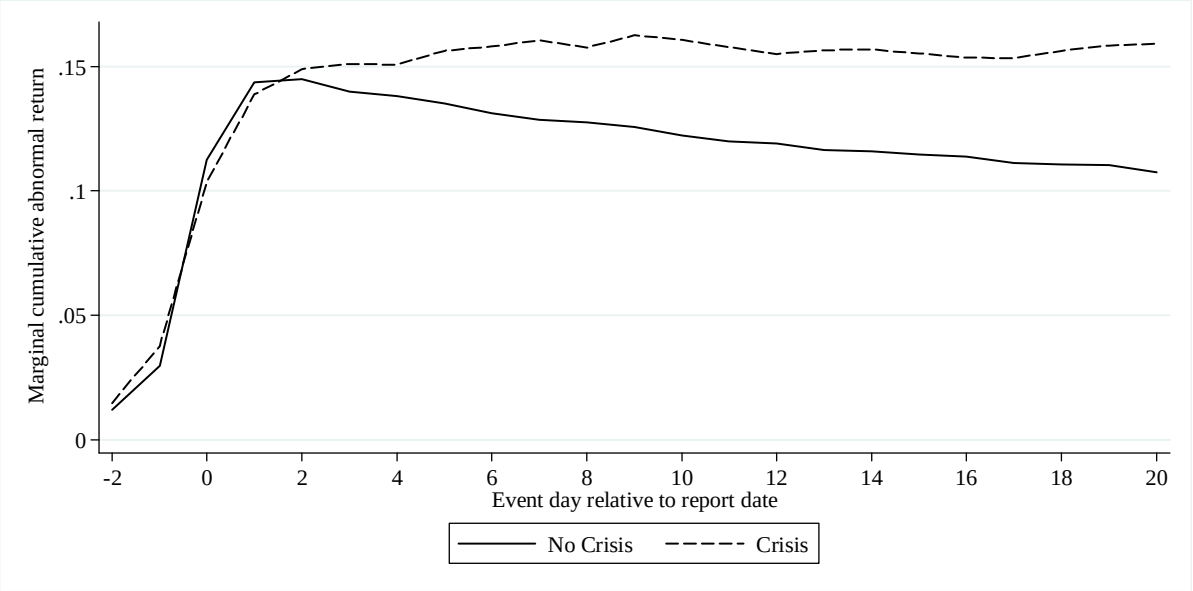


presented by Hess et al. (2012), who find that downgraded stocks underperform the peer group for as long as six months after the recommendation change.

We now turn our attention to analysts' revisions of target prices. We recall that Table 4 revealed economically and statistically significant short-term abnormal returns associated with this metric, but only very small differences in crisis versus non-crisis times. In contrast to this, columns (1) and (2) of Table 5 provide evidence that the mid-term market reactions to TP_REV during the crisis (0.159) were significantly stronger that outside the crisis (0.108). Again, this corresponds to an increase of approximately +50% in the corresponding coefficient. The positive interaction coefficient on $TP\_REV \times CRISIS$ of 0.060 in column (3) confirms this observation. Shifting the attention to the right part of Table 5, the coefficient of -0.037 in column (4) suggests that the post-publication abnormal returns $CAR(+3;+20)$ to TP_REV in non-crisis times were negative on average. That is, there was some reversion effect subsequent to the initial market reaction. For the crisis subsample, in contrast, the coefficient is statistically insignificant (0.010) and does not confirm such a reversal effect. The full sample results in column (6), and the coefficient on $TP\_REV \times CRISIS$ in particular, confirm that the reversion of cumulated abnormal returns over the (+3;+20) period associated with TP_REV can only be observed for the non-crisis but not for the crisis sub-sample. Overall, with respect to analysts' target price revisions we conclude that although the short-term market reactions were not significantly different in the two economic settings

Figure 4: Cumulative abnormal return to analysts' target price revisions, by event day

This figure illustrates how the marginal impact of analysts' target price revisions on the cumulative abnormal return evolved as the length of the event window increases.



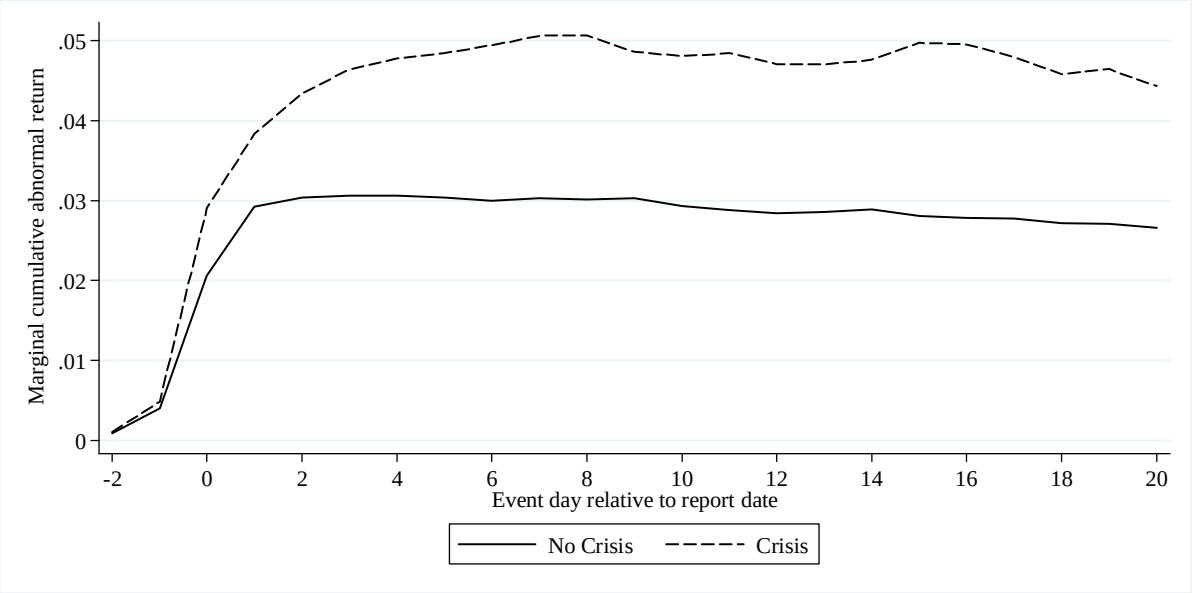
that we consider, the mid-term reactions suggest that, again, the stock market reactions were more pronounced and more persistent if the report was published during the crisis. The corresponding illustration in Figure 4 even suggests that during the crisis stock prices only gradually assimilated the information conveyed through target price revisions and that this price formation process lasted until approximately 9 trading days after the target price revision.[18]

Finally, we turn towards analysts' earnings forecast revisions. While the short-term results in Table 4 already revealed that abnormal returns associated with EPS_REV were particularly strong during the crisis, the corresponding coefficients in columns (1) through (3) of Table 5 confirm that these differential market reactions persisted during the (-2;+20) window. The marginal impact of EPS_REV on $CAR(-2;+20)$ was only 0.027 in non-crisis times (column (1)) but 0.044 – and therefore almost 70% higher – during the crisis (column (2)). Both coefficients are statistically significant at the 1%-level. The interaction coefficient on $EPS\_REV \times CRISIS$ in column (3) further confirms the statistical significance of the incremental crisis impact. Concerning the post-publication abnormal returns, the base coefficients of EPS_REV in columns (4) and (6) imply that in non-crisis times there was some reversion of the initial market reactions, although we admit that the economic relevance of

[18] This is confirmed by untabulated regressions, which yield the largest coefficient for TP_REV in the crisis sub-sample if the dependent variable is $CAR(-2;+9)$.

Figure 5: Cumulative abnormal return to analysts' earnings forecast revisions, by event day

This figure illustrates how the marginal impact of analysts' earnings forecast revisions on the cumulative abnormal return evolved as the length of the event window increases.



this effect is limited (-0.004). In contrast, during the crisis no such post-publication reversion can be observed as the insignificant coefficient on EPS_REV in column (5) and the significantly positive interaction coefficient of 0.006 in column (6) suggest. Figure 5 graphically supports the notion that during the crisis stock price reactions to earnings forecast revisions were larger and more persistent than outside the crisis. The figure even reveals that during the crisis the market took until about day +8 to fully reflect the news from analysts' earnings forecast revisions in stock prices.[19] These results are entirely consistent with those for TP_REV.

Overall, our findings from Section 4 suggest that the financial crisis had an enhancing impact on the market reactions associated with the publication of sell-side analysts' reports. While the stock market reactions to recommendation upgrades were generally limited regardless of the market phase, recommendation downgrades triggered significantly stronger short-term market reactions during the crisis, which persisted until at least 20 days after the publication of the analyst report. With respect to target price and earnings forecast revisions, the short-term market reactions were significantly stronger and persistent when these were issued during the 2008 financial crisis, whereas they were partly temporary and reverting when the corresponding report was issued during non-crisis times. We interpret the significantly stronger market reactions to analysts' target price and

[19] Again, untabulated results confirm this observation.

earnings forecast revisions as evidence that investors had particularly low confidence in their own expectations of future stock returns and firms' earnings prospects and, therefore, put much emphasis on analysts' opinions during the financial crisis. A likely reason is that due to the volatile market environment during the downturn it was even more challenging for market participants than in other periods to make precise forecasts concerning how their investments would fare in the future.

5. Conclusion

In this paper we investigate how the 2008 financial crisis impacted sell-side analysts' behavior and performance as well as investor reactions to analyst reports. We argue that this is an interesting field of study because the crisis most likely had a detrimental impact on analysts' performance although it is exactly these economically volatile and unpredictable times when investors' need for valuable external advice is biggest.

With respect to analysts' behavior and performance, the results reveal that during the crisis analysts adjusted their expectations downward in absolute terms, as the distribution of stock recommendations as well as average target price and earnings forecast revisions suggest. At the same time, however, their relative (implied) optimism even increased. In particular, analysts' stock return prospects and earnings yields implicitly assumed in their target prices and earnings forecasts were significantly more optimistic during than outside the crisis. This had a detrimental impact on the quality of their research. For instance, analysts' average earnings forecast error during the crisis was as high as 30.7%, up from 21.0% during non-crisis times. Consequently, analysts' absolute downward adjustments of their expectations were relatively too low, compared to the contemporaneous stock price performance during the downturn. That is, analysts underestimated the full impact of the 2008 financial crisis, which rendered their research output during that market phase less reliable to investors.

Concerning market reactions, we report significantly higher cumulative abnormal returns to analyst reports during than outside the 2008 financial crisis. Additional findings suggest that these more pronounced market reactions during the crisis were not only due to temporary overreaction. Rather, they persisted until at least 20 trading days after the publication date of the analyst report, whereas outside the crisis analysts' target prices and earnings forecast revisions were negatively associated with post-publication abnormal stock returns, suggesting that the initial market reactions were partly eliminated in the days following the release of a report. Overall, our results imply that investors relied relatively

more on analyst reports that were published during the crisis, potentially due to general lack of reliable information in the market during those days. We conclude that analyst research was most important to investors during the crisis, although the quality of such research in terms of forecasting accuracy was particularly low during that time.

Our study suggests several directions for future research. One question that arises is whether performance differences between individual analysts persist over time, that is, whether analysts who were amongst the "best" researchers before the crisis were able to outperform their peers during the crisis as well. Consequently, it would be interesting to understand whether in times of crisis investors are able to identify "good" analysts in order to base their investment decisions on the best information available.

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