AAR
AUSTRALIAN ACCOUNTING REVIEW
CPA AUSTRALIA

The Real Effects of Analyst Research Quality: Evidence from the Adoption of the Broker Protocol

Petya Platikanova, *ESADE-University Ramon Llull*

I provide empirical evidence that labour market frictions have an adverse effect on the quality of analyst research. Using the staggered, voluntary adoption of the Protocol for Broker Recruiting (Protocol) since 2004, I show that, without non-compete agreements, financial analysts produce more accurate forecasts and exert greater efforts in updating their research more frequently. Consistent with the notion that information asymmetry in the capital market are lower in the post-Protocol period, I provide empirical evidence and argue that the research coverage by Protocol members enables managers to access capital and extend their investment opportunities. My findings suggest that analyst coverage by Protocol members has a favourable effect on investment in innovative projects, production capacity and acquisitions.

> By abandoning the Protocol, firms are selling their investors short.
> (Sedoric and Snyder 2019[1])

In 2019, the number of Securities and Exchange Commission (SEC)-registered investment advisors was at a record high of 12 993, up 3.3% since 2018, with these firms serving more than 43 million clients and overseeing $83.7 trillion in assets, or close to 96% of the global gross domestic product (GDP) (NRS 2019). Along with the growth of the advisory business over the past decade, the demand for discretionary investment, where financial advisors are not scrutinised over their investment choices, has also increased. In recent years, many investors have shown more trust in their advisors, allowing them to manage up to 86% of their assets with complete discretion on how to invest without needing client approval for trades (Fox 2019). Fiduciary duties require advisors and brokers to manage client wealth by acting in clients' 'best interest'. However, the scandals in the financial industry in the past decade confirm that the conflicts of interest leading to abusive practices are so severe that they understandably raise concerns regarding to what extent the high level of client trust is deserved.

To improve financial stability by strengthening the reputation of financial institutions, over recent decades several significant legislative reforms in the area of capital market regulation have been introduced with the main objective of mitigating conflicts of interest in the financial sector and improving the quality of the financial services offered to both institutional and retail clients. A conflict of interest, for example, arises when financial institutions benefit by generating higher revenues or strengthening their market position from putting pressure on financial analysts to issue biased research reports. Although the impact of capital market regulation on sell-side analyst research has been extensively documented, we have limited knowledge on the effect of voluntary, self-regulation initiatives in the financial industry as a market-based mechanism in mitigating conflicts of interest in financial institutions. If those initiatives can make capital markets more efficient by promoting high-quality information production in the financial industry, the costs of designing and enforcing financial regulation can be considerably reduced.

In this paper, I study whether the quality of sell-side research, along with its associated effect on corporate decisions, is determined by a voluntary, industry-wide initiative to regulate labour conditions in the advisory business, the Protocol for Broker Recruiting (Protocol). Prior research suggests that career incentives in the labour market can significantly reduce pressure from financial institutions on financial analysts to produce biased research (e.g., Hong and Kubik 2003). Consistent with this research, I argue that a more competitive labour market in the financial industry is likely to affect the role of analyst reputation and, by extension, the cost of issuing biased research. Empirical evidence further suggests that analyst coverage reduces agency costs (e.g., Chen et al. 2015), improves financial reporting quality

Accepted for publication 06 feb 2023.

Correspondence
Petya Platikanova, ESADE-University Ramon Llull, Barcelona, Spain. email: petya.platikanova@esade.edu

Accepted for publication 6 February 2023.

(e.g., Irani and Oesch 2013) and causes changes in corporate policies (e.g., Derrien and Kecskés 2013). I extend this argument and expect to find that high-quality equity research in the post-Protocol period reduces information asymmetry in capital markets. As a result, covered stocks will have a lower cost of capital and the profitability, and thus the optimal amount of investment will increase.

UBS Financial Services, Citigroup Global Markets and Merrill Lynch originally signed the Protocol in 2004. In 2020, the Protocol had more than 1600 investment advisor and dealer-broker signatories.[2] Prior to the Protocol, labour market frictions, including noncompete agreements, significantly impeded labour mobility, thus weakening the role of analyst reputation in reducing the impact of conflicts of interest. The Protocol established a set of rules for the departure of advisors, allowing a financial advisor and their teams to take client lists and contact information to their new employer without fear of legal action. As a result, in the presence of a more competitive labour market in the post-Protocol period, the costs of issuing biased research are likely to increase significantly by making individual reputation and labour market rewards relatively more important in comparison to short-term gains from satisfying institutional demands. Because analyst reputation strengthens with the production of unbiased and accurate research outputs (Jackson 2005), financial advisors and analysis should be more willing to ignore pressures from their employers to provide biased advice for the benefit of generating profitable business when labour competition increases the role of their reputation. I predict that the improved quality of equity research issued by Protocol members will reduce information asymmetry, thus facilitating access to external financing and enabling managers to undertake investment projects to explore new market opportunities.

To estimate the role of personal reputation on more competitive labour markets in the advisory industry following the adoption of the Protocol, I combine data on personal traits of financial advisors, including equity analysts, from the regulator (the Financial Industry Regulatory Authority (FINRA)) with analysts' research (i.e., individual and consensus earnings forecasts) over the period 2000–2019. Because there is a significant time variation in the adoption of the Protocol (i.e., staggered adoption), the Protocol presents promising empirical settings to identify the effect of enhanced labour mobility in the post-Protocol period on sell-side research quality. The findings suggest that, arguably due to the increased role of analyst reputation, financial institutions produce more precise forecasts following Protocol adoption. I present empirical results consistent with the notion that research quality reduces information asymmetry in capital markets with a favourable effect on access to external financing and investment opportunities. The findings also suggest that firms with Protocol coverage are able to attract capital, engage in innovative projects, extend production capacity and grow through acquisitions.

The contribution of this paper is twofold. First, it contributes to the literature on the real effects of a variety of regulatory changes (e.g., Alesina et al. 2005, with a focus on regulation and investment) and private arrangements with capital market implications (e.g., Sufi 2009, with a focus on the introduction of credit ratings on syndicated loans). Moreover, it provides evidence that a voluntary initiative to regulate labour market frictions in the advisory business has a favourable effect on the availability of external financing and corporate investment. The findings complement existing research on the economic consequences of the adoption of the Protocol. Gurun et al. (2021) propose that the costs of 'unlocking' clients may not outweigh the benefits. Coleman et al. (2021) suggest that the brokerage division is less likely to exert pressure on the equity research division to produce optimistic research following Protocol entry and find that the optimistic bias of analyst forecasts is lower for brokers who are Protocol members. The paper complements previous research on the Protocol and shows that, apart from the improved quality of information produced by the advisory industry, the Protocol affects real corporate decisions. Second, the paper contributes to the literature on the efficiency of market-based mechanisms in reducing conflicts of interest in the financial industry by strengthening the role of analyst career concerns in the presence of more competitive labour market conditions. The results suggest that analyst reputation concerns and career advances have a real effect on capital allocation decisions and corporate growth prospects.

Past Literature and Hypothesis Development

Career incentives and equity research quality

The behaviour of sell-side analysts has been examined extensively over recent decades. To facilitate information processing and thus guarantee efficient resource allocation in capital markets, financial analysts need to provide unbiased research. For this reason, empirical research has focused on how competing demand and conflicting incentives at both the individual and institutional levels interact in the process of information collection and dissemination (see Mehran and Stulz 2007 for a discussion). Although analysts appear to channel private information on capital markets (Dimson and Marsh 1984; Womack 1996) and effectively process public information (e.g., Antônio et al. 2019; Saastamoinen et al. 2018), they also seem to produce biased research

due to institutional incentives (Lin and McNichols 1998; Michaely and Womack 1999), management relations (Das et al. 1998; Francis and Philbrick 1993; Lim 2001) and trade generation (Irvine 2004; Jackson 2005).

Prior studies examine several factors that can arguably mitigate conflicts of interest in financial institutions. If consumers of financial services are naïve in not demanding a price discount on tainted advice (Malmendier and Shanthikumar 2007) and financial institutions do not effectively coordinate their efforts to reduce the adverse effect of conflicts of interest (Stein 1989), there could be a role for law and regulation. A large number of studies have examined the economic consequences of regulatory solutions on conflicts of interest in financial institutions, including the Regulation Fair Disclosure (2000), the New York Stock Exchange (NYSE)- and the National Association of Securities Dealers (NASD)-approved rules (2002), the Global Settlement (2003) and other regulatory actions. Empirical evidence is not conclusive to what extent legal and regulatory attempts to affect the impact of conflicts of interest made customers of financial institutions better off by receiving unbiased advice. In the post-Regulation Fair Disclosure period, financial analysts appear to follow fewer firms (Mohanram and Sunder 2006), become less precise (Agrawal et al. 2006; Gintschel and Markov 2004), disagree more often (Bailey et al. 2003; Mohanram and Sunder 2006) and produce less informative research (Cornett et al. 2005; Gintschel and Markov 2004). In the post-Global Settlement period, financial analysts do not appear to be less optimistic (Boni 2006; Kadan et al. 2008) and proprietary trading incentives do not appear to be weaker (Charitou and Karamanou 2020) but sanctioned banks improve the quality of their service compared to non-sanctioned banks (Barber et al. 2007; Corwin et al. 2017).

As an alternative to regulation, prior research suggests that reputation, both at the institutional and individual level, is a disciplinary mechanism that can mitigate conflicts of interest in the financial industry. At the institutional level, financial institutions may have incentives to control conflicts of interest, build a reputation that such conflicts do not affect the quality of the service provided to their customers, and sell their services at a premium. When such a reputation allows financial institutions to build a more loyal customer base and thus guarantee a stable revenue flow, they will be willing to invest efforts and resources to protect it (Mehran and Stulz 2007). However, it is also plausible that a bank decides to sacrifice reputation capital to protect a rent stream associated with a strong relationship (Ljungqvist et al. 2006). Therefore, the relationship between a corporate client and the bank as an underwriter of equity or debt issuances may have an adverse effect on the quality of equity research. Although empirical studies suggest that reputation capital is likely to mitigate conflicts of interest (e.g., Altınkılıç et al. 2019), recent research on financial institutions shows that financial misconduct in advisory businesses is pervasive (Egan et al. 2019), contagious (Dimmock et al. 2018) and harmful for investors (Law and Mills 2019). Furthermore, empirical evidence shows that precisely large financial institutions, with high reputation capital, are unable to control the spread of financial fraud. Moreover, they also appear to 'specialise' in the market for financial misconduct by catering to unsophisticated investors (Egan et al. 2019).

Even when financial institutions do not find it beneficial to protect their reputation with objective research production, financial analysts may have strong private incentives to avoid institutional pressure to bias their reports. Because reputation is likely to matter most when analysts make a career move, empirical findings on the role of reputation capital as a mitigating force for conflicts of interest have often been examined in the context of career advancements (Hong and Kubik 2003; Ke and Yu 2006; Groysberg et al. 2011; Lourie 2019). Other empirical studies indirectly examine the role of analyst reputation on the quality of equity research. For example, Ljungqvist et al. (2007) show that analysts appear to resist investment banking and brokerage pressure for stocks that are highly visible to institutional investors. In a recent study, Harford et al. (2019) show that analysts strategically allocate efforts across to firms that are more relevant for their career advancement.

I examine career moves that the Protocol appears to trigger at an accelerated rate and argue that, *at the individual level*, the Protocol strengthens analyst incentives to develop a reputation for providing good advice, thus improving the possibility of favourable career advances.[3] I expect that the Protocol is likely to enhance the role of analyst reputation and thereby improve the quality of research produced by financial institutions, thus improving the functioning of capital markets. The Protocol has effectively transferred ownership rights over the lifeblood of a successful advisory business, client relationships as an intangible asset, to individual advisors who personally build and nurture them over decades.[4] Consistent with the prediction, Clifford and Gerken (2021) find that advisors who are employed by Protocol firms take better care of their clients, as evidenced by their lower rates of customer disputes.

I also expect the enhanced mobility of financial advisors in the post-Protocol period to trigger changes *at the institutional level*. Departing advisors often name rampant bureaucracy, little flexibility and unfavourable compensation revisions as primary reasons for leaving their firm. For instance, advisor departures from Wells Fargo increased in late 2016 following revelations that the consumer banking side of the company had engaged in questionable sales practices, including the opening of millions of accounts without client approval. In 2018, a $1 billion nine-member team from Wells Fargo

picked up Raymond James arguably for its culture and as a place to grow their expanding practice. Regional dealer-brokers often present themselves to recruited advisors as an antidote to the bureaucracy of large institutions and to eschew the wirehouse push for cross-selling, the practice of having brokers sell high-margin banking products to clients, a corporate initiative that many wirehouse advisers strongly dislike (Kell 2018). I argue that the Protocol may effectively spark a radical change in the large-firm culture where biased research is implicitly or explicitly promoted, resulting in high-quality research output.

Conflicts of interest in the financial industry have been addressed through regulatory solutions, including rules and penalties, in order to limit certain trading practices and guide the development of financial institutions. For example, the Global Settlement of 2003 attempted to improve the integrity of analyst research by requiring the separation of research and investment banking departments, preventing the exchange of information between the two. In addition to penalties, financial institutions that participated in the settlement also agreed to pay $80 million over five years to support independent research. This mandate obliged banks to fund independent research organisations, ensuring that retail investors have access to diverse research sources.

Empirical studies are inconclusive regarding the impact of the Global Settlement on equity research quality. Several papers suggest that financial analysts have not become less optimistic following the Global Settlement (Boni 2005; Kadan et al. 2008), the overall level of research quality has decreased in the post-Settlement period following a brain drain on sell-side equity research (Guan et al. 2019), and proprietary trading incentives in relation to stock recommendation for low-visibility stocks have not weakened in the post-Settlement period (Charitou and Karamanou 2020). Other studies, however, show that the Global Settlement effectively increased the costs of issuing biased coverage because sanctioned banks produce high-quality research compared to non-sanctioned banks in the post-Settlement period (Barber et al. 2007; Corwin et al. 2017). The requirement to fund independent research further has resulted in higher research costs (e.g., Skiles et al. 2003) and heightened awareness of the economic implications of biased research in the financial industry.

I argue that regulatory enforcement and associated costs is likely to affect the role of analyst reputation (i.e., *the individual level*) and drive institutional changes (i.e., the *institutional level*). The Protocol, a self-regulation industry agreement, was adopted in the post-Global Settlement period when financial institutions face stricter regulatory oversight and higher enforcement costs. I expect the Global Settlement, which brought attention to conflicts of interest in the financial sector for investors, to amplify the effect of Protocol adoption on research quality. My prediction is that, in the post-Settlement period, financial analysts will prioritise their individual reputation and career prospects while financial institutions will incentivise high-quality research to avoid penalties and negative publicity, leading to an improvement in the quality of equity research.

H1: The quality of sell-side equity research is higher in the post-Protocol period.

Although the Protocol triggered significant developments in the investment advisory industry, it is not obvious that the Protocol can mitigate conflicts of interest and, by extension, improve the information properties of analyst research. There are several arguments to support the view that the Protocol is unlikely to affect the role of analyst reputation in career advancements and institutional culture. First, Protocol protections only apply if both the delivering and receiving firms are current participants. In addition, even if both firms are Protocol members, other restrictions may apply. For example, if the broker is subject to a restrictive covenant by contract, the terms of that agreement may override the Protocol, thus limiting the ability to solicit clients. With or without the Protocol, advisors working in teams find it more difficult to move because senior partners are less reluctant to leave and control the team's revenues and salaries.[5] Second, it is plausible that following breakaways, compensation deals paid to recruited advisors may create incentives for the advisor to recommend unsuitable transactions to their customers to meet any production thresholds associated with those deals, both at inception and throughout the life of their contract.[6] Third, advisory firms can decide to exit the Protocol, similar to UBS and Morgan Stanley in 2017. If individual advisors anticipate a strategic exit of their current employers from the Protocol in the near future, they may not respond to their entrance into the arrangement by improving the quality of their service in the first place. Moreover, advisors may find Protocol protection weak when Protocol firms come up with innovative initiatives to circumvent the Protocol without actually getting out of it.[7]

Corporate decisions, analyst coverage and equity research quality

Financial analysts not only direct investor attention but also reduce information asymmetry between insiders (managers) and outsiders (creditors and investors) by gathering and processing information from diverse sources. Increased attention has been devoted in the past decade to the question of how analyst coverage decisions and research quality influence corporate investment, financial policy and stock valuation.

A large number of empirical papers focus on the relation between analyst coverage, investment selection and financial policy. For example, Chang et al. (2006) find that firms covered by fewer analysts are less likely to issue equity as opposed to debt. Moreover, when they issue equity, it is less frequent, in larger amounts and a function of favourable market conditions. Their findings are consistent with the argument that firms followed by fewer analysts suffer from more information asymmetry and therefore are more likely to be misvalued. Because they are undervalued and unable to issue equity, they are forced to seek for their project alternative sources of financing, such as debt. Using broker closures and mergers, Derrien and Kecskés (2013) examine the causal effects of analyst coverage on corporate investment and financing policies. Their findings show that the decrease in analyst coverage causes firms to significantly reduce total investment, including in capital expenditure, research and development (R&D), and acquisitions. Additionally, firms that lose an analyst not only decrease debt and equity issuances but also switch to financing that is less sensitive to information asymmetry (i.e., lower equity dependence and higher usage of cash reserves). Derrien et al. (2016) find that the loss of an analyst causes an increase in the cost of debt of 25 basis points (from three months before to three months after) and the rate of defaults, delistings and bankruptcies by a factor of 1.5. Using brokerage closure events, Billett et al. (2017) find an exogenous shock to analyst coverage that increases asymmetric information to cause declines in market share. The empirical results are consistent with Bolton and Scharfstein (1990) in that outside investors set tighter performance contingencies to mitigate managerial agency costs, which limit the manager's ability to respond to competitive threats.

Other empirical papers associate the quality of equity research with the cost of capital and investment choices. Mansi et al. (2011), for example, find empirical support that research quality, including forecast precision and dispersion, explains the lower cost of debt, proxied with corporate bond yields. This finding supports the notion that financial analysts reduce information asymmetry among market participants, thus enabling covered stock to access financing at a lower cost. Chen et al. (2017) examine the analyst research role in the efficiency of corporate investment projects. They find that a high-quality forecast is associated with higher investment if the firm is more likely to underinvest and with lower investment if the firm is more likely to overinvest, suggesting that forecast quality increases firm-level investment efficiency. Using instrumental variables to address endogeneity concerns, To et al. (2018) provide empirical evidence that equity research quality leads to higher total factor productivity. They show that the positive effect of analysts on productivity occurs only in financially constrained firms, opaque firms and firms with weaker investor protection, suggesting that analysts improve investment decisions by playing an important role in information distribution and external monitoring.

H2: Higher coverage by analysts employed by Protocol members is associated with increased investment and external equity financing.

Data Sources, Sample and Variable Construction

To explore career advancements across different advisory firms with different institutional characteristics and examine the properties of sell-side analyst research published by Protocol and non-Protocol members, we must observe the names of individual analysts and track their career advancements with different employers (i.e., broker-dealer and/or registered investment advisors (RIAs)). Data were obtained on all individual analysts' forecasts of annual earnings per share from the Factset Detail Estimates Files for the period 2000–2019. I complement the Factset Estimates Files with the following additional databases: (a) FINRA Broker Check with more than 1.070 million records of individual advisors, including employment history and misconduct cases; (b) Factset People Files with detailed employment records of more than 1.5 million individuals, including professionals with management positions, auditors and members of the finance industry, such as financial analysts and finance risk directors; (c) Factset Advanced Entity Master Files with information on the entity structure, including ultimate parents of broker dealers and RIAs; and (d) the list of Protocol agreements signed by advisory firms and broker dealers created and maintained by the law firm Carlile Patchen & Murphy, representing financial firms who wish to join the agreement and the recruitment of financial professionals from other Protocol firms (see Appendix A for more detail on the data selection and matching procedures).

To test Hypothesis 1, I measure research quality using earnings forecasts obtained from the Factset Detail Estimates Files according to four dimensions: earnings forecast accuracy, timeliness, frequency of coverage revisions and optimism.[8] Clarke et al. (2007) suggest that some of the measures used by *Institutional Investor* to rank an analyst include responsiveness, earnings estimates and timeliness. Similar to Clarke et al. (2007), three measures of research quality (earnings forecast accuracy, frequency of coverage revisions and timeliness) are used as a proxy for analyst reputation; the measure of optimism captures aspects of analyst behaviour that are likely a proxy for bias. Following Hong and Kubik (2003) and Clarke et al. (2007), I calculate a score measure that adjusts for the difference in analyst

coverage. Hong and Kubik (2003) argue that the relative measure of research quality is problematic for several reasons. First, an analyst might have, for instance, a higher absolute forecast error than another analyst either because the analyst did not perform as well as the other analyst or the firms the analyst follows were more difficult to forecast than the firms of the other analyst. Second, the quality of analyst research depends on the overall research information produced in the advisory sector (Hong and Kubik 2003; Merkley et al. 2017).

I construct relative measures of research quality that account for these issues as follows. Similar to Hong and Kubik (2003) and Clarke et al. (2007), I first sort the analysts that cover a particular stock in a year based on their forecast precision, frequency, forecast timeliness and optimism. I then assign a ranking based on this sorting; the best analyst (e.g., the analyst with the lowest forecast error or more timely forecasts) receives the first rank for that stock, the second-best analyst receives the second rank and onward until the worst analyst receives the lowest rank. If more than one analyst is equally accurate, I assign those analysts the midpoint value of the ranks they assume. Similar to prior literature (Hong et al. 2000; Richardson et al. 2004; Kim et al. 2011), I consider only the last forecast for each analyst–firm pair during the 12 months of the annual earnings release date reported by Factset. I exclude observations with forecast horizons shorter than one month and longer than one year (Clement and Tse 2005).

To examine the career advancements of sell-side analysts, I classify the brokerage houses into different status groups using several sorting characteristics, namely, size and advisor misconduct. First, following Hong and Kubik (2003), I measure the status of the brokerage house based on the number of analysts from each brokerage house who issued forecast reports. Although I observe the exact name of the brokerage house for which the analysts worked, I am unable to use an external ranking system because the results of the survey published by *Institutional Investor* over past year are not accessible. Hong and Kubik (2003) find that the alternative classification based on the size of a brokerage house largely overlaps with the *Institutional Investor* ranking system. Second, I classify the brokerage houses based on the overall misconduct culture.

To test Hypothesis 2, I combine the following databases: (a) the financial information of covered stocks from Compustat; (b) I/B/E/S forecasts issued by individual analysts and their respective employers; and (c) the list of Protocol members, along with the specific date on which they signed the Protocol agreements. To capture the effect of research issued by Protocol members on corporate decisions, I construct a proxy for Protocol coverage as the relative share of financial analysts who cover the stock and are employed by a Protocol member.

Results

Research quality and Protocol: Methodological approach and empirical results

In the first part of the paper, I focus on the effect of Protocol membership on the quality of analyst research. To test Hypothesis 1, I estimate the following difference-in-difference regression model using analyst-level proxies for research quality:

$$Performance_{j,\ i,\ t+1} = \alpha_i + \gamma_t + \beta_p Firm\ in\ Protocol_{j,i,t} + \Gamma' Controls_{i,t} + \epsilon_{j,i,t} \quad (1)$$

where $Performance_{j,\ i,\ t+1}$ is a proxy for analyst performance using the following four measures: accuracy, frequency, timeliness and optimism. $Firm\ in\ Protocol_{j,i,t}$ is an indicator variable that is one if brokerage house i is a member of the Protocol by the end of year t, and α_i and γ_t are brokerage house and year fixed effects, respectively. Similar to prior research, I control for other factors, including broker size, number of firms followed, experience and average coverage (See Appendix C with variable definitions).

I calculate the four performance measures using a scoring methodology following Hong and Kubik (2003), Clarke et al. (2007) and Groysberg et al. (2011). To compute the scores, I use the most recent annual earnings forecasts issued from 360 to 90 days prior to the annual earnings announcement for each analyst–firm pair. Following Hong and Kubik (2003), I calculate the relative *Forecast accuracy* using the unsigned errors (i.e., forecast compared to actual earnings) to obtain a relative score for each analyst–firm observation. For each analyst, I then aggregate the relative accuracy score, thus computing the average accuracy score at the analyst-year level. Following Groysberg et al. (2011), I proxy analyst efforts with the earnings forecast update frequency. I compute *Forecast frequency* using the number of annual forecasts issued by an analyst in a given year from 360 to 90 days prior to the earnings announcement of the covered firms. Similar to forecast accuracy, I use a scoring methodology where a forecast frequency score is obtained relative to other analysts who cover a particular firm. For each analyst, I calculate a frequency score using the average relative frequency scores in a particular year. I follow the same scoring procedure for *Forecast timeliness*, where analysts are ranked based on when they issued their first annual earnings forecast for a firm in a particular year (Clarke et al. 2007). Following Hong and Kubik (2003), I also compute the relative *Forecast optimism* score by comparing an analyst's forecast to the consensus forecast made by other analysts following a particular stock. A higher score of performance measures (e.g., score equal to 100) suggests that a particular

Table 1 Descriptive statistics

Panel A: Financial analysts – Factset/FINRA dataset

Variable	Observations	Mean	P50	SD	P5	P95
Forecast accuracy	30 242	51.900	52.574	13.112	29.464	71.697
Forecast frequency	30 242	54.987	57.576	20.013	17.517	84.415
Forecast timeliness	30 242	62.136	66.387	26.352	11.663	97.286
Forecast optimism	30 242	49.550	50.000	19.852	16.667	81.250
Average coverage effect	30 242	13.020	11.679	6.824	4.933	25.594
Experience effect	30 242	1.754	1.792	0.638	0.693	2.773
Number of firms followed effect	30 242	2.712	2.833	0.628	1.386	3.555
Broker size effect	30 242	5.983	6.047	1.673	3.104	8.505
Firm in Protocol	30 242	0.256	0.000	0.437	0.000	1.000
Turnover (%)	30 242	9.820	7.537	11.564	0.000	25.063
Turnover with Protocol firms (%)	30 242	1.913	1.457	3.900	0.000	5.409
Turnover with non-Protocol firms (%)	30 242	6.626	4.749	9.339	0.000	18.059
Misconduct culture (%)	30 242	11.677	4.243	15.506	0.000	41.453

Panel B: Corporate decisions and Protocol coverage – Compustat/I/B/E/S dataset

	N	Mean	Median	SD	p25	p75
Protocol Coverage	61 658	0.228	0.190	0.250	0.000	0.375
Coverage	61 658	8.914	6.000	8.133	3.000	12.00
Size	61 658	6.985	6.900	2.063	5.522	8.325
Market-to-book	61 658	2.135	1.494	2.810	1.092	2.340
Leverage	61 658	0.233	0.182	0.271	0.034	0.354
Tangibility	61 658	0.231	0.135	0.243	0.041	0.350
Profitability	61 658	0.010	0.062	0.338	0.009	0.111
R&D	61 658	0.052	0.000	0.119	0.000	0.054
Capex	61 658	0.044	0.027	0.056	0.001	0.057
Acquisition	61 658	0.021	0.000	0.055	0.000	0.009
Total investment	61 658	0.117	0.079	0.134	0.031	0.158
Equity issuance	61 658	0.055	0.004	0.151	0.000	0.020
Net debt issuance	30 980	0.012	0.000	0.088	–0.007	0.017
Long-term debt issuance	58 850	0.092	0.013	0.161	0.000	0.113
Short-term debt change	32 244	0.000	0.000	0.048	–0.002	0.000
Debt reduction	59 549	0.079	0.017	0.144	0.000	0.086
Debt-equity choice	23 675	1.402	0.000	18.334	–0.303	0.833

This table presents the descriptive statistics of the data at the cross-section between FINRA records and Factset Estimates Files. Factset Estimates Files (global sample – row files) contain forecasts issued for 48 816 global firms by 33 781 financial analysts (identified by name) employed by 1730 financial firms. The original Factset Estimates Files with analyst-stock-year observations contain 18 391 127 forecasts issued over the period 2000–2019. To prepare the data for empirical analysis, the name of the financial firm in Factset Estimates Files (global sample) was matched to FINRA records using the CRD code. The final dataset with analyst-year observations contains observations for 6105 financial analysts employed by 254 financial firms registered with FINRA. Panel B tabulates the descriptive statistics of the data at the cross-section between Compustat and I/B/E/S for 8905 unique publicly listed companies with analyst coverage over the period 2000–2020.

analyst is relatively more accurate and issues forecasts more frequently on a timely basis with optimism bias.

Table 1 tabulates descriptive statistics and Table 2 presents the baseline regression estimates. It is expected that Protocol membership will strengthen analysts' incentives to improve the quality of the research output. I argue that the quality of research is likely to improve when a firm joins the Protocol due to career incentives and find empirical results consistent with this expectation. Similar to prior research, I control for other factors, including broker size, number of firms followed, experience and average coverage. Regression coefficients are obtained with analyst- and year-fixed effects. An analyst's skills, and by extension research quality, are likely to improve during their career path. Although I control for experience and coverage, it could be that other omitted factors can explain the quality of the analyst's research. To isolate the effect of Protocol membership, I include analyst fixed effects, reporting more conservative estimates.

The positive and statistically significant coefficient of forecast accuracy (column (1)) suggests that financial analysts working for Protocol members issue more accurate earnings forecasts. I also find that Protocol membership has a positive effect on analyst efforts, as proxied by forecast frequency (column (2)). There is

Table 2 Analyst performance measures and Protocol membership

Dependent variable	(1) Forecast accuracy	(2) Forecast frequency	(3) Forecast timeliness	(4) Forecast optimism
Firm in Protocol	1.325***	2.013***	0.145	–0.019
	(3.36)	(3.44)	(0.22)	(–0.03)
Average coverage effect	0.081**	–0.442***	–0.262***	0.033
	(2.52)	(–10.48)	(–5.04)	(0.66)
Experience effect	–1.867***	18.135***	37.993***	2.092**
	(–3.18)	(19.42)	(35.23)	(2.28)
Number of firms followed effect	0.325	7.921***	10.835***	0.643
	(1.05)	(18.94)	(21.99)	(1.35)
Broker size effect	0.207	0.959***	1.970***	0.001
	(1.55)	(4.52)	(7.49)	(0.01)
Analyst fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Observations	30 242	30 242	30 242	30 242
Adj. R^2	0.190	0.403	0.510	0.232

This table displays regression estimates obtained using OLS with a dependent variable different measures of analyst research performance: forecast accuracy (column (1)), forecast frequency (column (2)), forecast timeliness (column (3)) and forecast optimism (column (4)). All measures are scores calculated relative to other financial analysts. The estimation models include analyst fixed effects. *t*-statistics (reported in parentheses) are computed using robust standard errors, clustered by firm. Significance levels are denoted by *, ** and ***, which correspond to 10%, 5% and 1% levels, respectively.

no empirical evidence to suggest that financial analysts working for Protocol members issue more timely and optimistic forecasts. The effect of Protocol membership on forecast optimism (column (4)) is negative but not statistically significant. Gurun et al. (2021) argue that, without restrictions on labour mobility under the Protocol, individuals have stronger bargaining positions with their employers. If financial analysts are under pressure to generate more trades for their brokerage firms by being more optimistic, this paper's empirical findings are consistent with the view that this pressure is not as pronounced for Protocol members. The lower pressure to generate trades may also be explained by the positive effect of Protocol membership on the assets under management. Gurun et al. (2021) find that when an advisor leaves one Protocol firm to join another, they bring a client list worth almost half the average client list of the firm's existing advisors. Owing to the larger inflow of assets for Protocol members, the demand for generating trades with optimistic forecasts is likely to be lower.

Table 3 shows whether the effect of Protocol membership on research quality is determined by analyst experience (Panel A), misconduct culture (Panel B), average analyst coverage (Panel C) and economic conditions (Panel D). The cross-sectional analysis shows that Protocol membership has a positive effect on forecast accuracy and frequency, independent of analyst experience. This finding is consistent with the view that the transfer of ownership rights to the individuals under the Protocol agreement seems to motivate both young and experienced analysts to develop high reputations by increasing the quality of their research (proxied with forecast accuracy) and investing more effort into producing more frequently updated forecasts (proxied by forecast frequency).

There is also the possibility that institutional culture is likely to affect the quality of analyst research. If a large share of financial advisors working for financial institutions have misconduct cases, forecast quality is expected to be lower. I argue that the lack of disciplining mechanisms in financial institutions to constrain misconduct behaviour is likely to have an adverse effect on individual incentives to produce high-quality research. However, I also contemplate the possibility that high rates of financial misconduct may provide strong incentives to improve the quality of research output with the objective of having a stronger bargaining position in the labour market when switching jobs. The empirical estimates reported in Panel B of Table 3 suggest that misconduct culture is negatively associated with both forecast accuracy and frequency. I find that forecasts and frequency are lower for financial analysts who work for financial institutions where misconduct behaviour is pronounced and financial advisors are more likely to have disclosure flags in their employment records (i.e., poor corporate governance). However, the positive effect from Protocol membership does not seem to be affected by the institutional culture (i.e., the interaction variable is not significant). The empirical results suggest that Protocol members within a misconduct culture are more likely to provide earnings forecasts with optimism bias. This result is consistent with the expectation that a misconduct culture is likely to correlate with the conflict of interest in which financial analysts are under pressure to generate trades by issuing reports with optimistic bias.

Table 3 Analyst performance and Protocol: Cross-sectional analysis

Panel A: Analyst performance measures, Protocol and analyst experience

Dependent variable	(1) Forecast accuracy	(2) Forecast frequency	(3) Forecast timeliness	(4) Forecast optimism
Firm in Protocol	1.458***	3.026***	–0.406	–0.313
	(3.25)	(4.72)	(–0.53)	(–0.48)
More experience	0.101	–1.765***	–4.888***	0.458
	(0.27)	(–2.91)	(–6.77)	(0.81)
Firm in Protocol * More experience	0.125	–1.339*	2.133**	0.382
	(0.27)	(–1.76)	(2.44)	(0.53)
Misconduct culture	–0.032***	–0.066***	–0.053**	0.001
	(–2.81)	(–4.23)	(–2.43)	(0.02)
Uncertainty (three-factor)	–0.914	–2.240	46.198***	12.260***
	(–0.71)	(–1.38)	(22.18)	(6.72)
Other controls	Yes	Yes	Yes	Yes
Observations	30 242	30 242	30 242	30 242
Adj. R^2	0.190	0.382	0.453	0.232

Panel B: Analyst performance measures, Protocol and corporate misconduct culture

Dependent variable	(1) Forecast accuracy	(2) Forecast frequency	(3) Forecast timeliness	(4) Forecast optimism
Firm in Protocol	1.515***	2.037***	–0.146	–1.151
	(2.99)	(2.69)	(–0.16)	(–1.59)
Misconduct culture	- 0.033**	–0.066***	–0.043*	–0.018
	(–2.36)	(–3.73)	(–1.68)	(–1.09)
Firm in Protocol * Misconduct culture	0.001	0.017	0.026	0.059**
	(0.02)	(0.69)	(0.79)	(2.46)
Other controls	Yes	Yes	Yes	Yes
Observations	30 242	30 242	30 242	30 242
Adj. R^2	0.191	0.404	0.510	0.232

Panel C: Analyst performance measures, Protocol and analyst coverage

Dependent variable	(1) Forecast accuracy	(2) Forecast frequency	(3) Forecast timeliness	(4) Forecast optimism
Firm in Protocol	1.445***	2.665***	0.296	0.178
	(3.39)	(4.19)	(0.39)	(0.29)
High coverage	0.191	2.954***	3.394***	–0.265
	(0.67)	(6.56)	(6.49)	(–0.63)
Firm in Protocol * High coverage	0.299	–0.872	0.366	–1.283*
	(0.65)	(–1.18)	(0.42)	(–1.79)
Misconduct culture	–0.033***	–0.075***	–0.057**	–0.001
	(–2.89)	(–4.68)	(–2.49)	(–0.01)
Other controls	Yes	Yes	Yes	Yes
Observations	30 242	30 242	30 242	30 242
Adj. R^2	0.191	0.384	0.487	0.233

Panel D: Analyst performance measures, Protocol and economic uncertainty

Dependent variable	(1) Forecast accuracy	(2) Forecast frequency	(3) Forecast timeliness	(4) Forecast optimism
Firm in Protocol	–4.135	–8.815*	–10.343*	–8.024
	(–1.23)	(–1.90)	(–1.91)	(–1.56)
Uncertainty (three-factor)	2.518	–52.747***	–55.670***	6.492**
	(1.31)	(–18.33)	(–16.49)	(2.25)
Firm in Protocol * Uncertainty (three-factor)	1.173*	2.326**	2.235**	1.666
	(1.68)	(2.41)	(1.98)	(1.57)
Misconduct culture	–0.028**	–0.056***	–0.041*	0.002
	(–2.48)	(–3.53)	(–1.81)	(0.13)
Other controls	Yes	Yes	Yes	Yes

(*Continued*)

Table 3 (Continued)

Panel D: Analyst performance measures, Protocol and economic uncertainty

Dependent variable	(1) Forecast accuracy	(2) Forecast frequency	(3) Forecast timeliness	(4) Forecast optimism
Observations	30 242	30 242	30 242	30 242
Adj. R^2	0.193	0.404	0.511	0.232
	(5)	(6)	(7)	(8)
Firm in Protocol	–4.137	–5.446	–13.605***	–6.220
	(–1.31)	(–1.22)	(–2.64)	(–1.28)
Uncertainty (news)	1.988	–43.906***	–46.732***	5.362**
	(1.24)	(–18.18)	(–16.54)	(2.22)
Firm in Protocol * Uncertainty (news)	1.161*	1.607*	2.886***	1.277
	(1.79)	(1.74)	(2.68)	(1.28)
Misconduct culture	–0.028**	–0.056***	–0.043*	0.002
	(–2.51)	(–3.54)	(–1.86)	(0.11)
Other controls	Yes	Yes	Yes	Yes
Observations	30 242	30 242	30 242	30 242
Adj. R^2	0.193	0.404	0.511	0.232

This table displays regression estimates from cross-sectional analysis using OLS with a dependent variable different measures of analyst research performance: forecast accuracy (column (1)), forecast frequency (column (2)), forecast timeliness (column (3)) and forecast optimism (column (4)). All measures are scores calculated relative to other financial analysts. Panel A presents the estimated effect of Protocol membership on analyst performance measures conditional on analyst experience. More experience is equal to one for financial analysts with experience above the sample median. Panel B presents the estimated effect of Protocol members on analyst performance measures conditional on misconduct culture of the financial firm. Misconduct culture is the percentage of advisors with historical misconduct records at the end of the calendar year. Panel C presents the estimated effect of Protocol members on analyst performance measures conditional on overall analyst attention (average coverage). All model specifications include analyst fixed effects. *t*-statistics (reported in parentheses) are computed using robust standard errors, clustered by firm. Significance levels are denoted by *, ** and ***, which correspond to 10%, 5% and 1% levels, respectively.

In cross-sectional analysis, I further examine to what extent coverage affects the positive effect of Protocol membership on research quality. It is plausible that there is a high cost to Protocol members for joining the agreement. Because the labour market is more competitive and advisors with valuable client lists have stronger bargaining power with potential new employers, it is likely that Protocol members have to increase the compensation deals offered to newly recruited advisors who bring new assets under management. As a result, financial analysts may observe an increase in workload (i.e., increased demand to produce research for newly hired advisors). Although I do not observe the analyst research produced internally, I use the average coverage effect as a proxy for analyst workload. The empirical findings do not suggest that the positive effect of Protocol membership on forecast accuracy and frequency is affected by the workload as proxied by high coverage. The only performance variable that is affected by the workload for Protocol members is forecast optimism. The empirical results show that financial analysts with large portfolios of stocks to cover are more likely to issue less optimistic forecasts when working for Protocol members. Overall, the empirical findings are consistent with the view that Protocol membership has a positive effect on research quality when using forecast accuracy and frequency as a proxy; forecast optimism is lower for Protocol members under certain conditions, namely, large portfolios of covered firms and lower rates of misconduct practices at the institutional level.

I argue that economic uncertainty is likely to affect labour market mobility and incentives to produce high-quality research. When difficult economic conditions are likely to result in reduced demand for investment services, I expect there to be great pressure to generate trades by issuing optimistic forecasts. Additionally, higher uncertainty makes forecasting tasks much more difficult, thus explaining the lower quality of information inputs during bad times. However, more difficult economic conditions also increase the value of the forecasting service provided by financial institutions and increase the rewards for analysts in the labour markets for producing more precise research outputs. Panel D of Table 3 shows the effect of Protocol membership on the quality of analyst research as a function of economic conditions. Consistent with the view that bad economic conditions have an adverse effect on research quality, financial analysts are less likely to update their frequency of earnings forecasts when economic uncertainty is high, using the three-factor or news score as a proxy. Additionally, during bad times, financial analysts are less likely to issue forecasts on a timely basis, and their forecasts are more likely to be optimistic, consistent with the expectation that there is increased pressure from the financial institution to generate trades with more optimistic forecasts. The results also suggest that

Table 4 Analyst performance measures, Protocol and turnover rates

Panel A: Analyst performance and overall turnover rates

Dependent variable	(1) Forecast accuracy	(2) Forecast frequency	(3) Forecast timeliness	(4) Forecast optimism
Firm in Protocol	1.489***	2.341***	0.374	–0.034
	(3.73)	(3.99)	(0.54)	(–0.06)
Turnover	–0.060***	–0.047***	0.066***	0.002
	(–5.84)	(–3.50)	(4.29)	(0.15)
Misconduct culture	–0.027**	–0.055***	–0.040*	0.002
	(–2.45)	(–3.47)	(–1.78)	(0.17)
Other controls	Yes	Yes	Yes	Yes
Observations	30 242	30 242	30 242	30 242
Adj. R^2	0.192	0.404	0.511	0.232

Panel B: Analyst performance and decomposed turnover rates

Dependent variable	(1) Forecast accuracy	(2) Forecast frequency	(3) Forecast timeliness	(4) Forecast optimism
Firm in Protocol	1.486***	2.363***	0.394	–0.043
	(3.73)	(4.05)	(0.57)	(–0.08)
Turnover with Protocol firms	–0.084***	–0.199***	0.016	0.043
	(–3.86)	(–7.02)	(0.48)	(1.18)
Turnover with non-Protocol firms	–0.056***	–0.004	0.084***	–0.010
	(–4.17)	(–0.26)	(4.28)	(–0.51)
Misconduct culture	–0.026**	–0.052***	–0.040*	0.002
	(–2.36)	(–3.24)	(–1.75)	(0.11)
Other controls	Yes	Yes	Yes	Yes
Observations	30 242	30 242	30 242	30 242
Adj. R^2	0.192	0.405	0.511	0.232

This table displays regression estimates using OLS with a dependent variable different measures of analyst research performance: forecast accuracy (column (1)), forecast frequency (column (2)), forecast timeliness (column (3)) and forecast optimism (column (4)). All measures are scores calculated relative to other financial analysts. Panel A presents the baseline model. Panel B decomposes the turnover rate by Protocol membership. All model specifications include analyst fixed effects. *t*-statistics (reported in parentheses) are computed using robust standard errors, clustered by firm. Significance levels are denoted by *, ** and ***, which correspond to 10%, 5% and 1% levels, respectively.

Protocol membership is strongly associated with high-quality research output even during bad times. Although economic uncertainty increases difficulties in forecasting, analysts who are employed by Protocol members are able to produce high-quality research, especially during bad times. The empirical results suggest that the positive effect of Protocol membership on research quality is more pronounced under bad economic conditions (i.e., a positive and statistically significant coefficient of the interaction term between economic *Uncertainty* and *Firm in Protocol*). Consistent with previous findings, the results show that financial analysts employed by Protocol members issue more accurate and updated forecasts. Moreover, those analysts are more likely to issue the first forecast before other analysts during bad times. The empirical findings support the view that without labour market frictions, the Protocol agreement provides strong incentives to financial analysts to build their personal reputations during bad times when forecasting is more difficult and highly valuable.

I document that, without any restriction to move with the client lists, financial advisors are more likely to move to Protocol members. Tables 4 and 5 present the relationship between the turnover rate following the adoption of the Protocol agreement and analyst research quality. Because the Protocol significantly is likely to affect labour mobility, I first estimate the effect of turnover rates on analyst research using the four proxies for analyst performance. Similar to *Misconduct culture*, I calculate the *Turnover* rate at the firm level. The empirical results show that financial analysts are less likely to issue more accurate, updated and timely forecasts when turnover rates are high (Panel A of Table 4). Protocol membership makes the labour market more competitive with high turnover rates, typically in the first years of Protocol adoption. I find, however, that research quality is lower when co-workers leave both Protocol and non-Protocol members (Panel B of Table 4). Therefore, there is no empirical support which shows that the enhanced labour mobility of Protocol members is likely the factor behind the lower research quality in the presence of high turnover rates. It is plausible that the departure of co-workers drives restructuring and reallocation of workload, explaining the negative effect on research outputs. The empirical estimates in Table 4 confirm the previous results that financial analysts employed by Protocol

Table 5 Analyst move to a Protocol firm and research performance

Panel A: Career moves to Protocol firms and analyst performance

Dependent variable	(1) Change	(2) Change	(3) Change	(4) Change
Analyst performance	Forecast accuracy	Forecast frequency	Forecast timeliness	Forecast optimism
Analyst performance	0.060*	0.063*	–0.014	–0.022
	(1.65)	(1.72)	(–0.48)	(–0.83)
Misconduct culture	0.062	0.063	0.064	0.062
	(0.52)	(0.53)	(0.54)	(0.52)
Turnover	0.107**	0.106**	0.104**	0.104*
	(2.01)	(1.99)	(1.98)	(1.96)
Other controls	Yes	Yes	Yes	Yes
Observations	2981	2981	2981	2981
Adj. R^2	0.162	0.163	0.162	0.162

Panel B: Cross-sectional analysis – Career moves to Protocol firms, misconduct culture and economic uncertainty

Dependent variable	(1) Change	(2) Change	(3) Change	(4) Change
Analyst performance:	Forecast accuracy	Forecast frequency	Forecast timeliness	Forecast optimism
Analyst performance	0.111**	0.131***	–0.016	–0.020
	(2.60)	(3.01)	(–0.48)	(–0.57)
Analyst performance * Misconduct culture	–0.505*	–0.712***	0.026	–0.013
	(–1.93)	(–2.76)	(0.15)	(–0.06)
Misconduct culture	0.294	0.396**	0.049	0.069
	(1.55)	(2.28)	(0.33)	(0.40)
Turnover	0.105**	0.101**	0.104**	0.103*
	(2.02)	(2.02)	(1.98)	(1.96)
Other controls	Yes	Yes	Yes	Yes
Observations	2981	2981	2981	2981
Adj. R^2	0.163	0.165	0.161	0.161
	(5)	(6)	(7)	(8)
Analyst performance	0.062*	0.039	–0.031	–0.024
	(1.71)	(1.02)	(–1.04)	(–0.93)
Analyst performance * High uncertainty	–0.007	0.119	0.074	0.011
	(–0.05)	(1.28)	(1.04)	(0.14)
High uncertainty	0.106	0.059	0.062	0.101*
	(1.19)	(0.82)	(0.91)	(1.66)
Misconduct culture	0.062	0.063	0.065	0.063
	(0.52)	(0.54)	(0.55)	(0.52)
Turnover	0.107**	0.107**	0.104**	0.103*
	(2.01)	(2.01)	(1.99)	(1.95)
Other controls	Yes	Yes	Yes	Yes
Observations	2981	2981	2981	2981
Adj. R^2	0.162	0.163	0.162	0.161

This table displays regression estimates using OLS with a dependent variable an indicator variable for career changes to Protocol members. Included as explanatory variables are different measures of analyst research performance: forecast accuracy (column (1)), forecast frequency (column (2)), forecast timeliness (column (3)) and forecast optimism (column (4)). All measures are scores calculated relative to other financial analysts. Panel A presents the baseline model. Panel B presents the cross-sectional analysis. All model specifications include analyst fixed effects. *t*-statistics (reported in parentheses) are computed using robust standard errors, clustered by firm. Significance levels are denoted by *, ** and ***, which correspond to 10%, 5% and 1% levels, respectively.

members issue more accurate and updated forecasts and that a misconduct culture has an adverse effect on analyst research quality.

I next focus on the research quality of financial analysts who move to Protocol members with a subsample analysis (Table 5). The dependent variable, *Change*, is equal to one when a financial analyst moves to a Protocol firm in the following year. By relaxing mobility constraints, Protocol members may be able to attract talent, that is, analysts who are likely to issue precise, updated and timely forecasts without optimism bias. The regression estimates in Panel A of Table 5 suggest that financial analysts who move to Protocol members have higher-quality research output, that is, their forecasts are more accurate and frequent in the year prior to the career change. Gurun et al. (2021) argue that Protocol members are willing to attract advisors with valuable client lists at any price, although such

advisors may have a strong record of misconduct cases. An unintended consequence of the enhanced labour mobility following the adoption of the Protocol could therefore be the 'promotion' of fraudulent behaviour in which financial misconduct is not penalised in the labour market. Panel B of Table 5 shows the extent to which misconduct practices affect the performance of financial analysts prior to career changes. There is no strong empirical evidence that financial analysts employed by Protocol members are more likely to come from financial institutions with fraudulent cultures (i.e., the regression coefficient of *Misconduct culture* is positive and statistically significant only when I estimate the probability of being hired by a Protocol member, with forecast timeliness as a proxy for analyst performance). The results also suggest that the research performance of newly hired financial analysis by Protocol members is not affected by economic conditions.

Corporate decisions with analyst coverage by Protocol members

In the second part of the paper, I relate analyst coverage by Protocol members with corporate financial policy and investment decisions. Because empirical evidence suggests that research quality is higher for Protocol members, we can expect information asymmetry on capital markets to decrease and therefore corporate decisions, including optimal investment and availability of external capital, to be affected. To test Hypothesis 2, I estimate the following regression model:

$$Corporate\ decisions_{i,\,t} = \alpha_{i,t} + \beta_{i,t} Protocol\ Coverage_{i,t} + \Gamma' Controls_{i,t} + \gamma_{i,t} + \epsilon_{,i,t} \quad (2)$$

where *Corporate decisions* is equal to financial choices (equity issuance, debt issuance and its components, and debt–equity choice) and investment decisions (capital expenditure, R&D expenditure, acquisitions and total investment). *Protocol Coverage* is equal to the number of financial analysts who cover stock *i* and are employed in year *t* by a Protocol member scaled by the total number of financial analysts with coverage in year *t* of stock *i*. To isolate the effect of Protocol membership from the effect of analyst coverage, I control for analyst coverage (i.e., the number of financial analysts with coverage of stock *i* in year *t*).[9] I include the following additional controls that are expected to affect corporate decisions: size, market-to-book, tangibility and profitability. Appendix C provides the variable definitions.

Similar to Chang et al. (2006) and Derrien and Kecskés (2013), I explain financial planning, including the choice between debt and equity, with analyst coverage and a focus on Protocol members. The tests are motivated by the notion that firms followed by more Protocol analysts should be less subject to information asymmetry and therefore should experience lower costs of issuing equity relative to debt. As a consequence, it is expected that firms followed by more Protocol analysts have a lower likelihood of issuing debt as opposed to equity (i.e., the coefficient of *Protocol Coverage* is negative). Furthermore, I predict that lower information asymmetry for stocks covered by a larger share of Protocol members will result in larger investments (i.e., the coefficient of *Protocol Coverage* is positive). Following To et al. (2018), I include industry and year fixed effects to capture variations across industry groups and changes over time.

Panel A of Table 6 tabulates the baseline model with the estimated effect of Protocol coverage on the financial policy of covered stocks. Because investors face adverse selection problems and high monitoring costs in the absence of reliable third-party information, low-quality equity research is likely to make them reluctant to participate in the business. Derrien and Kecskés (2013) examine the effect of lower analyst coverage on financial decisions and argue that, following an increase in information asymmetry, firms should alter their financing mix to use those sources of financing that are the least sensitive to information asymmetry: internal financing (cash) first, then debt in increasing order of riskiness (lower-risk short-term debt first, then higher-risk long-term debt), and equity only as a last resort. In this paper, the settings are reversed compared to Derrien and Kecskés (2013), where there is an increase in equity research quality when brokers sign the Protocol, an exogenous change that is independent of the corporate financial policy. Therefore, consistent with Derrien and Kecskés (2013), I expect to find a positive effect of Protocol coverage on equity and debt issuance and a higher reliance on equity.

Consistent with the notion that information asymmetry is lower for high-quality research production by Protocol members, I find a positive effect of Protocol coverage on equity issuance (column (1)). The increased coverage by Protocol members enables managers to re-evaluate their capital composition and access external capital at a lower cost, which can explain the increase in equity issuances. The results also provide empirical support for the prediction that Protocol coverage affects the decision to use debt financing. I estimate the effect of Protocol coverage on net debt issuances (column (2)) and its components, more specifically long-term debt issuance (column (3)), short-term debt changes (column (4)) and debt reduction (column (5)). The empirical findings suggest that higher coverage by Protocol members is positively associated with both long-term debt issuance and reduction. The positive effect of Protocol coverage on long-term debt issuance is consistent with the notion that information asymmetry is lower and managers are willing to issue long-term

Table 6 Protocol coverage and financial policy

Panel A: Baseline estimates

Variables	(1) Equity issuance	(2) Net debt issuance	(3) Long-term debt issuance	(4) Short-term debt change	(5) Debt reduction	(6) Debt-equity choice
Protocol coverage	0.044***	0.001	0.014***	–0.004***	0.013***	–1.455**
	(14.26)	(0.33)	(4.58)	(–2.81)	(4.49)	(–2.09)
Coverage	0.003***	0.001**	0.000	–0.000	–0.002***	0.397**
	(4.77)	(2.26)	(0.62)	(–0.33)	(–2.61)	(2.18)
Market-to-book	0.005***	–0.000	–0.003***	–0.000**	–0.003***	–0.066**
	(3.80)	(–0.79)	(–5.15)	(–2.53)	(–6.19)	(–2.42)
Leverage	–0.064***	0.092***	0.211***	0.016***	0.142***	8.499***
	(–10.88)	(9.81)	(21.53)	(3.81)	(22.03)	(9.99)
Tangibility	–0.089***	–0.058***	–0.009	–0.008***	0.042***	–6.425***
	(–20.33)	(–10.74)	(–1.62)	(–2.96)	(8.16)	(–5.38)
Profitability	–0.041***	–0.002	0.014**	–0.003	0.021***	0.603
	(–3.72)	(–0.44)	(2.03)	(–1.31)	(4.04)	(1.25)
Size	–0.014***	–0.001***	–0.003***	–0.001***	–0.003***	0.086
	(–27.16)	(–2.79)	(–6.68)	(–3.07)	(–7.71)	(0.84)
R&D	0.167***	0.023**	–0.055***	–0.005	–0.070***	1.684*
	(8.18)	(2.46)	(–4.73)	(–0.84)	(–6.96)	(1.84)
Capex	0.230***	0.319***	0.341***	0.040***	–0.004	36.912***
	(12.51)	(16.76)	(18.70)	(3.91)	(–0.21)	(10.79)
Acquisition	0.023**	0.455***	0.633***	0.055***	0.121***	51.203***
	(2.29)	(29.68)	(45.45)	(8.75)	(10.12)	(18.37)
Observations	61 658	30 980	58 850	32 244	59 549	23 675
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.259	0.148	0.231	0.019	0.142	0.050

Panel B: Regression coefficients with a lagged response

Variables	(1) Equity issuance	(2) Net debt issuance	(3) Long-term debt issuance	(4) Short-term debt change	(5) Debt reduction	(6) Debt-equity choice
Protocol coverage$_{t-1}$	0.019***	0.004	0.018***	–0.002	0.015***	–1.420*
	(7.03)	(1.61)	(5.12)	(–1.26)	(4.46)	(–1.75)
Coverage$_{t-1}$	–0.028***	–0.004***	–0.005***	–0.001	–0.000	–0.123
	(–20.11)	(–3.24)	(–3.14)	(–1.25)	(–0.31)	(–0.41)
Observations	52 772	26 654	50 416	27 736	51 008	20 336
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.286	0.154	0.234	0.018	0.148	0.052

This table displays regression estimates obtained using OLS with a dependent variable different aspect of financial policy: equity issuance (column (1)), net debt issuance (column (2)), long-term debt issuance (column (3)), short-term debt changes (column (4)), debt reduction (column (5)) and debt-equity choice (column (6)). The estimation models include three-digit industry and year fixed effects. *t*-statistics (reported in parentheses) are computed using robust standard errors. Significance levels are denoted by *, ** and ***, which correspond to 10%, 5% and 1% levels, respectively.

risky debt for their investment projects. Derrien and Kecskés (2013) find that firms with lower coverage after broker closure (i.e., high information asymmetry) reduce net total debt issuance and equity issuance by 1.07% and 0.90%, respectively. Following the adoption of the Protocol, there is an increase in analyst research quality (see *Research quality and Protocol: Methodological approach and empirical results*), which arguably reduces information asymmetry in capital markets, enabling managers to attract both equity and risky long-term debt financing on more favourable terms.

I next examine the debt–equity choice in relation to the coverage of Protocol analysts. The empirical results in columns (1)–(5) suggest that both equity and long-term debt issuances are higher when Protocol members provide research coverage. Consistent with Chang et al. (2006), I predict that firms followed by Protocol analysts will suffer from less information asymmetry, will be less frequently misvalued and therefore will be able to issue equity instead of seeking alternative means of financing, such as debt, for their projects. I construct a proxy for the debt–equity choice as the fraction of net debt issuance compared to equity issuance. If

Table 7 Protocol coverage and investment policy

Panel A: Baseline estimates

Variables	(1) R&D	(2) $R\&D_{0/1}$	(3) Capex	(4) Acquisition	(5) $Acquisition_{0/1}$	(6) Total investment
Protocol coverage	0.025***	0.284***	0.006***	0.003***	0.088*	0.033***
	(12.08)	(3.87)	(7.07)	(2.75)	(1.86)	(14.07)
Coverage	0.015***	0.089***	0.004***	0.003***	0.182***	0.023***
	(22.42)	(4.46)	(18.10)	(13.45)	(15.14)	(30.73)
Market-to-book	0.000	0.234***	0.001***	–0.001***	–0.099***	0.000
	(0.07)	(10.07)	(6.17)	(–5.06)	(–12.36)	(0.34)
Leverage	–0.024***	–1.551***	–0.010***	0.020***	0.357***	–0.014*
	(–3.17)	(–19.21)	(–9.66)	(16.13)	(8.17)	(–1.89)
Tangibility	–0.044***	–2.548***	0.158***	–0.030***	–1.561***	0.083***
	(–14.04)	(–27.74)	(86.38)	(–21.28)	(–24.54)	(22.61)
Profitability	–0.130***	–1.428***	0.001	0.009***	0.872***	–0.121***
	(–9.56)	(–8.41)	(0.29)	(7.28)	(9.98)	(–9.31)
Size	–0.014***	0.115***	–0.003***	0.000	0.247***	–0.017***
	(–16.91)	(9.21)	(–20.23)	(0.63)	(34.44)	(–20.27)
Observations	61 658	61 658	61 658	61 658	61 658	61 658
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adj R^2/ Pseudo R^2	0.506	0.574	0.524	0.063	0.122	0.408

Panel B: Regression coefficients with a lagged response

Variables	(1) R&D	(2) $R\&D_{0/1}$	(3) Capex	(4) Acquisition	(5) $Acquisition_{0/1}$	(6) Total investment
Protocol $coverage_{t-1}$	0.029***	0.215***	0.005***	0.001	0.036	0.035***
	(10.99)	(2.60)	(5.65)	(1.31)	(0.69)	(12.13)
$Coverage_{t-1}$	0.005***	0.103***	–0.005***	–0.004***	–0.126***	–0.003***
	(4.79)	(2.80)	(–11.53)	(–6.37)	(–5.20)	(–2.68)
Observations	52 772	52 772	52 772	52 772	52 772	52 772
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adj R^2/ Pseudo R^2	0.520	0.585	0.542	0.067	0.125	0.421

This table displays regression estimates obtained using OLS with a dependent variable different aspect of investment policy: R&D (% of total assets, column (1) and an indicator variable, column (2)), capital expenditure (% of total assets, column (3)), acquisitions (% of total assets, column (4), and an indicator variable, column (5)), and combined (total) investment (column (6)). The estimation models include three-digit industry and year fixed effects. *t*-statistics (reported in parentheses) are computed using robust standard errors. Significance levels are denoted by *, ** and ***, which correspond to 10%, 5% and 1% levels, respectively.

information asymmetry concerns are less pronounced for stocks with a higher coverage from Protocol members, the coefficient of *Protocol coverage* is expected to be negative and statistically significant. I find that debt issuances are less likely compared to equity issuances for managers with Protocol coverage. Because across all estimation models I control for the number of analysts following a particular stock, the estimates suggest that Protocol membership has a distinct, additive, statistically significant effect on financial policy compared to the effect of analyst coverage.

Panel B of Table 6 presents the financial policy of covered stocks with past analyst coverage by both Protocol members. In this model specification, I assume that the financial policy will be adjusted in a lag following the increase in research quality by Protocol members. The empirical results are consistent with the prediction that the Protocol has a favourable effect on access to external financing due to lower information asymmetry costs.

I next examine whether investment decisions are affected by stronger incentives to produce high-quality research following the adoption of the Protocol. I argue that stocks that are covered by Protocol analysts will be able to increase investment due to improved access to external financing. Prior research suggests that finance and investment projects are likely to become exceedingly expensive for firms with limited analyst coverage, which forces managers to forgo value-enhancing opportunities and ultimately jeopardise their growth and survival prospects (e.g., Derrien and Kecskés 2013; To et al. 2019).

Table 7 provides empirical support for the prediction that an increase in analyst research quality – through the resulting decrease in information asymmetry and thus the cost of capital – explains an increase in investment. Panel A presents the baseline estimates where investment decisions, including R&D expenditure (columns (1) and (2)), capital expenditure (column (3)) and

acquisitions (columns (4) and (5)), are explained with research coverage by Protocol analysts. I control for firm characteristics that are likely to explain the investment choices (*Size*, *Market-to-book*, *Tangibility*, *Leverage* and *Profitability*), and also control for total analyst coverage (*Coverage*). The estimates suggest that large and more leveraged firms with tangible assets are less likely to have cash flows towards R&D projects and capital expenditure, in contrast to firms with growth potential as proxied by the market-to-book ratio, assuming other factors are constant. The estimated coefficients also support the expectation that large and profitable firms with high leverage will engage in acquisitions. Across different types of investments, I find empirical support that analyst coverage (*Coverage*) is positively associated with the level of investment, consistent with previous research. I find strong empirical evidence for the additional positive effect of *Protocol Coverage* on the decision to engage in innovative projects, extend production capacity and grow through acquisitions (i.e., positive and statistically significant coefficient of Protocol coverage in columns (1)–(6)). The results are not sensitive to the construction of the investment variable (i.e., scaled to assets or an indicator variable) or the speed of adjustment (i.e., Panel B of Table 7 with the lagged response).

I next examine whether the effect of Protocol coverage is more pronounced when information asymmetry costs are supposed to be high. Table 8 tabulates the regression coefficients from the cross-sectional tests. I expect that the higher quality of equity research following the adoption of the Protocol will be more beneficial for firms that are likely to face high information asymmetry, namely, those with low analyst coverage, low tangibility and low institutional ownership. To facilitate the interpretation of the regression results, I create an indicator variable using three sorting variables: (a) the number of following analysts (Panel A); (b) the share of tangible assets to total assets (Panel B); and (c) the percentage of institutional ownership (Panel C). Following prior research (e.g., Cleary 1999), the bottom one-third of the firms each year are categorised as having high information asymmetry (i.e., a lower number of analysts with coverage, a low share of tangible assets and a low share of institutional ownership), and the top one-third are categorised as having low information asymmetry. I predict Protocol coverage will have a stronger effect on firms with more information asymmetry problems due to their financial reporting opaqueness (i.e., as proxied with the low share of tangible assets) and/or low scrutiny and monitoring from analysts and institutional investors (i.e., as proxied with the low coverage and reduced institutional ownership stakes).

The findings provide empirical support for the prediction that the Protocol has a favourable effect on investment selection for firms with high information asymmetry. To et al. (2019) show that the positive effect of analysts on productivity occurs for opaque firms and firms with weaker investor protection, suggesting that analysts improve investment decisions by playing an important role in information distribution and external monitoring. The results also support this view: (a) firms with low analyst coverage are more likely to increase R&D and capital expenditure following an increase in Protocol coverage; (b) firms with low tangibility and high Protocol coverage have a higher increase in capital expenditure and are more likely to engage in acquisitions; and (c) the effect of Protocol coverage on R&D (acquisitions) is more (less) pronounced for firms with low institutional ownership. Independent of the proxies for information asymmetry, I find that higher coverage by Protocol analysts has a significant effect on investment in R&D. Although I predict that the effect of Protocol coverage on the debt–equity choice is stronger for firms with high information asymmetry, I do not find a statistically significant difference across groups.

Table 9 presents the regression coefficients from additional cross-sectional analysis. In Panel A, I test for the possibility that the effect of Protocol coverage on both financial policy and investment projects is stronger for the early years. The argument is that the analyst incentives to improve research quality are higher during the early years of the Protocol, when Protocol analysts were likely to face a lower level of labour market competition from their peers (i.e., the marginal benefits from increasing efforts and improving research output are high due to the significantly improved labour market prospects when other analysts are unable to move with their client lists). To test this expectation, I create an indicator variable equal to one for the first two years following the adoption of the Protocol (i.e., 2004 and 2005) and zero otherwise. Consistent with this prediction, I find that the effect of Protocol analysts on total investment (R&D and capital expenditure) is higher during the first two years of the Protocol. I do not find that the debt–equity choice is strongly determined by Protocol members during the first two years.

Prior research suggests that market competition may play a disciplinary and informational role, where product market competition performs an important governance role by mitigating agency problems (e.g., Hart 1983; Tian and Twite 2011). Hoberg et al. (2014) show that product market fluidity, as a proxy for market competition, is correlated with R&D, consistent with the fact that product market fluidity requires at least some investment. Boubaker et al. (2018) find that competitive pressure from the product market leads firms to rely less on bank debt financing. I argue that the Protocol effect – through improved research quality and lower information asymmetry – will be more pronounced for less competitive firms. Following Hoberg et al. (2014), I use product market fluidity, a text-based measure of product similarity based on the product descriptions

Table 8 Cross-sectional analysis: Protocol coverage and information asymmetry

Panel A: Low analyst coverage

Variables	(1) Debt-equity choice	(2) R&D	(3) Capex	(4) Acquisition	(5) Total investment
Protocol coverage	–1.144	0.012***	0.002	0.012***	0.026***
	(–0.79)	(2.89)	(1.14)	(4.29)	(5.05)
Low coverage	–0.633	–0.027***	–0.009***	–0.004***	–0.041***
	(–1.28)	(–17.25)	(–12.49)	(–4.84)	(–20.23)
Protocol coverage * Low coverage	0.115	0.012***	0.005***	–0.012***	0.005
	(0.08)	(2.71)	(2.60)	(–4.29)	(0.87)
Observations	16 305	44 671	44 073	44 671	44 073
Other controls	Yes	Yes	Yes	Yes	Yes
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.045	0.481	0.525	0.061	0.404

Panel B: Low tangibility

Variables	(1) Debt-equity choice	(2) R&D	(3) Capex	(4) Acquisition	(5) Total investment
Protocol coverage	–0.392	0.021***	0.001	–0.001	0.021***
	(–0.30)	(9.22)	(0.55)	(–0.47)	(6.69)
Low tangibility	1.677**	0.045***	–0.023***	–0.001	0.020***
	(2.08)	(14.98)	(–17.71)	(–1.10)	(5.80)
Protocol coverage * Low tangibility	–2.282	–0.003	0.011***	0.006***	0.014***
	(–1.61)	(–0.81)	(6.67)	(3.25)	(3.15)
Observations	14 943	42 257	41 509	42 257	41 509
Other controls	Yes	Yes	Yes	Yes	Yes
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.035	0.529	0.545	0.074	0.436

Panel C: Low institutional ownership

Variables	(1) Debt–equity choice	(2) R&D	(3) Capex	(4) Acquisition	(5) Total investment
Protocol coverage	0.978	0.018***	0.005***	0.006**	0.029***
	(0.73)	(5.41)	(3.62)	(2.46)	(6.93)
Low inst. ownership	1.122**	0.018***	0.003***	–0.009***	0.012***
	(2.24)	(10.23)	(3.84)	(–9.78)	(5.83)
Protocol coverage * Low inst. ownership	–2.203	0.011***	0.001	–0.005**	0.006
	(–1.58)	(2.78)	(0.61)	(–2.16)	(1.24)
Observations	14 756	41 751	41 300	41 751	41 300
Other controls	Yes	Yes	Yes	Yes	Yes
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.042	0.520	0.518	0.070	0.430

This table displays the cross-sectional analysis using different filtering variables: analyst coverage (Panel A), tangibility (Panel B) and institutional ownership (Panel C). The marginal effects are obtained from OLS regressions with control variables included in the baseline estimation model, three-digit industry and year fixed effects. *t*-statistics (reported in parentheses) are computed using robust standard errors. Significance levels are denoted by *, ** and ***, which correspond to 10%, 5% and 1% levels, respectively.

in annual reports, as a proxy for competitive pressure. I construct an indicator variable equal to one when a firm is below the mean industry-adjusted product fluidity and zero otherwise. I do not find empirical evidence that the Protocol strongly affects the debt-equity choice of less competitive firms (i.e., with more fluid product offerings compared to rivals). The findings, however, suggest that the research coverage of Protocol analysts has a stronger effect on total investment by firms with a more consolidated position in the industry. The effect is driven by investment in production capacity (i.e., capital expenditure) and is consistent with Hoberg et al. (2014), where competition puts pressure on firms to invest.

Conclusions

Although the impact of capital market regulation on sell-side analyst research has been extensively documented, there is limited knowledge about the effect of voluntary, self-regulation initiatives in the financial

Table 9 Corporate decisions with Protocol coverage: Additional cross-sectional analysis

Panel A: Time effect

Variables	(1) Debt-equity choice	(2) R&D	(3) Capex	(4) Acquisition	(5) Total investment
Protocol coverage	–1.184*	0.024***	0.004***	0.003***	0.032***
	(–1.67)	(11.11)	(5.51)	(3.09)	(12.88)
First years	–1.518*	0.003	0.016***	0.012***	0.030***
	(–1.92)	(1.03)	(16.38)	(8.47)	(9.95)
Protocol coverage * First years	–3.488	0.021***	0.009***	–0.004	0.027***
	(–0.96)	(4.45)	(2.85)	(–0.86)	(3.98)
Observations	19 573	50 910	50 910	50 910	50 910
Other controls	Yes	Yes	Yes	Yes	Yes
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.042	0.517	0.537	0.068	0.421

Panel B: Market competition

Variable	(1) Debt-equity choice	(2) R&D	(3) Capex	(4) Acquisition	(5) Total investment
Protocol coverage	–1.079	0.007*	–0.003**	0.004***	0.008*
	(–1.20)	(1.80)	(–2.39)	(2.74)	(1.87)
Less competitive	–0.191	–0.025***	–0.004***	0.002***	–0.027***
	(–0.55)	(–14.88)	(–7.14)	(3.31)	(–14.33)
Protocol coverage * Less competitive	–0.180	0.005	0.005***	0.001	0.011**
	(–0.16)	(1.20)	(3.39)	(0.33)	(2.50)
Observations	20 190	52 352	51 677	52 352	51 677
Other controls	Yes	Yes	Yes	Yes	Yes
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.048	0.551	0.545	0.065	0.454

This table displays the additional cross-sectional analysis. Panel A interacts Protocol coverage with an indicator variable equal to one for the first two years following the adoption of the Protocol. Panel B applies an indicator variable equal to one when a firm is below the mean industry-adjusted product fluidity. The marginal effects are obtained from OLS regressions with control variables included in the baseline estimation model, three-digit industry and year fixed effects. *t*-statistics (reported in parentheses) are computed using robust standard errors. Significance levels are denoted by *, ** and ***, which correspond to 10%, 5% and 1% levels, respectively.

industry as a market-based mechanism in mitigating conflicts of interest in financial institutions. If these initiatives can render capital markets more efficient by promoting high-quality information production in the financial industry, the costs of designing and enforcing financial regulation could be considerably reduced.

The findings of this paper suggest that a voluntary, industry-wide initiative that significantly affects labour market dynamics has a positive effect on analyst research quality. The empirical results are consistent with the view that career incentives in the labour market are likely to reduce pressure from financial institutions on financial analysts and increase the role of analyst reputation, explaining the better quality of analyst forecasts in more competitive labour markets. Using a comprehensive database with analysts' earnings forecasts, I show that: (a) financial analysts working for Protocol members produce more accurate forecasts and exert greater efforts to update their research on a timely basis; (b) Protocol membership has a positive effect on forecast accuracy and frequency, independent of analyst experience; (c) although corporate misconduct at the institutional level (i.e., a large percentage of financial advisors with financial misconduct cases) has a negative effect on analysts' research, the positive effect of Protocol membership does not seem to be affected by the institutional culture; and (d) Protocol membership is strongly associated with high-quality research output, even during bad times.

I also show that the effect of higher research quality following the adoption of the Protocol has a real effect on corporate investment and financial policy. Consistent with the prediction that lower information asymmetry in capital markets affects corporate decisions, I find that: (a) Protocol coverage is positively associated with equity issuance, long-term debt issuance and reduction, consistent with the notion that managers attract both equity and risky long-term debt financing at more favourable terms when information asymmetry is lower; (b) debt issuances are less likely compared to equity issuances for managers with Protocol coverage; (c) there is a positive effect of Protocol coverage on the decision to engage in innovative projects, extend production capacity and grow through acquisitions; and (d) the higher quality of equity research following the adoption of the Protocol is more beneficial for R&D investment in firms facing high information asymmetry.

This research suggests that a market-based mechanism for reducing conflicts of interest in the financial industry is effective, as reflected in the higher quality of analyst research with real effects on corporate decisions. I contribute to the literature by showing not only that labour market mobility can allow talented analysts to make career advancements but also that such career changes have positive effects on the quality of their investment advice and ultimately economic growth. Because the costs of designing and enforcing financial regulation can be considerable, this study shows that market-based initiatives, such as the Protocol, can render capital markets more efficient in allocating limited resources by promoting high-quality information production in the financial industry.

Notes

1 Top advisors according to Barron's and Forbes magazine. Sedoric was named #4 in Forbes Best-In-State Wealth Advisors 2018 and more recently was listed on the 2021 Forbes/SHOOK Best-In-State Top Wealth Advisor List.

2 In legal terms, broker-dealers are not always registered investment advisors. Many investment advisors are also brokers, but these two groups of investment professionals are not the same. For simplicity, I use investment advisors and brokers (usually referred to as financial advisors) interchangeably as a reference to individuals or firms that are paid for providing advice about securities to their clients. See more about the difference between investment advisors and brokers here.

3 It is not unusual for advisory firms to hire teams of brokers and financial analysts. In 2020, for example, UBS hired a team that managed $6 billion and generated $20 million in production at Goldman Sachs, replacing some recent losses to its rivals. According to Welsch (2020), the new hires, Gregory Divine and Denis Cleary, also reflect the wirehouse's focus on catering to elite advisors and their high-net-worth and ultra-high-net-worth clients. Part of the moving team were the analysts registered with FINRA Abigail Harris, Seamus O'Neill, Mindi Chen and Christopher Carbone.

4 According to this view, clients are usually attracted to a specific advisory firm as a result of its market presence and strong brand. Investment advisors spend millions training people, developing appropriate client propositions and investing in systems and infrastructure; as a result, client advice is created and delivered by the firm and not by an individual.

5 For example, to reduce broker attrition following the Protocol exit in 2017, UBS tactically decided to boost the number of brokers working in teams, thus making it harder for team members to seek employment at a rival firm (Kelly 2018).

6 This concern motivated the regulatory authorities (FINRA) to issue Rule 2273 in 2016, under which advisors have to send out 'educational communication' to former customers with information about costs they may incur if they follow them to their new firm (Rule 2273 'Educational Communication Related to Recruitment Practices and Account Transfers').

7 Frank LaRosa, CEO of Elite Consulting Partners, a recruiting firm, suggests that, as a consequence of the new initiative, Wells Fargo decided to notify clients, who rarely read and understand the consequences of different contract provisions, about how they could opt out of the Protocol and decide whether advisors may take their contact information with them when switching employers (LaRosa 2018).

8 Empirical studies using earnings forecasts as proxies for research quality show that financial analysts with more precise forecasts are more likely to issue profitable stock recommendations (Loh and Mian 2006). This study does not investigate the direct relation between the Protocol and the quality of stock recommendations. Further research is needed to shed light on the impact of labour market frictions on providing unbiased and profitable stock recommendations.

9 The correlation matrix suggests that both variables can be included in the analysis, because the correlation between *Protocol Coverage* (i.e., the share of financial analysts with stock coverage who work for Protocol members compared to the total number of analysts with research coverage) and *Analyst Coverage* (i.e., the number of financial analysts following the stock in its logarithmic transformation) is low (i.e., 0.057). Therefore, the regression coefficients reported in the paper are not subject to multicollinearity issues.

10 Although analyst forecasts in I/B/E/S are not identified by name, I/B/E/S files with stock recommendations contain abbreviated names of brokers (e.g., RAYMOND) and the names of following analysts (e.g., Long D). For this reason, more recent empirical studies with a focus on the advisory industry examine sell-side research quality using as a proxy only the bias in stock recommendations (e.g., Call et al. 2019).

Conflict of Interest

The author has no conflicts of interest to declare.

Acknowledgements

I acknowledge the thoughtful comments of conference participants and colleagues, Amedeo Pugliese, Anna Alexander Vincenzo, Antonio De Vito, Christian Fons-Rosen and Marco Maria Mattei. I appreciate the outstanding support received by Desislava Petkova, Lino Sinevirski, Nick Williams and Tommaso Danova (Factset representatives). I acknowledge the valuable research assistance of Kiril Mandov. The project was conducted with financial support from AGAUR (SGR 2017-640), the Spanish Ministry of Science, Innovation, and Universities (PGC2018-099700-A-100) and URL grants.

Data Availability Statement

No data are available. Data used are available from data providers (e.g., FactSet, Compustat) with a subscription.

References

Agrawal, A., Chadha, S. and Chen, M. 2006, 'Who Is Afraid of Reg FD? The Behavior and Performance of Sell-Side Analysts Following the SEC's Fair Disclosure Rules', *The Journal of Business*, 79 (6): 2811–34.

Alesina, A., Ardagna, S., Nicoletti, G. and Schiantarelli, F. 2005, 'Regulation and Investment', *Journal of the European Economic Association*, 3 (4): 791–825.

Altınkılıç, O., Balashov, V. and Hansen, R. 2019, 'Investment Bank Monitoring and Bonding of Security Analysts' Research', *Journal of Accounting and Economics*, 67 (1): 98–119.

Antônio, R., Lima, F., dos Santos, R. and Rathke, A. 2019, 'Use of Derivatives and Analysts' Forecasts: New Evidence from Non-financial Brazilian Companies', *Australian Accounting Review*, 29 (1): 220–34.

Bailey, W., Li, H., Mao, C.X. and Zhong, R. 2003, 'Regulation Fair Disclosure and Earnings Information: Market, Analyst, and Corporate Responses', *The Journal of Finance*, 58: 2487–514.

Barber, B., Lehavy, R. and Trueman, B. 2007, 'Comparing the Stock Recommendation Performance of Investment Banks and Independent Research Firms', *Journal of Financial Economics*, 85 (2): 490–517.

Billett, M., Garfinkel, J. and Yu, M. 2017, 'The Effect of Asymmetric Information on Product Market Outcomes', *Journal of Financial Economics*, 123 (2): 357–76.

Bolton, P. and Scharfstein, D. (Mar., 1990), *The American Economic Review*, Vol. 80, No. (1): pp. 93–106. https://www.jstor.org/stable/2006736

Boni, L. 2005, *Analyzing the Analysts after the Global Settlement*, University of New Mexico Business School, Mimeo.

Baker, S.R., Bloom, N. and Davis, S.J. 2016, 'Measuring Economic Policy Uncertainty', *The Quarterly Journal of Economics*, 131 (4): 1593–636.

Boubaker, S., Saffar, W. and Sassi, S. 2018, 'Product Market Competition and Debt Choice', *Journal of Corporate Finance*, 49: 204–24.

Call, A., Sharp, N. and Wong, P. 2019, 'Changes in Analysts' Stock Recommendations Following Regulatory Action against Their Brokerage', *Review of Accounting Studies*, 24 (4): 1184–213.

Charitou, A. and Karamanou, I. 2020, 'Sleeping with the Enemy: Should Investment Banks be Allowed to Engage in Prop Trading?', *Review of Accounting Studies*, 25 (2): 513–57.

Chang, X., Dasgupta, S. and Hilary, G. 2006, 'Analyst Coverage and Financing Decisions', *The Journal of Finance*, 61 (6): 3009–48.

Chen, T., Harford, J. and Lin, C. 2015, 'Do Analysts Matter for Governance? Evidence from Natural Experiments', *Journal of Financial Economics*, 115 (2): 383–410.

Chen, T., Xie, L. and Zhang, Y. 2017, 'How Does Analysts' Forecast Quality Relate to Corporate Investment Efficiency?' *Journal of Corporate Finance*, 43: 217–40.

Cleary, S. 1999, 'The Relationship Between Firm Investment and Financial Status', *The Journal of Finance*, 54 (2): 673–92.

Clarke, J., Khorana, A., Patel, A. and Rau, P. 2007, 'The Impact of All-star Analyst Job Changes on Their Coverage Choices and Investment Banking Deal Flow', *Journal of Financial Economics*, 84 (3): 713–37.

Clifford, C. and Gerken, W. 2021, 'Property Rights to Client Relationships and Financial Advisor Incentives', *The Journal of Finance*, 76 (5): 2409–45.

Clement, M. and Tse, S. 2005, 'Financial Analyst Characteristics and Herding Behavior in Forecasting', *The Journal of Finance*, 60 (1): 307–41.

Coleman, B., Drake, M., Pacelli, J. and Twedt, B. 2021, 'Brokerage Relationships and Analyst Forecasts: Evidence from the Protocol for Broker Recruiting', *Review of Accounting Studies*.

Cornett, M., Tehranian, H. and Yalçın, A. 2005, 'Regulation Fair Disclosure and the Market's Reaction to Analyst Recommendation Changes', Southern Illinois University Working Paper.

Corwin, S., Larocque, S. and Stegemoller, M. 2017, 'Investment Banking Relationships and Analyst Affiliation Bias: The Impact of the Global Settlement on Sanctioned and Non-sanctioned Banks', *Journal of Financial Economics*, 124 (3): 614–31.

Das, S., Levine, C. and Sivaramakrishnan, K. 1998, 'Earnings Predictability and Bias in Analysts' Earnings forecasts', *The Accounting Review*, 73 (2): 277–94.

Derrien, F. and Kecskés, A. 2013, 'The Real Effects of Financial Shocks: Evidence from Exogenous Changes in Analyst Coverage', *The Journal of Finance*, 68 (4): 1407–40.

Derrien, F., Kecskés, A. and Mansi, S. 2016, 'Information Asymmetry, the Cost of Debt, and Credit Events: Evidence from Quasi-random Analyst Disappearances', *Journal of Corporate Finance*, 39: 295–311.

Dimmock, S., Gerken, W. and Graham, N. 2018, 'Is Fraud Contagious? Coworker Influence on Misconduct by Financial Advisors', *The Journal of Finance*, 73 (3): 1417–50.

Dimson, E. and Marsh, P. 1984, 'An Analysis of Brokers' and Analysts' Unpublished Forecasts of UK Stock Returns', *The Journal of Finance*, 39 (5): 1257–92.

Egan, M., Matvos, G. and Seru, A. 2019, 'The Market for Financial Adviser Misconduct', *Journal of Political Economy*, 127 (1): 233–95.

Fox, L. 2019, 'FT 300 List: The Top US Registered Investment Advisers in 2019', *Financial Times* (June).

Francis, J. and Philbrick, D. 1993, 'Analysts' Decisions as Products of a Multi-task Environment', *Journal of Accounting Research*, 31 (2): 216–30.

Gintschel, A. and Markov, S. 2004, 'The Effectiveness of Regulation FD', *Journal of Accounting and Economics*, 37 (3): 293–314.

Groysberg, B., Healy, P. and Maber, D. 2011, 'What Drives Sell-side Analyst Compensation at High-status Investment Banks?' *Journal of Accounting Research*, 49 (4): 969–1000.

Guan, Y., Li, C., Lu, H. and Wong, M. 2019, 'Regulations and Brain Drain: Evidence from Wall Street Star Analysts' Career Choices', *Management Science*, 65 (12): 5766–84.

Gurun, U., Stoffman, N. and Yonker, S. 2021, 'Unlocking Clients: The Importance of Relationships in the Financial Advisory Industry' *Journal of Financial Economics*, 141 (3): 1218–43.

Hart, O. 1983, 'The Market Mechanism as an Incentive Scheme', *The Bell Journal of Economics*, 14: 366–82.

Harford, J., Jiang, F., Wang, R. and Xie, F. 2019, 'Analyst Career Concerns, Effort Allocation, and Firms' Information Environment', *The Review of Financial Studies*, 32 (6): 2179–224.

Hong, H. and Kubik, J. 2003, 'Analyzing the Analysts: Career Concerns and Biased Earnings Forecasts', *The Journal of Finance*, 58 (1): 313–51.

Hoberg, G., Phillips, G. and Prabhala, N. 2014, 'Product Market Threats, Payouts, and Financial Flexibility', *The Journal of Finance*, 69 (1): 293–324.

Hong, H., Lim, T. and Stein, J. 2000, 'Bad News Travels Slowly: Size, Analyst Coverage, and the Profitability of Momentum Strategies' *The Journal of Finance*, 55 (1): 265–95.

Irani, R. and Oesch, D. 2013, 'Monitoring and Corporate Disclosure: Evidence from a Natural Experiment', *Journal of Financial Economics*, 109 (2): 398–418.

Irvine, P. 2004, 'Analysts' Forecasts and Brokerage-Firm Trading', *The Accounting Review*, 79(1): 125–49.

Jackson, A. 2005, 'Trade Generation, Reputation, and Sell-side Analysts', *The Journal of Finance*, 60 (2): 673–717.

Kadan, O., Madureira, L., Wang, R. and Zach, T. 2008, 'Conflicts of Interest and Stock Recommendations: The Effects of the Global Settlement and Related Regulations', *The Review of Financial Studies*, 22 (10): 4189–217.

Ke, B. and Yu, Y. 2006, 'The Effect of Issuing Biased Earnings Forecasts on Analysts' Access to Management and Survival', *Journal of Accounting Research*, 44 (5): 965–99.

Kelly, B. 2018, 'Regional Broker-dealers Quietly Making Comeback Now, but the Future Remains Uncertain', *Investment News* (December).

Kim, Y., Lobo, G. and Song, M. 2011, 'Analyst Characteristics, Timing of Forecast Revisions, and Analyst Forecasting Ability', *Journal of Banking & Finance*, 35 (8): 2158–68.

LaRosa, F. 2018, 'Wells Fargo Leadership Team Misses the Mark Again', *Financial Planning Online* (June).

Law, K. and Mills, L. 2019, 'Financial Gatekeepers and Investor Protection: Evidence from Criminal Background Checks', *Journal of Accounting Research*, 57 (2): 491–543.

Lim, T. 2001, 'Rationality and Analysts' Forecast Bias', *The Journal of Finance*, 56 (1): 369–85.

Lin, H. and McNichols, M. 1998, 'Underwriting Relationships, Analysts' Earnings Forecasts and Investment Recommendations', *Journal of Accounting and Economics*, 25 (1): 101–27.

Ljungqvist, A., Marston, F. and Wilhelm, W. 2006, 'Competing for Securities Underwriting Mandates: Banking Relationships and Analyst Recommendations', *The Journal of Finance*, 61 (1): 301–40.

Ljungqvist, A., Marston, F., Starks, L., Wei, K. and Yan, H. 2007, 'Conflicts of Interest in Sell-side Research and the Moderating Role of Institutional Investors', *Journal of Financial Economics*, 85 (2): 420–56.

Lourie, B. 2019, 'The Revolving Door of Sell-side Analysts', *The Accounting Review*, 94 (1): 249–70.

Loh, R.K. and Mian, G.M. 2006, 'Do Accurate Earnings Forecasts Facilitate Superior Investment Recommendations?', *Journal of Financial Economics*, 80 (2): 455–83.

Malmendier, U. and Shanthikumar, D. 2007, 'Are Small Investors Naive About Incentives?' *Journal of Financial Economics*, 85 (2): 457–89.

Mansi, S., Maxwell, W. and Miller, D. 2011, 'Analyst Forecast Characteristics and the Cost of Debt', *Review of Accounting Studies*, 16 (1): 116–42.

Mehran, H. and Stulz, R. 2007, 'The Economics of Conflicts of Interest in Financial Institutions', *Journal of Financial Economics*, 85(2): 267–96.

Merkley, K., Michaely, R. and Pacelli, J. 2017, 'Does the Scope of the Sell-side Analyst Industry Matter? An Examination of Bias, Accuracy, and Information Content of Analyst Reports', *The Journal of Finance*, 72 (3): 1285–334.

Michaely, R. and Womack, K. 1999, 'Conflict of Interest and the Credibility of Underwriter Analyst Recommendations', *The Review of Financial Studies*, 12 (4): 653–86.

Mohanram, P. and Sunder, S. 2006, 'How Has Regulation FD Affected the Operations of Financial Analysts?' *Contemporary Accounting Research*, 23: 491–525.

National Regulatory Services. 2019, 'Investment Adviser Sector Continues Growth with Record High RAUM and Number of Clients. (September)'. Available at: https://www.nrs-inc.com/about/press-room/investment-adviser-sector-continues-growth-with-record-high-raum-and-number-of-clients/

Richardson, S., Teoh, S. and Wysocki, P. 2004, 'The Walk-down to Beatable Analyst Forecasts: The Role of Equity Issuance and Insider Trading Incentives', *Contemporary Accounting Research*, 21 (4): 885–924.

Saastamoinen, J., Ojala, H., Pajunen, K. and Troberg, P. 2018, 'Analyst characteristics and the level of critical perception of goodwill accounting', *Australian Accounting Review*, 28 (4): 538–55.

Skiles, M., General, S. and Monahan, G. 2003, 'After the Bubble has Burst: New Regulation for Research Analysts in the US', *SIA Research Reports*, 4 (5).

Stein, J. 1989, 'Efficient Capital Markets, Inefficient Firms: A model of Myopic Corporate Behavior', *The Quarterly Journal of Economics*, 104 (4): 655–69.

Sufi, A. 2009, 'The Real Effects of Debt Certification: Evidence from the Introduction of Bank Loan Ratings', *The Review of Financial Studies*, 22 (4): 1659–91.

Tian, G. and Twite, G. 2011, 'Corporate Governance, External Market Discipline and Firm Productivity', *Journal of Corporate Finance*, 17 (3): 403–17.

To, T., Navone, M. and Wu, E. 2019, 'Analyst Coverage and the Quality of Corporate Investment Decisions', *Journal of Corporate Finance*, 51: 164–181.

Welsch, A. 2020, UBS Hires $6B Team from Goldman as Recruiting Wars Heat up. *Wall Street Online*.

Womack, K. 1996, 'Do Brokerage Analysts' Recommendations Have Investment Value?' *The Journal of Finance*, 51 (1): 137–67.

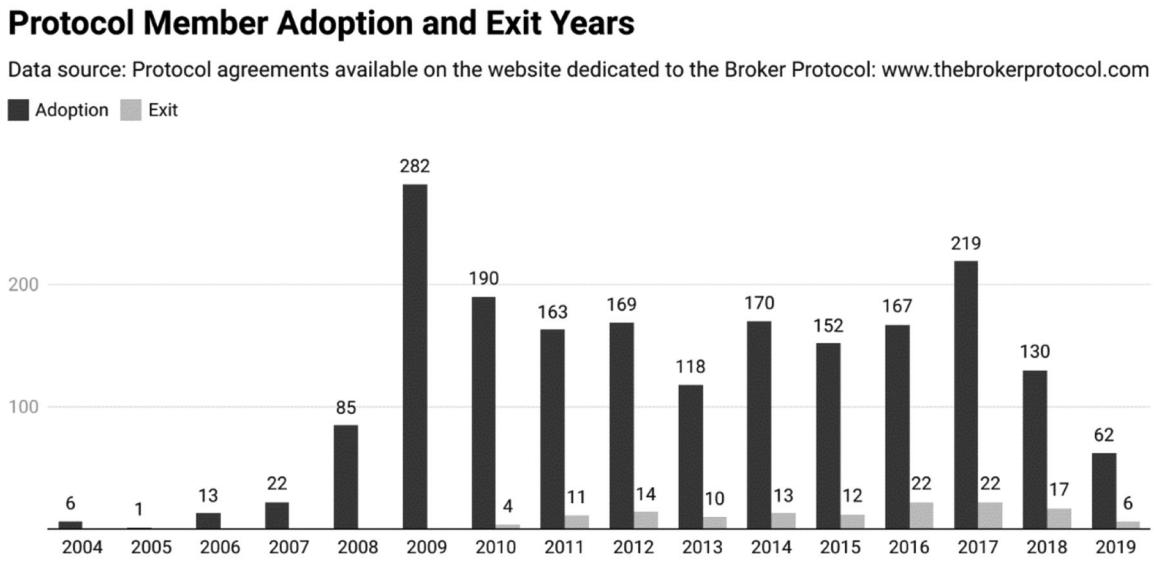
Appendix A: Data Selection and Matching Procedure

To explore career advancement across different advisory firms with different institutional characteristics and examine the properties of sell-side analyst research published by Protocol and non-Protocol members, it is necessary to observe the names of individual analysts and track their career advancement with different employers (i.e., broker-dealer and/or registered investment advisors (RIAs)). Before 2007, analyst forecasts published by the Institutional Brokers' Estimate System (I/B/E/S), could be identified by name using the broker translation file provided by I/B/E/S. Because the translation file is no longer available, empirical research on financial analysts in the past decade has not been able to complement I/B/E/S files with other databases due to the lack of a matching variable (i.e., analyst and/or employer name).[10]

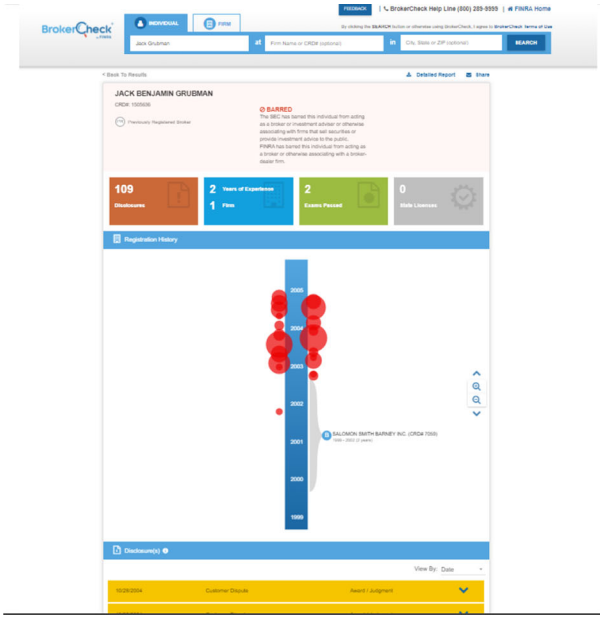
To overcome this limitation and address the research questions, I leverage an alternative comprehensive database with sell-side analyst research, Factset. Similar to I/B/E/S, Factset collects detailed estimates at the individual analyst level from more than 3000 contributors (i.e., both broker dealers and RIAs). This database contains more than 20 years of broker history across more than 59 000 global companies. Because certain data contributors are restricted (i.e., the name of the contributor and/or the name of the individual analyst is obfuscated), I filed a request and obtained permission to access the unrestricted data.

The specific procedure carried out to create the Master data files is as follows. FINRA Broker Check records identify both individual advisors and advisory firms with a unique CRD code. To relate financial analysts to the FINRA profiles of their employers, I use the Advanced Entity Master Files by Factset, where CRD identifies for each contributor with analyst estimates (RIA or broker-dealer) are provided, and extract information about the entity's structure (i.e., the ultimate parent of each contributor). When the identity of a contributor is not available, I manually extract the CRD codes from FINRA Broker Check records and match them to Factset contributor names. In Factset Detail Estimates Files, I observe earnings forecasts issued by individual analysts with different employers in the case of job separation. I compare the employment records obtained using Factset Detail Estimates Files to FINRA Broker Check records and Factset People Files. Using analyst names and employment records available in Factset People Files and/or FINRA records, I identify the CRD codes of each contributing advisor firm. Appendix B contains the FINRA Broker Check records of analysts Grubman and McKelvey Blodget, both accused and penalised under the Global Settlement by the SEC, as examples.

Carlile Patchen & Murphy, a law firm, created and keeps a record of Protocol agreements signed by advisory firms and broker dealers. The agreements can be accessed publicly on the website dedicated to the Protocol, www.thebrokerprotocol.com; from here the adoption date for each member can be obtained. By the end of 2019, 1946 advisory firms and broker dealers had adopted the Protocol. From 2010 to 2019, 131 members withdrew their signatures and exited the Protocol. The chart displays the years of adoption and exit of Protocol members.



Appendix B: FINRA Records of Financial Analysts

Jack Benjamin Grubman, a former *Salomon Smith Barney* research analyst covering the telecommunications sector	Henry McKelvey Blodget, a former *Merrill Lynch* research analyst
FINRA record of Jack Benjamin Grubman Grubman was accused and penalised under the Global Settlement by the SEC, because he 'issued research reports that were fraudulent, misleading, or that were not based on principles of fair dealing and good faith and did not provide a sound basis for evaluating facts, contained exaggerated or unwarranted claims about the companies, and/or contained opinions for which there was no reasonable basis under SSB's name' (SEC Litigation Release No. 18438/31 October 2003).	FINRA record of Henry McKelvey Blodget Blodget was accused and penalised under the Global Settlement by the SEC for issuing fraudulent research under the name of his former employer, Merrill Lynch, as well as research in which he expressed views that were inconsistent with privately expressed negative views (SEC Litigation Release No. 18438/31 October 2003).
	

Appendix C: Variable Definitions

Variable	Definition	Source
Firm in Protocol	An indicator variable that is one if any of the firm is a member of the Protocol as of the end of the calendar year	Broker protocol website
Forecast accuracy	A relative score of average analyst forecast accuracy using the methodology of Hong and Kubik (2003)	Factset Estimates Files
Forecast frequency	A relative score of average analyst forecast frequency using the methodology of Clarke et al. (2007)	Factset Estimates Files
Forecast timeliness	A relative score of average analyst forecast timeliness using the methodology of Clarke et al. (2007)	Factset Estimates Files
Forecast optimism	A relative score of average analyst forecast optimism using the methodology of Hong and Kubik (2003)	Factset Estimates Files

Variable	Definition	Source
Experience effect	A proxy for analyst experience calculated as the number of years with forecasts issued by a financial analyst in the data (log-transformed)	Factset Estimates Files
Average coverage effect	A proxy for overall analyst attention calculated as the number of financial analysts following the firm in an analyst's portfolio (log-transformed)	Factset Estimates Files
Number of firms followed effect	A proxy for analyst attention calculated as the number of firms covered by a financial analysis (log-transformed)	Factset Estimates Files
Broker size effect	A proxy for institutional pressure calculated as the number of financial analysts issuing forecasts by a brokerage house/investment advisor firm	Factset Estimates Files
Turnover	The number of departing advisors scaled by the total number of advisors employed by the firm at the end of the calendar year	BrokerCheck website
Turnover with Protocol firms	The number of departing advisors who are subsequently hired by a Protocol member firm scaled by the total number of advisors employed by the firm at the end of the calendar year	BrokerCheck website
Turnover with non-Protocol firms	The number of departing advisors who are subsequently hired by a non-Protocol member firm scaled by the total number of advisors employed by the firm at the end of the calendar year	BrokerCheck website
Misconduct culture	The total number of misconduct cases scaled by the number of financial advisors employed by the firm	BrokerCheck website
Change	An indicator variable that is one if a financial analyst moves in the following year to a firm that is a member of the Protocol, zero for a move to a non-Protocol member	BrokerCheck website
High uncertainty	An indicator variable equal to one if the following year is characterised by a high uncertainty (i.e., top quartile) using the three-factor uncertainty score	Baker et al. (2016) policy uncertainty index available on the Policy Uncertainty website
Uncertainty (three-factor)	An index of policy-related economic uncertainty based on three underlying components: (a) newspaper coverage of policy-related economic uncertainty; (b) the number of federal tax code provisions set to expire in future years; and (c) disagreement among economic forecasters as a proxy for uncertainty	Baker et al. (2016) policy uncertainty index available on the Policy Uncertainty website
Uncertainty (news)	An index of policy-related economic uncertainty based on the newspaper coverage of policy-related economic uncertainty (i.e., the first component of the three-factor index)	Baker et al. (2016) policy uncertainty index available on the Policy Uncertainty website
Protocol Coverage	The number of financial analysts who cover the stock and work for a Protocol member divided by the total number of financial analysts with stock coverage	I/B/E/S
Coverage	The logarithmic transformation of the total number of financial analysts who issue an estimate for a given stock	I/B/E/S
Size	The logarithmic transformation of the total assets (AT)	Compustat
Market-to-book	The ratio of the market value of assets (AT + CSHO*PRCC_F – CEQ) to book value of total assets (AT)	Compustat
Tangibility	The ratio of net property, plant and equipment (PPENT) to total assets (AT)	Compustat
Profitability	The ratio of income before extraordinary items (IB) plus depreciation and amortisation (DP) to total assets (AT)	Compustat
Leverage	The ratio of total debt (DLTT) plus debt in current liabilities (DLC) divided by total assets (AT)	Compustat
R&D	The ratio of R&D expenditure (XRD) to total assets (AT)	Compustat
Capex	The ratio of capital expenditure (CAPX) to total assets (AT)	Compustat
Acquisition	The ratio of acquisition expenditure (AQC) to total assets (AT)	Compustat
Total investment	The sum of capital expenditures, R&D expenditure and acquisitions expenditure (CAPX + XRD + AQC) to total assets (AT)	Compustat

Variable	Definition	Source
Equity issuance	The ratio of equity issuance (SSTK) to total assets (AT)	Compustat
Net debt issuance	The ratio of total debt issued, changes in short-term debt and net long-term debt issuance (DLCCH + DLTIS – DLTR) to total assets (AT)	Compustat
Short-term debt change	The ratio of changes in short-term debt (DLCCH) to total assets (AT)	Compustat
Long-term debt issuance	The ratio of long-term debt issuance (DLTIS) to total assets (AT)	Compustat
Debt reduction	The ratio of long-term debt reduction (DLTR) to total assets (AT)	Compustat
Debt-equity choice	The ratio of net debt issuance (*Net Debt issuance*) to equity issuance (*Equity issuance*)	Compustat
Fluidity	A text-based, firm-specific measure of competitive threat developed by Hoberg et al. (2014)	Hoberg-Phillips Data Library
Institutional ownership	The percentage of shares outstanding held by institutional investors	Thomson-Reuters 13-F filings