Bias in Affiliated Sell Side Analyst Recommendations: A Repeated Hazard Duration Model

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Abstract

Research on analyst bias typically identifies affiliation with reference to IPO and/or SEO issues. However, this is only a subset of the mandates that could give rise to incentives for bias in a multi-function investment bank. In addition the above offerings are relatively isolated events and particularly in the case of IPOs there is a concern that since typically few analysts follow an IPO stock early on, there may be an omitted variable problem relating to severe information asymmetries that exist before a company has a listing history. To address these concerns this paper exploits a feature unique to the UK stock market environment, the requirement that all listed firms have a "sponsor" that has an ongoing responsibility to advise corporate clients on disclosures to the market. Since UK sponsors are typically affiliated to investment banks, this study can identify ongoing (repeated) affiliation. This work is in contrast to previous studies of US and other datasets that could only define affiliation once in the life of a company at the IPO date or alternatively at the infrequent date of SEOs if they happened. Hence this research can adopt a design that systematically explores specific time series effects in the panel data set that was not possible in previous studies. Exploiting this feature, this research tests to see whether the 'Global Settlement' has had any significant effect on the recommendation practice of sell side analysts. The paper finds evidence that affiliated analysts are typically more optimistic and tend to concentrate their changes of recommendations in the most common recommendations range, 'Buy' and 'Overweight.' In addition to being optimistic, their recommendations appear to be biased given that they are slower to downgrade and faster to upgrade compared to their counterparts. These results are robust both in an univariate and multivariate setting. With respect to changes in affiliated analyst bias through time, this research documents the form and extent of an observed reduction in the gap between affiliated and unaffiliated analysts recommendation behavior post the Global Settlement.

Key words: Conflicts of interest; Investment Banking; Affiliation; Recommendations; Global Settlement.

JEL classification: C41, G24, G28.

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1 INTRODUCTION

"*Here is a lesson that even the biggest of the big-league investment banks are learning: to succeed in London's equity capital markets, first cultivate a thriving practice in corporate broking. A peculiarly British custom, corporate broking is an advisory relationship between banker and client in which the banker assesses the market's perception of the client and advises on future strategy, including financing needs. Peter Koh notes that the correlation between lists of the top 10 corporate brokers and the top 10 UK bookrunners from 1999 to 2003 shows the importance of establishing such a relationship. In the United Kingdom, most capital-raising business, from the initial public offering onward, goes exclusively to corporate brokers. In 1996, Merrill Lynch became the first US bank to enter the corporate-broking club. Over the years, Merrill's efforts have resulted in a list of 62 broking clients, the number two spot for UK corporate bond issues, and the number three place for equity issues (excluding IPOs)... US investment banks are beginning to realize that a solid corporate-broking list is a prerequisite for doing capital-markets business in Great Britain. Brokers enjoy access to corporate strategy and to board-level executives, and they usually receive a flow of trading in a company's shares.";* Thriving In The UK: What Investment Banks Need To Know, Bowne Abstracting, October 2004.

Some of the most controversial discussions leading up to the "Global Settlement" between Elliot Spitzer and Wall Street concerning analyst bias concentrated on the issue over whether (sell side) research analyst recommendations may have been influenced by their reward incentives, which linked bonus pay to success of other (affiliated) units of the investment bank obtaining profitable business like M&A and IPO mandates. This research investigates the issue of optimistic affiliated recommendations in the UK. Specifically, this paper tests whether affiliated analysts produce biased recommendations, and in particular whether this bias has changed in any significant way following the Global Settlement.

Prior research using US data on affiliated analyst bias by Dugar and Nathan (1995), Lin and McNichols (1998), Dechow et al. (2000), and Michaely and Womack (1999) finds that affiliated analysts are more likely to issue optimistic earnings growth forecasts and favorable recommendations. However, as commented on by some of the above authors and others these studies suffer from an ambiguous direction of causation: Are analysts biased because of banking ties - *strategic bias* - or do managers select banks according to the favorableness of their analysts research - *selection bias*? Recent research by O'Brien et al. (2005) uses an innovative research design to address this problem head on. Using a hazard duration model they analyze the relative speed of revision of recommendations by affiliated and unaffiliated analysts. They accept that while a corporate issuer may rationally choose an IPO or SEO underwriter from an investment bank whose sell side analysts issue more favorable recommendations, they see "no motive for an issuer preferring a bank whose analysts are slow to downgrade, except for the purpose of delaying the disclosure of negative information to investors" (p.625). In tests of their main hypotheses they find statistical support for the conjectures that affiliated analysts delay the disclosure of negative information and accelerate favorable information. However, their study faces two related limitations derived from the nature of their sample dataset. First,

affiliation is defined in their research only with respect to an IPO or SEO. For a bulge bracket full service investment bank these mandates represent only two elements of a large set of potentially highly profitable mandates. For established corporates the IPO option is obviously no longer available, hence an investment bank may for instance be targeting M&A work as the most likely possibility of a mandate. Thus if one is to attempt to detect the full potential effects of affiliation induced bias, then it would be desirable to define the affiliation sample space as covering all the firms that potentially could award mandates to investment banks, including the full range of investment banking product offerings rather than just underwriting of IPOs and SEOs. Second, given the special first time nature of the affiliation between an investment bank and a client with an IPO, O'Brien et al. (2005) choose to search for possible bias effects induced by affiliation by looking at analyst recommendations *after* an IPO mandate has been awarded. However, incentives for analysts to introduce bias in recommendations are probably greatest *before* a mandate is awarded, that is, the most powerful bias incentives exist at the time when the investment bank is bidding for a mandate rather than ex post. Taken together these two inter related issues can be regarded as the *ex ante full mandate set* affiliation identification problem.

By specifically choosing instead to look at UK data, this paper exploits the unique institutional features of the UK capital markets environment which allow for the consideration of the ex ante affiliation identification problem. Specifically, as the opening quotation highlights the UK has what the author refers to as *peculiarly British custom* of corporate broking. As set out by the requirements of the UK Listing Authority, every listed company on the London Stock Exchange must have an appointed corporate broker formally referred to as a "sponsor" to advise on communication with the stock market on an ongoing basis.[1] To summarize the differences between the US and UK settings, Figures 1 and 2 contrast the nature of potential inter-investment bank information flows with or without Chinese Walls constraining leakage across operating units.[2]

Place Figures 1 and 2 Here

Much of the debate about analyst bias in the US has been concerned with claims that the Chinese Walls between sell side analysts and other investment bank departments were compromised. Political concern over the lack of independence and possible induced bias by US

[1] In the UK the Listing Authority sets out requirements for Chinese Walls to be in place between the corporate brokers and the rest of the investment bank. An extract from the UK Listing Authority concerning the duties and requirements of a sponsor is provided in the Appendix.

[2] As far as the authors are aware there is only one published paper on analyst bias in a UK setting which recognizes the link between affiliation and corporate brokerage in the UK. Constantinou et al. (2003) find underreaction in the UK, especially in the presence of earnings momentum. Underreaction means that, when earnings are rising, the analysts will issue cautious (low) forecasts, whereas when earnings are falling, analysts question whether this negative trend will continue. The authors argue that underreaction is stronger with downward earnings momentum for affiliated analysts, which suggests disregard for firm performance decline. However, they only used data from one major investment bank, so they dealt with the issues of affiliation in a biased way.

analysts was debated by the US congress in a set of "analyzing the analysts" hearings during the summer of 2001. These hearings and the subsequent public comment in large part resulted in the NYSE and NASD issuing new regulations for sell side analysts taking effect from July 9th 2002. The principal purpose of the new rules was to remove conflicts of interests that could arise when sell side analysts did not maintain full independence from the multi-function investment banks within which they were located. For instance, sell side analyst compensation could no longer be related to the business the main investment bank had with specific sell side "followed" clients, and the practice of rewarding sell side analysts in part on the basis of IPO mandate fees gained was outlawed. The rules on communication between sell side analysts and the rest of the investment bank were also severely curtailed as were the periods during which sell side research could be published if the investment bank was working on a client mandate such as an SEO or M&A transaction. Commensurate with the Senate hearings the New York attorney general's office began investigating specific sell side analysts of investment banks for alleged misconduct. The investigations resulted in the Global Settlement between the top ten US investment banks and the regulatory authorities and office of the New York attorney general. The details of the settlement were announced later on the 22nd of December 2002 and officially enacted on the 28th of April 2003. The terms of the Global Settlement closely mirrored the new regulatory changes enacted by the NYSE and NASD and introduced some further requirements such as requiring the sell side analysts of an investment bank to be physically separated from the rest of the investment banks' staff and operations and also to have a dedicated legal department. Kadan et al. (2004, 2005) examine analysts' earnings forecasts and recommendations for IPOs and SEOs before and after the 'Global Analyst Research Settlement' in April 2003. They find that while affiliated recommendations are still more optimistic than unaffiliated recommendations, the gap has been reduced following the elimination of the dependency between research and investment banking departments. Analysts have become more cautious in their forecasts and recommendations. The Global Settlement has thus eliminated the strategic bias in the US, but some selection bias might still be present. However, their work does not benefit from the insights of the O'Brien et al. (2005) study that duration times are critical in assessing such effects. Moreover their study is limited to IPO/SEO firms during a period over which there was arguably significant changes in market sentiment without explicitly allowing for this time dimension to be incorporated in the research design.

If incentives were so powerful as to compromise Chinese Wall directives in the US setting, the situation in the UK where the corporate broker has even more sensitive information that could benefit the rest of the investment bank suggests the incentives in the UK for compromise could be more powerful. Thus, in this study the adopted research design addresses the ex ante affiliation identification problem as follows. First, while in the spirit of O'Brien et al. (2005) the methodology uses a hazard duration model of research analyst recommendations, affiliation is however defined with respect to the relationship between a company's corporate broker and the investment bank. Since the corporate brokerage function is an ongoing regulatory required relationship, the focus is on the repeated events nature of the UK analysts' duration setting. Studying analyst recommendations and affiliation using UK rather than US data thus provides a considerable advantage in terms of the extended research design that can be implemented.

Given the inherent advantages of UK data for the above reasons, one initial concern that may arise however is the use of this dataset to investigate the effects on analysts behaviour of a US regulatory change such as the Global Settlement. A number of points are worth raising here. First, US investment banks have been the dominant force in London for some considerable time following London's Big Bang changes in November 1986 with only relatively few small UK merchant banks remaining in existence. Secondly, unlike some other US regulatory initiatives such as SOX, the UK regulator (Financial Services Authority) actively embraced the US Global Settlement proposals and confirmed that the basic tenets behind the settlement were implicit in the principles based regulatory framework that was in place in the UK. Thus with respect to the US Global Settlement applicability to the UK, it is noted that the changes that took place in the US had immediate impact in the UK divisions of US investment banks since they interpreted the rules as having effect on their worldwide operations. Thus while studying UK data the appropriate dates to investigate the revised regulatory effects are identical to the US dates.

Returning to the specifics of the repeated interactions between analysts and companies we next need to identify the primary repeated event of interest from which reactions will be measured. Following Bagnoli et al. (2004) we note that analyst forecast revisions tend to cluster after formal earnings announcements because the financial information is in accordance with generally accepted accounting principles and there is a direct link with firm value. Thus we choose the annual preliminary announcement as the main defining event at which analysts recalibrate their forecasts not least because their forecasts for the current years operating results will now be directly comparable with actual results reported in the preliminaries.[3]

To briefly summarize the results, this paper finds evidence that affiliated analysts are typically more optimistic than unaffiliated analysts and tend to concentrate their changes of recommendations in the most common recommendations range, 'Buy' and 'Overweight.' In particular, downgrades tend to occur for 'Buy' and 'Overweight' initial recommendations, while upgrades are more associated with initial recommendationsn of 'Overweight' and 'Hold.' In addition, affiliated analysts' recommendations appear to be biased given that they are slower to downgrade and faster to upgrade compared to unaffiliated analysts. These results are robust both in an univariate and multivariate setting. The Global Settlement has had a significant impact in the UK by reducing the gap between affiliated and unaffiliated analysts' behavior. In fact, the differential in frequency and speed of upgrading/downgrading for affiliated analysts versus unaffiliated analysts has reduced resulting in a much smaller gap between the recommendation behavior of affiliated and unaffiliated analysts.

The rest of the paper is organized as follows. The next section presents a more detailed review of related literature and develops hypotheses. Section three sets out the research design

[3]The listing rules set out that the preliminary announcement of annual financial results must be released by a primary information provider (PIP). Furthermore to insure equitable access the status of the prelims is that the disclosure over the PIP must be the first time that a company reports on its annual financial results to the market. Any other 'leakage' of information prior to this date by another means is illegal. The prelims are the first time analysts receive information from the company on annual results and are actively used by analysts to confirm or modify their recommendations.

and provides some initial descriptive statistics for the data set. Section four contains the principal findings and section five presents concluding comments.

2 Related Literature and Hypothesis Development

Prior research by Dugar and Nathan (1995), Lin and McNichols (1998), Dechow et al. (2000), and Michaely and Womack (1999) examine the effect of underwriting relationships on recommendations and analysts' earnings forecasts in US seasoned equity offerings (SEOs). These papers have broadly similar findings. For instance, Lin and McNichols (1998) find that affiliated and unaffiliated analysts' earnings forecasts tend to be similar to each others'. However, affiliated analysts' recommendations and growth forecasts tend to be more favorable, which suggests that it seems less costly for an analyst to issue over-optimistic recommendations and growth forecasts than over-optimistic earnings forecasts. Still, investors following affiliated recommendations do not experience poorer investment performance, implying that any intentional bias or prior more favorable view seem to be offset by a potentially greater access to information. However, Michaely and Womack (1999), for a sample of US initial public offerings (IPOs), find that affiliated analysts' recommendations are biased and stocks with affiliated analysts' 'Buy' recommendations perform more poorly. They also find that affiliated recommendations add value given that stocks without recommendations start to fall three months following the IPO.

As the earlier discussion makes clear the above papers suffer from an ambiguous direction of causation. The paper by O'Brien et al. (2005) adopts an innovative research design in an attempt to directly address this issue. They use a hazard duration model to see whether banking ties influence the timeliness with which analysts convey negative news on US companies that issued common stock in an underwritten public equity offering during the period 1994 - 2001. They test whether for a given issuer, affiliated analysts downgrade their recommendations more slowly than unaffiliated analysts, and for a given investment bank whether analysts downgrade their recommendations more slowly for client companies than for non-clients. Their methodology "helps resolve the ambiguous causality in prior tests that focus on analysts' relative optimism at a single point in time" (p.625). According to their research design, *if* it is shown that affiliated analysts are *faster* than unaffiliated analysts to downgrade, this evidence will contradict the claim that affiliation negatively affects the flow of accurate information to investors. Alternatively, *if* it is shown that affiliated analysts are *slower* than unaffiliated analysts to downgrade, then reverse causality can no longer be inferred from the evidence.

The work closest in spirit to this research is that of O'Brien et al. (2005). However, a potential criticism to their work is that since the principle incentives for analysts to bias information is *ex ante* to increase the chance of the affiliated main investment bank winning an IPO mandate, the data being used to test for these incentive effects does not match the period over which the incentives were most marked. Consideration of the UK setting where affiliated corporate brokers are continuously providing advice to a client, i.e., affiliation is continuously identifiable, thus constitutes a richer setting for detecting evidence of ex ante incentives effects. Also given this continuity, the sample does not need to be restricted only to firms issuing equity

since incentive pressure exists for the full range of investment banking mandates. This approach thus reduces the potential chance of an omitted variable associated specifically with making recommendations for new or established firms that issue equity but not others, which can affect the interpretation of the results.

While this study builds on the hazard framework of O'Brien et al. (2005), the obvious difference is that the data is a panel with both cross sectional and times series components, given the way affiliation is identified as an enduring relationship. An issue then is how to partition the multiperiod event space into meaningful segments. In this respect Bagnoli et al. (2004) find that analyst forecast revisions tend to cluster after earnings announcements which are traditionally viewed as primary sources of news about firm value changes. This observation is meaningful since these announcements have been specially attested to see that reporting conforms to generally accepted accounting principles. Empirically, Zhang (2005) provides further support for this cut-off date. He examines the responsiveness of analysts' first forecast revisions for the quarter ahead following quarterly earnings announcements and finds that 49% of the analysts review their forecasts within three days and the remainder within 35 days on average following such announcements. Thus this paper uses the annual preliminary earnings announcement date as the commencement of the period over which the hazard of downgrade or upgrade is analyzed.

In line with O'Brien et al. (2005) this paper commences by testing two hypotheses (stated in alternative form) regarding the behavior of affiliated analysts compared to that of unaffiliated analysts:

$H1_A$: For a given company, following a preliminary announcement, affiliated sell side analysts downgrade (upgrade) their recommendations more slowly (quicker) than unaffiliated analysts.

$H2_A$: For a given investment bank, following a preliminary announcement, affiliated sell side analysts downgrade (upgrade) their recommendations more slowly (quicker) when the company's corporate broker is affiliated than when not.

Subsequent to a series of investigations regarding alleged biases in analysts' research, the Global Analysts Research Settlement was announced on 22nd December 2002 and enacted on 28th April 2003. According to this agreement all relations between research and IB departments were severed, with analysts no longer being able to participate in road shows and pitches. In addition they could no longer have IB business supported/won as comprising a component of their compensation. This regulation was agreed by the SEC, NYSE, NASD, NY Attorney General, and top ten US IBs in order to eliminate the strategic bias observed in analysts' behavior. In the spirit of Kadan et al. (2004), this paper sets two periods, before and after the Global Settlement, and assesses the effectiveness of this settlement by testing a third hypothesis (again stated in alternative form) on the speed of change in recommendations by analysts:

$H3_A$: Behavioral differences between affiliated sell side analysts and unaffiliated analysts regarding respective reactions to the preliminary announcements have decreased following the

Global Settlement period.

3 Data and Methodology

This section describes the data and the methodology used in this paper.

3.1 Data

The FactSet JCF analyst database was the principal source of information for the list of companies and the dates of their annual preliminary announcements.[4] This database also provided individual analyst recommendations for any time period of interest and the precise date and level of recommendations changes. The initial sample is made up of all 1,319 companies that were constituents of the FTSE All Share Index at some point over the period 1997-2004 and are covered by FactSet JCF. The research design requires that both the record of the annual preliminary announcement date be available (reducing the sample to 1,215 firms) and the prevailing recommendation at that time (reducing the sample to 1,040 firms). The information regarding corporate brokers was hand collected.

Table 1 provides detailed information regarding our sample. The final sample used in this study consists of 1,040 firms and 202 analysts. Overall there are 28,880 recommendations over the eight-year period, including 2,004 recommendations from affiliated analysts. On average, the proportion of affiliated analysts' recommendations has been floating around 7%-10% of the total for each period of the analysis with a few exceptions. The overall percentage is 7%. Companies are typically followed by 5 to 7 analysts, and analysts tend to cover about 35 to 42 firms per year.

Place Table 1 Here

Adopting FactSet JCF conventions, the paper uses the following classification and scores for recommendations:

Buy	Overweight	Hold	Underweight	Sell
1.00	1.50	2.00	2.50	3.00

Table 2 provides descriptive statistics for the opening analyst recommendations (immediately preceeding the annual preliminary earnings announcement of a company).

Place Table 2 Here

[4]FactSet JCF is a direct competitor of IBES that originated in Europe and has particulary good coverage of UK firms.

Afiliated analysts are typically more optimistic than unaffiliated analysts [mean (median) recommendation of 1.41 (1.50) for affiliated versus 1.75 (2.00) for unafilliated] as both average and median recommendations of the former are closer to 'Overweight' (1.50), while the latter ones concentrate closer to 'Hold' (2.00). Affiliated analysts recommendations are also less volatile than those of unaffiliated analysts (standard deviations of 0.42 and 0.58, respectively). There is some statistically significant evidence that all analysts have started to give less optimistic recommendations following the Global Settlement [mean and median recommendations of affiliated (unafilliated) analysts of 1.34 and 1.50 (1.71 and 2.00) before the Global Settlement, and 1.50 and 1.50 (1.80 and 2.00) afterwards]. In particular, affiliated analysts have broadened the range of their recommendations (standard deviations of 0.38 and 0.46 before and after the Global Settlement).

Table 3 gives more detailed information for the initial recommendations. Analysts typically concentrate their recommmendations in the range 'Buy' (1.00), 'Overweight' (1.50), and 'Hold' (2.00), thus trying to avoid less favorable recommendations. Affiliated analysts give significantly more 'Buy' and 'Overweight' recommendations than unaffiliated analysts (77% versus 48%), but fewer 'Hold' recommendations (21% versus 37%). The Global Settlement has contributed to a sharp decrease in 'Buy' recommendations for all analysts (49% to 36% for affiliated, and 28% to 20% for unaffiliated), with affiliated analysts significantly increasing their 'Hold' recommendations (from 16% to 29%), but with unaffiliated analysts increasing 'Overweight' recommendations (22% to 26%) to the detriment of 'Hold' recommendations (38% to 36%). Despite substantial differences still remaining, the Global Settlement seems to have contributed to a reduction in the gap between the two types of analysts.

Place Table 3 Here

3.2 Methodology

This subsection presents an overview of survival analysis describing the most commonly used hazards model, and explains the research design used in this paper.

3.2.1 Overview of Survival Analysis

The topic of survival analysis has been widely researched by the medical profession (see e.g., Box-Steffensmeier and Jones (2004, p.7)). The event of interest is typically the death of a patient, otherwise known as a failure, and the observed survival time is the time for which the patient remains alive, i.e., the duration of time leading up to death. The notions of failure (death) and survival of patients are intimately related to each other through the concept of hazard rate. The hazard rate gives the rate at which a patient will fail (die) by a specific point in time given that he/she has already survived until that time period. Hence, the hazard rate can be seen as a conditional failure rate.

Mathematically, let T be a nonnegative, continuous random variable describing the failure-time process. The hazard function $h(t)$ gives the probability that an individual will experience

a particular event within the next small time interval Δt given that he/she has survived up to time t:

$$h(t) = \frac{\Pr(t \leq T \leq t + \Delta t \mid T \geq t)}{\Delta t}$$

In essence, the hazard function can be estimated with the relation:

$$h(t) = \frac{\text{Number of subjects experiencing an event in the small time interval}}{\text{Number of subjects at time } t \ \times \ \Delta t}$$

In reality, researchers may need to assess the relationship between survival times and relevant independent variables (e.g., medication), which are commonly described as the covariates in the survival analysis literature.

3.2.2 The Cox Proportional Hazards Model

Cox (1972) developed a hazard approach that models the covariates and hazards as:

$$h(t \mid \mathbf{X}_j) = h_0(t) \exp(\mathbf{X}_j \boldsymbol{\beta}_x)$$

In this framework, h represents the hazard, or instantaneous risk of failure, at time t, for subject j were $h_0(t)$ is the baseline or underlying hazard function. $\mathbf{X}$ is a matrix of observations of covariates (regressors). $\boldsymbol{\beta}_x$ is a vector of coefficients that give the proportional change expected in the hazard as a result of changes in the explanatory variables. In this particular setup, a positive coefficient means that the hazard is higher (i.e., the prognosis is worse) for higher values of that explanatory variable. Conversely, negative coefficients imply a lower hazard (i.e., the prognosis is better) for subjects with higher values for that explanatory variable. $exp(\mathbf{X}\boldsymbol{\beta}_x)$ is called the relative hazard and $\mathbf{X}\boldsymbol{\beta}_x$ is the log-relative hazard (or risk score), i.e., a weighted linear combination of predictors.

The model can be solved using maximum likelihood techniques following Cox (1972), also known as proportional hazards regression analysis. This model is semi-parametric in nature as it assumes that hazard rates have two components: a nonparametric baseline hazard (equivalent to the intercept in conventional regression) and a parametric part which is determined by a set of explanatory variables. This approach hence does not impose a particular shape for the baseline hazard, yet it still allows us to assess the effect of covariates on hazard rates. According to this method survival times do not follow any particular distribution. Instead the assumption is that there is a constant relationship between the dependent variable and the covariates, otherwise called proportional hazards. Specifically, a unit variation in a covariate causes the baseline function to be multiplied by the exponential of the beta coefficient of that covariate, suggesting that the functions are magnifications and diminutions of each other - they are proportional. Hence, the hazard ratio for the subjects being compared is assumed to be the same at all times during follow-up.

The hazard model can alternatively be expressed in logs:

$$\log h(t \mid \mathbf{X}_j) = \log h_0(t) + (\mathbf{X}_j \boldsymbol{\beta}_x)$$

In this way, a unit variation in a covariate causes the baseline function to shift vertically by the beta coefficient of that covariate regardless of the value assumed by the dependent variable.

3.2.3 Research Design

In this paper duration is defined as the period between the preliminary announcement of the annual results and either a change in an analyst recommendation or the end of the financial year (typically 365 days), whichever comes first. The events of interest – failures – include downgrades and upgrades, so separate analyses are conducted for each case. In this setup the hazard can be seen as the instantaneous risk of downgrade/upgrade at time t for analyst i and company j, conditional on survival to t.

In terms of the class of hazard models that applies, note that there is:

- Right censoring – Fixed ending point in time each year (the end of the financial year);

- Left truncation – Fixed starting point in time – The hazard is assumed zero until the annual preliminary announcement;

- Informative random censoring – Analysts dropping coverage – Even though analysts dropping coverage may imply an implicit downgrade, FactSet JCF omit stale recommendations (over 75 days old) from the database, so this issue should not be serious.

In this study there are two different time lines that need to be considered: A global time line for the eight-year-period and restricted time lines within each year. Hence, there is some scope to observe several failures (of either type) for each firm at different time periods within each of the eight years under study.

Taking an annual time reference, two events of the same type with different durations can occur for one particular company (subject). Instead of considering only the first failure, as in Andersen and Gill (1982), the procedure followed here is that of the "marginal risk set" model of Wei et al. (1989), where each observation is assumed to be at risk of all possible failures from the very beginning of the period under study (i.e., only information regarding a particular failure at a time matters). With regard to the global time line, this paper builds on the conditional risk set model developed by Prentice et al. (1981) and allocates a categorical variable to the year of the preliminary announcement (1 – 8). A value of 1 means that the subject is at risk of failure in 1997, a value of 2 means that the subject is at risk of failure in 1998, and so on. This variable is then used to produce different baseline hazards for each year.

Analyst downgrades (upgrades) can then be analyzed using the multiple failure time data (or multivariate survival data) framework. However, even though it may be reasonable to assume independence of subjects, it seems unreasonable to assume independence of recurrence times within each subject. Box-Steffensmeier and Zorn (2002) argue that leaving these dependencies unaccounted for would produce similar problems to autocorrelation and clustered data heteroscedasticity in conventional regression models, i.e., incorrect estimates of standard errors, while limiting the impact of the covariates to be the same across events. Following the variance-corrected model developed by Lyn and Wei (1989), the methodology accounts for the additional correlation by adjusting the matrix of the estimators to produce a robust variance-covariance matrix. This procedure is accomplished by clustering either by company

or by analyst and adjusting the estimated variance-covariance matrix for correlation within cluster. Robust standard errors thus assume independence across clusters but not within each cluster. Let $\mathbf{I}^{-1}$ be the estimated variance-covariance matrix (i.e., the inverse of the information matrix, the Hessian) and $L(\boldsymbol{\beta})$ the likelihood function:

$$\mathbf{I}^{-1} = -\frac{\partial^2 \ln L(\boldsymbol{\beta})}{\partial \boldsymbol{\beta} \partial \boldsymbol{\beta}'}$$

Then the robust variance-covariance matrix $\mathbf{V}$ can be written as a "sandwich" estimate:

$$\mathbf{V} = \mathbf{I}^{-1}\mathbf{G}'\mathbf{G}\mathbf{I}^{-1}$$

where $\mathbf{G}$ is a matrix of group efficient score residuals.

In a Cox model the typical assumption is that all subjects face the same baseline hazard, multiplied by their relative hazard. The assumption of equal baselines across all individuals is relaxed in a stratified Cox model, as baseline hazards are allowed to differ by group, i.e., the regression has fixed effects. Still, the coefficients $\boldsymbol{\beta}_x$ are constrained to be the same throughout. Thus, each stratum is allocated its own baseline hazard, while maintaining the coefficients across all data.

The issue of stratification is crucial in repeated event data as the hazard rate is likely to vary across failures. Given the particular setup of this research, stratification is performed both by company-by-year and by analyst-by-year, where i denotes company, j denotes analyst, and k denotes year of the preliminary announcement. The rationale is that mechanisms such as learning or path dependence may cause different responses to reoccurrences of the same phenomena. The two hypotheses can then be expressed using stratified regression:

$H1_A$: $h_{ijk}(t) = h_{ik}(t)\exp(\mathbf{X}_{ijk}\boldsymbol{\beta}_x)$, conditioning on the company-by-year and clustering by company to produce a robust variance-covariance matrix.

$H2_A$: $h_{ijk}(t) = h_{jk}(t)\exp(\mathbf{X}_{ijk}\boldsymbol{\beta}_x)$, conditioning on the analyst-by-year and clustering by analyst to produce a robust variance-covariance matrix.

In a Cox regression, like in any conventional regression model, it is important to choose a parameterization of $\mathbf{X}\boldsymbol{\beta}_x$that realistically embodies the process at work. The risk score includes a set of dummy variables that accounts for the outstanding recommendation at the time of the preliminary announcement – 'Buy', 'Overweight,' and 'Hold' –, a set of interaction variables between the outstanding recommendation and a dummy variable of analyst affiliation, and a set of interaction variables of the previous variables with a dummy variable for preliminary announcements after the Global Settlement enactment to account for the possibility of time-varying coefficients (or time-dependent coefficients).

For downgrades, the base line is 'Underweight' (outstanding recommendation at the time of the preliminary announcement), so all hazards are meaningful with respect to this variable. But the regression excludes 'Sell' (outstanding recommendation at the time of the preliminary

announcement) because it is impossible to downgrade any further from this score. In the same way, for upgrades the base line is the combined 'Underweight' and 'Sell' group (outstanding recommendations at the time of the preliminary announcement; combination of the two recommendations conditioned by data availability), so all hazards are meaningful with respect to these variables. But the regression excludes 'Buy' (outstanding recommendation at the time of the preliminary announcement) because it is impossible to upgrade any further from this score.

To summarise, there are significant differences between the repeated hazards model we use here and the stand alone (single spell) hazards model of O'Brien et al. (2005). These differences are well explained by Box-Steffensmeier and Jones (2004, p.185) who argue that there is a common problem in applying hazard models developed from a background of medical statistics to social science events, because often the *patient never dies* in the social science applications, as there is repeated interaction. This fact leads Box-Steffensmeier and Jones (2004, p.185) to comment that "[i]gnoring the repeatability of events induces a strong and probably wrong assumption that past and future events are independent of each other." The case here of looking at analyst bias falls into this classic trap. Developing an analysis by assuming that an analyst's bias forecast may only happen once (for instance after an IPO) assumes that the observation exits the risk set within 24 months of an IPO, as assumed in the O'Brien et al. (2005) setup, even though in reality the risk remains indefinitely given the continual mandate concerns of multi-function investment banks through time.

4 Results

This section supplies detailed information on downgrades and upgrades and their determinants using a Cox-regression framework.

4.1 Univariate Analysis

Table 4 details the frequencies of *downgrades* across categories of initial recommendations for affiliated and unaffiliated analysts, respectively. In general all analysts downgrade proportionately more from more favorable initial recommendations (44% for 'Buy' and 24% for 'Overweight' for affiliated, and 51% for 'Buy' and 34% for 'Overweight' for unaffiliated). Affiliated analysts downgrade less often from all categories of recommendations except for 'Underweight' recommendations, where the behavior of both affiliated and unaffiliated analysts is fairly similar (13% for affiliated versus 11% for unaffiliated). The Global Settlement has contributed to a convergence of both affiliated and unaffiliated analysts, who recently only appear to diverge in what concerns downgrades from 'Hold,' where unaffiliated analysts downgrade proportionately more (7% for affiliated versus 17% for unaffiliated).

Place Table 4 here

This table ignores the 'Sell' category given that it is not possible to downgrade from this recommendation. The duration analysis in the next section will take this restriction into account

by excluding initial 'Sell' recommendations from the regression.

The situation is very different with *upgrades*, where affiliated analysts upgrade proportionately more than unaffiliated analysts. Table 5 details the frequencies of upgrades across categories of initial recommendations for affiliated and unaffiliated analysts, respectively. In general, all analysts upgrade proportionately more from less favorable initial recommendations (81% for 'Sell' and 44% for 'Underweight' for affiliated, and 54% for 'Sell' and 46% for 'Underweight' for unaffiliated). Affiliated analysts upgrade more often from all categories of recommendations except for 'Underweight' recommendations, as before, where the behavior of both affiliated and unaffiliated analysts is fairly similar (44% for affiliated versus 46% for unaffiliated). In this case the evidence concerning the impact of the Global Settlement is mixed. In general all analysts have decreased the frequency of upgrades from 'Hold' and 'Underweight' recommendations [55% to 41% (from 'Hold') and 50% to 42% (from 'Underweight') for affiliated analysts, and 32% to 30% (from 'Hold') and 52% to 41% (from 'Underweight') for unaffiliated analysts], but simultaneously they have increased the upgrades from 'Overweight' recommendations (24% to 32% for affiliated and 18% to 27% for unaffiliated). Thus it seems that when analysts are very certain about the improved quality of a firm which was previously ranked 'Overweight' they now upgrade their recommendation proportionately more following the Global Settlement. There seems to be less evidence of a convergence of affiliated and unaffiliated analysts, who still appear to diverge in the likelihood of upgrading from 'Overweight' and 'Hold' [32% versus 27% (from 'Overweight') and 41% versus 30% (from 'Hold') for affiliated and unaffiliated, respectively], though the evidence regarding upgrades from 'Overweight' is only marginally significant.

Place Table 5 here

This table ignores the 'Buy' category given that it is not possible to upgrade from this recommendation. The duration analysis in the next section will take this restriction into account by excluding initial 'Buy' recommendations from the regression.

The results so far suggest that affiliated analysts appear to be 'more optimistic' than unaffiliated analysts by downgrading proportionately less and upgrading proportionately more. Interestingly, the Global Settlement has substantially reduced the gap for both downgrades and upgrades except for changes from 'Hold' - and to some extent from 'Overweight' - recommendations.

4.2 Multivariate Analysis

It is now relevant to check whether these results hold in a multivariate framework. Tables 6 and 7 report the results of Cox regressions for downgrades and upgrades, respectively, within firms and analysts.[5] The tables display both coefficients and hazard ratios which are exponentiated coefficients. A hazard ratio of e.g., 'Buy' of 5 in a downgrade regression means that, conditional on arriving at time t without a downgrade, unaffiliated analysts are 5 times as likely to downgrade from 'Buy' than from the baseline 'Underweight.' The columns on the left of the tables

[5]The method of Breslow (1974) is used for ties (i.e., failures with the same duration).

test H1, i.e., the within-firm test for affiliated versus unaffiliated analysts, and the columns on the right test H2, i.e., the within-analyst test for client versus non-client firms.

4.2.1 Analysis of Downgrades

The first part of Table 6 has similar results to Table 5 in O'Brien et al. (2005), except that this paper finds significance for downgrades from 'Hold' as well within-firms. Specifically, unaffiliated analysts are generally more likely to downgrade from 'Buy' (6.763 times), 'Overweight' (4.685), and 'Hold' (1.681) than from 'Underweight' (the baseline), conditional on arriving at time t without a downgrade. This result holds for the within-analyst analysis, with unaffiliated analysts more likely to downgrade from 'Buy' (5.200) and 'Overweight' (3.162).

Place Table 6 Here

Turning now to the anticipated bias in affiliated analyst recommendations, affiliated analysts appear to downgrade slower from 'Buy' (0.748), 'Overweight' (0.595), and 'Hold' (0.451) than from the baseline. This result also holds for the within-analyst analysis, as affiliated analysts are slower to downgrade client firms than non-client firms from 'Buy' (0.644), 'Overweight' (0.554), and 'Hold' (0.327). For all analysts, the hazard of downgrading from a better recommendation is larger than that from a worse recommendation, as expected. In fact, the decreasing strength of the hazard ratios is consistent with the results in Table 4, where analysts are more likely to downgrade from good recommendations.

The inclusion of a dummy variable for the Global Settlement produces interesting results. If on one hand unaffiliated analysts have started to downgrade slower [from 'Buy' (0.752), 'Overweight' (0.632), and 'Hold' (0.719)], affiliated analysts on the other hand have started to downgrade faster from 'Buy' (1.337) and 'Overweight' (1.720) following the Global Settlement for the within-firm case. These results also hold for the within-analyst analysis, with unaffiliated analysts downgrading slower [from 'Buy' (0.749), 'Overweight' (0.752), and 'Hold' (0.801)] and affiliated analysts downgrading faster from 'Buy' (1.514) and 'Overweight' (1.649). This evidence supports H3 and suggests that the convergence in analyst behavior has come from both types of analysts, probably as a result of more cautious revisions in their recommendations, as pointed out by Kadan (2004).

In a Cox proportional hazards model hazard ratios are obtained with respect to the baseline, which is 'Underweight' in this case. Thus, significance levels are also computed relative to the baseline, and as such do not allow for direct comparisons of the coefficients of the different covariates in the regression. The second part of Table 6 produces significance levels for tests on the coefficients and hazards (exponentiated coefficients) of pairwise differences between several regressors. In particular the tests refer to direct comparisons of affiliated and unaffiliated analysts by initial recommendation, both before and after the Global Settlement, and also to comparisons between the two periods defined by the Global Settlement, by initial recommendation and type of analyst affiliation. The results support the view that banking ties seem to affect the behavior of analysts. Affiliated analysts downgrade slower from 'Buy'

(0.111 times), 'Overweight' (0.127), and 'Hold' (0.268) compared to unaffiliated analysts for the same firm. This result also holds for the within-analyst analysis, as affiliated analysts are slower to downgrade from 'Buy' (0.124), 'Overweight' (0.175), and 'Hold' (0.739) than their couterparts. With the Global Settlement affiliated analysts have become faster downgraders than unaffiliated analysts [from 'Buy' (1.779) and 'Overweight' (2.724) within-firm, and from 'Buy' (2.022) and 'Overweight' (2.192) within-analyst]. Compared to the pre-Global Settlement period, in the post-Global Settlement period unaffiliated analysts have started to downgrade slower regardless of the initial recommendations [from 'Buy' (0.111), 'Overweight' (0.135), and 'Hold' (0.427) within-firm, and from 'Buy' (0.144), 'Overweight' (0.238), and 'Hold' (0.666) within-analyst]. Affiliated analysts on the other hand have started to downgrade faster [from 'Buy' (1.786) and 'Overweight' (2.892) within-firm, and from 'Buy' (2.351) and 'Overweight' (2.977) within-analyst]. Consistent with the univariate analysis, the results show that affiliated analysts have not changed significantly their behaviour regarding downgrades from 'Hold' recommendations.

4.2.2 Analysis of Upgrades

Moving on to upgrades, the first part of Table 7 produces similar results to Table 6 in O'Brien et al. (2005). In this case, unaffiliated analysts are less likely to upgrade from 'Overweight' (0.288 times) and 'Hold' (0.508) than from the combined 'Underweight' and 'Sell' group (the baseline), conditional on arriving at time t without an upgrade. Again consistent with the conflicts of interest story, affiliated analysts appear to upgrade faster from 'Overweight' (1.424) and 'Hold' (2.204) than from the baseline for the same firm. As before, these results also hold to some extent for the within-analyst analysis, given that unaffiliated analysts are less likely to upgrade from 'Overweight' (0.339) and 'Hold' (0.519), and affiliated analysts are faster to upgrade from 'Hold' (1.740). As expected, the hazard of upgrading from a worse recommendation is larger than that from a better recommendation.

Place Table 7 Here

The Global Settlement in this case has caused unaffiliated analysts to speed up upgrades from 'Overweight' both within-firm (1.681) and within-analyst (1.997), with some weak evidence that affiliated analysts have started to upgrade slower from 'Hold' (0.633) for the within-analyst analysis only. These results again support H3 and emphasize the subsequently more cautious approach to recommendation changes post the Global Settlement.

Thus, in general the findings are in line with expectations, with affiliated analysts typically downgrading slower and upgrading faster compared to unaffiliated analysts relative to the baseline. The Global Settlement has produced the desired effects given that the gap between affiliated and unaffiliated analysts has been reduced, although not completely removed, as suggested by the univariate analysis.

Turning now to direct comparisons of the coefficients of the different regressors, the second part of Table 7 shows significance levels for tests on the coefficients and hazards of pairwise

differences between the variables. As before, the tests refer to direct comparisons of affiliated and unaffiliated analysts by initial recommendation, both before and after the Global Settlement, and also to comparisons between the two periods defined by the Global Settlement, by initial recommendation and type of analyst affiliation. The results lend support to the conflicts of interest story. Affiliated analysts upgrade faster from 'Overweight' (4.938 times) and 'Hold' (4.341) compared to unaffiliated analysts for the same firm. This result also holds for the within-analyst analysis, as affiliated analysts are faster to upgrade from Overweight' (3.536) and 'Hold' (3.353) than their couterparts. With the Global Settlement affiliated analysts have become slower upgraders than unaffiliated analysts but for the within-analyst analysis only [from 'Overweight' (0.442) and 'Hold' (0.698)]. Compared to the pre-Global Settlement period, in the post-Global Settlement period unaffiliated analysts have started to upgrade faster regardless of the initial recommendations [from 'Overweight' (5.830) and 'Hold' (2.056) within-firm, and from 'Overweight' (5.900), and 'Hold' (1.747) within-analyst]. Affiliated analysts on the other hand have started to upgrade slower from 'Hold' (0.353 within-firm and 0.363 within-analyst). These results are again consistent with the univariate analysis in what concerns upgrades from 'Overweight' and 'Hold' recommendations. Some considerable differences still subsist in the behavior of affiliated and unaffiliated analysts despite significant evidence that affiliated analysts have started to upgrade substantially slower from 'Hold' recommendations.

4.3 Robustness Checks

A central assumption in a Cox regression model is that of proportional hazards. One commonly used approach is the graphical method, where the data is plotted in a manner somewhat analogous to a univariate analysis in OLS, using the Kaplan-Meier (1958) method.

Let $S(t \mid \mathbf{X})$ denote the survival probability (of no upgrade or downgrade) at failure time t. Then the Kaplan-Meier curve is estimated as:

$$\widehat{S}(t \mid \mathbf{X}) = S_0\left(t\right)^{\exp(\mathbf{X}\boldsymbol{\beta}_x)}$$

Turning now to closer consideration of the regressions, the analysis is conditional on the level of the initial recommendation since the hazard probability of a downgrade is hypothesized to differ depending on the level of the initial recommendation and affiliation. Thus, conditioning on the covariates, it is possible to plot adjusted survival curves. Figure 3 shows downgrades from 'Buy,' 'Overweight,' and 'Hold,' and upgrades from 'Overweight' and 'Hold.' In line with the regression results, affiliated analysts are less likely to downgrade their recommendations from 'Buy,' 'Overweight,' and 'Hold' than unaffiliated analysts. Compared to unaffiliated analysts, affiliated analysts are however more likely to upgrade from 'Overweight' and 'Hold.'

If the proportional hazards assumption were to hold then the Kaplan-Meier curves stratified by affiliation should be magnifications and diminutions of each other, and in particular they should never cross. All graphs in Figure 3 seem to comply with these requirements, so the models have been adequately parameterized and a correct specification has been chosen for $\mathbf{X}\boldsymbol{\beta}_x$.

Place Figure 3 Here

5 Conclusion

Prior studies of analysts bias typically using US data have employed a restricted definition of affiliation, related typically to the one-off event of an IPO or to the also infrequent event of an SEO. Using UK data this paper considers the continuous affiliation that arises with an ongoing corporate broking relationship. An advantage of the survival analysis based research design adopted here is that it helps resolve the ambiguous causality in prior tests that focus on analysts' relative optimism at a single point in time. Using a Cox Proportional Hazards duration model the paper tests whether there is evidence to support the hypothesis that affiliated sell side analysts are partial. Furthermore, exploiting the repeated events nature of the research design setting allows the paper to critically analyze whether the afore mentionned relationship has shifted after a major regulatory initiative (the Global Settlement) which was explicitly designed to enforce clearer standards of impartiality.

With respect to the first set of tests, similar to earlier research the results show that affiliated analysts are typically more optimistic and tend to concentrate their changes of recommendations in the most common recommendations range, 'Buy' and 'Overweight.' Furthermore, their recommendations appear to be biased given that they are significantly slower to downgrade and faster to upgrade compared to unaffiliated analysts. These results are robust both in an univariate and multivariate setting. With respect to relative bias pre and post the regulatory change commonly referred to as the "Global Settlement," this study finds that in the UK the differential in frequency and speed of upgrading/downgrading for affiliated analysts versus unaffiliated analysts has substantially reduced resulting in a much smaller gap between the recommendation behavior of affiliated and unaffiliated analysts.

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7 APPENDIX - Principal Duties of a UK Corporate Broker and Independence Conditions Including Chinese Wall Requirements

The following is an extract from Chapters 2 and 4 of the UKLA Sourcebook (May 2004). The corporate broker is formally described as the sponsor.

Services to be provided by a sponsor - Nature of services:

2.9 A sponsor must:

(a) in the case of any application for listing which requires the production of listing particulars, satisfy itself, to the best of its knowledge and belief, having made due and careful enquiry of the issuer and its advisers, that the issuer has satisfied all applicable conditions for listing and other relevant requirements of the listing rules;

(b) for each transaction in respect of which it acts as sponsor in accordance with the listing rules, submit to the UK Listing Authority at an early stage (and, in any event, no later than the date on which any documents in connection with the transaction are first submitted to the UK Listing Authority for approval) a confirmation of independence in the form set out in schedule 1A;

(c) provide to the UK Listing Authority any information or explanation known to it in such form and within such time limit as the UK Listing Authority may reasonably require for the purpose of verifying whether listing rules are being and have been complied with by it or by an issuer;

(d) take all reasonable steps to ensure that a confirmation or declaration required to be provided to the UK Listing Authority by a sponsor under the listing rules is correct and complete in all material respects; and

(e) advise the UK Listing Authority in writing without delay of its resignation or dismissal, giving details of any relevant facts or circumstances.

4.14 Independence - General

4.14.1 Under listing rule 2.11 a sponsor must not provide sponsor services to an issuer from which it is not independent. This means that a sponsor must be independent whenever it provides sponsor services to an issuer i.e. not only when it has been appointed by an issuer in relation to a specific transaction.

4.14.2 If a sponsor is not independent of an issuer to whom it provides sponsor services it will be in breach of the listing rules and will be subject to the disciplinary procedures set out in Chapter 8.

4.14.3 When the UKLA is not satisfied that a sponsor is independent, it will not accept documents produced by that sponsor in support of an application for listing or a request for approval of any document required under the listing rules.

4.14.4 The UKLA, when assessing independence, will expect a sponsor to consider a broad range of factors that might impact on its ability to act independently of an issuer for which it provides sponsor services. These factors are considered below, but sponsors should note that this manual is guidance only and is not exhaustive. In cases of doubt sponsors are encouraged

to consult the UKLA at an early stage.

4.14.5 A sponsor may not be regarded as independent of an issuer by the UKLA (subject to paragraph 4.14.6 below) if it or another company in the sponsor's group, is interested in 3 per cent or more of the share, debt or loan capital of an issuer or any other company in an issuer's group.

4.14.6 The UKLA may agree that a sponsor or another company in the sponsor's group is independent even if it is interested in 3 per cent or more of the share, debt or loan capital of an issuer or any other company in an issuer's group, provided that it is demonstrated to the UKLA's satisfaction that no conflict of interest will arise and that there are no other matters that may affect the sponsor's independence. For example, the UKLA may be satisfied that no conflict of interest arises where some or all of the sponsor's interest results from a holding in a business area that is separated by a "Chinese wall" from the business area of the sponsor providing sponsor services to the relevant issuer.

4.14.7 Other matters that the UKLA considers may affect a sponsor's independence include: (1) business relationships with an issuer that could give the sponsor or another company in the sponsor's group a material interest in the success of a transaction (subject to paragraph 4.14.8 below); and (2) financial interests in an issuer including fee arrangements, loans to the issuer and security over the assets of the issuer by the sponsor or another company in the sponsor's group that could give the sponsor or another company in the sponsor's group a material interest in the success of a transaction.

4.14.8 A normal business relationship between the issuer and the sponsor or another part of the sponsor's group such as that of banker, reporting accountant or auditor will not usually affect the independence of a sponsor provided that there is an adequate segregation of roles. Confirmation from the sponsor's compliance department that there are "Chinese walls" between the business areas of the sponsor involved in providing sponsor services to the issuer and the other business areas of the sponsor will be sufficient for the UKLA to agree that there is adequate segregation of roles. However, relationships that would give the sponsor's group a material interest in the success of a transaction, may result in the sponsor not being independent.

4.14.9 Paragraph 4.14.5 does not apply to investment entities where the sponsor's interest arises by virtue of the holdings of its discretionary clients.

4.14.10 A sponsor or sponsor employee will be taken by the UKLA to be interested in a class of share, debt or loan capital of a company if such person (or someone connected with them within the meaning of the section 203 of the Companies Act 1985) has an interest in accordance with the provisions of section 208 of the Companies Act 1985.

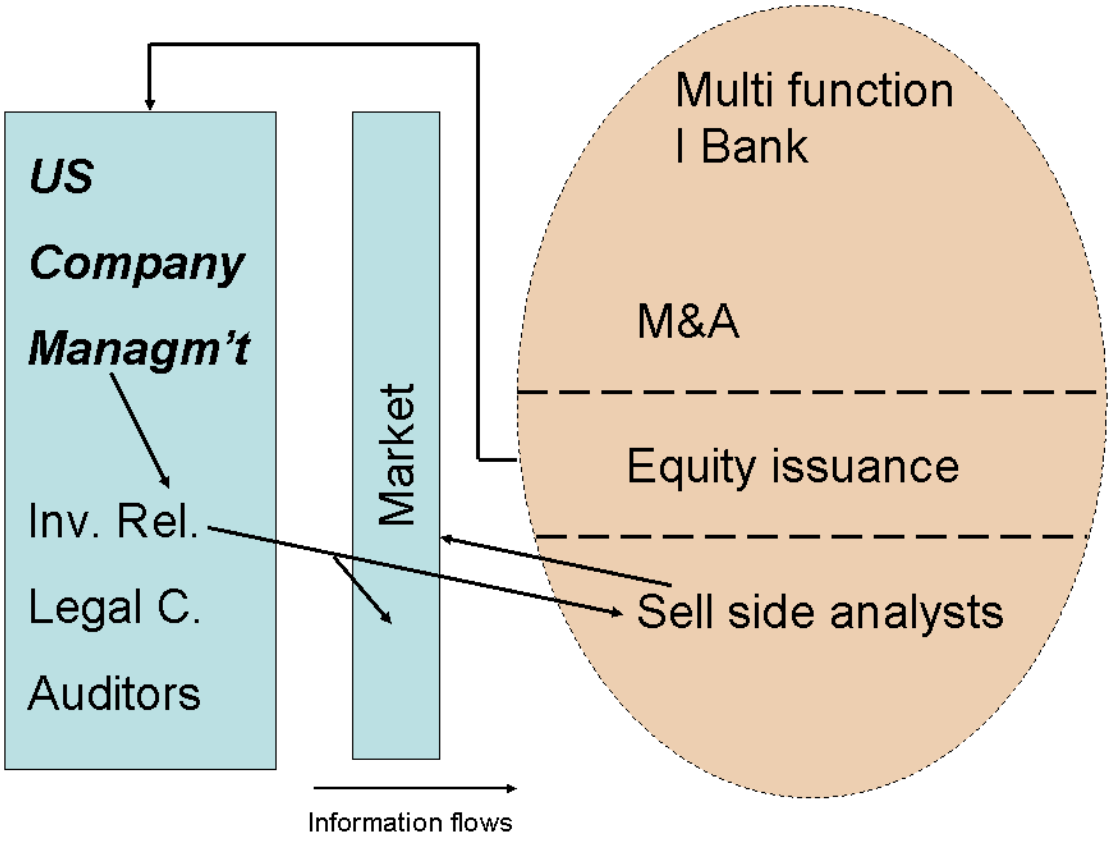

Figure 1: US Institutional Setting

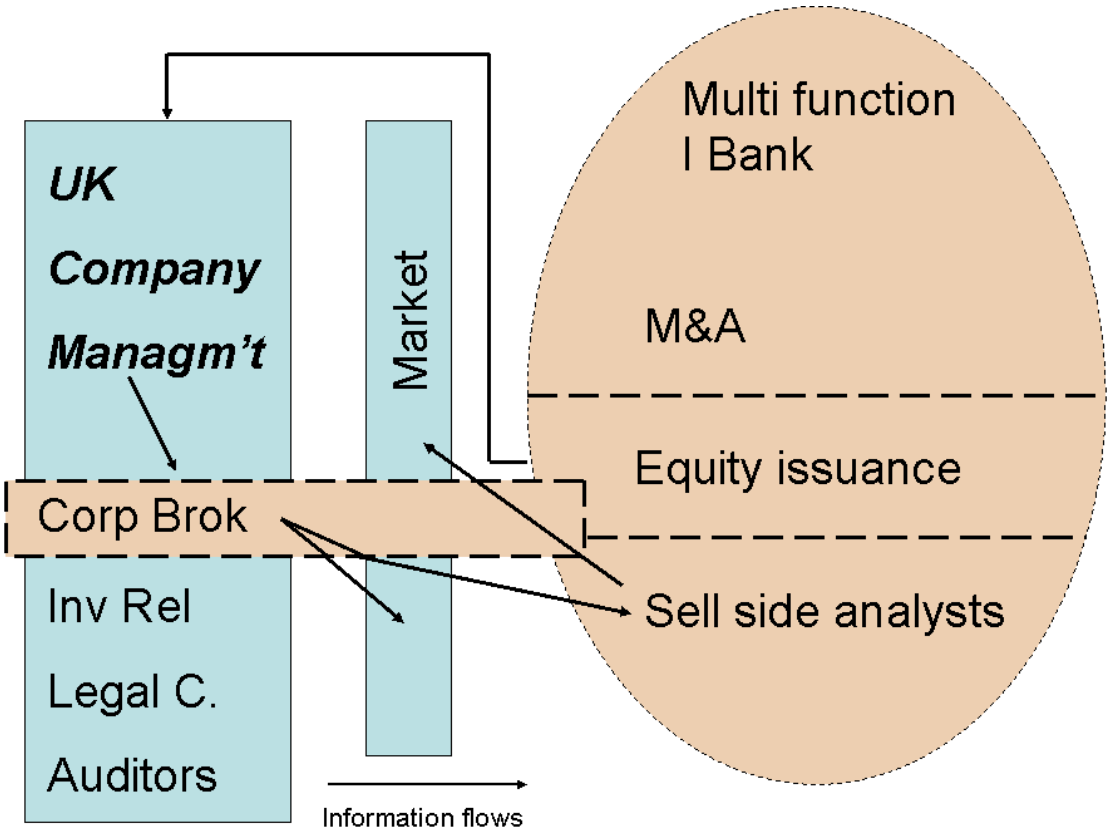

Figure 2: UK Institutional Setting

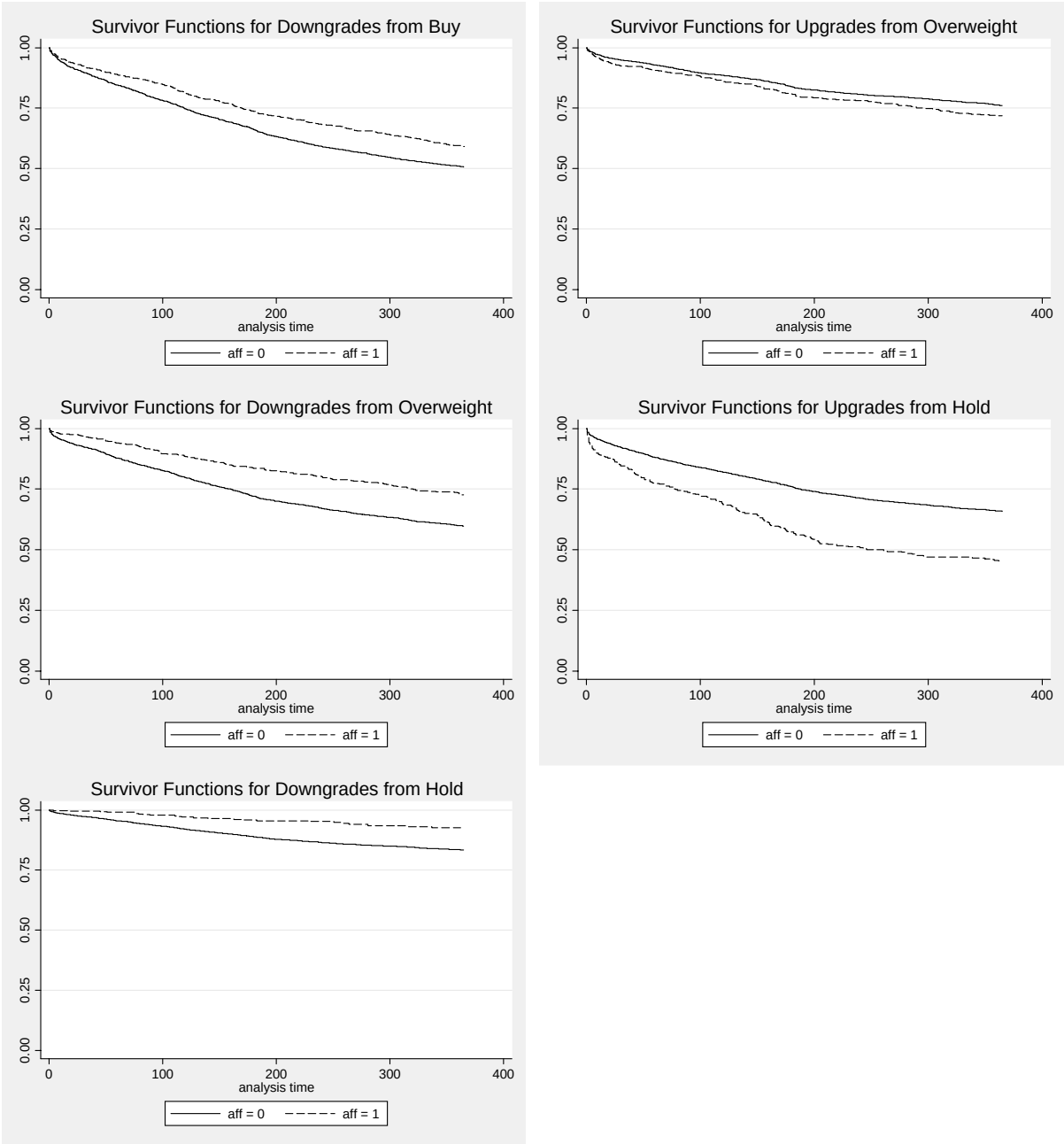

Figure 3: Survivor Functions for Downgrades and Upgrades

Table 1:
Annual Recommendations

Year of Announcement	1997	1998	1999	2000	2001	2002	2003	2004	Total
Total Firms in JCF	425	655	957	969	955	905	866	819	1,319
No. Firms Covered in JCF	395	594	712	697	683	640	646	595	1,040
Coverage %	93%	91%	74%	72%	72%	71%	75%	73%	79%
No. Analysts Issuing Recom.	57	86	102	105	104	98	110	104	202
No. Recommendations	2,350	3,195	3,530	3,879	3,651	3,824	4,593	3,858	28,880
No. Recom. by Aff. Analysts	88	172	256	362	304	342	282	198	2,004
Affiliation %	4%	6%	8%	10%	9%	10%	7%	5%	7%
No. Analysts per Firm (mean)	6	5	5	6	5	6	7	6	28
No. Firms per Analyst (mean)	41	37	35	37	35	39	42	37	143

Table 2:
Descriptive Statistics for Initial Recommendations by Affiliation of Analyst and Period

	Aff		Unaff	Total
Total				
No. Recommendations	2,004		26,876	28,880
Mean	1.41	***	1.75	1.73
Median	1.50	***	2.00	2.00
Standard Deviation	0.42	***	0.58	0.58
Minimum	1.00		1.00	1.00
Maximum	3.00		3.00	3.00
Before Global Settlement (BGS)				
No. Recommendations	1,182		15,423	16,605
Mean	1.34	***	1.71	1.69
Median	1.50	***	2.00	1.50
Standard Deviation	0.38	***	0.58	0.58
Minimum	1.00		1.00	1.00
Maximum	3.00		3.00	3.00
After Global Settlement (AGS)				
No. Recommendations	822		11,453	12,275
Mean	1.50	***	1.80	1.78
Median	1.50	***	2.00	2.00
Standard Deviation	0.46	***	0.58	0.57
Minimum	1.00		1.00	1.00
Maximum	3.00		3.00	3.00
Test means BGS-AGS	***		***	***
Test medians BGS-AGS	***			***
Test stand. dev. BGS-AGS	***		***	

Note: *** means significant at the 1% level, and refers to tests on the equality of means, medians, and standard deviations of initial recommendations for 1) affiliated analysts versus unaffiliated analysts; 2) analysts BGS versus analysts AGS by category of analyst and for all analysts.

Table 3:
Distribution of Initial Recommendations by Affiliation of Analyst and Period

	Buy			Overweight			Hold		
	Aff		Unaff	Aff		Unaff	Aff		Unaff
Total									
Recommendations	871		6,606	679		6,280	422		10,020
	43%	***	25%	34%	***	23%	21%	***	37%
Before Glob. Settl (BGS).									
Recommendations	576		4,302	415		3,347	185		5,879
	49%	***	28%	35%	***	22%	16%	***	38%
After Glob. Settl. (AGS)									
Recommendations	295		2,304	264		2,933	237		4,141
	36%	***	20%	32%	***	26%	29%	***	36%
Test proport. BGS-AGS	***		***			***	***		***

	Underweight			Sell			Total		
	Aff		Unaff	Aff		Unaff	Aff		Unaff
Total									
Recommendations	16		1,881	16		2,089	2,004		26,876
	1%	***	7%	1%	***	8%	100%		100%
Before Glob. Settl. (BGS)									
Recommendations	4		725	2		1,170	1,182		15,423
	0%	***	5%	0%	***	8%	100%		100%
After Glob. Settl. (AGS)									
Recommendations	12		1,156	14		919	822		11,453
	1%	***	10%	2%	***	8%	100%		100%
Test proport. BGS-AGS	**		***	***					

Note: *** and ** mean significant at the 1% and 5% level, respectively, and refer to tests on the equality of the proportions of initial recommendations by category of recommendation for 1) affiliated analysts versus unaffiliated analysts; 2) analysts BGS versus analysts AGS by category of analyst.

Table 4:
Frequency of Downgrades by Initial Recommendation by Affiliation of Analyst and Period

	Buy			Overweight			Hold			Underweight		
	Aff		Unaff	Aff		Unaff	Aff		Unaff	Aff		Unaff
Total	871		6,606	679		6,280	422		10,020	16		1,881
Downgrades	386		3,376	163		2,140	25		1,455	2		214
Down % Total	44%	***	51%	24%	***	34%	6%	***	15%	13%		11%
Bef. Glob Settl. (BGS)	576		4,302	415		3,347	185		5,879	4		725
Downgrades	235		2,098	82		1,160	9		741	0		68
Down % Total	41%	***	49%	20%	***	35%	5%	**	13%	0%	-	9%
Aft. Glob. Settl. (AGS)	295		2,304	264		2,933	237		4,141	12		1,156
Downgrades	151		1,278	81		980	16		714	2		146
Down % Total	51%		55%	31%		33%	7%	***	17%	17%		13%
Test proport. BGS-AGS	***		***	***					***	-		**

Note: *** and ** mean significant at the 1% and 5% level, respectively, and refer to tests on the equality of the proportions of downgrades by category of initial recommendation for 1) affiliated analysts versus unaffiliated analysts; 2) analysts BGS versus analysts AGS by category of analyst.

Table 5:
Frequency of Upgrades by Initial Recommendation by Affiliation of Analyst and Period

	Overweight			Hold			Underweight			Sell		
	Aff		Unaff	Aff		Unaff	Aff	Unaff	Aff		Unaff
Total	679		6,280	422		10,020	16	1,881	16		2,089
Upgrades	183		1,411	197		3,125	7	859	13		1,124
Up % Total	27%	***	22%	47%	***	31%	44%	46%	81%	**	54%
Before Glob Settl. (BGS)	415		3,347	185		5,879	4	725	2		1,170
Upgrades	98		614	101		1,878	2	380	2		636
Up % Total	24%	***	18%	55%	***	32%	50%	52%	100%	-	54%
After Glob. Settl. (AGS)	264		2,933	237		4,141	12	1,156	14		919
Upgrades	85		797	96		1,247	5	479	11		488
Up % Total	32%	*	27%	41%	***	30%	42%	41%	79%		53%
Test proport. BGS-AGS	***		***	***		**		***	-		

Note: ***, ** and * mean significant at the 1%, 5%, and 10% level, respectively, and refer to tests on the equality of the proportions of upgrades by category of initial recommendation for 1) affiliated analysts versus unaffiliated analysts; 2) analysts BGS versus analysts AGS by category of analyst.

Table 6:
Cox Regressions of Duration from Preliminary Announcement Date to Downgrade

	Within Firm			Within Analyst		
	Coefficient	p-value	Hazard	Coefficient	p-value	Hazard
Buy	1.911	0.000	6.763	1.649	0.000	5.200
Overweight	1.544	0.000	4.685	1.151	0.000	3.162
Hold	0.520	0.000	1.681	0.184	0.321	1.202
Affil×Buy	-0.290	0.001	0.748	-0.440	0.001	0.644
Affil×Overweight	-0.519	0.000	0.595	-0.591	0.000	0.554
Affil×Hold	-0.797	0.010	0.451	-1.118	0.000	0.327
Buy×Glob. Settl.	-0.286	0.102	0.752	-0.289	0.040	0.749
Overweight×Glob. Settl.	-0.459	0.009	0.632	-0.285	0.016	0.752
Hold×Glob. Settl.	-0.330	0.065	0.719	-0.222	0.063	0.801
Affil×Buy×Glob. Settl.	0.290	0.035	1.337	0.415	0.000	1.514
Affil×Overweight×Glob. Settl.	0.543	0.025	1.720	0.500	0.020	1.649
Affil×Hold×Glob. Settl.	-0.329	0.452	0.719	0.027	0.954	1.027
Subjects	26,775			26,775		
Downgrades	7,761			7,761		
Log-Likelihood	-12,826.014	0.000		-32,350.809	0.000	

Tests on Equality of	Within Firm			Within Analyst		
Coefficients/Hazards	Coefficient	p-value	Hazard	Coefficient	p-value	Hazard
Buy (Aff−Unaff)	-2.201	0.000	0.111	-2.089	0.000	0.124
Overweight (Aff−Unaff)	-2.063	0.000	0.127	-1.742	0.000	0.175
Hold (Aff−Unaff)	-1.317	0.000	0.268	-0.302	0.000	0.739
Buy×Glob. Settl. (Aff−Unaff)	0.576	0.009	1.779	0.704	0.000	2.022
Overw.×Glob. Settl. (Aff−Unaff)	1.002	0.001	2.724	0.785	0.011	2.192
Hold×Glob. Settl. (Aff−Unaff)	0.001	0.999	1.001	0.249	0.603	1.283
Buy (Post GS−Pre GS)	-2.197	0.000	0.111	-1.938	0.000	0.144
Overw. (Post GS−Pre GS)	-2.003	0.000	0.135	-1.436	0.000	0.238
Hold (Post GS−Pre GS)	-0.850	0.004	0.427	-0.406	0.078	0.666
Aff×Buy (Post GS−Pre GS)	0.580	0.003	1.786	0.855	0.000	2.351
Aff×Overw. (Post GS−Pre GS)	1.062	0.001	2.892	1.091	0.000	2.977
Aff×Hold (Post GS−Pre GS)	0.468	0.497	1.597	1.145	0.110	3.142

Table 7:
Cox Regressions of Duration from Preliminary Announcement Date to Upgrade

	Within Firm			Within Analyst		
	Coefficient	p-value	Hazard	Coefficient	p-value	Hazard
Overweight	-1.244	0.000	0.288	-1.083	0.000	0.339
Hold	-0.678	0.000	0.508	-0.656	0.000	0.519
Affil×Overweight	0.353	0.002	1.424	0.180	0.136	1.197
Affil×Hold	0.790	0.000	2.204	0.554	0.000	1.740
Overweight×Glob. Settl.	0.519	0.000	1.681	0.692	0.001	1.997
Hold×Glob. Settl.	0.043	0.552	1.044	-0.098	0.237	0.907
Affil×Overweight×Glob. Settl.	0.198	0.389	1.219	-0.124	0.545	0.884
Affil×Hold×Glob. Settl.	-0.250	0.179	0.779	-0.458	0.008	0.633
Subjects	21,403			21,403		
Upgrades	6,919			6,919		
Log-Likelihood	-11,020.828	0.000		-27.808.712	0.000	

Tests on Equality of	Within Firm			Within Analyst		
Coefficients/Hazards	Coefficient	p-value	Hazard	Coefficient	p-value	Hazard
Overweight (Aff−Unaff)	1.597	0.000	4.938	1.263	0.000	3.536
Hold (Aff−Unaff)	1.468	0.000	4.341	1.210	0.000	3.353
Overw.×Glob. Settl. (Aff−Unaff)	-0.321	0.223	0.725	-0.816	0.008	0.442
Hold×Glob. Settl. (Aff−Unaff)	-0.293	0.174	0.746	-0.360	0.029	0.698
Overw. (Post GS−Pre GS)	1.763	0.000	5.830	1.775	0.000	5.900
Hold (Post GS−Pre GS)	0.721	0.000	2.056	0.558	0.000	1.747
Aff×Overw. (Post GS−Pre GS)	-0.155	0.600	0.856	-0.304	0.296	0.738
Aff×Hold (Post GS−Pre GS)	-1.040	0.000	0.353	-1.012	0.000	0.363