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What determine financial analysts' career outcomes during mergers?

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ABSTRACT

We investigate the effects of mergers on the career outcomes of financial analysts. We hypothesize and find that analysts with good earnings forecast performance experience higher turnover during mergers, target analysts are more likely to turnover and the existence of a competing analyst in a merger counter party also increases analyst turnover. We analyze the promotion of analysts to research executive positions and find that analysts with greater experience and especially experienced stars are more likely to be promoted. Finally, we document that analyst turnover is associated with decreases in research quality at the merged firms post-merger.

1. Introduction

One defining aspect of the financial industry since the 1990s has been a torrent of mergers and acquisitions, which brought tremendous transformation to the entire industry and at the same time profoundly changed the courses of many careers. How mergers affect analyst career concerns deserves researchers' attention for several reasons.[1] First, the effect of the mergers is far-reaching on the financial analyst profession. During our sample period of 1994–2004, 24% of the financial analysts tracked by the I/B/E/S database and 48% of the *Institutional Investor* magazine ranked All-Star analysts are affected by mergers in the financial industry. Second, mergers raise analyst turnover substantially relative to the pre-merger levels (an increase of 15.7% after adjusting for industry trend) and especially for the group of top quality analysts. This suggests that mergers can adversely affect research quality in the merged firms.

Our inquiry goes beyond the financial analyst literature, however. The combination of data on financial analysts with a sample of corporate mergers generates interesting implications for how mergers impact the labor force. Existing research on mergers' effect on the wider workforce is confined to studying the change in *overall* employment following mergers without linking individual employee attributes to their career outcomes (see, for example, Jarrell et al., 1988), thus little is known about the turnover mechanism for employees outside the top executive suite during mergers. The data on financial

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[1] For brevity, we use the term 'merger' to include both mergers and acquisitions.

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analysts offer a unique, and so far unexploited, opportunity to precisely measure an individual worker's performance and tie it to the worker's career outcome following a merger.

The US financial industry has experienced significant consolidation since the 1990s.[2] Much of the consolidation is spurred by deregulation, especially the repeal of the Glass–Steagall Act, which had separated commercial banking from investment banking since the 1930s (Group of Ten, 2001; Berger et al., 1999). The ensuing entry of commercial banks into the lucrative securities underwriting business brings fundamental changes to the competitive landscape in the entire financial industry.[3] Many financial firms employ sell-side financial analysts because of the synergies between a research department and the investment banking and brokerage sides of the business (Cowen et al., 2006, offer detailed discussions of such interactions and synergies). Thus, our sample firms can be an investment bank, a brokerage firm, a commercial bank, or a financial conglomerate provided that the merger transaction affects financial analysts.[4] Our final sample includes 2742 financial analysts involved in 76 mergers from 1994 to 2004.

We address three research questions: (1) the determinants of analyst turnover during mergers (analyst turnover is defined as an analyst leaving the merged firm versus staying *as a financial analyst*); (2) the determinants of an analyst's promotion to a research executive position post-merger; and (3) changes in post-merger firm research strength. We first investigate the determinants of analyst turnover during mergers. Prior studies suggest that poor earnings forecast accuracy carries negative labor market consequences for financial analysts (e.g. Mikhail et al., 1999; Hong and Kubik, 2003). This can be true in the case of mergers, which likely create excess research capacity, leading to the firing of weaker performers. However, we also predict that during mergers good performers are likely to experience high turnover as well. A merger likely destroys part of an employee's firm-specific human capital or the 'fit' with the employer, breeds substantial uncertainty for the employees regarding their future career prospects, and creates potential changes in the work environment. Top employees are at particularly high risk for turnover because they likely have more external career opportunities and competing firms can use the changes and uncertainties caused by the merger to convince them to leave. Supporting these predictions, we find increased turnover among analysts with good earnings forecast performance as well as among analysts with poor forecast performance. We also hypothesize and find that affiliation with the acquirer significantly reduces turnover, and the existence of a competing analyst in terms of stock coverage significantly increases analyst turnover, consistent with the elimination of excess research capacity during mergers.

One potential career outcome for financial analysts that has received little attention in the literature is the promotion to a research executive post. We use the Nelson's Directory of Investment Research as the data source for executive positions and document that close to 10% of the analysts, who disappear from I/B/E/S post-merger, become research executives.[5] We predict that more senior analysts have greater chances of becoming research executives because of their greater experience with and knowledge of the firm and the industry. Furthermore, their survival in the profession can indicate ability. We also expect that senior *star* analysts selected by the *Institutional Investor* rankings have even higher likelihoods of taking on executive positions as they likely have a set of attributes, such as recognition within the profession, inter-personal skills and customer focus, all of which are valuable for an executive position. Our findings are consistent with these predictions. Finally, we find evidence that analyst turnovers are associated with decreases in firm research strength post-merger, reflected in decreases in stock coverage and decreases in earnings forecast frequency and accuracy from pre- to post-merger.

Our research makes several contributions to the literature. We expand the understanding of analyst turnover by predicting and documenting heightened turnover for top earnings forecasters during mergers and its negative implications for research quality at the merged firms. Our findings suggest that whatever the rationales are for the mergers, they can have the unintended consequence of driving away top talent from the merged firms.

[2] Between 1994 and 2003, over 3500 merger deals are completed among US commercial banks (Pilloff, 2004). The merger activities go far beyond commercial banks, however. Close to 40% of the deals in the financial industry involve non-banks such as securities firms or insurance companies (Berger et al., 1999). Another noted feature of this merger wave is the size of the mergers. Some 'mega-mergers' are among the largest in *any* industry during this period. For example, the mergers between Citicorp and Travelers Group in 1998 and between Chase Manhattan and J.P. Morgan in 2000 result in the two largest banking institutions in the US.

[3] The Glass–Steagall Act of 1933 prohibited commercial banks from engaging in public offering of securities other than federal and state debt issuances. Beginning in the late 1980s, commercial banks were gradually allowed to engage in underwriting activities through the so-called Section 20 subsidiaries (Bhargava and Fraser, 1999). The Glass–Steagall Act was officially repealed in 1999. Many mergers in our sample result from commercial banks entering into investment banking, which in turn creates competitive pressure for even more consolidation in the financial industry. For instance, the Dallas-based securities firm Rauscher in announcing its 1997 merger with another brokerage Dain Bosworth makes the following observation:

> Consolidation has swept through the securities industry recently, especially since the megamerger in February of Morgan Stanley and Dean Witter Reynolds Inc. At least nine major securities firms have been purchased or combined since then. The catalyst for much of this activity was a move in December by the Federal Reserve Board to allow commercial banks to acquire investment banks.

[4] There are few independent research firms during our sample period. For example, Cowen et al. (2006) find only 18 such firms in I/B/E/S prior to 2002. Although our merger searches in SDC include independent research firms, none exists in our final sample.

[5] Nelson's reports the names of key research executives at each firm—separately for equity research operations and fixed income operations. We focus on equity research executives as they likely contribute in significant ways to a firm's equity research quality. The equity executive titles reported in Nelson's include "Head of Equity", "Head of Equity Research", "Head of Institutional Equity Trading", "Head of Institutional Equity Sales", and "Other Key Equity Executives." A firm may not adopt all executive titles. Out of the analysts promoted to research executives in our sample, about 7% assume the title of "Head of Equity", 40% are "Head of Equity Research", and 45% are "Other Key Equity Executives." The rest are "Head of Institutional Equity Trading" or "Head of Institutional Equity Sales" (4% for each group).

Our study is the first to analyze promotion to executive positions as a possible career outcome for financial analysts. We highlight that measuring *firm-level analyst turnover* can be confounded by analysts being promoted to research executive posts within the same firm. We also raise serious concerns about the validity of the *industry turnover measure* ('leaving profession') based on I/B/E/S (e.g. Hong et al., 2000).[6] Our manual matching of I/B/E/S with Nelson's Directory of Investment Research reveals that for close to 30% of the analysts who disappear from I/B/E/S post-merger, their career outcomes are potentially misclassified based on I/B/E/S information (10% have become research executives within the same industry and another 20% reflect I/B/E/S data errors).

Our findings also speak to the literature on how mergers impact the labor force and indicate that various factors at the employee, firm, and merger transaction levels have implications for employee turnover. To our knowledge, ours is the first study to tie merger-related turnover outside the top management team to individual employee attributes, such as job performance. Existing studies on merger-related top executive turnover find higher CEO turnover at poorly performing target firms, which supports the disciplinary role of corporate takeovers (e.g. Martin and McConnell, 1991). While top executives are an interesting and important group of employees, they do not represent the wider workforce and their turnover mechanism likely differs from that of other employees during a merger. Our evidence suggests that mergers can lead to a brain drain in the broader workforce.

Finally, research on the recent financial industry consolidation has mostly focused on the causes and effects of mergers between commercial banks (e.g. Pilloff, 2004). Recognizing this limitation, Berger et al. (1999) call for research on mergers involving non-bank financial institutions. We take a step in that direction by studying analyst career outcomes in mergers involving different types of financial firms. Although our analysis focuses on a very specific aspect of the merger wave, we add richness to the existing understanding of this important chapter for the financial industry.

Our study has several limitations. First, its scope is confined to financial analysts. The financial analyst profession is unique in the sense that certain information on analyst performance and quality (e.g. earnings forecast accuracy and star status) is publicly available, making it easier for competitors to identify top analysts in a merged firm. To the extent this differs from other work forces, our findings may not generalize to merger-related employee turnover in other industries.

Second, following the financial analyst literature we use analyst earnings forecast accuracy as an important measure of analyst quality (for example, Mikhail et al., 1999, Hong et al., 2000, Hong and Kubik, 2003, Mikhail et al., 1997, Clement, 1999; Jacob et al., 1999). We recognize that analyst performance has many other dimensions, such as the ability to generate investment banking business and trading commissions and the rankings by *Institutional Investor*, which may play more direct roles than earnings forecast accuracy in determining analyst compensation and career outcome. Our reliance on earnings forecast accuracy as a quality measure is consistent with the prior evidence that earnings forecast accuracy is an important predictor of analyst turnover (e.g. Mikhail et al., 1999; Hong et al., 2000; Hong and Kubik, 2003). From an empirical perspective, earnings forecast accuracy can be relatively easily and objectively measured. As long as it is revealing about analysts' effort, we expect it to be important in predicting turnover (e.g. Mikhail et al., 1999). In addition to forecast accuracy, we also include star status as a measure of analyst quality.[7]

Finally, there are confounding events during our sample period that potentially affect analyst turnover at the industry level. To isolate the mergers' effects from the potential confounding events experienced by the industry during the same period, we use non-merger brokers as controls. However, we acknowledge that the control sample is not perfect as the brokers in the merger sample tend to be among the largest and the most prestigious. As a result, some of our findings need to be interpreted with caution.

The rest of the paper is organized as follows. We develop our hypotheses in Section 2. Section 3 describes our data and sampling procedures. Section 4 presents the regression models. Summary statistics are in Section 5. Sections 6–8 present the results on analyst turnover, promotion to executive positions and changes in post-merger research quality, respectively. We present robustness tests on potential industry-wide confounding effects in Section 9. Conclusions and implications are in Section 10.

2. Hypothesis development

In this section, we develop hypotheses regarding analyst turnover at the merged firm (Section 2.1), analyst promotion to executive positions (Section 2.2), and post-merger changes in firm research strength (Section 2.3).

2.1. Analyst turnover at the merged firm

We define turnover as an analyst leaving the combined firm after a merger. Analysts who become research executives at the merged firm are removed from this part of the analysis.[8] The determinants of turnover include analyst-specific variables (earnings forecast accuracy, star status, and experience), brokerage-specific variables (acquirer indicator,

[6] We thank our editor, Bob Holthausen, and the referee for raising concerns about the firm-level and industry-level turnover measures.

[7] Star status is a dichotomous variable (ranked versus non-ranked) in our study because we rely on the published issues of *Institutional Investor*, which names the three or four highest ranked analysts in each industry each year. We do not have access to *Institutional Investor*'s complete rankings of all analysts, which could produce a continuous and potentially more powerful measure of analyst quality.

[8] Including these observations in the analysis does not change our inferences.

brokerage research strength, and investment banking strength), various measures comparing competing analysts, and merger-specific variables measuring the purpose of a merger and its complexity. We also control for industry effects by including turnover at size-matched firms not involved in mergers.

2.1.1. Analyst-specific variables

2.1.1.1. Low earnings forecast accuracy. Prior studies of *regular analyst turnover* find earnings forecast accuracy to be a strong turnover predictor and suggest that poor earnings forecast performance carries negative labor market consequences (e.g. Mikhail et al., 1999; Hong and Kubik, 2003). This can also be true in the case of mergers, which likely create excess research capacity, leading to the firing of weaker performers. We therefore have the following prediction[9]:

H1. Ceteris paribus, during mergers analyst turnovers are higher for analysts with low earnings forecast accuracy.

2.1.1.2. High earnings forecast accuracy. During mergers the impact of earnings forecast performance on analyst turnover is likely more complex than that in regular analyst turnovers. There is a dearth of evidence on the relation between employee performance and merger-related turnover for the wider workforce outside top management. Unlike the *regular analyst turnover* scenario, a merger likely destroys part of an employee's firm-specific human capital or the 'fit' with the employer, breeds substantial uncertainty for employees regarding their future career prospects, and creates potential changes in the work environment. Top employees are at particularly high risk for turnover because they likely have better external career opportunities and competing firms can use the changes and uncertainties caused by the merger to convince them to leave. This suggests that good performers are likely to experience high turnover during mergers.

H2. Ceteris paribus, during mergers analyst turnovers are higher for analysts with high earnings forecast accuracy.

2.1.1.3. Star status and brokerage investment banking strength. In addition to earnings forecast accuracy, rankings by the *Institutional Investor* magazine also measure analyst quality and reputation (e.g. Stickel, 1992).[10] Each year the *Institutional Investor* magazine publishes the names of top-ranked sell-side financial analysts in each industry based on survey results of a large group of buy-side professionals. The rankings reflect analyst performance along several dimensions including industry knowledge, written reports, stock picks, earnings estimates, timely communication with investors, and responsiveness to investor requests (e.g. Leone and Wu, 2007). Star analysts may experience higher turnover around mergers due to the rationale behind H2. On the other hand, there are also forces that can reduce their turnover. Star analysts likely hold strong appeal to the merged firms as they play prominent roles in investment banking during the 1990s.[11] From the star analysts' perspective, their human capital is likely the most valuable if they are employed at a strong investment bank. Under the job matching theory by Jovanovic (1979), the star analysts' best job matches are likely with strong investment banks. The bond with investment banks potentially limits the set of external career opportunities that are attractive to a star analyst. The wave of mergers in our sample period involves many investment banks, which means that many of the competing employers for the stars are involved in mergers themselves. For example, among the top 20 investment banks in 1997 at the beginning of the merger wave, 70% are involved in mergers within the next 5 years. The above forces can create a negative relation between turnover and star status. We control for star status and its interaction with brokerage investment banking strength but do not have predictions on these variables.

2.1.1.4. Experience. Prior studies on regular analyst turnover find mixed evidence on its relation with analyst experience. Mikhail et al. (1999) document a negative relation between turnover and experience. Hong et al. (2000) do not find a strong relation between turnover and experience but suggest that more experience dampens the effects of poor forecasting performance on turnover. We control for experience in our analysis but do not offer a prediction for this variable.

2.1.2. Brokerage-specific variables

2.1.2.1. Acquirer versus target. Mergers and acquisitions reflect competition for corporate control. The dominant party controls the resources at the merged entity and to a large extent dictates the terms of employment for the combined workforce. Existing evidence on top management turnover is consistent with the target firm losing executive autonomy. For example, Hadlock et al. (1999) report high target top executive turnover for a sample of bank mergers. Walsh and Ellwood (1991) find that target top executives experience turnover rates several times higher than acquirer executives. The dominance by the acquirer likely affects top executives and the average employees alike. Because of the existing ties

[9] All hypotheses are stated in alternative form.

[10] Our later results in Table 4 suggest that there is a positive correlation between star status and earnings forecast accuracy, but the correlation is small (0.04). Out of our sample of 815 top quality analysts (560 star analysts and 278 analysts in the top forecast accuracy decile), 23 (2.8%) are both stars and ranked in the top decile in accuracy.

[11] For instance, Cliff and Denis (2004) attribute part of the IPO underpricing during this period to compensation for star analysts' research coverage. Krigman et al. (2001) documents SEO firms switching away from their IPO underwriters in order to obtain more research coverage by star analysts. We note that the vast majority of our sample mergers predates the Global Settlement, where allegations of biased analyst research led to a $1.4 billion settlement in 2003 between the regulators and 10 top investment banks. The aim of the settlement is to create a clear separation between analyst research and investment banking activities at the investment banks.

between the acquirer employees and the top management in the post-merger entity, we predict lower turnover for employees at the acquirer than those at the target.

H3. Ceteris paribus, during mergers analyst turnovers are lower for acquirer analysts.

2.1.2.2. Brokerage research strength. We conjecture that during a merger the career outcome of an employee is determined by the strength of his/her employer at various levels of the organization relative to the other merger entity. The corporate-level strength (measured by the acquirer status) is expected to be important (H3). However, when it comes to keeping existing analysts, we expect the strength of an analyst's own research department to make a difference as well. The integration of the merger entities likely occurs by functional areas. If efficiency improvement is one of the goals of a merger (Jensen and Ruback, 1983; Berger et al., 1999), we expect a functional area (e.g. the research department within a firm) that is stronger than its counterpart in the other merger entity to have greater influence in shaping that particular functional area in the combined firm, regardless of its affiliation with the acquirer or target. We therefore predict the strength of the research department to be of incremental importance in retaining analysts following a merger.

H4. Ceteris paribus, during mergers analyst turnovers are lower for analysts at stronger research departments among the merged firms.

2.1.3. Comparing competing analysts

One of the value-maximizing motives for mergers is efficiency improvement. Healy et al. (1992) document that post-merger performance gains are associated with large industry overlaps between the acquirer and target. It is conceivable that mergers create excess research capacity and eliminating redundant workforce between the acquirer and target improves efficiency.[12] One measure of the potential redundancy of a financial analyst as a result of the merger is the existence of a direct competitor from a merger counter party, who covers the same or a similar portfolio of stocks. To measure the existence of direct competition for each analyst, we search for a matching analyst who covers a similar group of stocks.[13] We expect turnover to increase with the existence of a competing analyst.

H5. Ceteris paribus, during mergers analyst turnovers are higher when an analyst has a direct competitor, i.e., a 'matching analyst,' from a merger counter party.

Once direct competitors have been identified for an analyst, the immediate question is who survives and who turns over among the competitors. When analysts are locked in a head-to-head competition, several factors can be important in predicting their turnover. First, higher quality analysts (for example, in terms of earnings forecast accuracy, star status, or stock coverage) likely have greater chances of survival. On the other hand, 'political' forces (affiliation with the acquirer) can also be important based on the prediction in H3. We therefore have the following hypotheses.

H5_a. Among directly competing analysts in a merger, turnovers are lower for higher quality analysts.

H5_b. Among directly competing analysts in a merger, turnovers are lower for acquirer analysts.

2.1.4. Merger-specific variables

2.1.4.1. The purpose of a merger. Some of our sample mergers combine very different entities, for example, commercial banks with investment banks or foreign firms with domestic firms. When a commercial bank first enters into the field of investment banking or a foreign bank first expands into the US market, there is likely little overlap in operations thus greater complementarities between the merger parties, suggesting lower employee turnover. However, differences can also breed conflicts, potentially leading to higher turnover.[14] We include indicator variables for mergers involving commercial banks/insurance companies and mergers involving foreign firms. We do not have specific predictions on how analyst turnover is affected by these variables.

2.1.4.2. Status difference. Cowen (2006) suggests that investment banks with similar status are more likely to experience integration problems in mergers because neither party is likely to defer to the other, leading to competing interests,

[12] Anecdotal evidence is consistent with this practice. One such example in our sample is the acquisitions by the Royal Bank of Canada of two securities firms in 2001, Dains Rauscher and Tucker Anthony Sutro. Soon after the second acquisition, all research analysts and investment bankers at Tucker are let go because Dain Rauscher already has a research staff and investment banking division. The motives behind RBC's acquisition of Tucker Anthony Sutro according to the merger announcement are Tucker's strength in retail brokerage and wealth management.

[13] As discussed later in Section 4, we use 1/3 overlap in stock coverage as the cutoff point for finding a match. Using other cutoff points (e.g. 1/2 overlap) or using an industry overlap measure (at the 3-digit SIC code level) leads to the same inferences.

[14] Weber and Camerer (2003) use an experimental approach to illustrate the difficulty of integrating different corporate cultures and the likely role of 'culture clashes' in merger failures. The different cultures in commercial banks and investment banks are a frequently cited source of conflict in our sample mergers. For example, a news article in the *Wall Street Journal* on June 16, 1998, regarding the merger between KeyCorp (a commercial bank) and McDonald & Company Investments Inc. (a securities firm) quotes a former McDonald partner as saying "(b)ut they're not at all close culturally. An investment bank and a commercial bank are completely different entities. I wish them luck, but I think it's going to be very difficult."

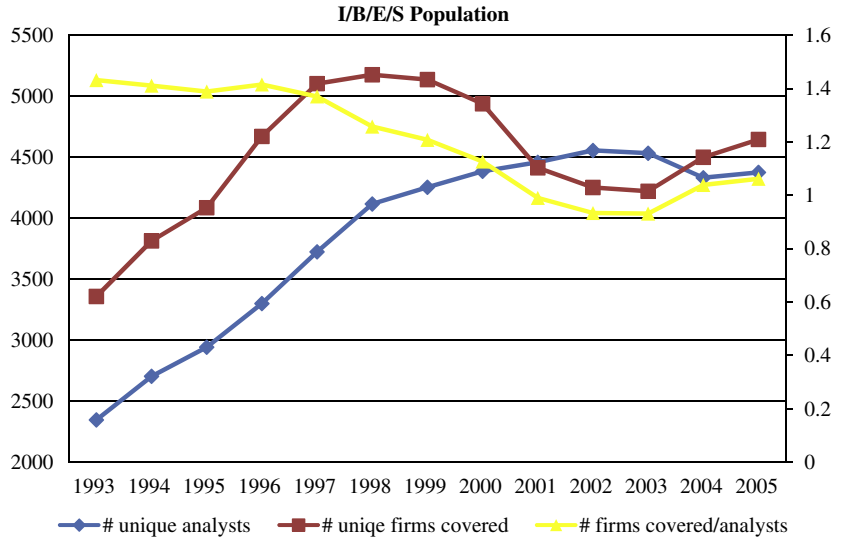


Fig. 1. I/B/E/S population of unique analysts and unique firms covered by analysts. The figure presents from 1993 to 2005, the number of unique analysts (blue line) and the number of unique firms covered by analysts (red line) in the I/B/E/S database (left scale). The yellow line corresponds to the ratio of the previous two numbers (right scale). (For interpretation of color, please see the figure in online version).

struggles for control, and ultimately poor merger outcome. We expect to see greater conflicts between corporate cultures when the merged entities are of similar status, leading to higher analyst turnover.

H6. Ceteris paribus, during mergers analyst turnovers are higher when there is smaller status difference among the merged firms.

2.1.4.3. Multi-deal merger. Some of the merger transactions are closely related and clustered in time (a formal definition of a merger cluster is in Section 4.1). When an entity is involved in multiple transactions within a short period of time, analysts can experience greater career uncertainty and larger change in the work environment. We expect these 'multi-deal' mergers to be associated with increased analyst turnover.

H7. Ceteris paribus, analyst turnovers are higher in 'multi-deal' mergers.

2.1.5. Industry effects

Our sample period of 1994–2004 spans the great bull market in the late 1990s and the market correction immediately afterwards. As a result, research funding in the financial industry likely varies over time, which affects the labor market demand for financial analysts. Confirming this, Fig. 1 reports a large increase in the number of firms covered by analysts around the peak of the bull market and then a sharp decline starting in 2000. The number of analysts is well below the number of firms during market boom but briefly exceeds it in the market downturn, suggesting that the tightness of the labor market for financial analysts varies over time.[15] One possible implication from this is that analysts with poor performance may experience higher turnover during the market downturn. The 1990s also saw the rise of the hedge fund industry. The resulting expansion of buy-side research opportunities for high quality analysts may also lead to higher turnover among top analysts. Another potential confounding factor is the Global Settlement in 2003 that leads to research funding declines, especially among top investment banks. To account for these industry effects, we control for analyst turnover at the size-matched brokers not involved in our sample mergers. Further robustness checks regarding industry effects are reported in Section 9.

2.2. Promotion of an analyst to research executive

Since the function of the labor market for financial analysts tends to weed out weak performers (e.g. Mikhail et al., 1999), the survival of an analyst in the profession can be an indicator of his/her ability. Senior analysts likely also have accumulated more knowledge about the brokerage firm and the industry, which is valuable for an executive position. As a result, we expect that more senior analysts have greater chances of becoming research executives.

H8. Ceteris paribus, more experienced analysts are more likely to be promoted to research executive positions.

[15] The ratio of the number of firms covered relative to the number of analysts fluctuates around one from year to year. One can interpret a ratio of one as on average each analyst covers *n* stocks and each stock is followed by the same number of analysts.

We also expect star status to be of significance when it comes to promotion to executives. The *Institutional Investor* rankings rely on surveys from an important group of consumers of sell-side research (buy-side professionals) and are based on a broad set of performance measures, such as industry knowledge, stock recommendations, earnings picks, and responsiveness to investor requests. This means that a star analyst likely has a set of attributes, such as recognition within the profession, inter-personal skills and customer focus, which are valuable for a research executive position. On the other hand, promoting a star analyst can carry significant costs because the firm loses a ranked analyst. However, these costs are likely lower for more senior star analysts who may be near the end of their careers as financial analysts. We therefore have the following prediction.

H9. Ceteris paribus, star analysts who have more experience are more likely to be promoted to research executive positions.

2.3. Post-merger changes in research strength

Mergers likely lead to high analyst turnover, especially among top quality analysts. As a result, mergers may have a negative impact on a firm's research quality. We measure changes in a merged firm's research quality in several ways, first by the change in the number of stocks covered from pre- to post-merger. Second, for stocks that receive coverage both before and after merger, we measure the changes in earnings forecast frequency and earnings forecast accuracy from pre- to post-merger. We have the following prediction.

H10. Analyst turnover is negatively related to changes in research strength at the merged firms from pre- to post-merger.

3. Data and sample construction

Our sample construction procedure consists of several major steps. We first identify a sample of mergers satisfying our requirements in the SDC database. The next step involves manually matching the merger sample with I/B/E/S brokerage names. Finally, we track the analysts who disappear from I/B/E/S using Nelson's Directory of Investment Research. The sampling procedures are summarized in Table 1. We describe each major step in detail below.

3.1. Sample selection

We search the SDC database for completed merger deals in the financial industry from 1994 to 2004. Our searches include international mergers so long as the target is a US domestic firm. The acquirer's primary two-digit SIC codes include 60 (commercial banks), 62 (securities firms), and 63 (insurance companies). Because we later manually match the merger sample with I/B/E/S brokerage names, in order to keep the matching process manageable we restrict the target primary SIC codes to 6211 (including but not limited to investment banks and brokerage firms) and 6282 (including but not limited to independent research firms). These firms likely employ sell-side financial analysts. We further require that the target is 100% owned by the acquirer after each merger. We collect from SDC 314 mergers with the target primary SIC code as 6211 and 143 mergers with the target primary SIC code as 6282.

In the second step we match the target and the acquirer names per SDC with I/B/E/S brokerage names. We describe the matching procedures in detail in Section 3.2. All observations with target SIC code 6282 are lost at this stage because none of them have names matched with I/B/E/S. This is not surprising in light of the fact that SIC code 6282 includes various businesses other than investment research firms, such as 'managers of mutual funds', 'investment counselors', and 'futures advisory services', and the finding in Cowen et al. (2006) that only 18 independent research firms exist in I/B/E/S prior to 2002. As a result, even though all firms in our final sample have a research function by virtue of employing financial analysts prior to the merger, none of them can be characterized as 'pure plays' in research. Our matched SDC and I/B/E/S sample has 60 merger deals.

We supplement our sample with a list of 81 investment bank mergers from 1997 to 2002 in Corwin and Schultz (2005) and a list of 26 principal bank mergers from 1988 to 2002 provided in Ljungqvist et al. (2006). Bank mergers are not the focus of these studies, but they are helpful in determining the post-merger corporate name changes (Corwin and Schultz, 2005) and in connecting related mergers in the form of 'merger trees' (Ljungqvist et al., 2006). We add 16 deals to our sample as a result. Most of these 16 deals are related to our sample mergers generated from SDC but with the target primary SIC code outside of 6211 (investment banks or brokerage firms).[16] Our final sample comprises 76 merger transactions.

[16] One example is the following two related acquisitions. The first is the 1997 acquisition by Bankers Trust, a commercial bank with no financial analysts, of Alex Brown, a top-ranked underwriter with a research department. The second is the 1999 acquisition by Deutsche Bank of Bankers Trust, which now carries the previously Alex Brown research group. Our SDC search identifies the first deal as part of our sample. The second deal, however, is not picked up by our SDC searches. This is because the target in the second deal, Bankers Trust, even with the previously Alex Brown research department, is still primarily a commercial bank and has a two-digit SIC code of 60. We add the second deal to our final sample because Bankers Trust employs financial analysts prior to its acquisition by Deutsche Bank.

Table 1
Sample description.

Panel A: Sample selection procedures

	Number of mergers—for target SIC 6211	Number of mergers—for target SIC 6282
Completed merger deals during 1994–2004 with domestic target and target primary SIC code of 6211 (including investment banks and brokerage firms) or 6282 (including independent research firms) in the SDC Database[a]	649	563
Deals with 100% ownership by acquirer after merger	514	424
Deals with the acquirer primary two-digit SIC code of 60 (commercial banks), 62 (securities firms), or 63 (insurance companies)[a]	314	143
Deals with both target name and acquirer name in I/B/E/S or at the minimum with the target name in I/B/E/S	60	0
Supplement with additional deals that are documented in Corwin and Schultz (2005) and Ljungqvist et al. (2006)		
Final sample of merger transactions	76	
Number of merger clusters (defined in Appendix C)	59	
Number of brokerage firms with analysts in I/B/E/S prior to merger	106	
Number of unique broker codes in our sample	77	
As a % of unique I/B/E/S broker codes during our sample period	10	
Number of financial analysts in our sample	3329	
Number of unique analysts in our sample	2626	
As a % of unique I/B/E/S analyst codes during our sample period	24	
Number of star analysts in our sample	619	
Number of unique star analysts in our sample	474	
As a % of total number of star analysts during our sample period	48	
Number of analysts who become research executives after merger	127	

Acquirer	Target
SIC 60: Depository Institutions SIC 62: Security and Commodity Brokers, Dealers, Exchanges and Services SIC 63: Insurance Carriers	SIC 6211: Security Brokers, Dealers, and Flotation Companies SIC 6282: Investment Advice

Panel B: Distribution of sample merger transactions by year

1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
2	3	1	11	16	13	14	10	3	1	2	76

[a] Official SIC code definitions for Acquirers and Targets (*Source*: http://www.osha.gov/pls/imis/sic_manual.html.).

Table 1 Panel A further reports that the number of brokerage firms in our sample is 106 (77 unique brokers, representing 10% of the I/B/E/S broker population during our sample period). The impact of the mergers reaches a substantial fraction of the financial analysts. The number of unique analysts in our sample accounts for 24% of the I/B/E/S analyst population and is close to half of the *Institutional Investor* ranked analysts.[17] The fact that our sample mergers affect 24% of the analysts but only 10% of the brokerage houses is consistent with our later finding that our sample mergers tend to involve large brokers. Panel B of Table 1 provides the distribution of the 76 merger transactions over time. There is a concentration of the deals in the 5-year period 1997–2001 (64 transactions or 84% of the sample).

Our primary data sources include the SDC, I/B/E/S (Brokerage ID File and Earnings Forecast File), and the Nelson's Directory of Investment Research. We also gather from *Institutional Investor* magazine the names of their All-America Research Team analysts and refer to these analysts as star analysts. We use the *Mergers & Acquisitions* annual rankings of investment banks based on their M&A advisory fees to measure a firm's strength in investment banking. A recent study by Ljungqvist et al. (2007) raises concerns about the integrity of the I/B/E/S stock recommendations data. Their findings of apparent *ex post* alterations of historical records apply to the *I/B/E/S stock recommendations database* and do not extend to the *I/B/E/S earnings forecast data*, which is the data source in this study.[18]

[17] We count the number of unique analysts in our sample so as not to overstate the impact of the mergers because some analysts are involved in multiple merger transactions.

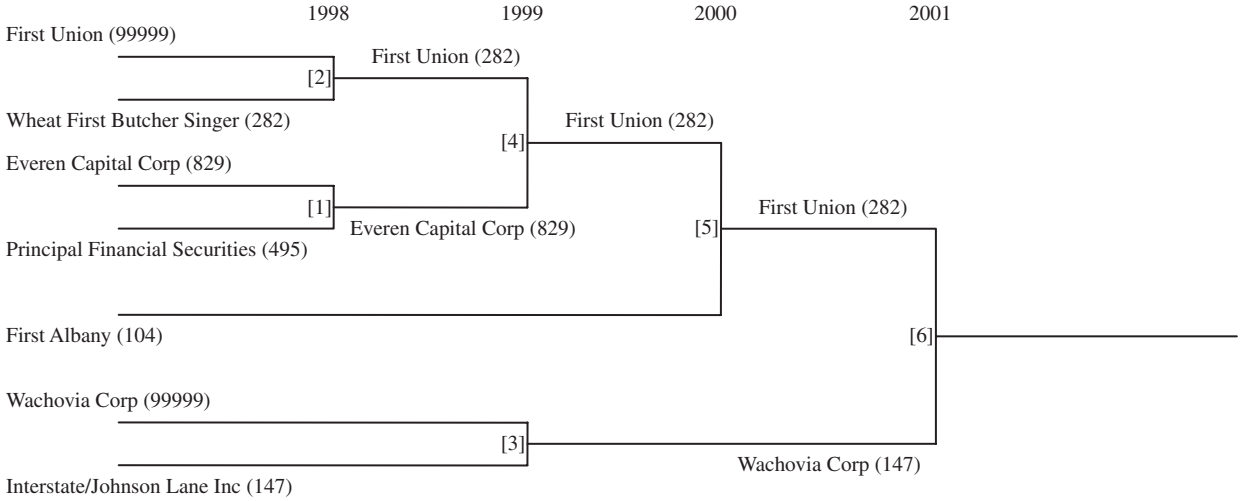
[18] We thank Ljungqvist for providing this information to us in a phone conversation. Ljungqvist et al. (2007) also describe a procedure using the I/B/E/S earnings forecast data to repopulate the anonymized stock recommendations (their Appendix A).

Part A: Information from SDC

Deal #	Merger Announcement Date	Merger Effective Date	Target Name	Acquirer Name
1	12/12/1997	01/09/1998	Principal Financial Securities	Everen Capital Corp
2	08/19/1997	02/02/1998	Wheat First Butcher Singer	First Union Corp,Charlotte,NC
3	10/27/1998	04/01/1999	Interstate/Johnson Lane Inc	Wachovia Corp,Winston-Salem,NC
4	04/26/1999	10/01/1999	Everen Capital Corp	First Union Corp,Charlotte,NC
5	05/09/2000	08/07/2000	First Albany-Brokerage Bus	First Union Corp,Charlotte,NC
6	04/16/2001	09/04/2001	Wachovia Corp,Winston-Salem,NC	First Union Corp,Charlotte,NC

Part B: Merger tree

Numbers in brackets correspond to deal numbers in Panel A. Numbers in parentheses correspond to I/B/E/S broker codes in Panel C.



Part C: I/B/E/S broker information

BACODE	BANAME	BAID	# of Years Broker is in I/B/E/S	Last Year Broker in I/B/E/S	Average # of Analysts while Broker is in I/B/E/S	Average # of Forecasts while Broker is in I/B/E/S	# of Analysts During Broker's Last Year in I/B/E/S	# of Forecasts During Broker's Last Year in I/B/E/S
829	EVEREN SECURITIES, INC.	KEMSEC	9	1999	34.6	3719.6	36	2783
495	PRINCIPAL FINANCIAL SECURITIES	EPPLER	10	1998	12.8	1089.4	2	9
104	FIRST ALBANY CORP.	FIRSTALB	21	2006	16.5	2219.2	18	430
147	WACHOVIA SECURITIES, INC.	JOHNSON	18	2001	14.4	1507.1	17	2567
282	WACHOVIA SECURITIES	WHEAT	25	2006	31.7	4747.1	48	983

Fig. 2. Six mergers involving First Union Corp.

3.2. Matching the merger sample with I/B/E/S brokerage names

Our study is the first to systematically match the I/B/E/S database with a sample of corporate mergers. The matching process is complicated due to several factors. First, many mergers come in clusters and involve complex changes in corporate names. More importantly, I/B/E/S routinely changes the name of a brokerage firm in its Brokerage ID File to reflect the most recent corporate name after a merger. This practice makes tracking the name history of brokerage firms that have been involved in mergers difficult. However, I/B/E/S often leaves traces of a broker's original name in a data field that was rarely used in prior studies (BAID), which we utilize in the matching process. Fig. 2 illustrates our matching procedure with a series of six transactions related to First Union Corp. This is one of the more complex examples in our

Table 2
Adjustments to I/B/E/S analyst turnover data based on Nelson's Directory of Investment of Research.

		(%)	Impact on turnover analysis at merged firms	Impact on other analysis
Total number of sample analysts disappearing from I/B/E/S database post-merger	1348	100		
Reclassifications according to Nelson's Directory of Investment Research		29.4		
(a) Due to information not available on I/B/E/S (i.e., Executives data from Nelson's)	127	9.4		
Promoted to research executive position with the merged firm post-merger	50	3.7	Observations removed from turnover analysis	Form the basis of analysis of promotion to executive positions
Promoted to research executive position with another firm	77	5.7		Form the basis of analysis of promotion to executive positions
(b) Due to potential data errors in I/B/E/S	267	20		
Moved to another brokerage firm as a sell-side analyst post-merger	176	13.1		
No turnover (staying with the merged firm for 3 years after merger)	66	4.9	Observations reclassified as no turnover	
No turnover, and employed by another firm not in our merger sample	10	0.7	Observations removed from sample	
Turnover related to a different merger transaction	15	1.1	Observations reclassified as turnover related to the other merger transaction	

sample. We use it to highlight some of the issues we encounter when matching SDC with I/B/E/S. Later in Section 4.1 we also refer back to this example in defining merger clusters. For brevity, we provide the details of the matching process in Appendix A, but would like to emphasize the following observation. The assumption in prior research that the subsample of job separations caused by mergers can be identified and thus removed when necessary by "defining job separations as only those in which the house from which an analyst leaves at year t is also in existence at year t+1" (see Hong and Kubik, 2003, p. 331) is inappropriate. This is because in some instances the target firm's I/B/E/S code survives along with the acquirer's I/B/E/S code, when apparently the target's research department remains a separate group after the acquisition. In addition, the procedure in Hong and Kubik (2003) does not purge out the acquirer analysts, who are also affected by the mergers.

3.3. *Tracking analysts who disappear from I/B/E/S using Nelson's directory of investment research*

A large number of our sample analysts disappear from the I/B/E/S database following a merger. According to some prior studies (e.g. Hong et al., 2000), this group of analysts would be classified as having left the industry. However, several alternative explanations exist for the disappearance. For example, an analyst might have moved to a firm not covered by I/B/E/S or have become a research executive. Of particular concern to our turnover analysis at the merged firms are those analysts promoted to research executives at the merged firm after a merger. Even though these individuals are no longer analysts, they likely still contribute to their employer's research strength in their new positions.

To track the career outcomes of analysts, who disappear from I/B/E/S post-merger, we turn to Nelson's Directory of Investment Research. The Nelson's Directory provides comprehensive information on the investment research industry. For example, its 2002 issue profiles close to 700 research firms, while the number of unique brokers in the same year on I/B/E/S is 385 (Ljungqvist et al., 2007). Nelson's Directory contains a wide range of information on the investment research industry. Of particular value to us is Nelson's information on key research executives. It is also important to note that the annual issues of Nelson's Directory are in print form, which is not subject to intentional or unintentional *ex post* alteration. We manually checked the career outcomes of the 1348 analysts, who disappear from I/B/E/S post-merger. The resulting discrepancies between I/B/E/S and Nelson's and their impact on our sample are reported in Table 2. We would like to highlight several observations here (detailed discussions of our manual checking procedures and findings are in Appendix B). First, 9.4% (127 out of 1348) of the analysts, who disappear from I/B/E/S, are promoted to research executives post-merger, either at the merged firm (3.7%) or at another brokerage firm (5.7%). For those analysts who have become research executives at *the same* brokerage post-merger, they not only have stayed within the same industry, they are in fact still with the same employer and contributing to its research functions. This highlights that *firm-level turnover* measures in prior literature are potentially confounded by promotions of analysts to research executive positions within the same firm. Second, about 20% of the 1348 analysts' career outcomes are re-classified due to potential data errors on I/B/E/S. The most common (13.1%) are due to analysts moving to another brokerage firm (instead of ceasing to be a sell-side analyst)

post-merger. Therefore, the total number of misclassifications of career outcomes comes close to 30% of the analysts disappearing from I/B/E/S. This raises serious concerns about the validity of the *industry turnover measure* ('leaving profession') based on I/B/E/S (e.g. Hong et al., 2000).

4. Methodology

4.1. Merger clusters

Our primary research goal is to investigate the relation between analyst career outcomes and the various determinants hypothesized in Section 2. We measure the dependent variable, analyst career outcome, *one year after* the merger and the independent variables *one year prior to* the merger. This straightforward setup in timeline becomes more complicated when we connect related mergers. A case in point is the example in Fig. 2, where First Union is involved in a quick succession of several mergers within a matter of 4 years. Although as we point out earlier this is one of the more complex cases in our sample, it illustrates the challenges posed by 'merger clusters.' This clustered nature of our sample is a natural reflection of the merger wave in the financial industry during this period.

Since many of our independent variables measure the 'interactions' among the merger entities, for example, comparison of competing analysts and differences among merger entities, we classify closely related mergers into a single 'merger cluster' in order to mitigate potential measurement errors in these explanatory variables. We define a '*merger cluster*' as a single-merger transaction ('*single-deal cluster*') unless one of the following two situations applies ('*multi-deal cluster*'): (1) an acquirer in a previous transaction becomes a target within the current or next calendar year, or (2) an acquirer buys two or more targets within the same calendar year. An example of situation (1) comes from Fig. 2, where Everen Capital bought Principal Financial Securities in 1998 (deal #1) and then was itself acquired by First Union in 1999 (deal #4). We believe the career outcomes of analysts involved in the first deal (both those at Everen and at Principal) are likely affected by the second deal, thus their interactions with First Union are important and should be taken into consideration. We therefore classify both Everen Capital and Principal Financial Securities as targets and First Union as the acquirer in this merger cluster. An example of situation (2) is one that we discussed earlier in Section 2.1 in footnote #12, the acquisitions by the Royal Bank of Canada of two securities firms in 2001, Dains Rauscher and Tucker Anthony Sutro. Although these are two separate transactions per SDC, given their proximity in time, 'interactions' likely exist between the two target firms as well as with the common acquirer. Admittedly, our classification scheme has an arbitrary component. For instance, conceivably one could argue that if an acquirer bought two targets, one in each of 2 adjacent years, the first deal likely also 'interacts' with the second deal (note that applying this definition to the Fig. 2 transactions would lead to all transactions except for deal #3 being lumped into one big cluster). Our classification scheme thus reflects our efforts to strike a balance between two concerns. On the one hand, we would like to measure our explanatory variables more precisely by placing highly related deals together. On the other hand, we try to avoid diminishing our sample size by forming very large clusters. Applying our definition of merger clusters reduces our sample of 76 merger transactions into 59 clusters.

4.2. Regression models for analyst turnover at the merged firm

We estimate logistic regressions of analyst turnover with models (1) and (2) below. Model (1) assumes a linear relation between turnover and forecast accuracy. Models (2) separately models high and low forecast accuracy.

$$\begin{aligned} Prob[Leave\_Combined = 1] = Logit(&a_0 + a_1\, Accu\_Score + a_{21}\, All\_Star + a_{22}\, I\_Banking \\ &+ a_{23}\, All\_Star \times I\_Banking + a_3\, Expr + a_4\, Acquirer + a_5\, Research \\ &+ a_{61}\, Match\_Found + a_{62}\, Match\_DiffAccu + a_{63} Match\_DiffAllStar \\ &+ a_{64}\, Match\_DiffFollow + a_{65}\, Match\_Acquirer + a_7 Commercial \\ &+ a_8\, International + a_9\, Status\_Diff + a_{10}\, Multi\_Deal \\ &+ a_{11}\, Matched\_Turnover) \end{aligned} \tag{1}$$

$$\begin{aligned} Prob[Leave\_Combined = 1] = Logit(&a_0 + a_{11}\, Top\_Accu + a_{12}\, Bottom\_Accu + a_{21}\, All\_Star \\ &+ a_{22}\, I\_Banking + a_{23}\, All\_Star \times I\_Banking + a_3\, Expr + a_4\, Acquirer \\ &+ a_5\, Research + a_{61}\, Match\_Found + a_{62}\, Match\_DiffAccu \\ &+ a_{63}\, Match\_DiffAllStar + a_{64}\, Match\_DiffFollow + a_{65}\, Match\_Acquirer \\ &+ a_7\, Commercial + a_8\, International + a_9\, Status\_Diff + a_{10}\, Multi\_Deal \\ &+ a_{11}\, Matched\_Turnover) \end{aligned} \tag{2}$$

The regressions are run at the analyst level. The dependent variable is an indicator of an analyst leaving the combined firm *one year after* the completion of the last transaction in a merger cluster. All independent variables are measured *one year before* the completion of the first transaction in a merger cluster. (Analyst and time subscripts are suppressed). We also include year dummies in all regressions and cluster the standard errors by our merger clusters. We provide brief descriptions of the variables below. Detailed variable definitions are in Appendix C.

Accu_Score is the relative earnings forecast accuracy score for an analyst scaled between 0 and 100 (the most accurate).[19] *Top_Accu* is an indicator for analysts whose forecast accuracy scores are in the top decile and H2 predicts a positive coefficient on this variable. *Bottom_Accu* is an indicator for analysts whose forecast accuracy scores are in the bottom three deciles and H1 posits a positive coefficient.[20] *Acquirer* is an indicator variable for analysts employed at the acquiring firm and we expect a negative coefficient on this variable from H3. H4 suggests a negative coefficient on firm research strength, *Research*. It is measured as the number of *Institutional Investor* rankings a firm receives. *Match_Found* is an indicator for analysts with competing analysts in the merger cluster. A competing analyst is defined as one who covers at least 1/3 of the stocks followed by the analyst of interest. H5 posits that analysts facing direct competition in the merger are more likely to turnover, therefore, we expect a positive coefficient on this variable. For each analyst facing competition, we also calculate the difference between his/her performance and that of the competitor, in terms of forecast accuracy (*Match_DiffAccu*), star status (*Match_DiffAllStar*), and the number of stocks followed (*Match_DiffFollow*), and expect these variables to have negative signs (H5_a), i.e., among competing analysts, higher quality ones are less likely to turnover. H5_b further predicts that among competing analysts, those affiliated with the acquirer are less likely to turnover, therefore a negative coefficient on *Match_Acquirer*. H6 suggests that investment banks with similar status are likely to be involved in more contentious mergers, leading to higher turnover, thus implying a negative coefficient on *Status_Diff*. Finally, H7 predicts that multi-deal mergers see higher analyst turnover due to their greater complexity, thus a positive coefficient on *Multi_Deal*.

In order to control for industry-wide effects, we include turnover at size-matched control firms not involved in our sample mergers (*Matched_Turnover*). A matched broker is one that is not involved in a merger in our sample and is closest in size (in terms of the number of analysts employed) to a sample broker in the merger year. Turnovers among the matched brokers for firms in the same merger cluster are not counted as turnover, similar to our treatment of turnovers among the merged firms.[21]

4.3. Regression model for promotion to research executive position

We estimate the following logistic regression in the analysis of promotion to executive positions:

$$\begin{aligned} Prob[Exec = 1] = Logit(&a_0 + a_{11}\,Expr + a_{12}\,All\_Star + a_{13}\,All\_Star \times Expr + a_2\,Acquirer \\ &+ a_3\,Research + a_4\,I\_Banking + a_{51}\,Match\_Found + a_{52}\,Match\_DiffAccu \\ &+ a_{53}\,Match\_DiffAllStar + a_{54}\,Match\_DiffFollow + a_{55}\,Match\_Acquirer \\ &+ a_6\,Commercial + a_7\,International + a_8\,Status\_Diff + a_9\,Multi\_Deal \\ &+ a_{10}\,Matched\_Turnover + a_{11}\,IMR) \end{aligned} \tag{3}$$

The regression is run at the analyst level. We use two different specifications for the dependent variable to analyze internal promotions and external promotions separately because they may involve different mechanisms. This procedure also alleviates potential confounding effects from the turnover decision. In particular, *Exec_Internal* is an indicator equal to one if an analyst is promoted to *a research executive position in the merged firm*, and equal to zero for *all other analysts who have stayed* with the merged firm post-merger. This specification analyzes the *promotion decision among those without turnover*. *Exec_External* is an indicator equal to one if an analyst is promoted to a research executive post outside the merged firm, and equal to zero for *all other analysts who have left* the merged firm post-merger. This specification analyzes the *promotion decision among those who have experienced turnover*.

A sample selection problem potentially arises because the above two specifications separately analyze analysts who have stayed and those who have left the merged firms. To address this issue, we run a first-stage analysis of an analyst's decision to stay (either as an analyst or as an executive) versus to leave the merged firm based on model (2) in the previous section and include the inverse Mills ratio (*IMR*) from the first-stage regression in model (3). The other independent variables in model (3) are similar to those in model (2), although we exclude *Top_Accu* and *Bottom_Accu*.[22] From H8 and H9 we expect *Expr* and *All_Star* × *Expr* to have positive signs.

4.4. Regression models for changes in post-merger research strength

This part of the analysis is conducted at the covered stocks level. We first investigate for which stocks the merged firm has dropped coverage post-merger and whether the drop in coverage is related to analyst turnover. For stocks that receive coverage

[19] We measure accuracy score over the previous 3 years, instead of just 1 year, in order to mitigate the potential reverse causality in the relation between turnover (or promotion) and performance, because some analysts might anticipate the impending turnover (or promotion) and reduce research effort leading up to the event.

[20] In unreported results, we also run an alternative specification where we include *Accu_Score* and its squared term, *Accu_Score_Squared*, in the model. The results confirm a non-linear relation between turnover and accuracy. In particular, the coefficient on *Accu_Score* is negative and significant, while that on its squared term is positive and significant.

[21] The turnover rates for our merger sample are calculated after adjusting for internal promotions of financial analysts based on Nelson's Directory of Investment Research. We do not make such adjustments for the matched-broker turnover due to the large additional data collection costs involved. This can introduce noise/bias into the matched-broker turnover variable.

[22] Including *Top_Accu* in the internal promotion regression creates econometric issues in the logistic regression as none of the top forecasters are promoted internally. Its effect on external promotion is insignificant. On the other hand, *Bottom_Accu* has no significant impact on either internal or external promotion.

Table 3
Summary statistics.

Variables	*N*	Mean	Std	25%	Median	75%
Leave_Combined	2742	0.607	0.488	0.000	1.000	1.000
Accu_Score	2742	51.057	14.042	43.748	51.422	58.350
Top_Accu	2742	0.101	0.302	0.000	0.000	0.000
Bottom_Accu	2742	0.298	0.457	0.000	0.000	1.000
All_Star	2742	0.204	0.403	0.000	0.000	0.000
Expr	2742	5.273	3.768	2.000	4.000	8.000
Acquirer	2742	0.497	0.500	0.000	0.000	1.000
Research (number of stars in broker)	2742	16.414	18.881	1.000	7.000	26.000
I_Banking	2742	0.445	0.497	0.000	0.000	1.000
Match_Found	2742	0.367	0.482	0.000	0.000	1.000
Match_DiffAccu	2742	−0.079	9.259	0.000	0.000	0.000
Match_DiffAllStar	2742	−0.039	0.344	0.000	0.000	0.000
Match_DiffFollow	2742	−2.223	9.807	0.000	0.000	0.000
Match_Acquirer	2742	0.005	0.425	0.000	0.000	0.000
Commercial	2742	0.561	0.496	0.000	1.000	1.000
International	2742	0.501	0.500	0.000	1.000	1.000
Status_Diff	2742	0.436	0.477	0.000	0.000	1.000
Multi_Deal	2742	0.361	0.480	0.000	0.000	1.000

Our sample includes mergers in the financial industry from 1994 to 2004. Variable definitions are in Appendix C.

from the brokers in a merger cluster both before and after a merger, we investigate the changes in earnings forecast frequency and earnings forecast accuracy for that stock and whether those changes are affected by analyst turnover.

$$Dropped\_Coverage = a_0 + a_1\, Turnover + a_2\, Top\_Forecaster\_Turnover + a_3\, All\_Star\_Turnover + a_4\, Avg\_Matched\_Turnover \quad (4)$$

$$Forecast\_Freq\_Change = a_0 + a_1\, Turnover + a_2\, Top\_Forecaster\_Turnover + a_3\, All\_Star\_Turnover + a_4\, Avg\_Matched\_Turnover \quad (5)$$

$$Accu\_Score\_Change = a_0 + a_1\, Turnover + a_2\, Top\_Forecaster\_Turnover + a_3\, All\_Star\_Turnover + a_4\, Avg\_Matched\_Turnover \quad (6)$$

The dependent variable in model (4), *Dropped_Coverage*, is an indicator that is equal to one for stocks dropped by the merged firm post-merger and equal to zero for stocks receiving coverage both before and after the merger. The dependent variables in models (5) and (6) are changes in earnings forecast frequency (*Forecast_Freq_Change*) and changes in earnings forecast accuracy (*Accu_Score_Change*) for a stock from the year before to the year after the mergers in a merger cluster. On the right-hand side, we include the turnover rate among the analysts covering a particular stock in a merger cluster (*Turnover*). We also include an indicator for turnovers of analysts in the top forecast accuracy decile (*Top_Forecaster_Turnover*) and an indicator for turnovers of star analysts (*All_Star_Turnover*), among the analysts covering a particular stock. If there are decreases in research quality at the merged firms that are related to analyst turnover, especially top quality analyst turnover, we expect these variables to have negative signs. In order to control for industry turnover effects, we include the average turnover at the matched brokers in all three models. One concern about models (4)–(6) is the endogeneity of the performance measures with analyst turnover. In unreported results, we conduct two-stage analyses by first calculating the predicted turnover for each analyst based on model (2) after dropping the potentially endogenous performance-related variables and then replacing the actual turnover with predicted turnover in models (4)–(6). All our inferences remain intact.[23]

5. Summary statistics

Table 3 presents the summary statistics for our main variables. The number of observations in our final sample is 2742 (compared to 3329 reported in Table 1) after imposing all data restrictions.[24] Roughly 61% of the analysts in our sample leave the combined firm within 1 year following the merger. The mean and median accuracy scores (*Accu_Score*) are close

[23] Specifically, the following variables are dropped from model (2) in the first-stage analyses: *Top_Accu*, *Bottom_Accu*, *All_Star*, *All_Star* × *I_Banking*, *Expr*, *Match_DiffAccu*, *Match_DiffAllStar*, *and Match_DiffFollow*. In the second-stage regression, *Turnover* is calculated as the average of the *predicted* turnover among the analysts covering a particular stock in a merger cluster. *Top_Forecaster_Turnover* (*All_Star_Turnover*) is the *predicted* likelihood of any top-forecaster (star) turnover. For example, if there are two star analysts covering a stock in a merger cluster with predicted turnover probabilities of P_1 and P_2, *All_Star_Turnover* is calculated as $1-(1-P_1)(1-P_2)$. When there is no top-forecaster (star analyst) covering a particular stock in a merger cluster, *Top_Forecaster_Turnover* (*All_Star_Turnover*) is set to zero.

[24] The number of star analysts in our final sample is 560 (compared to 619 reported in Table 1) after all data requirements.

Table 4
Correlation matrix.

	Leave_ Combined	*Accu_ Score*	*Top_ Accu*	*Bottom_ Accu*	*All_ Star*	*Expr*	*Acquirer*	*Research*	*I_Banking*	*Match_ Found*	*Match_ DiffAccu*	*Match_ DiffAllStar*	*Match_ DiffFollow*	*Match_ Acquirer*	*Commercial*	*International*	*Status_ Diff*	*Multi_ Deal*
Leave_Combined		−0.03	**0.05**	**0.04**	**−0.10**	−0.03	**−0.13**	**−0.15**	**−0.15**	**0.08**	−0.03	**−0.04**	**−0.06**	**−0.09**	**0.07**	0.03	**−0.06**	**0.05**
Accu_Score	−0.01		**0.52**	**−0.79**	**0.04**	0.00	0.02	**0.07**	0.02	0.02	**0.22**	0.00	−0.02	0.01	0.00	−0.01	**0.05**	**−0.04**
Top_Accu	**0.05**	**0.59**		**−0.22**	**−0.10**	**−0.22**	0.02	−0.01	−0.02	**0.05**	**0.11**	−0.01	**−0.07**	0.00	**−0.03**	0.01	−0.01	**−0.03**
Bottom_Accu	**0.04**	**−0.71**	**−0.22**		**−0.12**	**−0.13**	−0.02	**−0.08**	**−0.04**	0.01	**−0.18**	−0.01	**−0.03**	−0.02	0.00	0.02	**−0.05**	**0.05**
All_Star	**−0.10**	**0.04**	**−0.10**	**−0.12**		**0.40**	**0.07**	**0.41**	**0.25**	**0.08**	0.02	**0.31**	**0.07**	0.03	**−0.18**	**0.09**	**0.22**	**−0.09**
Expr	−0.03	0.01	**-0.19**	**-0.12**	**0.40**		**0.04**	**0.10**	**0.06**	**−0.15**	−0.01	**0.17**	**0.23**	0.02	**−0.04**	**0.06**	**0.05**	−0.02
Acquirer	**−0.13**	0.02	0.02	−0.02	**0.07**	**0.04**		**0.30**	**0.13**	0.02	0.00	−0.01	0.02	**0.42**	**−0.17**	**0.07**	**0.16**	0.03
Research	**−0.17**	**0.07**	0.03	**−0.08**	**0.39**	**0.09**	**0.35**		**0.69**	**0.19**	0.01	**−0.05**	**−0.05**	**0.09**	**−0.30**	**0.34**	**0.55**	**−0.17**
I_Banking	**−0.15**	0.02	−0.02	**−0.04**	**0.25**	**0.06**	**0.13**	**0.66**		**0.10**	−0.01	0.02	−0.01	−0.01	**−0.14**	**0.10**	**0.43**	**−0.10**
Match_Found	**0.08**	0.02	**0.05**	0.01	**0.08**	**−0.12**	0.02	**0.16**	**0.10**		0.00	**−0.16**	**−0.40**	0.02	−0.02	**0.04**	**0.16**	**0.04**
Match_DiffAccu	−0.03	**0.22**	**0.15**	**−0.19**	0.01	−0.01	0.00	0.01	−0.01	−0.01		0.03	**−0.04**	**0.03**	−0.01	0.01	−0.02	0.00
Match_DiffAllStar	**−0.04**	0.00	−0.01	−0.02	**0.32**	**0.17**	0.00	**−0.04**	0.02	**−0.15**	**0.04**		**0.26**	0.02	**0.04**	−0.03	**−0.04**	0.00
Match_DiffFollow	**−0.04**	0.02	−0.03	**−0.04**	0.02	**0.10**	**−0.04**	**−0.06**	**−0.07**	**−0.30**	**0.04**	**0.10**		**0.04**	0.00	−0.01	−0.03	−0.02
Match_Acquirer	**−0.09**	0.00	0.00	−0.02	0.03	0.01	**0.42**	**0.13**	−0.01	0.01	0.03	0.02	0.01		−0.03	**0.03**	−0.01	−0.03
Commercial	**0.07**	0.00	**−0.03**	0.00	**−0.18**	**−0.04**	**−0.17**	**−0.45**	**−0.14**	−0.02	0.00	**0.04**	**−0.05**	−0.03		**−0.15**	**−0.13**	**0.39**
International	0.03	−0.02	0.01	0.02	**0.09**	**0.08**	**0.07**	**0.35**	**0.10**	**0.04**	0.02	−0.03	**−0.05**	**0.03**	**−0.15**		**0.15**	**−0.08**
Status_Diff	**−0.06**	**0.04**	−0.01	**−0.05**	**0.22**	**0.05**	**0.16**	**0.47**	**0.43**	**0.16**	−0.02	**−0.04**	**−0.07**	−0.01	**−0.13**	**0.16**		−0.01
Multi_Deal	**0.05**	**−0.04**	**−0.03**	**0.05**	**−0.09**	−0.01	0.03	**−0.24**	**−0.10**	**0.04**	0.00	0.00	**−0.08**	−0.03	**0.39**	**−0.08**	0.01	

Upper diagonal reports Spearman correlation coefficients; lower diagonal reports Pearson correlation coefficients. Bolded coefficients are statistically significant at the 0.1 level, two-tailed test. Variable definitions are in Appendix C.

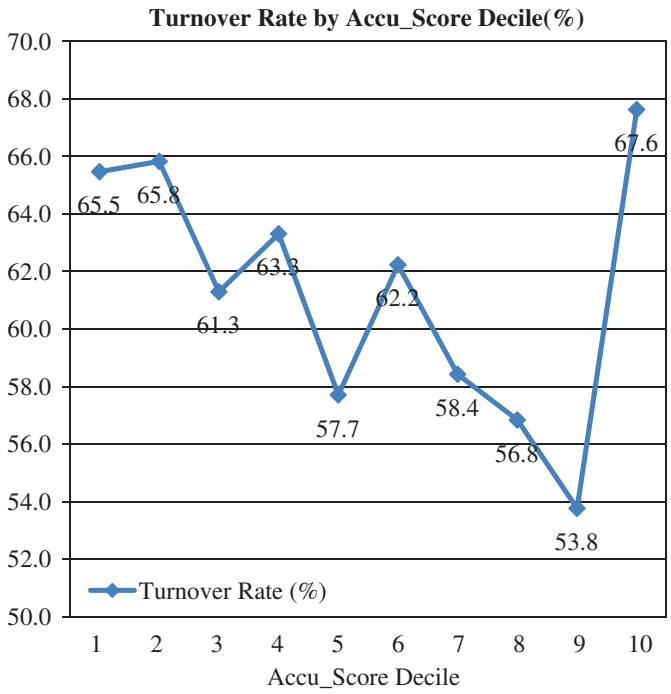


Fig. 3. Analyst turnover rate by accuracy score decile. Our sample includes mergers in the financial industry from 1994–2004. Accu_Score and analyst turnover rate (Leave_Combined) are defined in Appendix C.

to 51 (accuracy scores are defined for all analysts covering a particular firm and range from 0 to 100). *Top_Accu* (*Bottom_Accu*) have means around 10% (30%). These are dummy variables for the top 10% and bottom 30% accuracy performance. We further find that 20.4% of our sample analysts are stars (*All_Star*), this contrasts with 7% of stars in the overall I/B/E/S analyst populations (Leone and Wu, 2007). The average analyst has about 5 years of forecasting experience (*Expr*). Roughly 50% of our sample analysts were employed by the acquirer before the merger (*Acquirer*). Our sample brokers employ on average 16 star analysts (*Research*).[25] Forty-four percent of our sample analysts are employed at high reputation investment banks (*I_Banking*). For about 37% of our sample analysts, there is a competing analyst in the merger cluster (*Match_Found*).[26] About 56% (50%) of our sample analysts are involved in mergers with commercial banks/insurance firms (foreign firms). Finally, 36% of the analysts are involved in multi-deal mergers.

We report the correlation matrix in Table 4 (with Spearman coefficients above the diagonal and Pearson correlations below). We focus on Spearman coefficients as many of our variables are indicator variables. The inferences from Pearson coefficients are similar. There is no significant correlation between *Accu_Score* and *Leave_Combined*. However, both *Top_Accu* and *Bottom_Accu* dummy variables have significant positive correlations with the turnover measure, indicating heightened turnover at both ends of the earnings forecast performance. The correlations between turnover and the other independent variables are generally consistent with our predictions.

6. Analysis of analyst turnover at the merged firm

6.1. Univariate analysis of analyst turnover

Fig. 3 plots analyst turnover against the earnings forecast accuracy score and shows a non-linear relation between the two variables. In particular, turnover follows a generally downward sloping curve from decile 1 (lowest accuracy) to decile 9, consistent with the evidence in prior literature that worse earnings forecast performance leads to higher turnover (e.g. Mikhail et al., 1999). However, there is a sharp rise in turnover for analysts in the top performance decile.

[25] The brokerage firms involved in mergers tend to be large, employing 65 analysts on average (during our sample period the average broker on I/B/E/S employs 14 analysts; the median is 6).

[26] The means of *Match_DiffAccu*, *Match_DiffAllStar*, *Match_DiffFollow*, and *Match_Acquirer* are non-zero because competing analysts may not come in pairs (had that been the case, these variables would have means of zero by construction). For example, assume analyst A covers 20 stocks and analyst B covers 10 stocks, out of which 5 stocks are covered by both analysts. Analyst A is a direct competitor of B's (overlapping with 50% of B's portfolio), but B is not classified as A's direct competitor (overlapping with 25% of A's portfolio) according to our 1/3 cutoff.

Merger window is the window from one year before the first merger in a merger cluster to one year after the last merger in a merger cluster; pre-merger (post-merger) window is the window before (after) merger window and with the same length as merger window. For each broker in a merger cluster, we find a matched broker in I/B/E/S with the following requirements: i) it is not involved in a merger in our sample; ii) it has the closest number of analysts in the merger year. Industry-adjusted turnover is the turnover rate of sample brokers minus the turnover rate of the matching brokers. Top Forecasters are analysts with top forecast accuracy (Top_Accu = 1). All Star analysts are analysts with All_Star = 1. ###, ## and # represent that the turnover rate for current window is significantly different from that in the previous window at 1%, 5%, and 10%, for a two-tailed test, respectively.

	Pre-Merger Window	Merger Window	Post-Merger Window
Overall sample			
N of Unadjusted	78	81	52
Un-adjusted(%)	38.7	53.3###	60.3###
N of Industry-adjusted	78	81	52
Industry-adjusted(%)	-4.1	11.6###	3.6
Top Forecasters			
N of Unadjusted	53	57	40
Un-adjusted(%)	47.1	60.6##	63.9##
N of Industry-adjusted	34	36	30
Industry-adjusted(%)	-6.5	26.5##	6.5
All-star analysts			
N of Unadjusted	31	39	28
Un-adjusted(%)	31.4	38.4##	52.0
N of Industry-adjusted	13	16	18
Industry-adjusted(%)	-25.8	-1.4#	0.4
Other analysts			
N of Unadjusted	78	80	52
Un-adjusted(%)	38.6	52.9###	60.5###
N of Industry-adjusted	78	80	52
Industry-adjusted(%)	-3.6	8.1###	1.6

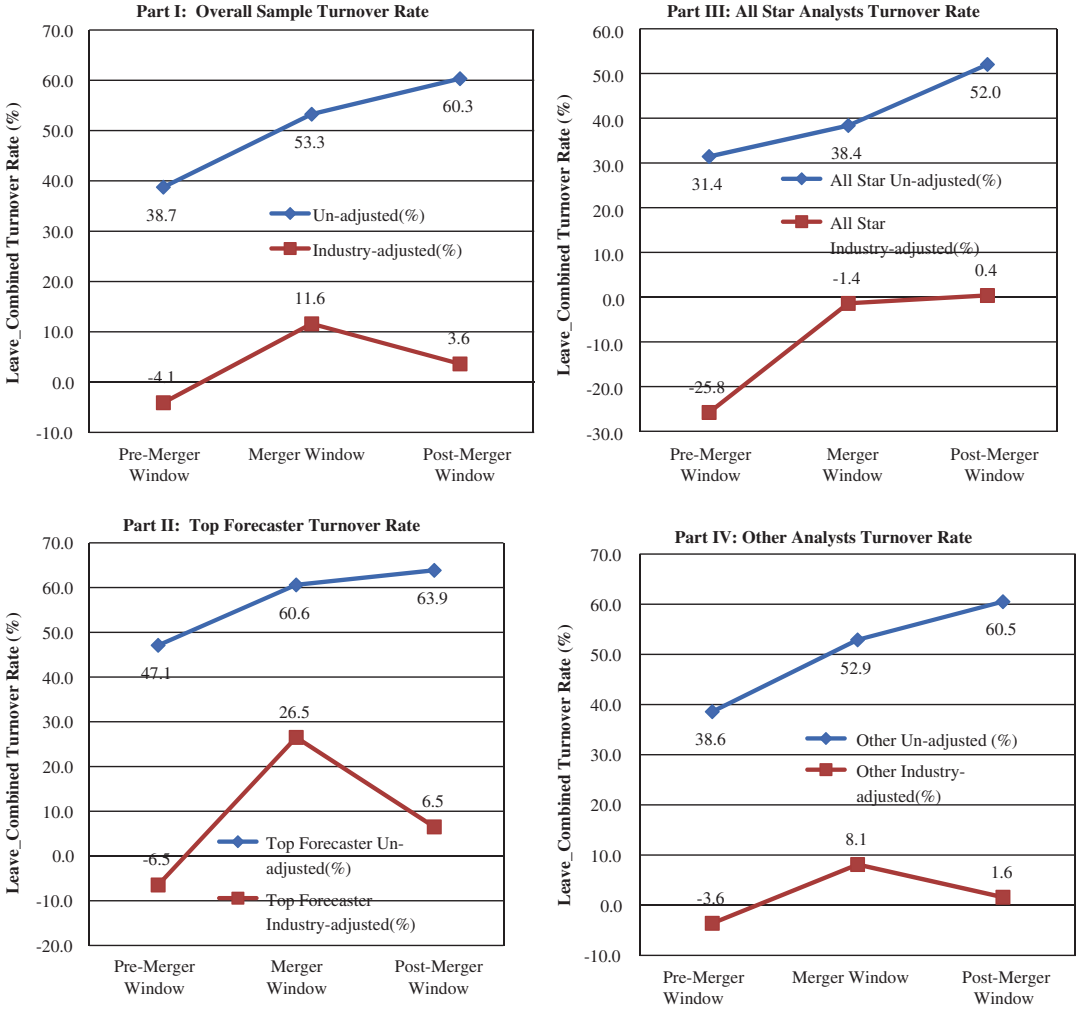


Fig. 4. Analyst turnover rates before, during, and after the merger.

Table 5
Logistic analysis of analyst turnover.

$$Prob[Leave\_Combined = 1] = Logit(a_0 + a_1 Accu\_Score + a_{21} All\_Star + a_{22} I\_Banking + a_{23}\, All\_Star \times I\_Banking + a_3 Expr + a_4 Acquirer + a_5 Research + a_{61} Match\_Found + a_{62}\, Match\_DiffAccu + a_{63} Match\_DiffAllStar + a_{64} Match\_DiffFollow + a_{65} Match\_Acquirer + a_7\, Commercial + a_8\, International + a_9 Status\_Diff + a_{10} Multi\_Deal + a_{11} Matched\_Turnover) \quad (1)$$

$$Prob[Leave\_Combined = 1] = Logit(a_0 + a_{11}\, Top\_Accu + a_{12}\, Bottom\_Accu + a_{21}\, All\_Star + a_{22}\, I\_Banking + a_{23}\, All\_Star \times I\_Banking + a_3\, Expr + a_4\, Acquirer + a_5\, Research + a_{61}\, Match\_Found + a_{62}\, Match\_DiffAccu + a_{63}\, Match\_DiffAllStar + a_{64}\, Match\_DiffFollow + a_{65}\, Match\_Acquirer + a_7\, Commercial + a_8\, International + a_9\, Status\_Diff + a_{10}\, Multi\_Deal + a_{11}\, Matched\_Turnover) \quad (2)$$

Our sample includes mergers in the financial industry from 1994 to 2004. We include year dummies in all regressions and cluster the standard errors by our merger clusters. Standard errors are in parentheses. ***, **, and * represent significance levels of 1%, 5%, and 10%, respectively, for one-tailed tests with predicted signs and two-tailed tests otherwise. Numbers in brackets are the marginal effects on the predicted probabilities in the logistic regressions from a one standard deviation increase from the mean for a continuous variable and from zero to one for an indicator variable, with other variables measured at the mean. Variable definitions are in Appendix C.

Dep	Exp. sign	(1) *Leave_Combined* (full sample)	(2) *Leave_Combined* (full sample)
Intercept		0.1800 (0.3226)	0.1363 (0.3245)
Analyst-specific variables			
Accu_Score		0.0012 (0.0025) [0.3%]	
Top_Accu	+		0.4352*** (0.1447) [9.6%]
Bottom_Accu	+		0.1468** (0.0860) [3.4%]
All_Star		0.0352 (0.2055) [0.8%]	0.0729 (0.2019) [1.6%]
I_Banking		−0.2578 (0.2551) [−6.0%]	−0.2537 (0.2533) [−5.9%]
All_Star × I_Banking		−0.4683** (0.2547) [−11.3%]	−0.4699** (0.2548) [−11.3%]
Expr		0.0067 (0.0119) [0.5%]	0.0144 (0.0120) [1.2%]
Brokerage-specific variables			
Acquirer	−	−0.3481** (0.1757) [−8.1%]	−0.3526** (0.1749) [−8.2%]
Research	−	−0.0095 (0.0087) [−4.3%]	−0.0094 (0.0088) [−4.2%]
Comparing competing analysts			
Match_Found	+	0.4760*** (0.0815) [10.9%]	0.4697*** (0.0811) [10.8%]
Match_DiffAccu	−	−0.0069* (0.0050) [−1.5%]	−0.0072* (0.0052) [−1.6%]

Table 5 (*continued*)

Dep	Exp. sign	(1) *Leave_Combined* (full sample)	(2) *Leave_Combined* (full sample)
Match_DiffAllStar	–	−0.0328	−0.0591
		(0.1016)	(0.0971)
		[−0.2%]	[−0.4%]
Match_DiffFollow	–	−0.0056**	−0.0051**
		(0.0031)	(0.0028)
		[−1.2%]	[−1.1%]
Match_Acquirer	–	−0.2559**	−0.2516**
		(0.1369)	(0.1367)
		[−2.5%]	[−2.4%]
Merger-specific variables			
Commercial		−0.2114	−0.1971
		(0.1863)	(0.1886)
		[−4.9%]	[−4.6%]
International		0.2096	0.2013
		(0.1652)	(0.1646)
		[4.9%]	[4.7%]
Status_Diff	–	0.2129	0.2037
		(0.2208)	(0.2217)
		[2.3%]	[2.2%]
Multi_Deal	+	0.3414**	0.3425**
		(0.1623)	(0.1626)
		[7.8%]	[7.9%]
Control variables			
Matched_Turnover		0.6255	0.5896
		(0.5323)	(0.5335)
		[5.1%]	[4.8%]
Year dummies		Yes	Yes
N ($Y = 1$)		2742 (1665)	2742 (1665)
Unconditional probability (%)		60.7	60.7
Pseudo-R^2 (%)		12.16	12.57

In Fig. 4, we present evidence on the time series change in analyst turnover before, during, and after a merger.[27] Part I of Fig. 4 plots the raw and industry-adjusted turnover rates for our overall sample. Parts II and III plot the turnover rates for top earnings forecasters and All-Stars, respectively, and Part IV for other analysts. In order to control for potential industry-wide effect in analyst turnover, we conduct industry adjustment by subtracting matched-broker turnover from the merged firm turnover. The results indicate an increasing trend of raw turnover over time. After industry adjustment, we find that the merger window corresponds to a substantial increase in turnover. There is a 15.7% increase in industry-adjusted turnover rate from −4.1% pre-merger to 11.6% in the merger window. The increase is 33% (from −6.5% pre-merger to +26.5% in the merger window) for top earnings forecasters. All-Star analysts also experience a substantial 24.4% increase in turnover during the merger window (from −25.8% to −1.4%), although the results need to be interpreted with caution due to the low number of matching brokers with star analysts. The increases in top quality analyst turnover (33% for top forecasters and 24.4% for All-Stars) are significantly higher than the 11.7% increase in turnover (from −3.6% pre-merger to +8.1% in the merger window) for other analysts.

6.2. Multivariate regression results

Table 5 presents logistic regression results for models (1) and (2). Column (1) includes *Accu_Score* in a linear fashion. After controlling for other variables, it is insignificant. In column (2), we separately model the effects of good and bad performances with *Top_Accu* and *Bottom_Accu*. The coefficient on *Top_Accu* is 0.4352, significantly different from zero at less than the 1% level. In terms of marginal effect, being in the top 10% in accuracy increases turnover by 9.6%, or 16% of the unconditional turnover probability of 61%. Thus, the effect of good performers departing following a merger appears economically significant and supports H2. The coefficient on *Bottom_Accu* is 0.1468, significantly different from zero at less

[27] The merger window starts in the year before the first merger in the merger cluster and ends in the year after the last merger of the merger cluster. The pre-merger and post-merger windows are adjacent to the merger window and are adjusted to match the length of the merger window (the turnover rates therefore reflect multi-year turnovers). The merger window varies from three to four years depending on the merger cluster.

than the 5% level, supporting H1. Being in the bottom 30% in accuracy increases the turnover rate by 3.4%, or 6% of the unconditional turnover probability of 61%.[28] The coefficients on *All_Star* and *I_Banking* are not significantly different from zero. However, their interactive term has a coefficient of −0.4699, significant at less than the 5% level. Star analysts experience 11% lower turnover at highly ranked investment banks. We do not find *Expr* to be significantly associated with turnover after controlling for other variables.

Affiliation with the acquirer reduces analyst turnover. The coefficient on *Acquirer* is −0.3526, significant at less than the 5% level, supporting H3. Being with the acquirer reduces the turnover likelihood by 8.2%, or 13% of the unconditional turnover probability of 61%. The coefficient on *Research* is insignificant. We find support for H5 that excess research capacity increases analyst turnover (the coefficient on *Match_Found* being 0.4697 with a *p*-value of less than 1%). The existence of a competing analyst increases the turnover likelihood by 10.8%, or 17.7% of the unconditional turnover probability of 61%. The coefficient on *Match_DiffAccu* is negative as predicted in H5_a, and significant at the 10% level. *Match_DiffAllStar* has an insignificant coefficient. The coefficient on *Match_DiffFollow* is −0.0051 consistent with H5_a, and significant at the 5% level. These results suggest that among competing analysts, those with greater forecast accuracy and greater stock coverage are less likely to turnover. We also find that *Match_Acquirer* is negative and significant at the 5% level, suggesting among competing analysts, those with the acquirer are more likely to survive (supporting H5_b). Interestingly, among competing analysts 'political' factor (affiliation with the acquirer) appears to have a bigger role in driving analyst career outcomes than quality measures such as earning forecast accuracy, star status, or stock coverage. In particular, the marginal effect on *Match_Acquirer* is −2.4%, relative to −1.6% for *Match_DiffAccu* and −1.1% for *Match_DiffFollow* (*Match_DiffAllStar* is insignificant).

The coefficients on *Commercial* and *International* are not significantly different from zero, possibly due to the offsetting effects on turnover from complementarities and potential cultural conflicts. In un-tabulated results, we also include an indicator variable for mergers where a commercial bank makes its first acquisition of an investment bank and an indicator variable for mergers where a foreign firm first acquires a domestic firm. These are situations where potential complementarities are the greatest between the merger parties. We do not find these variables to be significant when included in the regression, potentially due to the low frequencies of these types of mergers.

The coefficient on *Status_Diff* is insignificant. We find a significant positive coefficient on *Multi_Deal* (0.3425, *p*-value of 5%), consistent with H7 that turnovers are higher in more complicated merger transactions. Being in a multi-deal merger increases the turnover likelihood by 7.9%, or 13% of the unconditional turnover probability of 61%. *Matched_Turnover*, turnover at matched brokers, has a positive coefficient, although it is not significant.

7. Logistic analysis of promotion to research executive position

Table 6 reports logistic regression results for model (3). Column (1) presents the results on internal promotions and column (2) on external promotions. The unconditional probability of internal promotions is 3.8% and that on external promotions is 3.3%. We first discuss the results on internal promotion. Consistent with H8, more experienced analysts are significantly more likely to be promoted to an executive position internally (coefficient of 0.2291 and significant at less than the 1% level). A one standard deviation increase in experience from the mean (roughly from 5 to 9 years) increases the internal promotion likelihood by 2.0%, or 53% of the 3.8% unconditional probability. The coefficient on *All_Star* × *Expr* is positive, although insignificant. We also find that target analysts are more likely to be promoted within the merged firm to executives (the coefficient on *Acquirer* is significantly negative). This can be due to the acquirer using executive positions to entice target analysts to stay.[29]

Turning to column (2) on external promotions, we find that more experienced analysts are significantly more likely to be promoted to an executive position externally (coefficient of 0.0929 and significant at less than the 1% level), supporting H8. A one standard deviation increase in experience from the mean increases the external promotion likelihood by 0.8%, or 24% of the 3.3% unconditional probability. The coefficient on *All_Star* is negative and significant, consistent with the high costs of promoting a star to executive position (with the firm losing a ranked analyst). However, we also find that more experienced stars are more likely to become executives (*All_Star* × *Expr* is positive and significant at the 10% level), supporting H9. The negative coefficient on *Match_Found* suggests that when an analyst leaves the merged firm due to redundancy, he/she is less likely to become an executive elsewhere. In both regressions, we control for turnover at the matched brokers (*Matched_Turnover*) and the inverse Mills ratio (*IMR*) from a first-stage analysis of an analyst's decision to stay (as either an analyst or an executive) versus to leave the firm.

8. Post-merger changes in research strength

We find that the average number of stocks followed by the merged firm decreases by 23 from before (counting stocks covered by all the brokers in the merger cluster) to after merger. The change in the number of stocks followed from pre- to

[28] In un-tabulated results, we conduct analyses for acquirer and target analysts separately and find significantly higher turnover for top and bottom forecasters for both subsamples. Therefore, the departure of top talent applies to both the target and the acquirer.

[29] One example can be the purchase of Donaldson Lufkin & Jenrette (DLJ) by Credit Suisse First Boston in 2000, when six of DLJ's analysts joined the executive team, with one serving as head of equity research.

Table 6
Logistic analysis of promotion to executive position.

$$Prob[Exec = 1] = Logit(a_0 + a_{11}\,Expr + a_{12}\,All\_Star + a_{13}\,All\_Star \times Expr + a_2\,Acquirer + a_3\,Research + a_4\,I\_Banking + a_{51}\,Match\_Found + a_{52}\,Match\_DiffAccu + a_{53}\,Match\_DiffAllStar + a_{54}\,Match\_DiffFollow + a_{55}\,Match\_Acquirer + a_6\,Commercial + a_7\,International + a_8\,Status\_Diff + a_9\,Multi\_Deal + a_{10}\,Matched\_Turnover + a_{11}\,IMR) \quad (3)$$

Our sample includes mergers in the financial industry from 1994 to 2004. We cluster the standard errors by our merger clusters and report the standard errors in parentheses. ***, **, and * represent significance levels of 1%, 5%, and 10%, respectively, for one-tailed tests with predicted signs and two-tailed tests otherwise. Numbers in brackets are the marginal effects on the predicted probabilities in the logistic regressions from a one standard deviation increase from the mean for a continuous variable and from zero to one for an indicator variable, with other variables measured at the mean. Variable definitions are in Appendix C.

Dep	Exp. sign	(1) *Exec_ Internal*	(2) *Exec_ External*
Intercept		−3.1539***	−3.8588***
		(1.0240)	(0.5464)
Analyst-specific variables			
Expr	+	0.2291***	0.0929***
		(0.0483)	(0.0337)
		[2.0%]	[0.8%]
All_Star		−0.7624	−2.2138**
		(1.1894)	(1.1837)
		[−0.9%]	[−2.7%]
*All_Star*Expr*	+	0.0685	0.1099*
		(0.1221)	(0.0845)
		[0.4%]	[0.9%]
Brokerage-specific variables			
Acquirer		−1.1678**	0.2849
		(0.4721)	(0.3412)
		[−1.9%]	[0.6%]
Research		0.0281	−0.0011
		(0.0225)	(0.0132)
		[1.1%]	[0.0%]
I_Banking		−0.8165	0.5414**
		(0.6399)	(0.2907)
		[−1.3%]	[1.2%]
Comparing competing analysts			
Match_Found		0.1412	−1.4633***
		(0.4768)	(0.4887)
		[0.2%]	[−3.0%]
Match_DiffAccu		−0.0093	0.0030
		(0.0136)	(0.0180)
		[−0.1%]	[0.0%]
Match_DiffAllStar		0.5040	−1.1988**
		(0.6062)	(0.4755)
		[0.2%]	[−0.7%]
Match_DiffFollow		0.0071	−0.0074
		(0.0154)	(0.0093)
		[0.0%]	[−0.1%]
Match_Acquirer		0.0484	0.3256
		(0.2753)	(0.3492)
		[0.0%]	[0.3%]
Merger-specific variables			
Commercial		−0.0794	0.1250
		(0.3679)	(0.3488)
		[−0.1%]	[0.2%]
International		−0.7680*	−0.0785
		(0.4377)	(0.3778)
		[−1.1%]	[−0.1%]
Status_Diff		−0.7155	−0.1890
		(0.5769)	(0.3225)
		[−0.4%]	[−0.1%]

Table 6 (*continued*)

Dep	Exp. sign	(1) *Exec_ Internal*	(2) *Exec_ External*
Multi_Deal		0.2927 (0.4080) [0.4%]	−0.2709 (0.2878) [−0.5%]
Control variables			
Matched_Turnover		0.2276 (0.6779) [0.1%]	0.5527 (0.3892) [0.4%]
IMR		1.6132 (1.1839) [1.0%]	−0.2821 (0.6930) [−0.1%]
N ($Y = 1$)		1119 (42)	1665 (55)
Unconditional probability (%)		3.8	3.3
Pseudo-R^2 (%)		22.57	8.09

Table 7
Post-merger changes in research strength.

$$Dropped\_Coverage = a_0 + a_1\, Turnover + a_2\, Top\_Forecaster\_Turnover + a_3\, All\_Star\_Turnover + a_4\, Avg\_Matched\_Turnover \quad (4)$$

$$Forecast\_Freq\_Change = a_0 + a_1\, Turnover + a_2\, Top\_Forecaster\_Turnover + a_3\, All\_Star\_Turnover + a_4\, Avg\_Matched\_Turnover \quad (5)$$

$$Accu\_Score\_Change = a_0 + a_1\, Turnover + a_2\, Top\_Forecaster\_Turnover + a_3\, All\_Star\_Turnover + a_4\, Avg\_Matched\_Turnover \quad (6)$$

Our sample includes mergers in the financial industry from 1994 to 2004. We include year dummies in all regressions and cluster the standard errors by our merger clusters. Standard errors are in parentheses. ***, **, * represent significance levels of 1%, 5%, 10%, respectively, for one-tailed tests with predicted signs and two-tailed tests otherwise.

Variable definition:

Dropped_Coverage = For the stocks covered by the brokers in the merger cluster 1 year before the first merger in merger cluster, *Dropped_Coverage* equals one if the stock is not covered by the brokers in the merger cluster 1 year after the last merger in the merger cluster; zero if the stock is still covered by the brokers in the merger cluster 1 year after the last merger in the merger cluster.

Forecast_Freq_Change = Change in forecast frequency for each stock that the brokers in the merger cluster cover from 1 year before the first merger in merger cluster to 1 year after the last merger in the merger cluster.

Accu_Score_Change = Change in average forecast accuracy score for each stock that the brokers in the merger cluster cover from 1 year before the first merger in the merger cluster to 1 year after the last merger in the merger cluster. If there is more than one analyst in the brokers in the merger cluster covering the stock, we calculate the average forecast accuracy score.

Turnover = Turnover rate of the analysts who are covering the stock 1 year before the first merger in the merger cluster.

Top_Forecaster_Turnover = Equals one if there is a top forecaster who covers the stock being turned over; zero otherwise. Top forecasters are analysts with top accuracy (*Top_Accu* = 1).

All_Star_Turnover = Equals one if there is an All-Star analyst (with *All_Star* = 1) who covers the stock being turned over; zero otherwise.

Avg_Matched_Turnover = Average analyst turnover at matched brokers. For each broker in the merger cluster covering the stock 1 year before the first merger in merger cluster, we find a matched broker in I/B/E/S with the following requirements: (i) it is not involved in a merger in our sample; (ii) it has the closest number of analysts in the merger year.

Model Dependent variable	Exp. sign	(1) *Dropped_Coverage*	Exp. sign	(2) *Forecast_Freq_Change*	(3) *Accu_Score_Change*
Intercept		0.3710***		−0.8507	−3.1905
		(0.0212)		(3.0252)	(4.9538)
Turnover	+	0.3466***	−	−2.4954**	2.7712
		(0.0182)		(1.0896)	(2.0647)
Top_Forecaster_Turnover		0.0009	−	−2.5505*	−14.4538***
		(0.0292)		(1.9216)	(4.0189)
All_Star_Turnover		−0.1624***	−	−7.8436***	−1.4620
		(0.0193)		(1.2720)	(1.5946)
Avg_Matched_Turnover	+	0.0716*	−	−6.2108*	0.3640
		(0.0512)		(3.8766)	(8.2415)
Year dummies		Yes		Yes	Yes
N		19,705		9270	8526
Adj-R^2 (%)		11.10		8.54	0.53

post-merger reflects the net effect of the stocks dropped and stocks added. Since we are investigating the effect of analyst turnover, it is natural to link turnover to the drop of stock coverage and to changes in research quality for the stocks that receive coverage both before and after merger. Table 7 presents the regression results of models (4)–(6). Column (1) reports that turnover among the analysts covering a particular stock is significantly positively related to the drop in coverage for that stock by the merged firm (*Turnover* being positive and significant at the 1% level).[30] Furthermore, the results in column (2) suggest earnings forecast frequency significantly decreases from pre- to post-merger when the analysts covering that stock have high turnover (*Turnover* being negative and significant at the 5% level).

The turnover of a top earnings forecaster is associated with an even larger decrease in forecast frequency (*Top_Forecaster_Turnover* being negative and significant at the 5% level in column (2)). *Top_Forecaster_Turnover* is also negative and significant at the 1% level in column (3), suggesting that it corresponds to a significant decrease in earnings forecast accuracy. Finally, *All_Star_Turnover* is related to a significant decrease in earnings forecast frequency. In all three models, we include the matched-broker turnover as controls for industry turnover effects. We find that higher matched-broker turnover are related to larger drops in stock coverage and greater decreases in forecast frequency, consistent with the presence of industry effects in research quality changes. The findings in Table 7 support H10 that the decrease in research quality (measured with stock coverage, earnings forecast frequency, and earnings forecast accuracy) post-merger are associated with analyst turnover and especially the turnover of top quality analysts. An interesting question that arises is whether unplanned (unintended) turnovers from the merger firm's perspective are more detrimental to post-merger research quality. Classifying analyst turnover into planned versus unplanned can be a noisy process as the firms' intentions are not observable. However, it is likely that turnovers of top quality analysts are unplanned (unintended) to the merged firms, and our evidence suggests that these turnovers have a more adverse impact on the merged firms' research strength.[31]

9. Robustness tests for potential confounding effects on analyst turnover

As discussed in Section 2.1 (E), analyst turnover among merger firms can be affected by several confounding events during our sample period. Our analysis so far has included the turnover at size-matched non-merger brokers as a control. In this section, we offer further robustness checks.

The confounding events that potentially increase industry-wide turnover are more concentrated in the later part of our sample period (e.g. the market downturn beginning around 2001 and the Global Settlement in 2003). Consistent with this, Fig. 1 indicates that the number of analysts on I/B/E/S increases each year from 1993 to 2002. It declines slightly in 2003 and then drops sharply in 2004. Because the early part of our sample is not subject to the influence of many of the confounding events, as a robustness check we repeat the turnover analysis in model (2) for merger transactions conducted from 1994 to 1999. This subsample includes 47 merger transactions in 37 clusters and 1526 analyst-year observations. The statistical significance is generally lower than that reported in Table 5 (column 2) due to the lower test power from a smaller sample; however, in un-tabulated results we continue to find that top earnings forecasters experience higher turnover, with *Top_Accu* being positive (0.5036) and significant at the 5% level. In addition, the existence of a competing analyst significantly increases analyst turnover; and among competing analysts, those following more stocks and affiliated with the acquirer have significantly lower turnover. We also find significantly higher turnover for multi-deal mergers.[32]

As a further robustness check for industry-level confounding effects, we directly incorporate the analysts in the control sample of non-merger brokers into our analysis and report the results in Table 8. The analyst turnover analysis is based on the following model:

$$\begin{aligned} Prob[Turnover = 1] = Logit(&a_{01} + a_{02}\, Merger + a_{11}\, Top\_Accu\_InBrkr \\ &+ a_{12}\, Merger \times Top\_Accu\_InBrkr + a_{21}\, Bottom\_Accu\_InBrkr \\ &+ a_{22}\, Merger \times Bottom\_Accu\_InBrkr + a_{31}\, All\_Star \\ &+ a_{32}\, Merger \times All\_Star + a_{41}\, Expr + a_{42}\, Merger \times Expr \\ &+ a_{51}\, Research + a_{52}\, Merger \times Research) \end{aligned} \tag{7}$$

Merger is equal to one if an analyst is from a broker in the merger sample, and zero otherwise. Compared to model (2), a number of merger-related variables (i.e., the acquirer dummy, variables concerning competing analysts and the

[30] It is not clear how top forecaster and All-Star turnovers incrementally affect the drop in stock coverage beyond analyst turnover. We therefore do not have predictions on *Top_Forecaster_Turnover* or *All_Star_Turnover* in model (4) on *Dropped_Coverage*. The significant negative coefficient on *All_Star_Turnover* suggests that stocks covered by all stars are likely of greater significance and their coverage is less likely to be dropped post-merger.

[31] In un-tabulated results, we also define a planned turnover indicator variable as one if an analyst who has turned over is not a star or a top forecaster and s/he faces competition in the merger (*Match_Found* = 1) (the elimination of redundant lower quality analysts); or if the analyst is a star facing competition in the merger who is internally promoted (retaining stars through promotion); otherwise, a turnover is classified as unplanned. We find that unplanned turnovers are significantly more likely to occur in mergers where there are smaller status differences among the merger parties (these mergers are likely to be more contentious according to Cowen, 2006). Unplanned turnovers are related to significantly larger drops in stock coverage post-merger than planned turnovers. However, unplanned turnovers also see smaller decreases in forecast frequency and no difference in earnings forecast accuracy changes post-merger, relative to planned turnovers. We caution that the above classification scheme can be noisy because the merger firms' intentions are not observable.

[32] In un-tabulated results, *Bottom_Accu* has the predicted positive sign, although it is insignificant, with a *p*-value of 12%, possibly due to the low test power. *All_Star* is also insignificant.

Table 8
Robustness tests with combined merger and non-merger samples.

Panel A: Analyst turnovers at merger brokers versus non-merger brokers

$$\begin{aligned} Prob[Turnover = 1] = Logit(&a_{01} + a_{02}\, Merger + a_{11}\, Top\_Accu\_InBrkr \\ &+ a_{12}\, Merger \times Top\_Accu\_InBrkr + a_{21}\, Bottom\_Accu\_InBrkr \\ &+ a_{22}\, Merger \times Bottom\_Accu\_InBrkr + a_{31}\, All\_Star \\ &+ a_{32}\, Merger \times All\_Star + a_{41}\, Expr + a_{42}\, Merger \times Expr \\ &+ a_{51}\, Research + a_{52}\, Merger \times Research) \qquad (7) \end{aligned}$$

The sample for model (7) includes analysts at the merger brokers in our sample, and analysts at non-merger brokers in IBES with at least 10 analysts during the same period of our merger sample, 1994–2004. Standard errors are in parentheses. ***, **, and * represent significance levels of 1%, 5%, and 10%, respectively, for one-tailed tests with predicted signs and two-tailed tests otherwise. Numbers in brackets are the marginal effects on the predicted probabilities in the logistic regressions from a one standard deviation increase from the mean for a continuous variable and from zero to one for an indicator variable, with other variables measured at the mean.

Variable definitions for *All_Star, Research,* and *Expr* are in Appendix C.
Turnover = *Leave_Combined* for analysts in the merger brokers. For analysts in non-merger brokers, it equals one if the analyst does not work for the same broker or disappears from IBES after 3 years; zero otherwise.
Merger = One if an analyst is from a broker in our merger sample; zero otherwise.
Top_Accu_InBrkr = One if the analyst's average accuracy score (*Accu_Score*) across all the stocks he covers ranks in the top 10% among all the analysts in the same broker year; zero otherwise.
Bottom_Accu_InBrkr = One if the analyst's average accuracy score (*Accu_Score*) across all the stocks he covers ranks in the bottom 30% among all the analysts in the same broker year; zero otherwise.

Dep	Exp. sign	*Turnover*
Intercept		0.4196***
		(0.0280)
Analyst-specific variables		
Merger	+	0.1808**
		(0.0928)
		[4.3%]
Top_Accu_InBrkr		0.1821***
		(0.0485)
		[4.4%]
Merger × *Top_Accu_InBrkr*	+	0.2833**
		(0.1569)
		[6.7%]
Bottom_Accu_InBrkr	+	0.2618***
		(0.0300)
		[6.3%]
Merger × *Bottom_Accu_InBrkr*		−0.0460
		(0.0968)
		[−1.1%]
All_Star		−0.2168***
		(0.0416)
		[−5.3%]
Merger × *All_Star*		0.1063
		(0.1309)
		[2.5%]
Expr		−0.0345***
		(0.0039)
		[−3.2%]
Merger × *Expr*		0.0424***
		(0.0128)
		[2.0%]
Brokerage-specific variables		
Research		−0.00304***
		(0.0009)
		[−1.1%]
Merger × *Research*		−0.0178***
		(0.0029)
		[−2.8%]
Year dummies		Yes

Table 8 (*continued*)

Dep	Exp. sign	*Turnover*
N ($Y = 1$)		26,422 (15,009)
Unconditional probability		56.8%
Pseudo-R^2		2.3%

Panel B: Changes in research strength at merger brokers versus non-merger brokers

$$\begin{aligned} Dropped\_Coverage = {} & a_0 + a_{11}\, Turnover + a_{12}\, Merger \times Turnover \\ & + a_{21}\, Top\_Forecaster\_Turnover \\ & + a_{22}\, Merger \times Top\_Forecaster\_Turnover \\ & + a_{31}\, All\_Star\_Turnover + a_{32}\, Merger \times All\_Star\_Turnover \end{aligned} \quad (8)$$

$$\begin{aligned} Forecast\_Freq\_Change = {} & a_0 + a_{11}\, Turnover + a_{12}\, Merger \times Turnover \\ & + a_{21}\, Top\_Forecaster\_Turnover \\ & + a_{22}\, Merger \times Top\_Forecaster\_Turnover \\ & + a_{31} All\_Star\_Turnover + a_{32}\, Merger \times All\_Star\_Turnover \end{aligned} \quad (9)$$

$$\begin{aligned} Accu\_Score\_Change = {} & a_0 + a_{11}\, Turnover + a_{12}\, Merger \times Turnover \\ & + a_{21}\, Top\_Forecaster\_Turnover + a_{22}\, Merger \times Top\_Forecaster\_Turnover \\ & + a_{31}\, All\_Star\_Turnover + a_{32}\, Merger \times All\_Star\_Turnover \end{aligned} \quad (10)$$

Our sample includes merger brokers and their matched brokers in the financial industry from 1994 to 2004. For each broker in the merger cluster covering the stock 1 year before the first merger in merger cluster, we find a matched broker in I/B/E/S with the following requirements: (i) it is not involved in a merger in our s ample; (ii) it has the closest number of analysts in the merger year. All the matching brokers for the merger brokers in one merger cluster form a matching cluster. Variables are calculated for matching clusters in the same way as for merger clusters. We include year dummies in all regressions and cluster the standard errors by our merger clusters. Standard errors are in parentheses. ***, **, * represent significance levels of 1%, 5%, 10%, respectively, for one-tailed tests with predicted signs and two-tailed tests otherwise.

Variable definitions:
Merger is equal to one if the stock is covered by the brokers in the merger cluster; zero if it is covered by the brokers in the matching non-merger cluster. The other variables are defined in the same way as those in Table 7 for stocks covered by the brokers in the merger cluster. They are calculated similarly for stocks covered by the brokers in the matching non-merger cluster.

Model Dependent variable	Exp. sign	(1) *Dropped_Coverage*	Exp. sign	(2) *Forecast_Freq_Change*	(3) *Accu_Score_Change*
Intercept		0.3543***		−1.4574	−0.0389
		(0.0399)		(2.8723)	(1.7149)
Turnover	+	0.3579***	−	−1.8622**	2.7431
		(0.0173)		(1.0760)	(2.0269)
Merger × *Turnover*	+	0.1445**	−	4.5467	−9.1545***
		(0.0373)		(3.3983)	(1.5053)
Top_Forecaster_Turnover		−0.0066	−	−2.9855**	−14.7222***
		(0.0304)		(1.8493)	(3.9719)
Merger × *Top_Forecaster_Turnover*		−0.0334		4.1020	−2.3163
		(0.0410)		(3.0619)	(2.3157)
All_Star_Turnover		−0.1743***	−	−8.1360***	−1.7786
		(0.0188)		(1.3262)	(1.5686)
Merger × *All_Star_Turnover*		−0.0461		4.3463	−2.6899
		(0.0559)		(3.6307)	(2.2836)
Year dummies		Yes		Yes	Yes
N		23,444		11,401	10,315
Adj-R^2 (%)		7.41		4.0	0.36

merger-specific variables) are dropped from model (7) because they are not defined for the non-merger sample. Note that due to the same reason, model (2) is our main model for hypothesis testing and model (7) serves as a robustness check. Furthermore, *I_Banking* is dropped because top investment banks are heavily represented in the merger group.[33] The results are reported in Table 8 Panel A. The coefficient on *Merger* is positive and significant at the 5% level, suggesting heightened analyst turnover for the merger sample. *Top_Accu_InBrkr* is positive and significant, suggesting higher turnover among good earnings forecasters in the non-merger sample. This can be due to good performers at lower tier firms, which are more concentrated in the non-merger sample, moving up to more prestigious brokers (e.g. Hong and Kubik, 2003). More importantly, we find a positive and significant coefficient on *Merger* × *Top_Accu_InBrkr*. This suggests an incremental effect on top performer turnover due to the mergers.[34]

To investigate the incremental merger effects on changes in firm research strength, we estimate the following regression models:

$$\begin{aligned} Dropped\_Coverage = {} & a_0 + a_{11}\, Turnover + a_{12}\, Merger \times Turnover \\ & + a_{21}\, Top\_Forecaster\_Turnover \\ & + a_{22}\, Merger \times Top\_Forecaster\_Turnover \\ & + a_{31}\, All\_Star\_Turnover + a_{32}\, Merger \times All\_Star\_Turnover \end{aligned} \tag{8}$$

$$\begin{aligned} Forecast\_Freq\_Change = {} & a_0 + a_{11}\, Turnover + a_{12}\, Merger \times Turnover \\ & + a_{21}\, Top\_Forecaster\_Turnover \\ & + a_{22}\, Merger \times Top\_Forecaster\_Turnover \\ & + a_{31} All\_Star\_Turnover + a_{32}\, Merger \times All\_Star\_Turnover \end{aligned} \tag{9}$$

$$\begin{aligned} Accu\_Score\_Change = {} & a_0 + a_{11}\, Turnover + a_{12}\, Merger \times Turnover \\ & + a_{21}\, Top\_Forecaster\_Turnover + a_{22}\, Merger \times Top\_Forecaster\_Turnover \\ & + a_{31}\, All\_Star\_Turnover + a_{32}\, Merger \times All\_Star\_Turnover \end{aligned} \tag{10}$$

Similar to models (4)–(6), this analysis is conducted at the stock level. *Merger* is equal to one if a stock is covered by the brokers in the merger sample, and zero if by the non-merger sample. Recall that Table 7 suggests analyst turnover, especially top analyst turnover, adversely affect firm research quality. Given the evidence in Table 8 Panel A that mergers are associated with higher overall turnover as well as higher turnover for top forecasters, it is likely that mergers have a more negative impact on firm research quality simply due the mean effect of higher turnover rates. Models (8)–(10) further test if there is also a slope effect, i.e., given a certain level of turnover, whether it is more detrimental to research quality in a merger setting. The results are presented in Table 8 Panel B. From column (1), the drop of stock coverage is significantly positively associated with turnover. More importantly, the coefficient on *Merger* × *Turnover* is also positive and significant at the 5% level, suggesting an incremental negative effect on stock coverage from merger-related turnovers. We do not find the merger-related interactive terms to be significant in the forecast frequency regression (column (2)). In column (3), we find that merger-related turnover has a significant negative impact on forecast accuracy changes, with *Merger* × *Turnover* being negative and significant at the 1% level. Overall the results from this section suggest that our inferences regarding the effects of mergers are unlikely to be driven by confounding events affecting the entire financial industry during the sample period.

10. Conclusions and implications

The US financial industry went through significant consolidation from 1994 to 2004, which created considerable analyst turnover, especially among top quality analysts. Our analysis of the determinants of analyst turnover suggests that various factors at the employee, firm, and merger transaction levels have important implications for turnover. Our finding of heightened turnover among top quality analysts suggests a brain drain at the merged firms. Our results also suggest that analysts employed by the acquirer experience significantly lower turnover. On the other hand, the existence of a competing analyst at a merger counter party significantly increases analyst turnover, consistent with mergers eliminating excess research capacity.

[33] To make the results more general and not dependent on a particular sample of matched non-merger brokers, we include all non-merger brokers with a minimum of 10 analysts on I/B/E/S during our sample period in the control sample. In order to account for the possibility that some brokers may not have high forecast accuracy analysts compared to other firms, we define the top and bottom forecast accuracy groups within each broker. Specifically, *Accu_Score*, which reflects accuracy rankings of analysts following the same stock, is further ranked within each broker-year. The top and bottom accuracy groups are then defined based on the relative rankings of *Accu_Score* within a broker-year. None of our earlier inferences are affected if we use the within-broker top and bottom accuracy rankings in the earlier regression models.

[34] The coefficient on *Merger* × *Bottom_Accu_InBrkr* is insignificant, neither is *Merger* × *All_Star*. The interactive terms regarding *Expr* and *Research* suggest that during mergers more experienced analysts are more likely to turnover and those from strong research departments are less likely to turnover.

We analyze the promotion of analysts to research executive positions and find that experienced analysts, and especially experienced stars, are more likely to become executives. Finally, our evidence indicates a decrease in firm research strength post-merger that is related to analyst turnover, especially top quality analyst turnover.

Finally, our research has implications for future studies of analyst career concerns regarding how to measure turnover. We highlight that *firm-level turnover* measures in the prior literature are confounded by promotions of analysts to research executive positions within the same firm. We also raise serious concerns about the validity of the *industry turnover measure* ('leaving profession') based on I/B/E/S (e.g. Hong et al., 2000).

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Appendix A. Illustration of the matching of the SDC merger sample with the I/B/E/S brokerage names with the transactions in Fig. 2

We combine the information from I/B/E/S with various other sources, e.g. academic studies (Corwin and Schultz, 2005; Ljungqvist et al., 2006), newspaper articles and information on company websites to construct 'merger trees' at the corporate level, and more importantly, at the research department level with I/B/E/S brokerage codes.

Part A of Fig. 2 chronicles six transactions related to First Union Corp. by their effective dates and provides the target and acquirer names reported in SDC. A visual presentation of these transactions in the form of a 'merger tree' is in Part B. Our goal is to determine the I/B/E/S brokerage codes involved in each merger; thus in Part C we present the relevant information from the I/B/E/S Brokerage ID File: broker code (BACODE), broker name (BANAME), and the data field BAID. To assist our inference, for each broker code we also obtain information on the number of years and the last year it appears in I/B/E/S, as well as the number of analysts and number of earnings forecasts for US firms averaged over the years and for the last year the broker code appears in I/B/E/S. For commercial banks or insurance companies without financial analysts (for example, First Union before its purchase of Wheat First Butcher Singer in 1998 in deal #2 and Wachovia before its acquisition of Interstate/Johnson Lane in 1999 in deal #3), we assign them a pseudo-broker code of 99999.

Everen Capital Corp. (acquirer in deal #1 and target in deal #4) is assigned I/B/E/S broker code 829 (BANAME: 'Everen Securities Inc.'). The target in deal #1, Principal Financial Securities is assigned I/B/E/S broker code 495 (BANAME: 'Principal Financial Securities').[35] The target in deal #5, First Albany, is assigned I/B/E/S broker code 104 (BANAME: 'First Albany Corp.'). Note that the code for First Albany, 104, survives until the end of the I/B/E/S tape in 2006, suggesting the First Albany research department remains a separate group after its acquisition by First Union in 2000 (deal #5).

It is important to note that there are no I/B/E/S broker codes for Wheat First Butcher Singer (target in deal #2) and Interstate/Johnson Lane (target in deal #3). Rather, we find two separate broker codes under the same I/B/E/S BANAME of 'Wachovia Securities.' The information contained in the previously rarely used data field, BAID, suggests that code number 147 (BAID 'JOHNSON') is likely Interstate/Johnson Lane, and that code number 282 (BAID 'WHEAT') is likely Wheat First Butcher Signer. This reflects the I/B/E/S practice of changing broker names to the most recent corporate name, since Wachovia is the eventual surviving name after the series of mergers.[36] It is worth pointing out that while First Union has the same corporate name in all the mergers per SDC, its broker code changes for the purpose of our analysis. Before its acquisition of Wheat First Butcher Singer, it was a commercial bank with code 99999. After the acquisition, it is assigned the WHEAT broker code of 282 because it now carries the previous WHEAT research department.

[35] We also consider the following information in the code assignments. I/B/E/S broker code 495, assigned to Principal Financial Securities, disappears from I/B/E/S in 1998, the same year Principal Financial was bought by Everen (deal #1). The code assigned to Everen, 829, disappears from I/B/E/S in 1999 when Everen itself was bought by First Union (deal #3).

[36] We assign I/B/E/S broker code 147 (BAID 'JOHNSON') to Interstate/Johnson Lane in deal #3 and assign I/B/E/S broker code 282 (BAID 'WHEAT') to Wheat First Butcher Signer in deal #2, while taking the following into consideration. Code 147 (BAID 'JOHNSON') and code 282 (BAID 'WHEAT'), even with their 'Wachovia Securities' broker names, existed for 18 and 25 years respectively, thus going back to the times when Wachovia was a commercial bank without any research analysts. Further, code 147 (JOHNSON) disappears from I/B/E/S in 2001, the same year when Wachovia (after its acquisition of Interstate/Johnson Lane in 1999) merged with First Union.

Appendix B. Tracking analysts who disappear from I/B/E/S using Nelson's Directory of Investment Research

Each annual issue of the Nelson's Directory has an 'Analyst Register' section, which lists alphabetically by last name all sell-side analysts along with their employers' names. Nelson's also reports the names of key research executives at each firm—separately for equity research operations and fixed income operations. We focus on equity research executives as they likely contribute in significant ways to a firm's equity research quality.

For each analyst who disappears from I/B/E/S after a merger, we identify in Nelson's the last year an analyst works for the merged firm, i.e., the analyst disappears from the Analyst Register in the next year. The disappearance needs to occur within a [−1,+1] year window of the merger to qualify as a merger-related turnover. We then search, in the year an analyst disappears from the Analyst Register, the list of research executives in Nelson's to determine if that person has become an executive. In the case of internal promotion, when different firms in a merger have separate listings in Nelson's, we search under all the separate firm names.

The above steps produce the results reported in Table 2. Out of the 1348 analysts who disappear from I/B/E/S post-merger, 127 analysts (9.4% of the observations) become research executives either at the merged firm or at another firm.

We also find that roughly 20% of the cases reflect potential I/B/E/S data errors. The most common (13.1%) are due to analysts moving to another brokerage firm (instead of ceasing to be a sell-side analyst) post-merger. These observations do not affect our turnover analysis at the merged firms.

For about 4.9% of the observations, we find no turnover. In other words, the analyst continues to be employed at the merged firms for 3 years after the merger. These observations are re-classified as no-turnover in our turnover analysis at the merged firm.

In addition, 0.7% of the analysts were employed at a different firm than that identified in I/B/E/S, and there has been no-turnover. These observations are removed from our sample.

Finally, about 1.1% of the observations were due to turnovers related to a different merger in our sample and they are re-classified accordingly.

Appendix C. Variable definitions

We define a '*merger cluster*' as a single-merger transaction ('*single-deal cluster*') unless one of the following two situations applies (referred to as '*multi-deal cluster*'): (1) an acquirer in a previous transaction becomes a target within the current or next calendar year, or (2) an acquirer buys two or more targets within the same calendar year.

Dependent variables:

Measured in the *year after* the completion of the last merger deal in a merger cluster

Leave_Combined	An indicator that is equal to one if an analyst does not issue any forecast for any brokerage involved in the merger cluster after all mergers in the merger cluster are completed, and zero otherwise.
Exec_Internal	An indicator that is equal to one if an analyst is promoted to a research executive position inside the merged firm, and equal to zero for all analysts who *stay with the merged firm as analyst* post-merger.
Exec_External	An indicator that is equal to one if an analyst leaves the merged firm post-merger and is promoted to a research executive position *outside* the merged firm, and equal to zero for all other analysts who *leave the merged firm* post-merger.

Independent variables:

Measured in the *year before* the completion of the first merger deal in a merger cluster

Analyst-specific variables	
Accu_Score	For each analyst, we keep his/her last forecast for a firm-year within 120 days before the earnings announcement date. Forecast error is calculated as the absolute difference between the forecasted and actual earnings, which is also obtained from I/B/E/S. Each year we rank analysts following each stock based on the absolute forecast error. The most accurate analyst receives a ranking of 1; the second most accurate analyst receives a ranking of 2; and so on until the worst analyst receives the highest rank. We divide the ranks minus one by the total number of analysts following this firm minus one, and calculate accuracy score as 100 minus the 100 times this ratio (Hong et al., 2000): $$Accuracy\_Score = 100 - 100 \times \frac{Accuracy\_Rank - 1}{Total\_Num\_Analyst - 1}$$ The most accurate analyst for a firm-year receives an accuracy score of 100; the least accurate analyst receives an accuracy score of 0. We then average each analyst's accuracy scores across all firms followed by him/her in the 3 years prior to merger.
Top_Accu	Equals one if an analyst's average accuracy score in the 3 years before the first merger in the merger cluster is in the top decile of the sample, and zero otherwise.
Bottom_Accu	Equals one if an analyst's average accuracy score in the 3 years before the first merger in the merger cluster is in the bottom 30% of the sample, and zero otherwise.
All_Star	Equals one if an analyst has ever been ranked as an All-Star analyst by Institutional Investor before the first merger in the merger cluster, and zero otherwise.
Expr	The number of years an analyst has provided earnings forecasts in the I/B/E/S database before the first merger in the merger cluster.

Brokerage-specific variables	
Acquirer	Equals one if a brokerage is the acquirer in the merger cluster, and zero otherwise.
Research	The number of *All_Star* analysts employed by a brokerage in the year before the first merger in the merger cluster.
I_Banking	Equals one if a brokerage is ranked among the top 20 M&A advisers based on advisory fee from completed deals as reported in Mergers & Acquisitions in the year before the first merger in the merger cluster, and zero otherwise.
Comparison of competing analysts	
Match_Found	Equals one if an analyst has a competing analyst, and zero otherwise. Competing analyst is defined as follows: For analyst *i* in the merger cluster, we find another analyst within the same merger cluster who covers the highest number of stocks out of the stocks covered by analyst *i*. If there are more than one analyst covering the same number of stocks out of the stocks covered by analyst *i*, we choose the analyst with the largest overlap in market cap with analyst *i*. We require a matching analyst to cover at least 1/3 of analyst *i*'s covered stocks, otherwise, we define analyst *i* as having no competing analyst.
Match_DiffAccu	Equals (*Accu_Score* of an analyst—*Accu_Score* of the competing analyst). It is set to zero if *Match_Found* = 0.
Match_DiffAllStar	Equals (*All_Star* indicator of an analyst—*All_Star* indicator of the competing analyst). It is set to zero if *Match_Found* = 0.
Match_DiffFollow	Equals (the number of stocks followed by an analyst—the number of stocks followed by the competing analyst). It is set to zero if *Match_Found* = 0.
Match_Acquirer	Equals (acquirer indicator of an analyst—acquirer indicator of the competing analyst). In other words, it is equal to 1 if an analyst is from the acquirer in the merger cluster, and the competing analyst is from the target; equal to −1 if an analyst is from a target broker and his competing analyst is from the acquirer; an equal to 0 if an analyst and the competing analyst are both from either the acquirer or the target. It is set to zero if *Match_Found* = 0.
Merger cluster-specific variables	
Commercial	Equals one if at least one of the firms in the merger cluster has a two-digit primary SIC code of either 60 (commercial bank) or 63 (insurance company) in the year before the first merger in the merger cluster, zero otherwise.
International	Equals one if there is at least one foreign firm involved in the merger cluster, zero otherwise.
Status_Diff	The mean of the absolute differences in *I_Banking* between any pair of the brokers involved in a merger cluster.
Multi_Deal	Equals one if there are at least two merger transactions in the merger cluster, zero otherwise.
Control variables	
Matched_Turnover	Analyst turnover rate at the matched brokers. For each broker in our sample, we find a matched broker in I/B/E/S with the following requirements: (i) it is not involved in a merger in our sample; (ii) it has the closest number of analysts in the merger year.
IMR	In model (3) for the internal promotion analysis, IMR is the Inverse Mills Ratio = $\phi(z)/\Phi(z)$, where z is the fitted value from the logit model (2) with the dependent variable set to one if an analyst stays with the merged firm as either an analyst or research executive, and zero if the analyst departs. For the external promotion analysis, IMR is the Inverse Mills Ratio = $\phi(z)/\Phi(z)$, where z is the fitted value from the logit model (2) with the dependent variable set to zero if an analyst stays with the merged firm as either an analyst or research executive, and one if the analyst departs. $\phi(\cdot)$ is the standard normal density function; $\Phi(\cdot)$ is the cumulative standard normal distribution function.

References

Berger, A., Demsetz, R., Strahan, P., 1999. The consolidation of the financial services industry: causes, consequences, and implications for the future. Journal of Banking and Finance 23.

Bhargava, R., Fraser, D., 1999. On the wealth and risk effects of commercial bank expansion into securities underwriting: an analysis of Section 20 subsidiaries. Journal of Banking and Finance 23.

Clement, M., 1999. Analyst forecast accuracy: do ability, resource, and portfolio complexity matter? Journal of Accounting and Economics, 285–303.

Cliff, M., Denis, D., 2004. Do initial public offering firms purchase analyst coverage with underpricing? Journal of Finance LIX.

Corwin, S., Schultz, P., 2005. The role of IPO underwriting syndicates: pricing, information production, and underwriter competition. Journal of Finance LX (1).

Cowen, A., 2006. For better or worse? Mergers and status outcomes in the investment banking industry. Working Paper. Harvard Business School.

Cowen, A., Groysberg, B., Healy, P., 2006. Which types of analyst firms are more optimistic? Journal of Accounting and Economics 41, 119–146.

Group of Ten, 2001. Report on consolidation in the financial sector.

Hadlock, C., Houston, J., Ryngaert, M., 1999. The role of managerial incentives in bank acquisitions. Journal of Banking and Finance 23.

Healy, P., Palepu, K., Ruback, R., 1992. Does corporate performance improve after mergers? Journal of Financial Economics 31.

Hong, H., Kubik, J.D., 2003. Analyzing the analysts: career concerns and biased earnings forecasts. Journal of Finance LVIII (1), 313–351.

Hong, H., Kubik, J.D., Solomon, A., 2000. Security analysts' career concerns and herding of earnings forecasts. RAND Journal of Economics 31 (1), 121–144.

Jacob, J., Lys, T., Neale, M., 1999. Expertise in forecasting performance of security analysts. Journal of Accounting and Economics, 51–82.

Jarrell, G., Brickley, J., Netter, J., 1988. The market for corporate control: the empirical evidence since 1980. Journal of Economic Perspectives 2 (1), 49–68.

Jensen, M., Ruback, R., 1983. The market for corporate control: the scientific evidence. Journal Financial Economics 11.

Jovanovic, B., 1979. Job matching and the theory of turnover. Journal of Political Economy 87, 972–990.

Krigman, L., Shaw, W., Womack, K., 2001. Why do firms switch underwriters? Journal of Financial Economics 60.

Leone, A., Wu, J.S., 2007. What does it take to become a superstar? Evidence from institutional investor rankings of financial analysts. University of Rochester, Working Paper.

Ljungqvist, A., Marston, F., Wilhelm, W., 2006. Competing for securities underwriting mandates: banking relationships and analyst recommendations. Journal of Finance LXI (1).

Ljungqvist, A., Malloy, C., Marston, F., 2007. Rewriting history. Working Paper. Stern School of Business, NYU.

Martin, K., McConnell, J., 1991. Corporate performance, corporate takeovers, and management turnover. Journal of Finance XLVI (2).

Mikhail, M., Willis, R., Walther, B., 1997. Do security analysts improve their performance with experience? Journal Accounting Research 35, 131–157.

Mikhail, M., Walther, B., Willis, R., 1999. Does forecast accuracy matter to security analysts? The Accounting Review 74 (2), 185–200.

Pilloff, S., 2004. Bank Merger Activity in the United States, 1994–2003. Board of Governors of the Federal Reserve System, Staff Study.

Stickel, S.E., 1992. Reputation and performance among security analysts. Journal of Finance XLVII (5), 1811–1836.

Walsh, J., Ellwood, J., 1991. Mergers, acquisitions, and the pruning of managerial deadwood. Strategic Management Journal 12, 201–217.

Weber, R., Camerer, C., 2003. Cultural conflict and merger failure: an experimental approach. Management Science 49.