MiFID II unbundling and sell-side analyst research☆

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ABSTRACT

We examine broad effects of MiFID II, which mandated unbundled pricing of analyst research in the European Union beginning in 2018. We find significant reductions in sell-side analyst following, particularly for firms for which the marginal analyst was less important (larger, older, less volatile firms with greater coverage and more accurate forecasts). High quality analysts (more accurate, experienced, and in positions of seniority) were more likely to leave the sell-side and move to the buy-side, while remaining sell-side analysts increased efforts to make their forecasts more informative (more accurate, more detailed, and more likely to include informative recommendations resulting in larger stock price responses). Firms responded to a loss of sell-side coverage with more frequent, forward-looking, and informative investor relations events, especially for firms that lost the most coverage. Our results support recent theoretical analysis predicting that unbundling had significant implications for sell-side research, buy-side research, and firm responses.

1. Introduction

Seeking to restore confidence in financial markets after the 2008 financial crisis, the European Union (EU) instituted the Markets in Financial Instruments Directive (MiFID) II to enhance financial market regulation and improve investor protection. The legislative framework is intended to standardize practices across the EU and increase transparency. A major component is the requirement that sell-side brokerages unbundle payments for research from execution costs to increase transparency and flexibility of payments. This component responded to the concern that brokers bundled research ("soft dollars") with execution costs to induce investment funds to steer trading to their brokerages. Bundled research costs were "hidden" as part of trading costs reported by investment funds to investors, limiting their ability to scrutinize the discretionary component of

research expenditures. MiFID II gives investment funds flexibility to choose whether to purchase research (and how much) and increases the visibility and potential scrutiny over research payments to assist investors in managing expenses.[1]

Commentators argued that MiFID II constituted "one of the largest global regulatory packages in the past ten years" (Hopfensperger, 2018) and that its development has been "dominating the thoughts of financial professionals across Europe and beyond." (Exane BNP Paribas, 2017). MiFID II significantly changed incentives for sell-side analysts at brokerages that provide execution and research to investment funds (Bloomberg, 2019). The additional transparency under MiFID II has potential implications for sell-side analyst following, effort levels, research quality, and career options, as well as potential spillover implications for buy-side research and company investor relations efforts.

Our primary empirical analysis uses a difference-in-differences design to compare analyst (and related) activity in the EU to that of the US from 2015 through 2018. Analyst activity in the US was stable over that period and provides a plausible counterfactual because the US faced similar economic forces but was not subject to MiFID II, and controls can be included to mitigate potential remaining differences. Data from 2015 through 2017 constitute the "pre" period and should be relatively unaffected by MiFID II.[2] Data beginning in 2018 constitute the "post" period after MiFID II was implemented.

We use recent theoretical insights on the incentive effects of analyst research unbundling in Zhao and Zhao (2022; hereafter ZZ) to develop predictions on the effects of unbundling for sell-side analysts, buy-side analysts, and corporate investor relations activities. ZZ (2022) extend a delegated portfolio management model (e.g., Admati and Pfleiderer, 1997) to examine agency issues raised by research bundling.[3] A key insight is that, when sell-side research costs are unobservable and bundled with execution fees (pre-MiFID II), investment funds have incentives to overinvest in sell-side research. With unbundling (post-MiFID II), investors can observe and contract on how much sell-side research the investment firm can use, which effectively mitigates agency issues associated with the investment funds extracting rents from the investor.

We examine five main research predictions based on the ZZ (2022) framework. First, did MiFID II reduce overall sell-side research coverage? Consistent with business commentary (Bloomberg, 2019) and other research (Fang et al., 2020; Guo and Mota, 2021), we document an economically and statistically significant decrease in analyst coverage for EU firms relative to US controls of about 10−15%.

Second, what types of firms lost coverage? Given that unbundling forces buy-side investment funds to internalize the cost of the sell-side research they purchase (and therefore become choosier about the research they purchase), ZZ (2022) suggest that the reduction in coverage will be larger for firms for which it is more difficult to justify the contribution of the marginal analyst (older, more stable, larger firms with greater analyst following and more accurate consensus forecasts). Predictions in the press were mixed as to which firms would be most affected, with some suggesting small firms (e.g., Bloomberg, 2019), some suggesting medium firms (e.g., Wall Street Journal, 2018), and some suggesting large firms (e.g., Integrity Research Associates, 2019). Current EU plans to relax unbundling for small firms (market value of less than €1 billion) in light of COVID reflect a belief that they were most affected. Consistent with predictions in ZZ (2022), however, we find that the loss of coverage was concentrated in medium and large firms, with no evidence of a reduction for small firms. Controlling for size, the effect was largest for firms with greater coverage, older firms, firms with less volatile returns, and firms for which consensus forecasts were more accurate prior to MiFID II. In other words, the reduction in sell-side coverage was greatest for firms for which the contribution of the marginal analyst was likely to be smaller.

Third, did individual analysts leave the sell-side, and if so, which ones left and where did they go? We use hand-collected data from LinkedIn profiles of sell-side analysts to understand the movement of analysts around MiFID II. ZZ (2022) suggest that MiFID II reduced the artificial sell-side advantage created by bundling, decreasing demand for sell-side research as buy-side investment funds replaced purchases of sell-side research with in-house buy-side research. The reduction in demand for sell-side research could manifest in a reduction in the quantity of sell-side analysts, a reduction in the quality of the average sell-side analyst, or both.[4] Following MiFID II, we document a net migration of individual analysts from the sell-side, primarily to the buy-side. Higher-quality analysts were disproportionately likely to leave the sell-side and move to the buy-side. This result runs counter to the predictions of some practitioners that sell-side analysts who stay would be the best analysts (e.g., Exane BNP Paribas, 2017) but is consistent with the intuition in ZZ (2022).

Fourth, how do remaining sell-side analysts change their output after MiFID II? ZZ (2022) suggest that, because buy-side investment funds internalize more of the cost of sell-side research they consume after unbundling, they become choosier about the types of research they purchase, limiting purchases to high value-added research (research that uncovers novel and idiosyncratic information that permits them to identify specific misvalued stocks). That puts pressure on remaining sell-side analysts to differentiate themselves by, for example, focusing on fewer firms and issuing more in-depth reports. We find that,

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[1] As discussed in Section 2.1, other provisions related to execution and transactional reporting are less likely to have direct implications for analyst research. Our empirical analyses, when appropriate, include controls for potential other changes.

[2] Brokerages may have started taking action (e.g., redeploying analysts) once the requirements became clear in 2017 in anticipation of the effective date of MiFID II in January 2018. We find evidence of an anticipatory response in the 4th quarter of 2017, the quarter before MiFID II formally took effect.

[3] ZZ (2022) model interactions between: (1) brokerages that conduct sell-side research and provide trade execution, (2) buy-side investment funds that make investment decisions based on inhouse buy-side research and purchased sell-side research and (3) investors who contract with investment funds to manage their money.

[4] ZZ (2022) operationalize research output as increasing the probability of identifying a misvalued asset, which could occur through increased research quantity and/or increased quality (they do not differentiate between the two). We examine both components (quantity and quality) separately to understand the underlying mechanism.

post-MiFID II, remaining analysts follow fewer firms and increase the quality and thoroughness of the reports on the firms they still follow (increased forecast accuracy, more line items forecasted, and more frequent inclusions of buy/sell recommendations). In addition, they update recommendations more frequently, and issue fewer "hold" recommendations and more extreme recommendations (strong buys or sells). Consistent with increased information content, the market reaction to individual analyst reports increases. However, when aggregated to the firm level, the total sell-side analyst informativeness significantly decreases (i.e., the decreased overall quantity of sell-side research reports outweighs the improved content of the remaining sell-side research reports).

Finally, how do firms respond to the reduction in sell-side research? ZZ (2022) predict that firms will respond to lost sell-side coverage with enhanced investor relations efforts. We find that, post-MiFID II, affected firms increased the frequency of media events, including both earnings calls and analyst days. The effect is particularly pronounced for firms that lost the most sell-side coverage. Corporate events became longer, with more time spent on executive presentations, analyst questions, and corporate responses, and more senior executive participation. There is a particularly large increase in forward-looking statements, consistent with the Balakrishnan et al. (2014) finding that firms respond to exogenous decreases in analyst following by increasing forward-looking guidance.

In terms of timing, the reaction to MiFID II was swift, perhaps reflecting anticipation of, and planning for, the unbundling requirements given that they had been in the works for some time. The drop in sell-side coverage began in 2017 Q4, one quarter before the initiation of MiFID II, consistent with anticipation by sell-side brokerages. Similarly, analyst migration from the sell-side to the buy-side began almost immediately post-MiFID II, and brokerages responded to increased pressure associated with unbundling by swiftly reoptimizing the portfolios of the remaining analysts.

Our primary contribution is in providing broad insight into the effects of MiFID II unbundling on the analyst industry and firm responses. While discussions of unbundling in the business press (e.g., Bloomberg, 2019) and academic literature (Guo and Mota, 2021; Fang et al., 2020) suggest that sell-side coverage decreased following MiFID II, the associated changes in incentives had potentially broader effects for affected analysts and firms. We focus on providing a deeper understanding of how the changes affected the sell-side labor market, buy-side incentives, and firm-level investor relations.

Second, we contribute to the literature on "soft dollar" brokerage payments. In the US, safe harbor provisions permit advisors to incur soft dollar research and brokerage costs if the commission is "reasonable" given the execution and products or services received (Biffany, 2018). As with bundling, clients only observe overall execution costs. Although soft dollar payments are pervasive and controversial, research on their effects is limited because unbundled payments are unobservable (both to researchers and investors). While some have argued that soft dollar payments are an efficient and effective arrangement (e.g., Johnsen, 2009), others suggest that bundling creates opacity and harms investors (Edelen et al., 2012; Erzurumlu and Kotomin, 2016). We add to this literature by examining a plausibly exogenous regulatory shock to research bundling.[5]

Third, our results contribute to studies that examine the consequences of shocks to analyst coverage in the US based on brokerage house mergers and closures that reduced analyst coverage (e.g., Wu and Zang, 2009; Hong and Kacperczyk, 2010; Kelly and Ljungqvist, 2012; Balakrishnan et al., 2014; Merkley et al., 2017) and regulatory changes such as NYSE deregulation (Jarrell, 1984) and NASD 2711 Rule and Global Settlement aimed at mitigating analyst bias emanating from investment banking conflicts of interest (Kadan et al., 2008; Corwin et al., 2017). While those events largely focus on shocks to the *supply* of analysts (e.g., due to redundancy associated with mergers), MiFID II represents a shock to the *demand* for sell-side coverage. Further, our results using LinkedIn data provide what is, to our knowledge, the first empirical evidence on the labor market for analysts in general and determinants of analysts' movements in particular.

Our results should be of interest to several constituencies. EU regulators continue to finetune the MiFID II rules, and evidence is particularly timely given that the EU is partially rolling back unbundling requirements for small firms (companies with less than €1 billion in market capitalization) to reduce MiFID's impact in light of COVID-19. Our results suggest that negative coverage effects associated with MiFID II were concentrated among medium and large firms, with no effect on small firms. While it is difficult to draw normative conclusions, our results indicate larger effects in contexts in which the contribution of the marginal analyst was smaller.

In addition, the SEC has long been concerned about the effects of "soft dollar" bundling in US markets, and MiFID II provides a unique natural experiment to observe effects in a similar economic setting (Jackson and Zhang, 2022). The SEC is currently considering unbundling rules like those in MiFID II, which makes timely research important to inform their deliberations. Further, MiFID II is an important shock with the potential to provide insight into the effects of "soft dollar" bundling and economic drivers of analyst activity more generally.

2. Background

Implemented in 2007, the Markets in Financial Instruments Directive (MiFID) was designed to increase transparency in EU financial markets and standardize regulatory oversight. The goal was for all EU members to share a common, robust, and

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[5] In their review of the soft dollar literature, Jackson and Zhang (2022) note, "Prior empirical studies of the matter exist but have been limited, in part because good datasets about unbundled commissions have not generally been available to independent researchers. With MiFID II, however, a natural experiment has been created."

transparent regulatory framework to enhance investor protection. The 2008 financial crisis prompted the design of MiFID II to further strengthen cooperation across member states and improve incentives and transparency in financial markets.

MiFID II was one of the most significant regulatory changes in recent decades, spanning research, execution, and transaction reporting. The main objectives were to improve the quality and value of sell-side research, provide assurances to investors of best trading execution, and improve transaction reporting to regulators. The best execution component raises the hurdle for investment funds from taking "reasonable steps" to benefit their clients to taking "all sufficient steps" and requires them to publish data on execution quality (cost, speed, etc.) at least annually without charge. The transaction reporting component increases the range of data that brokerages report to regulators.

Our primary focus is on the unbundling of research from execution costs, which has attracted the bulk of attention given its potential effects on brokerages, sell-side analysts, investment funds, investor relations departments, and investors, both intended and unintended (Jefferies, 2017). Although potential effects were thought to be substantial, the directions, cross-sectional variation, spillovers, and magnitudes were less clear. The effects are subtle because MiFID II did not directly affect research output but, rather, increased the ability of investment funds to separately purchase, and increased transparency over amounts paid for, research. Requirements on research unbundling applied to investment funds and brokerages operating in the EU.

Changes to unbundling in MiFID II were a response to regulators' concerns that brokerages used "soft dollar" research to attract trading volume from investment funds. Under pre-MiFID II bundling, the final investor observed (1) raw returns (net of bundled execution costs and purchased sell-side research) and (2) management fees charged by the buy-side investment fund. Because sell-side research costs were bundled, they could be passed on to investors as part of execution costs as opposed to management fees (which are observable and closely tracked by investors). As a result, a euro spent by the investment fund on in-house buy-side research would increase the fee ratio, while the same "soft" euro spent on sell-side research would be directly deducted from the gross return.[6]

While MiFID II did not directly limit the ability of brokerages to charge for research, it made the cost of research visible and contractable, removing a potential artificial advantage of sell-side research relative to buy-side research. As a result, it created incentives for investment funds to bring research in-house, increased demand for disclosure by corporate investor relations departments, and affected the overall mix of information available to investors.

2.1. Other aspects of MiFID II

Our primary focus is on the effect of MiFID II in unbundling analyst research. As noted above, there were also effects on execution and transaction reporting. With respect to execution, MiFID II instituted more stringent restrictions on high frequency and algorithmic trading, venue restrictions for EU securities, limits on dark pools (such as volume limits and suspensions for violators), and tick size changes. MiFID II also introduced the Markets in Financial Instruments and Amending Regulation (MiFIR), which implemented requirements regarding timely reporting of trades, pre- and post-trade reporting, and inclusion of personal information in transaction reporting to regulators.

For our empirics, a potential concern is that execution or transaction reporting changes might have indirect effects on analysts.[7] In terms of transaction reporting, it is unlikely that there would be a significant effect because reporting is primarily to regulators (as opposed to the public). Another possibility is that the reporting burden could be onerous for brokerages, with implications for resource allocation to research. However, it seems unlikely that reporting requirements would be sufficiently onerous to affect overall brokerage operations. We include brokerage size as a control in our analyst- and forecast-level regressions to mitigate resource differences across brokerages.

In terms of execution restrictions, MiFID II's goal was to improve market quality by reducing transaction costs. That should bias against our findings of a deterioration in the overall informativeness of sell-side research after implementation. Further, results are robust to controls for tick size changes and dark trading suspensions, which were two of the key execution-related components of MiFID II.

More generally, it is difficult to envision how those execution and transaction reporting changes would affect which analysts leave the sell-side industry, where they move, the quality of research by remaining sell-side analysts, or changes in firm-level communication post-MiFID II. Nevertheless, we cannot completely rule out other potential effects of MiFID II.

2.2. Empirical predictions

Because the potential incentive effects of MiFID II are multifaceted, we motivate our empirical analyses using the ZZ (2022) theoretical framework, which models research bundling and its incentive effects on brokerages (sell-side), investment funds (buy-side), and investors in an agency setting to derive predictions about changes to the broad research landscape.

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[6] As Jackson and Zhang (2022) argue, it is difficult for investors to infer the level of execution costs relative to bundled sell-side research costs given the variety of variables that factor into gross returns.

[7] Recent research questions the effectiveness of MiFID II execution and transaction regulations. Johann et al. (2019) find that, while suspensions may have limited dark pool trading, there were no significant effects on liquidity or price efficiency. Martins Pereira (2020) argues that the MiFID II definition of algorithmic trading lacks breadth, undermining its effectiveness.

ZZ (2022) model an economy in which an investor (principal) delegates portfolio management to a buy-side investment fund (agent) following research such as Admati and Pfleiderer (1997).[8] In the typical delegated asset management model, the agency problem lies in the fact that the portfolio manager can exert effort to acquire information about a specific asset, but their effort is unobservable, and return performance is partially a function of effort and partially random. As a result, the optimal contract is second-best.

ZZ (2022) add a second agency conflict created by the fact that, rather than exerting their own effort, buy-side managers can substitute research purchased from sell-side brokerages. Under bundling (pre-MiFID II), the cost of purchased sell-side research was comingled with execution costs (which are partially random) and was therefore unobservable. The resulting equilibrium is "third-best," with the buy-side manager extracting rents from the investor by exerting low effort and over-investing in sell-side research while passing on the research costs (bundled with execution costs) to investors. Mandated unbundling (post-MiFID II) makes the cost of sell-side research observable and contractible, reducing agency issues. Essentially, bundling sell-side research with execution costs created an artificial advantage for the sell-side relative to buy-side research. With unbundling, sell-side research loses that advantage, and, as a result, demand drops for sell-side research, leading to our first prediction.

Prediction 1: Restrictions on bundling reduce the quantity of sell-side research.

While there will be overall reductions in sell-side research spending under unbundling, the effect will not be uniform across stocks. ZZ (2022) argue that with unbundling, investment managers become "choosier" about the more limited research they purchase from the sell-side because they internalize more of the research costs. As a result, the reduction will be more pronounced in stocks for which the marginal value of an incremental unit of sell-side research to understanding idiosyncratic firm value is the smallest. Given prior research (Bhushan 1989; Frankel et al., 2006; Kim et al., 2019), we expect the value of an incremental analyst to be smaller for firms that are less volatile, older, larger, with higher levels of existing coverage and greater consensus forecast accuracy.[9]

Prediction 2: Coverage losses will be greater for firms for which the contribution of the incremental analyst was smallest (lower-volatility, older, larger firms, with higher analyst coverage and relatively accurate consensus forecasts).

In the ZZ (2022) framework, a key consequence of sell-side research losing its artificial advantage under unbundling is that investment funds will shift research that had been outsourced to sell-side brokerages to in-house buy-side analysts. Reflecting the shift in research demand from the sell-side to buy-side research, we expect a movement of analysts from sell-side brokerages to buy-side investment funds, both in terms of the number and quality of analysts.[10]

Prediction 3: Analysts will leave the sell-side and move to the buy-side. The effect will be felt in terms of both the quantity and quality of analysts.

ZZ (2022) predict that, given the need to justify spending on unbundled research post-MiFID II, investment funds will become more selective in picking specific research to purchase. As a result, sell-side brokerages will attempt to enhance the value of their research by focusing more intensively on fewer firms, increasing the detail in their reports, providing more informative recommendations, and increasing forecast accuracy.

Prediction 4: Remaining sell-side analysts will follow fewer firms, and reports will become more disaggregated, more accurate, and more likely to include informative recommendations, and will elicit a larger stock price response.

In the ZZ (2022) framework, the reduction in sell-side research associated with unbundling is not entirely compensated by the increase in buy-side research, creating an information vacuum, particularly for firms most affected by the loss of sell-side analyst coverage. ZZ (2022) suggest that firms experiencing a decrease in sell-side coverage will respond by engaging more actively with analysts and investors.[11] We expect firms to respond to the loss in coverage by sponsoring more investor relations events (e.g., earnings calls and analyst days), where they interact directly with analysts to facilitate coverage, respond to questions, and provide additional information and insight into corporate events. During those events, we expect firms to engage more intensively in terms of length of calls, content, executive participation, and forward-looking guidance, particularly for firms that lost coverage.

Prediction 5: Firms will respond to the reductions in sell-side analyst coverage by increasing the quantity and intensity of firm-initiated interactions with analysts and investors, with the effect concentrated among the firms that lost the most coverage.

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[8] See Stracca (2006) for a review of key papers related to delegated portfolio management.

[9] Press coverage was mixed in terms of which firms would be most affected, with some suggesting small firms (e.g., Bloomberg, 2019), some medium firms (e.g., Wall Street Journal, 2018), and some large firms (e.g., Integrity Research Associates, 2019).

[10] ZZ (2022) model research output as increasing the probability of identifying a misvalued security. As a result, a decrease in research would reflect some combination of a decrease in the quantity and/or quality of analysts (ZZ, 2022, do not separately model the components). While it is possible that a decrease in research demand would result in a decrease in exclusively quantity or quality of analysts, we expect the effect to be felt on both margins, especially if there are fixed costs to an analyst moving to the buy-side. On the other hand, some practitioners argued that the best analysts would stay on the sell side, reflecting a "flight to quality" under MiFID II (e.g., Exane BNP Paribas, 2017).

[11] The argument is similar to Balakrishnan et al. (2014) who show that firms experiencing an exogenous decrease to analyst coverage as a result of brokerage closures responded by increasing voluntary disclosure.

Table 1
List of countries and mean analyst following.

Country	Num Obs	Avg # Analysts
Austria	421	0.89
Belgium	176	1.09
Bulgaria	16	0.06
Cyprus	41	1.71
Czech Republic	55	0.95
Germany	2525	1.60
Denmark	585	3.52
Spain	581	1.26
Estonia	32	0.38
Finland	1238	3.01
France	338	0.87
Greece	197	0.76
Croatia	32	0.09
Hungary	48	1.19
Ireland	16	2.19
Italy	645	0.78
Lithuania	32	0.16
Luxembourg	67	1.21
Malta	27	2.19
Netherlands	229	1.39
Poland	627	0.46
Portugal	80	2.66
Romania	94	0.32
Slovenia	16	0.06
Sweden	2389	2.27
EUROPE	10,507	1.78
United States (control)	48,923	7.13

This table lists the countries included in our sample, the number of firm-quarter observations during our 2015−2018 sample period, and the mean firm-level analyst coverage, averaged across all firms and all quarters within each country.

3. Sample and research design

3.1. Sample

We use Compustat (Global) as our source of financial and market data for US (EU) firms.[12] We obtain quarterly analyst forecast data from I/B/E/S. Our primary sample period is from the 1st quarter of 2015 until the 4th quarter of 2018, and we define the 1st quarter of 2018 as the beginning of the post-MiFID II period. We exclude firms that do not have at least one-quarter of analyst forecast data during our sample period or that have less than $10 million in total assets. We use quarterly data in our primary analysis for consistency between the EU and US samples and to permit multiple observations per firm around the MiFID II transition.[13] We use all EU firms as our treatment sample and all US firms as our control sample.[14]

Our analyst-level employment data come from a combination of I/B/E/S, Bloomberg, and hand-collection from LinkedIn, and our corporate events are from Capital IQ Global Transcripts. We use LinkedIn to gather data on analyst movements around MiFID II adoption. We gather analyst names from I/B/E/S and Bloomberg. Following a methodology similar to Guo and Mota (2021), we categorize analysts as "treated" if at least 70% of firms covered during the sample period are domiciled and listed in Europe and as "controls" if no more than 30% of firms covered during the sample period are European.[15] We provide detailed steps of how we gathered and filtered our data on page 2 in the Internet Appendix. After deleting analysts whom we could not categorize based on location, those for whom we were unable to find a useable LinkedIn profile, and those that were missing

Table 2
Descriptive statistics.

Variable	N	Mean	Std Dev	Q1	Median	Q3
Firm Level Variables						
Coverage	59,430	6.188	6.692	1.000	4.000	9.000
Ret_Vol	59,430	0.024	0.015	0.014	0.020	0.029
Earn_Vol	59,430	0.021	0.041	0.003	0.008	0.020
Loss	59,430	0.299	0.458	0.000	0.000	1.000
Intan	59,430	18.048	21.670	0.646	7.763	30.646
Size	59,430	7.249	2.141	5.755	7.292	8.678
Lev	59,430	0.579	0.265	0.399	0.577	0.762
ROA	59,430	−0.007	0.058	−0.004	0.005	0.016
Firm_Age	59,430	21.365	15.734	9.000	18.000	27.000
MtB	59,430	2.868	3.318	1.080	1.849	3.467
GDP_Percap	59,430	10.821	0.189	10.837	10.858	10.880
GDP_Growth	59,430	2.271	0.728	1.485	2.273	2.862
Avg_Analyst_Firms	50,939	13.779	6.078	10.500	13.938	16.750
Avg_Analyst_Forecasts	50,939	18.541	9.137	13.143	17.750	22.667
Analy_Info	59,425	0.098	0.124	0.004	0.060	0.142
EPSOnly_Info	59,425	0.088	0.106	0.000	0.053	0.130
Recommend_Info	59,425	0.008	0.021	0.000	0.000	0.000
Dark_Trading_Susp	59,430	0.015	0.122	0.000	0.000	0.000
Tick_Size_Change	59,430	0.002	0.041	0.000	0.000	0.000
All_Events	59,430	1.033	0.983	0.000	1.000	1.000
Earn_Calls	59,430	0.694	0.472	0.000	1.000	1.000
Analyst_Days	59,430	0.026	0.162	0.000	0.000	0.000
Lose_Cov	59,430	0.420	0.494	0.000	0.000	1.000
All_Events_Sec	59,430	3033.930	3634.610	0.000	2451.000	3918.000
Earn_Calls_Sec	59,430	2005.960	1591.100	0.000	2246.000	3306.000
Analyst_Days_Sec	59,430	307.016	2043.000	0.000	0.000	0.000
Present_Words	59,430	3227.830	4917.270	0.000	2356.000	3796.000
Question_Words	59,430	968.211	1111.520	0.000	725.000	1450.000
Answer_Words	59,430	2944.200	3868.990	0.000	1935.000	3966.000
PctFwdLook_EC	59,430	0.220	0.210	0.000	0.240	0.348
PctFwdLook_AD	59,430	0.005	0.062	0.000	0.000	0.000
Avg_Execs_EC	59,430	1.813	1.547	0.000	2.000	3.000
Avg_Execs_AD	59,430	0.147	1.034	0.000	0.000	0.000
Analyst/Brokerage Level Variables						
Stay_At_Firm	34,317	0.9678	0.1764	1.0000	1.0000	1.0000
Leave_SellSide	34,317	0.0113	0.1057	0.0000	0.0000	0.0000
Buy_Side	34,317	0.0032	0.0566	0.0000	0.0000	0.0000
Higher_Pos	34,317	0.0101	0.0999	0.0000	0.0000	0.0000
CSuite	34,317	0.0017	0.0413	0.0000	0.0000	0.0000
RF_Opt	34,317	0.0003	0.3478	−0.2055	−0.0027	0.2021
GExp	34,317	7.7629	6.9163	2.0000	6.0000	11.0000
N_Ind	34,317	2.9117	2.3542	1.0000	2.0000	4.0000
N_Firms	34,317	9.8288	6.9312	4.0000	9.0000	14.0000
Bro_Size	34,317	44.8270	47.1002	11.0000	25.0000	64.0000
Forecast Level Variables						
Sale_Forecast	496,144	0.567	0.495	0.000	1.000	1.000
Num_OtherVars	496,144	3.398	3.057	0.000	3.000	6.000
Accuracy	479,274	0.429	0.716	0.055	0.153	0.424
Recommend	496,144	0.072	0.259	0.000	0.000	0.000
Rec_Change	496,144	0.063	0.244	0.000	0.000	0.000
Nonhold_Rec	496,144	0.042	0.200	0.000	0.000	0.000
Extreme_Rec	496,144	0.014	0.118	0.000	0.000	0.000
CAR	491,890	0.061	0.043	0.028	0.050	0.087
FExp	496,144	9.181	8.432	2.000	7.000	14.000
FHor	496,144	66.032	33.716	35.000	82.000	91.000

This table presents descriptive statistics including the number of firm-quarter observations, sample mean, standard deviation, lower quartile, median, and upper quartile. All descriptive statistics of log-transformed variables (e.g., Coverage) are presented in their original form (not log-transformed) for ease of interpretation.

necessary data in I/B/E/S (e.g., experience, historical accuracy), we were able to collect LinkedIn employment data for 57.3% of analysts and 72.2% of analyst-quarters from our original analyst sample.[16]

Table 1 reports the number of firm-quarter observations and the average analyst coverage by country. Our US control sample is larger than our EU sample, and more analysts follow the typical US firm than the typical EU firm. Our EU sample is spread across 25 countries, with Germany and Sweden contributing the most observations (2525 and 2,389, respectively). Our main regressions are robust to using entropy balancing and propensity score matching to ensure that any remaining differences between US and EU firms do not drive our results, and to examining changes only within the EU to ensure that US controls do not drive the results.

3.2. Descriptive statistics

Table 2 presents descriptive statistics for our primary firm-, country-, analyst-, brokerage-, and forecast-level variables. Variable definitions are included in Appendix A. Both the mean and median firms have $1.4 billion in total assets (unlogged *Size*), the mean (median) firm has been in existence for 21 (18) years (*Firm_Age*), and nearly 30% of sample firms report a loss (*Loss*). The average firm has just over one corporate event per quarter, and nearly 70% of firm-quarters have an earnings call. At the individual forecast level, 57% of forecasts contain a supplementary sales forecast (*Sale_Forecast*), analyst reports include forecasts of about 3 variables in addition to EPS (*Num_OtherVars*), and 7.2% of forecasts contain stock recommendations (*Recommend*). We report descriptive statistics by treatment and control group in Table IA.1 of the Internet Appendix.

3.3. Research design

Our primary analyses are based on difference-in-differences regressions comparing outcomes between the EU and the US around MiFID II adoption. We conduct three sets of analyses (firm-, analyst- or forecast-level) depending on our specific research question. In all of our analyses, continuous, unlogged measures are winsorized at the 1 and 99% levels.[17]

3.3.1. Firm-level analysis

For analyst coverage and other firm-quarter outcomes, we estimate a difference-in-differences model of firm outcomes on firm- and country-level variables and fixed effects. Our basic regression specification is:

$$Coverage\ (Firm\ Outcome) = \alpha + \beta 1*I(Treat)*I(Post) + \beta 2*(X) + \text{Fixed Effects} + \eta.$$

Coverage is the log of one plus the number of analysts who issued quarterly EPS forecasts for a given firm-quarter. The primary variable of interest, *I(Treat)*I(Post)*, is an interaction of *I(Treat)*, which equals one if the firm is from an EU country; and *I(Post)*, which equals one if the observation is post-2017. *X* is a vector of firm- and country-level controls. We include firm and year-quarter fixed effects to control for unobservable firm- and time-trend characteristics and cluster standard errors by firm.

Other firm outcomes include two measures of analyst focus: the number of firms covered by the average analyst covering a given firm (*Avg_Analyst_Firms*) and the total number of forecasts issued in a quarter by the average analyst covering the firm (*Avg_Analyst_Forecasts*); three measures of sell-side research informativeness based on stock market reactions: all analyst forecasts (*Analy_Info*), forecasts limited to EPS (*EPSOnly_Info*), and forecasts supplemented by recommendations (*Recommend_Info*); and variables capturing the quantity and characteristics of corporate media events, including earnings calls and analyst days (audio length, number of words spoken, amount of forward-looking information, and the number of participating firm executives). Details are in Section 4.6.

We follow prior literature (e.g., Mola et al., 2013; Fang et al., 2020) and control for the logged value of total assets in US dollars (*Size*), the standard deviation of daily returns (*Ret_Vol*), profitability (*ROA*), the standard deviation of quarterly ROA (*Earn_Vol*), a loss indicator (*LOSS*), intangible assets (*Intan*), leverage (*Lev*), market to book ratio (*MtB*), and firm age (*Firm_Age*). We include logged GDP per capita (*GDP_Percap*) and GDP growth (*GDP_Growth*) to control for country-level characteristics. In market reaction tests, we also control for dark pool trading suspensions (*Dark_Trading_Susp*) and tick size changes (*Tick_Size_Change*), as other non-research provisions of MiFID II could affect market outcomes. In our corporate media event analyses, we also control for *Coverage*.

3.3.2. Analyst-level analysis

To examine analyst movement in response to MiFID II, we estimate an analyst-quarter-level difference-in-differences model of various measures of analyst employment outcomes on analyst- and brokerage-level control variables and fixed effects. Our basic analyst-level regression specification is:

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[16] Analysts we are able to match are similar to those we are unable to match in terms of forecast accuracy and optimism. Matched analysts tend to be more experienced than unmatched analysts (mean of 7.8 vs. 6.9 years), cover more firms (2.1 vs. 1.9 firms) in more industries (1.2 vs. 1.1 industries), and work for smaller brokerages (45 vs. 52 analysts).

[17] The exception is the market-to-book ratio, which we winsorize at the 2.5 and 97.5% levels reflecting the frequency of extreme values driven by high market capitalizations coupled with small denominators for firms with near-zero book values. Results are consistent if we instead winsorize market-to-book at the 1 and 99% levels.

$$Analyst\ Outcome = \alpha + \beta 1*I(ATreat)*I(Post) + \beta 2*(X) + \text{Fixed Effects} + \eta.$$

Analyst Outcome includes indicator variables for staying at the brokerage firm (*Stay_At_Firm*), leaving the sell-side (*Leave_SellSide*), moving to the buy-side (*Buy_Side*), moving to a higher position (*Higher_Pos*), or moving to the C-Suite (*CSuite*) at the new firm.[18] The primary variable of interest is *I(ATreat)*I(Post)*; *I(ATreat)* equals one for EU analysts and zero for non-EU analysts.

Following prior literature such as Hong and Kacperczyk (2010) and Guan et al. (2019), controls include relative forecast optimism (*RF_Opt*), analyst sell-side experience (*GExp*), logged brokerage size (*BroSize*), logged number of industries covered by the analyst (*NInd*), and logged number of firms covered by the analyst (*NFirm*). All specifications include analyst, year-quarter, and brokerage fixed effects, and we cluster standard errors by analyst.[19]

3.3.3. Forecast-level analysis

To examine changes in forecast characteristics for EU firms after MiFID II, we estimate forecast-level difference-in-differences regressions of forecast characteristics on analyst-, brokerage-, firm-, and country-level control variables and fixed effects. The unit of observation is the individual quarterly forecast made by a given analyst for a given firm during (and for) a given quarter. We limit our sample to a one-quarter forecast horizon given our limited post-MiFID II period. Our basic forecast level regression specification is:

$$Forecast\ Characteristics = \alpha + \beta 1*I(Treat)*I(Post) + \beta 2*(X) + \text{Fixed Effects} + \eta$$

Forecast Characteristics are: an indicator for inclusion of a sales forecast (*Sale_Forecast*); number of other line-items (besides EPS) forecast (*Num_OtherVars*); forecast accuracy (*Accuracy*); and indicators for inclusion of a recommendation (*Recommend*), a recommendation change (*Rec_Change*), a non-hold recommendation (*Nonhold_Rec*), and an extreme buy/sell recommendation (*Extreme_Rec*). The variable of interest is *I(Treat)*I(Post)*. We require that forecasts have a non-missing EPS and that the analyst identifier is not missing or unknown (i.e., not coded as 000000 in I/B/E/S).

We include the same firm- and country-level controls from the analyst coverage regressions. In addition, we add brokerage-, forecast-, and analyst-level controls following papers such as Clement and Tse (2003) and Keung (2010). We include the log of brokerage size (*BroSize*), analyst experience at the firm (*FExp*), analyst general sell-side experience (*GExp*), forecast horizon (*FHor*), the logged number of industries covered by the analyst (*NInd*), and the log number of firms covered by the analyst (*NFirm*). We include firm, analyst, brokerage, year-quarter fixed effects, and cluster by firm.

4. Results

4.1. Changes in analyst coverage

Table 3 presents results using various specifications for our first prediction that analyst coverage decreased following MiFID II. Panel A, Column 1, reports results with firm and year-quarter fixed effects, but no other controls. We find a statistically significant and negative coefficient (coefficient = −0.046, t-stat = −3.56) for our primary variable of interest, *I(TREAT)*I(POST)*, which indicates a drop in analyst coverage for EU firms relative to US firms following MiFID II. In Column 2, we include firm- and country-level control variables, along with country, industry, and year-quarter fixed effects. Results *I(TREAT)*I(POST)*, are stronger, both in magnitude and significance (coefficient = −0.050, t-stat = −3.70). Column 3 is the most restrictive in that we include firm and year-quarter fixed effects along with all controls. Results are strongest for this specification, both in magnitude and significance (coefficient = −0.057, t-stat = −4.53). Based on Column 3, for the average EU firm, MiFID II was associated with an approximate 10% decline in analyst following relative to the US controls.[20]

The fact that results are consistent across a range of controls is reassuring because it indicates that conclusions are not sensitive to specification. Going forward, we report results with firm and year-quarter fixed effects along with controls (analogous to Table 3, Panel A, Column 3) because it is the most conservative in controlling for firm and time-period effects, as well as a range of other variables.

An issue with the preceding analysis is that some EU firms did not have quarterly analyst coverage pre-MiFID II and, hence, could not lose coverage. An alternate approach is to limit the analysis to firms with nonzero coverage pre-MiFID II. Results are reported in Column 4. The coefficient on *I(TREAT)*I(POST)* nearly doubles (coefficient = −0.112, t-stat = −5.47), which translates into a 15% decrease in coverage for firms with analyst following pre-MiFID II.

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[18] We categorize an analyst as moving to a higher position if the LinkedIn profile indicates a change from "Equity Analyst," "Analyst," etc., to a title containing "Head," "Director," "Senior," "Chief," "President," "VP," etc.

[19] Although it is possible that changes in coverage reflect decisions by brokerages to no longer include reports in I/B/E/S, the Financial Conduct Authority reports that, "Evidence does not suggest analyst contributions (to market data providers) have materially changed since MiFID II." (Financial Conduct Authority, 2019). Inclusion of analyst, brokerage and firm fixed effects ensures that comparisons are for the same analyst, brokerage, and firm over time.

[20] Economic significance is computed using mean pre-MiFID number of analysts following EU firms, 1.75 (untabulated), and the coefficient of −0.057.

Table 3

Analyst coverage. Panel A − effect of MiFID II on analyst coverage.

Specification	Coverage No controls	Coverage Country, Industry, Quarter Fixed Effects	Coverage Firm, Quarter Fixed Effects	Coverage Must have nonzero analyst following in pre-MiFID period
I (Treat)*I(Post)	−0.046***	−0.050***	−0.057***	−0.112***
	(−3.56)	(−3.70)	(−4.53)	(−5.47)
Ret_Vol		−0.095	−0.166	0.573**
		(−0.19)	(−0.67)	(2.03)
Earn_Vol		−0.366**	−0.525***	−0.429***
		(−2.31)	(−5.02)	(−3.18)
Loss		0.003	−0.026***	−0.018***
		(0.19)	(−4.57)	(−3.10)
Intan		0.002***	−0.000	−0.002***
		(3.83)	(−0.83)	(−3.16)
Size		0.335***	0.320***	0.316***
		(57.19)	(21.49)	(19.99)
Lev		−0.217***	0.063**	0.104***
		(−5.33)	(2.04)	(3.07)
ROA		−0.885***	−0.514***	−0.488***
		(−6.73)	(−7.78)	(−6.20)
Firm_Age		−0.005***	−0.022**	−0.008
		(−8.22)	(−2.38)	(−0.76)
MtB		0.044***	0.005***	0.005***
		(18.55)	(4.85)	(4.14)
GDP_Percap		−0.131	0.229	−0.682
		(−0.22)	(0.42)	(−0.99)
GDP_Growth		−0.013**	−0.013**	−0.003
		(−2.13)	(−2.12)	(−0.52)
N	59,430	59,158	59,430	39,165
R^2	0.90	0.61	0.90	0.88
Firm FE	Y	N	Y	Y
Country FE	N	Y	N	N
Industry FE	N	Y	N	N
Year-Qtr FE	Y	Y	Y	Y

Panel B − Cross Sectional Tests of Analyst Coverage following MiFID II

	Coverage	Coverage	Coverage	Coverage	Coverage
I (Treat)*I(Post)	0.026	−0.045***	−0.030	−0.103***	0.019
	(1.11)	(−3.01)	(−1.51)	(−6.89)	(0.88)
I (Treat)*I(Post)*Large	−0.113***				
	(−3.59)				
I (Treat)*I(Post)*Medium	−0.135***				
	(−4.35)				
I (Treat)*I(Post)*High_Cov		−0.063*			
		(−1.86)			
I (Treat)*I(Post)*High_Age			−0.047*		
			(−1.83)		
I (Treat)*I(Post)*High_Vol				0.115***	
				(4.32)	
I (Treat)*I(Post)*High_Acc					−0.130***
					(−4.99)
N	59,430	59,406	59,406	59,406	59,406
R^2	0.90	0.90	0.90	0.90	0.90
Controls	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y
Year-Qtr FE	Y	Y	Y	Y	Y

This table presents the effects of MiFID II on analyst coverage at the firm-quarter level. Specifically, we estimate OLS regressions of logged analyst coverage on indicator variables of whether the firm is affected by MiFID II (I(Treat)) and post-MiFID II (I(Post)), controlling for firm and country characteristics. Our main variable of interest is the average treatment effect captured by the coefficient of I(Treat)*I(Post). Panel A presents the results for different model specifications. Panel B presents the cross-sectional effects of MiFID II on coverage based on firm size, prior coverage, prior age, prior stock return volatility, and prior forecast accuracy. Besides size, splits are based on median values in the year prior to MiFID II (2017). For size, splits are based on sample terciles (Large, Medium, and Small). All variables are defined in Appendix A. Standard errors are clustered by firm. ***, **, * indicate significance at the 0.01, 0.05, 0.10 levels, respectively.

The difference-in-differences design relies on the parallel trends assumption. Fig. 1, Panel A plots the coefficients of the year-quarter indicators and associated confidence intervals analogous to Table 3, Panel A, Column 3. Coefficients for the pre-MiFID II periods are generally indistinguishable from zero, but, following MiFID II, coefficients are all significantly negative,
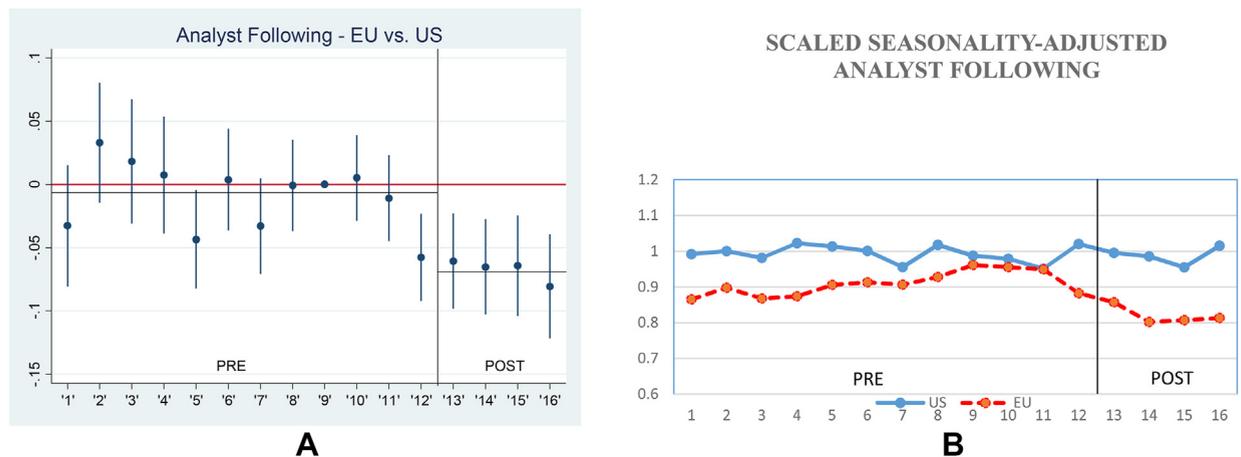
Figure 1. − **Graphical Display of Analyst Following**. Fig. 1 Panel A plots coefficients and associated 90% confidence intervals from an estimated difference-in-differences model of log-transformed analyst coverage (*Coverage*) on control variables, year-quarter, and firm fixed effects, same as the regression model in Table 3, Panel A, Column 3. The reference period is 2017 Q1. Panel B plots seasonality-adjusted analyst following scaled by the pre-sample analyst coverage (i.e., 2014 levels) separately for EU and US firms. Quarters 1−12 (13−16), as labeled on the x-axis, represent 2015 Q1 to 2017 Q4 (2018 Q1 to 2018 Q4), making up the pre-MiFID II (post-MiFID II) period. Standard errors are clustered at the firm level. **Panel A − Analyst Coverage effects of MIFID II (Difference-in-Difference estimates), Panel B − Analyst Coverage effects of MIFID II (EU and US firms)**.

suggesting that trends were similar prior to MiFID II but diverged following MiFID II.[21] There is some evidence of an anticipation effect, with coverage beginning to drop in 2017 Q4, once the terms of MiFID II were finalized (Financial Times, 2017). Panel B plots standardized analyst following pre- and post-MiFID II separately for EU and US firms.[22] There are no noticeable trends in US analyst coverage either pre- or post-MiFID II.[23] In contrast, EU firms experienced a notable decrease in 2017 Q4, which persists until the end of our sample period. Importantly, there are no noticeable pre-MiFID II trends for either the EU or US sample. The figures suggest a swift and anticipatory response by EU brokerages and analysts to the impending changes in research incentives once plans for MiFID II were finalized.

We replicate our analyses using entropy balancing for covariate balance between EU and US firms based on the controls from Table 3 (Hainmueller, 2012). Results using entropy balancing, as well as all of our other analyses, presented in the Internet Appendix, Table IA.6, Panels A−Q, are consistent with our primary analyses. In addition, we replicate our primary analyses with propensity score matching based on control variables from Table 3 using the nearest neighbor method to identify the three closest US observations for each EU observation. Our sample size decreases substantially and we cannot match on some controls (e.g., country-level variables), but the results (untabulated) are robust.

4.2. Variation in the effect of MiFID II on analyst coverage across firms

While the decrease in analyst following is consistent with predictions in the press (e.g., CFA Institute, 2019), it was less clear which firms would be most affected. Findings in the research literature are also mixed; Guo and Mota (2021) find that large firms experienced a greater decrease in analyst coverage post-MiFID II, while Fang et al. (2020) find a greater effect among small firms.[24]

In the ZZ (2022) framework, the effect of unbundling is not driven by firm size per se but, rather, by the incremental value added by the marginal analyst. Greater scrutiny facilitated by unbundling is predicted to lead to sell-side research cutbacks for firms for which the value added by the marginal analyst was lowest. We examine five firm characteristics to capture the incremental research value of the marginal analyst: size, age, pre-existing analyst coverage, return volatility, and forecast accuracy. We divide firms into small, medium, and large terciles based on total assets in 2017; for other characteristics, we split on the 2017 median value. To test for cross-firm variation in the effect of MiFID II, we interact *I(TREAT)*I(POST)* with indicators for firm characteristics.[25]

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[21] Figure IA.1 presents plots of the difference-in-differences coefficients without control variables.

[22] To present the two series on a comparable basis we scale by pre-sample coverage using the corresponding quarter in 2014 as our base level.

[23] Results are robust to using all non-EU firms as controls, using all non-US non-EU firms as controls (Table IA.2), having no control sample (Tables IA.3), extending the sample period from 2012 to 2019 (Table IA.4) and adding dark trading suspensions and tick size changes as additional controls (Table IA.5).

[24] Fang et al. (2020) define size as the residual from a regression of total assets on analyst following, while Guo and Mota (2021) use unadjusted market capitalization, which likely explains the conflicting results. While those studies split the sample into small and large firms, we split into small, medium, and large firms for consistency with discussion in the press.

[25] We include all main effects along with our triple interactions in our cross-sectional regressions. However, for parsimony, we do not present coefficients for all main effects.

Results in Table 3, Panel B, Column 1, indicate that MiFID II had a significantly negative effect on analyst following for medium firms (coefficient −0.135, t-stat = −4.35) and large firms (coefficient = −0.113, t-stat. = −3.59), while the effect for small firms was statistically insignificant. Figures IA.2-IA.4 in the Internet Appendix plot relative coverage changes for EU and US firms analogous to Fig. 1, split between large, medium, and small firms. Coverage for medium and large firms shows no clear pattern pre-MiFID II but a marked drop following MiFID II. There is no clear pattern for small firms, confirming the regression results.

To ensure that results are not sensitive to how we measure coverage, we assess robustness in two ways. First, we rerun the analysis using an indicator, *Lose_Cov*, which takes on a value of one if the firm lost coverage relative to the prior quarter. Second, we estimate a quarterly percentage change in analyst following, *Analyst_D*, based on the change relative to the prior quarter to control for general coverage of a firm (e.g., a firm with ten analysts has more analysts to lose than a firm with two analysts). Results reported in Table IA.7 in the Internet Appendix indicate that, in both cases, medium and large firms experienced a significant loss of coverage, but small firms did not.

A particular concern was that small firms might lose all coverage under MiFID II unbundling. To examine that possibility, we change the dependent variable to take a value of one if a firm had no analyst coverage in a quarter and zero otherwise. Because small firms have lower analyst following in general, we limit this analysis to quarters with one to three lagged analysts. Consistent with the results in Table 3, we find no evidence that small firms were more likely to lose complete coverage post-MiFID II (untabulated). Overall, our results run counter to the narrative that MiFID II disproportionately affected small firms as reflected, for example, in the EU decision to relax MiFID II unbundling regulations for small firms in light of COVID.

Next, we examine cross-sectional variation in the effect of MiFID II based on other firm characteristics. Prior research suggests that analyst following tends to strongly correlate with firm size (Bhushan, 1989). To separate coverage from size, we define an indicator, *High_Cov*, which takes a value of one for residuals above the median from a regression of coverage on market value of equity. We define indicators, *High_Age* and *High_Vol*, based on firms of above-median age and return volatility, as prior literature shows that analyst research is most informative for firms that are younger and more volatile (e.g., Frankel et al., 2006). We define an indicator, *High_Acc*, based on firms with above-median forecast accuracy pre-MiFID II. We predict that loss of coverage will be positively correlated with *High_Cov*, *High_Age,* and *High_Acc*, and negatively correlated with *High_Vol*.

Results in Table 3, Panel B, Columns 2−5 are consistent with expectations. The coverage loss was greater for firms with more coverage prior to MiFID II (Column 2), as well as for older firms (Column 3), with lower return volatility (Column 4), and greater consensus forecast accuracy (Column 5) in the year prior to MiFID II. Results are statistically significant in Columns 4 and 5 and marginally significant in Columns 2 and 3. Overall, our cross-sectional results are consistent with the prediction that unbundling reduced analyst coverage most for firms for which the contribution of the marginal analyst was likely to be lower. The primary effects were more pronounced for larger, well-covered, low-volatility, easy-to-forecast firms for which incremental analyst coverage was likely less important.

4.3. Effect of MiFID II on sell-side analyst employment

The preceding provides evidence on the types of firms that disproportionately lost coverage post-MiFID II. A related question is about the labor market implications of MiFID II. In particular, did individual analysts leave the sell-side (extensive margin), or did they just cover fewer firms (intensive margin)? If they left the sell-side, what were the characteristics of the analysts who left? Did they leave the sell-side entirely or just switch firms? And if they left the sell-side, where did they go?

I/B/E/S does not track the career paths of individual analysts, so our labor-market analysis is based on hand-matching analysts on I/B/E/S to LinkedIn and tracking career movements around MiFID II. Our specification changes relative to the prior analysis because the unit of analysis in Table 3 was firm-quarter (which firms lost analysts?), whereas here, the unit of analysis is analyst-quarter (which specific analysts left and where did they go?). We include analyst, brokerage, and year-fixed effects, along with controls, and use non-EU analysts as the control sample.

Table 4, Panel A, examines whether sell-side analysts were more or less likely to remain at the same brokerage (*Stay_At_Firm*) post-MiFID II and which analysts are more likely to do so. The significant negative coefficient on *I(ATreat)* I(Post)* in Column 1 indicates that, relative to non-EU analysts, EU analysts were significantly more likely to leave their brokerage after MiFID II. In terms of which analysts left, we measure analyst quality in three different ways. First, we split analysts based on their relative forecast accuracy (*RelAccuracy*) in the pre-MiFID II period. Analysts in the top tercile of relative forecast accuracy are categorized as *HighQuality,* while those in the bottom tercile are *LowQuality.*[26] Second, we assume that analysts with more experience in the industry (*GExp*) are of higher quality and categorize analysts in the top (bottom) tercile as *HighQuality (LowQuality)*. Third, we split analysts into two seniority groups based on LinkedIn job titles and assign analysts

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[26] A more detailed explanation of how relative forecast accuracy is computed and ranked to form *TopAccu* and *BotAccu* measures can be found in Appendix A.

Table 4
MiFID II and analyst employment. Panel A — analysts who stay at brokerage.

Dep. Variable	Stay_At_Firm	Stay_At_Firm	Stay_At_Firm	Stay_At_Firm
Quality Measure		*RelAccuracy*	*Experience*	*Seniority*
I (ATreat)*I(Post)	−0.030***	−0.012	−0.015	0.020***
	(-3.58)	(-1.12)	(-1.36)	(2.98)
I (ATreat)*I(Post)*HighQuality		−0.032**	−0.039**	−0.091***
		(-2.02)	(-2.18)	(-5.65)
I (ATreat)*I(Post)*LowQuality		−0.014	−0.005	
		(-0.79)	(-0.35)	
HighQuality		0.005*	0.032***	0.004
		(1.85)	(3.81)	(0.88)
LowQuality		0.002	−0.009	
		(0.69)	(-1.29)	
RF_Opt	−0.001	−0.001	−0.001	−0.001
	(-0.13)	(-0.23)	(-0.15)	(-0.10)
GExp	−0.008**	−0.008**	−0.021***	−0.008**
	(-2.27)	(-2.21)	(-4.36)	(-2.22)
BroSize	−0.012	−0.012	−0.012	−0.014
	(-1.36)	(-1.38)	(-1.38)	(-1.57)
NInd	0.002	0.001	0.002	0.002
	(0.26)	(0.24)	(0.29)	(0.38)
NFirm	0.064***	0.065***	0.065***	0.063***
	(9.59)	(9.60)	(9.65)	(9.43)
N	34,317	34,317	34,317	34,317
R^2	0.19	0.19	0.19	0.19
Year-Qtr FE	Y	Y	Y	Y
Analyst FE	Y	Y	Y	Y
Broker FE	Y	Y	Y	Y
F Test of Differences between high & low quality analysts		0.90 (0.34)	2.98 (0.09)	
Panel B — Analysts Who Leave the Sell-Side Industry				
	Leave_SellSide	Leave_SellSide	Leave_SellSide	Leave_SellSide
Quality Measure		*RelAccuracy*	*Experience*	*Seniority*
I (ATreat)*I(Post)	0.026***	0.005	0.006	−0.011***
	(3.95)	(0.60)	(0.79)	(-6.01)
I (ATreat)*I(Post)* HighQuality		0.041***	0.048***	0.067***
		(2.93)	(2.84)	(5.74)
I (ATreat)*I(Post)* LowQuality		0.011	0.010	
		(0.99)	(0.80)	
N	34,317	34,317	34,317	34,317
R^2	0.17	0.17	0.17	0.17
Controls	Y	Y	Y	Y
Fixed Effects	Y-Q, A, B	Y-Q, A, B	Y-Q, A, B	Y-Q, A, B
F Test of Differences between high & low quality analysts		3.86 (0.05)	4.21 (0.04)	
Panel C — Analysts Who Move To Buy-Side				
	Buy_Side	Buy_Side	Buy_Side	Buy_Side
Quality Measure		*RelAccuracy*	*Experience*	*Seniority*
I (ATreat)*I(Post)	0.011**	0.003	−0.001	−0.003***
	(2.33)	(0.55)	(-0.36)	(-3.51)
I (ATreat)*I(Post)* HighQuality		0.021***	0.026**	0.025***
		(2.63)	(2.24)	(3.00)
I (ATreat)*I(Post)* LowQuality		−0.002	0.011	
		(-0.39)	(1.34)	
N	34,317	34,317	34,317	34,317
R^2	0.17	0.17	0.17	0.17
Controls	Y	Y	Y	Y
Fixed Effects	Y-Q, A, B	Y-Q, A, B	Y-Q, A, B	Y-Q, A, B
F Test of Differences between high & low quality analysts		6.26 (0.01)	1.23 (0.27)	
Panel D — Analysts Who Are Promoted At Their New Firms				
	Higher_Pos	Higher_Pos	CSuite	CSuite
I (Treat)*I(Post)	0.026***	0.014	0.011***	0.005
	(3.50)	(1.40)	(2.96)	(0.95)
I (Treat)*I(Post)*TopAccu		0.030**		0.017*
		(2.07)		(1.84)
I (Treat)*I(Post)*BotAccu		−0.001		−0.002
		(-0.10)		(-0.46)

N	34,317	34,317	34,317	34,317
R^2	0.15	0.16	0.14	0.14
Controls	Y	Y	Y	Y
Fixed Effects	Y-Q, A, B	Y-Q, A, B	Y-Q, A, B	Y-Q, A, B
F Test of Differences between high & low quality analysts		3.44 (0.06)		5.44 (0.02)

This table presents the effects of MiFID II on analyst employment at the analyst-quarter level. Specifically, we estimate linear probability model regressions of analyst employment on indicator variables of whether the analyst works in Europe (I(ATreat)) and post-MiFID II (I(Post)), controlling for analyst characteristics. Our main variable of interest is the average treatment effect captured by the coefficient of I(ATreat)*I(Post). In certain specifications, we also interact I(ATreat)*I(Post) with *HighQuality* and *LowQuality* based on various definitions of analyst quality (relative forecast accuracy, experience in the sell-side industry, and seniority rank at the brokerage as of the initiation of MiFID II). Panel A presents the results for whether the analyst stays at the brokerage in a given quarter. Panel B presents results for whether the analyst leaves the sell-side industry in a given quarter. Panel C presents the results for whether the analyst moves to the buy-side in a given quarter. Panel D presents results for whether analysts are promoted upon taking a job at a new firm and whether the analysts end up in the C-Suite at the new firm. Regressions in Panels B–D all include the same control variables as in Panel A, but the coefficients are not reported for parsimony. All variables are defined in Appendix A. Standard errors are clustered by brokerage. ***, **, * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.
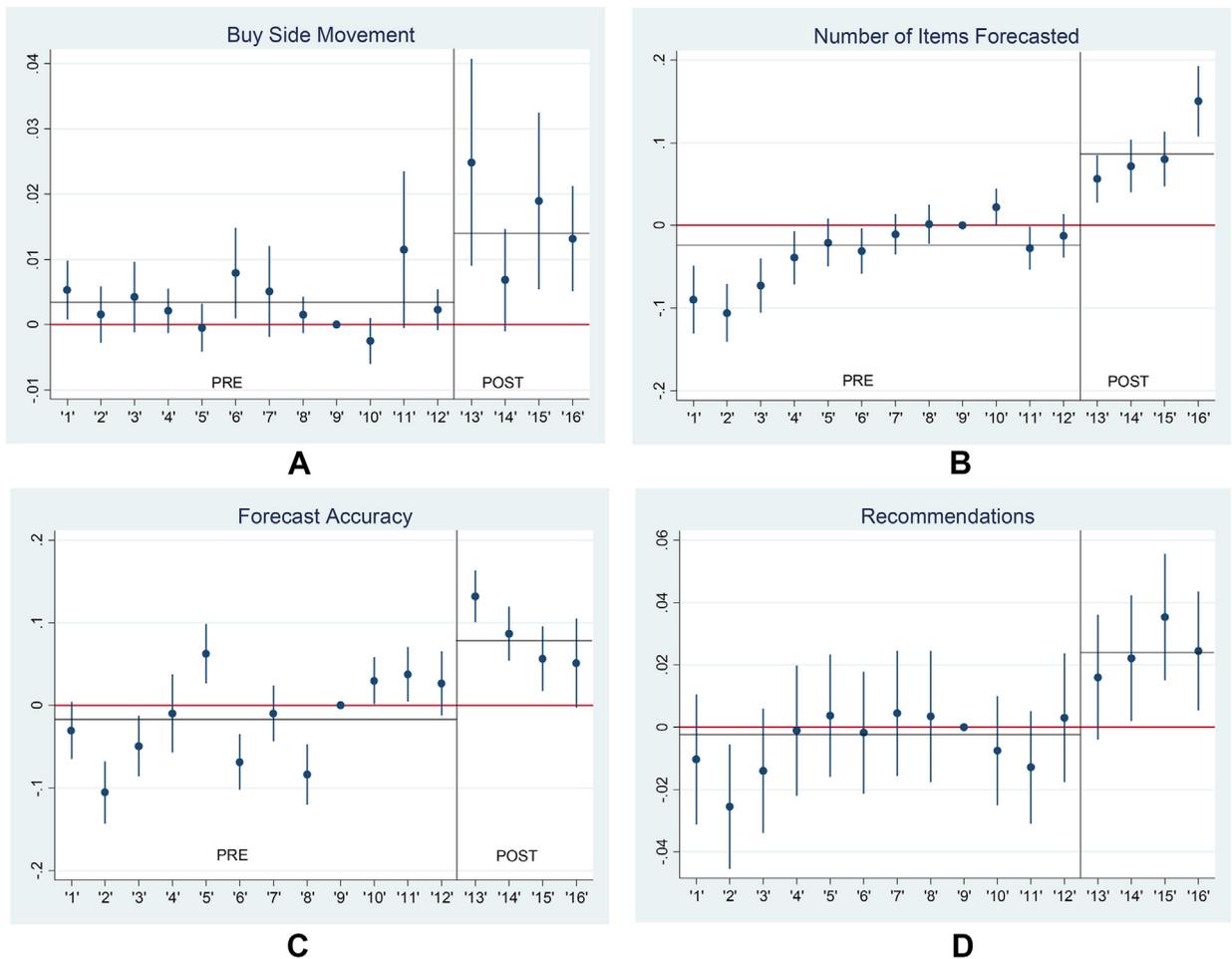
Figure 2. — **Graphical Display of Analyst Forecast Characteristics**. Fig. 2 plots coefficients and associated 90% confidence intervals from estimated difference-in-differences models presented in Table 4, Panel C, Column 1 (Panel A), Table 6, Panel A, Columns 2 and 3 (Panels B and C), and Table 6, Panel B, Column 1 (Panel D). The reference period is 2017 Q1. Panel B plots seasonality-adjusted analyst following scaled by the pre-sample analyst coverage (i.e., 2014 levels) separately for EU and US firms. Quarters 1–12 (13–16), as labeled on the x-axis, represent 2015 Q1 to 2017 Q4 (2018 Q1 to 2018 Q4), making up the pre-MiFID II (post-MiFID II) period. Standard errors are clustered at the firm level. **Panel A — Buy-Side Movement, Panel B — Number of Items Forecasted, Panel C — Forecast Accuracy, Panel D — Recommendation Likelihood.**

Table 5
MiFID II and analyst effort — focus of remaining analysts.

	Avg_Analyst_Firms	Avg_Analyst_Forecasts
I (Treat)*I(Post)	−0.059***	−0.059***
	(-3.81)	(-2.82)
Ret_Vol	0.241	0.545**
	(1.36)	(2.49)
Earn_Vol	0.012	0.004
	(0.19)	(0.05)
Loss	0.008*	0.009*
	(1.71)	(1.68)
Intan	0.000	−0.000
	(0.42)	(-0.46)
Size	0.030***	0.064***
	(3.31)	(5.38)
Lev	−0.016	−0.034
	(-0.78)	(-1.31)
ROA	−0.056	−0.114*
	(-1.06)	(-1.81)
Firm_Age	−0.018*	−0.029**
	(-1.73)	(-2.19)
MtB	−0.000	−0.000
	(-0.62)	(-0.49)
GDP_Percap	1.853**	2.035**
	(2.48)	(2.13)
GDP_Growth	−0.024***	−0.031***
	(-4.74)	(-4.53)
N	50,939	50,939
R^2	0.76	0.76
Firm FE	Y	Y
Year-Qtr FE	Y	Y

This table presents the effects of MiFID II on analyst focus or busyness at the firm-quarter level. We measure analyst focus or busyness using the log-transformed average number of firms a given analyst covers in a given quarter (*Avg_Analyst_Firms*) and the log-transformed average number of forecasts a given analyst issues in a given quarter (*Avg_Analyst_Forecasts*). Our main variable of interest is the average treatment effect captured by the coefficient of I(Treat)*I(Post). Standard errors are clustered by firm. ***, **, * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

in more senior positions to the *HighQuality* group.[27] Since we split analysts into only two seniority groups (rather than terciles), there is no *LowQuality* group for the seniority tests (i.e., the comparison is between high and low seniority).

The statistically significant and negative coefficients on *I(ATreat)*I(Post)*HighQuality* in Columns 2−4 suggest that it was disproportionately the high-quality (more experienced and senior) EU analysts that left their brokerages after MiFID II. In contrast, low-quality and non-senior EU analysts were not significantly more likely to leave post-MiFID II. The F test of differences in coefficients between *I(ATreat)*I(Post)*HighQuality* and *I(ATreat)*I(Post)*LowQuality* is marginally significant when quality is measured by analyst experience but is insignificant when measured by accuracy.

A related question is whether analysts leaving their brokerage around MiFID II were leaving the sell-side entirely (*Leave_SellSide*) as opposed to moving between brokerages. The significant positive coefficient on *I(ATreat)*I(Post)* in Table 4, Panel B, Column 1 indicates that sell-side analysts were not only disproportionately likely to leave their brokerages post-MiFID II, but were also significantly more likely to leave the sell-side industry entirely, consistent with the prediction that MiFID II reduced demand for sell-side analysts. The inclusion of the non-EU control assures that changes were not driven by general sell-side trends. Figure IA.5 of the Internet Appendix provides no evidence of trends in the pre-MiFID II period and suggests a clear and rapid change following MiFID II adoption. Columns 2−4 provide evidence on the quality of analysts leaving the sell-side. Relative to the non-EU controls, more accurate, experienced, and senior EU analysts were disproportionally likely to leave the sell-side entirely after MiFID II; the F-statistics indicate that the differences were statistically significant in all cases.

Where did departing sell-side analysts go? ZZ (2022) argue that unbundling would lead to a shift in demand for analysts from the sell-side to the buy-side. In Table 4, Panel C, *Buy-Side* is an indicator equal to one for analysts who leave the sell-side for the buy-side. In Column 1, the coefficient on *I(ATreat)*I(Post)* is significantly positive, indicating a tendency for EU analysts to move from the sell-side to the buy-side following MiFID II. As predicted, the movement is concentrated among top-accuracy (Column 2), experienced (Column 3), and senior (Column 4) analysts with no evidence of movement for low-

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[27] Using LinkedIn data, we identify a senior position as a job title that contains "Head," "Director," "Senior," "Chief," "President," "VP" etc. For analysts who are missing a LinkedIn profile or are missing job title information, we classify them as in a senior rank if they have been at the same brokerage for ten or more years.

quality analysts, although the coefficient differences are statistically significant only for accuracy and seniority. Trends in Fig. 2, Panel A, suggest that the shift to the buy-side was rapid, beginning in 2018 Q1, with no apparent pre-MiFID II trends. EU analysts were 2.6% more likely to leave the sell-side, with high-quality analysts between 4.6 and 5.6% more likely to leave, depending on the analyst quality construct, relative to non-EU analysts. EU analysts were 1.1% more likely to move to the buy-side, with high-quality analysts about 2.5% more likely to move to the buy-side. For comparison, only 1.1% of analysts (1.4% of EU analysts) leave the sell-side, and only 0.3% of analysts (0.5% of EU analysts) move to the buy-side in a typical quarter.

Finally, we consider what happens when sell-side analysts leave their pre-MiFID II brokerages, including those that stay on the sell-side. If MiFID II buy-side demand increased the value of high-quality analysts and senior positions were freed up by the departure of top analysts, we expect a flow of analysts to better alternatives even on the sell-side (e.g., promoted to higher positions or the C-Suite at the brokerage). Results in Panel D suggest that EU (relative to non-EU) analysts were significantly more likely to receive a promotion, in many cases ending up in the C-Suite, post-MiFID II.[28] Top accuracy analysts drive this result as well, which is corroborated by the significant F-statistic in a test of differences in coefficients.[29]

Overall, Table 4 provides evidence of labor disruptions associated with MiFID II. Consistent with predictions, results suggest that, following MiFID II, high-quality analysts disproportionately left their brokerages (and the sell-side entirely) and moved to the buy-side or exploited other opportunities, often involving promotion.

4.4. Effect of MiFID II on individual forecasts

The preceding suggests that coverage dropped following MiFID II, especially for firms for which the marginal contribution was likely lowest, with high-quality analysts leaving the sell-side for opportunities on the buy-side and promotions at sell-side brokerages. This raises the question of how sell-side brokerages responded to the increased transparency associated with MiFID II.

Table 5 provides evidence on whether analysts covered fewer firms (*Avg_Analyst_Firms*) and provided fewer forecasts (*Avg_Analyst_Forecasts*) post-MiFID II. The more mechanical response to sell-side analysts leaving is for brokerages to expand the portfolio of remaining analysts to cover firms that were dropped by departing analysts. However, ZZ (2022) suggest that the response would be the opposite, as investors become choosier once they can observe where the research spending is being allocated with unbundling. As a result, brokerages will have remaining analysts focus on fewer firms, leaving some firms uncovered, and provide more thorough analyses on a more limited set of firms to justify the separately priced value of their research reports. The coefficient on *I(Treat)*I(Post)* in Table 5 is significantly negative for both variables, suggesting that remaining sell-side analysts follow fewer firms and issue fewer forecasts in total. Rather than spreading the remaining analysts over a broader set of stocks, it appears that brokerages responded to MiFID II by narrowing the focus of each analyst.[30]

The fact that analysts were following fewer firms does not necessarily imply that their reports would be more thorough. Our next set of tests, in which the unit of observation is an individual analyst report, examine changes in analyst reports around MiFID II. We include firm, analyst, brokerage, and year-quarter fixed effects, so the comparison is based on changes for a given analyst working for a given brokerage covering a given firm. Table 6, Panel A provides evidence that analyst reports were significantly more likely to contain supplementary sales forecasts (Column 1) and include more other line items (Column 2) post-MiFID II. For the median EU forecast pre-MiFID II, the number of other line items forecasted increased by roughly 12% post-MiFID II.

It is possible that analysts forecast sales and other line items pre-MiFID II, but did not report them to I/B/E/S.[31] However, the inclusion of analyst, brokerage, and firm fixed effects mitigates concern that forecast characteristics reflect changes in the portfolio of firms. We examine changes in the accuracy of forecasts (*Accuracy*) in Table 6, Panel A, Column 3. The significantly positive coefficient on *I(TREAT)*I(POST)* indicates an increase in forecast accuracy post-MiFID II, suggesting that analysts were not only forecasting more line items but were also providing more accurate forecasts. The results indicate a 16.1% increase in forecast accuracy for the median EU firm, all else equal.

An alternate approach to assessing whether analysts appear to increase their value-added is to assess whether they are more likely to include stock recommendations in their reports and, if so, the recommendation characteristics. Francis and Soffer (1997) suggest that recommendations are incrementally informative to earnings forecasts, suggesting that they add value for investors and entail greater effort by analysts. Recommendations are likely to be particularly relevant to fund

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[28] In untabulated analyses, we find that EU sell-side analyst promotions post-MiFID II are driven by those leaving the sell-side industry. Analysts who stay on the sell-side are not significantly more likely to be promoted post-MiFID II.

[29] We do not split the analysts based on experience or seniority for the promotion tests as such variables are already naturally correlated with the probability of further promotion or ending up in the C-Suite.

[30] In addition to narrowing the set of firms in each analyst's portfolio, analysts also took longer to update their forecasts relative to both their prior forecast and to the firm's earnings announcement (Table IA.8). Coupled with our main results, we interpret the longer revision lag times as likely reflecting more thorough analyses post-MiFID II.

[31] While all analysts likely forecast sales and other line items in forecasting EPS, Keung (2010) and Ertimur et al. (2011) suggest that publishing forecasts of sales and other items enhances the credibility of EPS forecasts as publishing disaggregated forecasts puts analysts' reputations at stake. As a result, the fact that analysts published such forecasts suggests that they expended more effort on the forecast (Call et al., 2009; Keung, 2010; Bradshaw, 2011).

Table 6

MiFID II and sell–side analyst forecast quality. Panel A — analyst effort and forecast accuracy.

	Sale_Forecast	Num_OtherVars	Accuracy
I (Treat)*I(Post)	0.056***	0.088***	0.028**
	(5.97)	(6.50)	(2.39)
Ret_Vol	−0.466***	−0.629***	−7.164***
	(−4.53)	(−4.05)	(−30.28)
Earn_Vol	0.052	−0.003	−1.453***
	(1.58)	(−0.07)	(−15.40)
Loss	−0.004	−0.004	−0.105***
	(-1.62)	(-1.04)	(-15.39)
Intan	0.000**	0.001***	−0.000
	(2.26)	(3.02)	(-1.33)
Size	−0.013***	−0.030***	0.007
	(−2.69)	(−3.84)	(0.89)
Lev	0.006	−0.018	−0.440***
	(0.53)	(-1.19)	(-22.02)
ROA	0.095***	0.053	0.124
	(3.30)	(1.23)	(1.59)
Firm_Age	0.003	−0.001	−0.022***
	(0.50)	(-0.15)	(-3.56)
MtB	−0.000	0.000	0.013***
	(-0.35)	(0.55)	(18.63)
BroSize	−0.001	−0.001	0.000
	(-0.51)	(-0.66)	(0.19)
FExp	0.002	0.005*	−0.004**
	(1.19)	(1.68)	(-2.26)
GExp	−0.017	−0.001	0.005
	(-1.06)	(-0.06)	(0.73)
FHor	0.001***	0.002***	−0.001***
	(18.73)	(14.40)	(-26.28)
NInd	0.002	0.002	−0.009*
	(0.44)	(0.22)	(-1.77)
NFirm	−0.009**	−0.019**	−0.009*
	(-2.06)	(-2.42)	(-1.75)
GDP_Percap	1.034***	1.885***	0.982**
	(3.28)	(4.50)	(2.53)
GDP_Growth	−0.001	−0.005	0.003
	(-0.27)	(-1.49)	(0.92)
N	496,144	496,144	479,274
R^2	0.49	0.59	0.57
Fixed Effects	F, A, B, Y-Q	F, A, B, Y-Q	F, A, B, Y-Q

Panel B — Recommendations Included In Forecasts

	Recommend	Rec_Change	Nonhold_Rec	Extreme_Rec
I (Treat)*I(Post)	0.024***	0.017***	0.015***	0.006**
	(4.13)	(3.04)	(3.62)	(2.47)
Ret_Vol	1.072***	1.028***	0.339***	0.074**
	(14.45)	(14.74)	(6.28)	(2.40)
Earn_Vol	0.096***	0.080***	0.098***	0.042***
	(4.26)	(3.67)	(5.27)	(3.86)
Loss	0.002	0.001	0.000	−0.000
	(1.08)	(0.91)	(0.31)	(-0.11)
Intan	0.000**	0.000**	0.000***	0.000
	(2.24)	(2.06)	(3.07)	(0.94)
Size	−0.014***	−0.012***	−0.014***	−0.005***
	(−5.47)	(−5.00)	(−7.31)	(−4.35)
Lev	−0.041***	−0.038***	−0.030***	−0.009***
	(−6.92)	(−7.02)	(−6.43)	(−3.22)
ROA	0.019	0.018	0.050***	0.014*
	(1.10)	(1.12)	(3.73)	(1.85)
Firm_Age	−0.015***	−0.012***	−0.012***	−0.005***
	(−4.88)	(−4.38)	(−5.88)	(−4.44)
MtB	−0.000	−0.000	0.000	0.000**
	(-1.10)	(-1.05)	(1.09)	(2.15)
lnBrosize	0.002*	0.002**	0.001**	0.000
	(1.85)	(2.20)	(2.08)	(0.01)
FExp	−0.002**	−0.001	−0.001**	−0.001**
	(-2.24)	(-1.48)	(-2.22)	(-2.49)
GExp	0.002	0.003	0.002	0.002
	(0.26)	(0.59)	(0.45)	(0.88)
FHor	−0.001***	−0.001***	−0.001***	−0.000***
	(-34.64)	(-34.56)	(-32.40)	(-21.54)

NInd	0.004	0.002	0.005**	0.001
	(1.36)	(0.64)	(2.33)	(0.52)
NFirm	−0.038***	−0.032***	−0.028***	−0.010***
	(−11.03)	(−10.34)	(−11.65)	(−7.29)
GDP_Percap	−1.044***	−0.983***	−0.516***	−0.131**
	(−5.59)	(−5.54)	(−4.13)	(−2.05)
GDP_Growth	0.004**	0.003*	0.000	−0.001
	(2.06)	(1.70)	(0.07)	(−0.81)
N	496,144	496,144	496,144	496,144
R^2	0.10	0.09	0.08	0.08
Fixed Effects	F, A, B, Y-Q	F, A, B, Y-Q	F, A, B, Y-Q	F, A, B, Y-Q

This table presents the effects of MiFID II on analyst effort at the forecast level. In Panel A, we examine whether MiFID II affects the likelihood of a report to contain a sales forecast (*Sale_Forecast*), the log-transformed number of additional variables forecasted other than EPS (*Num_OtherVars*) and forecast accuracy (*Accuracy*). In Panel B, we examine whether MiFID II affects the likelihood of a forecast to include a recommendation (*Recommend*), a recommendation change (*Rec_Change*), a non-hold (*Nonhold_Rec*) or an extreme (*Extreme_Rec*) recommendation. Our main variable of interest is the average treatment effect captured by the coefficient of I(Treat)*I(Post). We include firm, analyst, brokerage, and year-quarter fixed effects in all columns. All variables are defined in Appendix A. Standard errors are clustered by firm. ***, **, * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

managers if they suggest some action (e.g., if the recommendation changes from previous recommendations, is a buy or sell as opposed to hold, or is more extreme such as a strong buy).[32]

To evaluate changes in recommendations, we repeat the analysis from Table 6, Panel A replacing forecast variables with recommendation-based variables. We include analyst, brokerage, firm, and year-quarter fixed effects, so comparisons are within the analyst/brokerage/firm triplet. Results in Table 6, Panel B, indicate that recommendations for EU firms changed significantly post-MiFID II. Consistent with the evidence on disaggregated forecasts, Column 1, indicates that analyst reports post-MiFID II were significantly more likely to include stock recommendations (*Recommend*). Column 2 indicates that recommendations were more likely to have changed from the previous recommendation (*Rec_Change*). Columns 3 and 4 indicate that recommendations were less likely to be "hold" (*Nonhold_Rec*) and more likely to be extreme ("strong buy" or "strong sell"; *Extreme_Rec*). Fig. 2, Panels B–D, suggest a swift change in forecast characteristics around MiFID II, confirming that brokerages responded quickly to increased pressure to provide value-added research and redeploy analysts to produce more detailed, thorough, and accurate forecasts. Brokerages redeployed remaining analysts to cover fewer firms (Table 5) but more intensively. In untabulated analyses, we examine changes in forecast quality by firm size. Analyst effort appears to have increased for all firms, with the effect concentrated among medium and large firms, consistent with our earlier findings that medium and large firms experienced the greatest decrease in sell-side coverage.

4.5. Market reaction tests

4.5.1. Forecast-level analysis

Our prior results suggest that sell-side analysts increased their effort in forecasting firms' financial information post-MiFID II. To directly assess the information content of those reports, we examine stock price reactions. If post-MiFID II forecasts had greater information content, stock price responses to revisions should be larger. Understanding the stock price response is important both to assessing brokerages' responses to changing incentives and to understanding implications for the information environment. We examine whether the absolute value of market-adjusted cumulative abnormal returns in the three-day window around earnings forecasts (*CAR*) for EU firms increased post-MiFID II relative to US controls.[33] We estimate the same basic difference-in-differences model including the controls and fixed effects from our previous forecast-level analyses.[34] If the informativeness of research reports improved post-MiFID II, we predict a positive coefficient on *I(TREAT)***I(POST)*.

Table 7, Column 1, reports results for the overall informativeness of analyst reports. The coefficient on *I(TREAT)***I(POST)* is significantly positive, suggesting increased information content, consistent with increased pressure to provide more valuable reports post-MiFID II. To link forecast characteristics to informativeness, we examine whether the stock price response is more pronounced for forecasts that were more disaggregated and included recommendations. *ManyVar*, equals one if the forecast contains more variables than the sample median of *Num_OtherVars*. The coefficient *I(TREAT)***I(POST)**ManyVar in Table 7, Column 2, is significantly positive, indicating that the increase in informativeness was most pronounced for more disaggregated forecasts.

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[32] In discussing MiFID II, Bloomberg (2019) notes "Why would a client pay to receive a note that says results are in line?" and "There is even more pressure now to write reports with concrete conclusions" (as opposed to "hold" recommendations or "maintenance research").

[33] We market-adjust returns by subtracting daily market returns from daily firm returns. Market returns for EU firms are equal-weighted for all firms on the focal firm's exchange based on Compustat Global's daily files. For US firms, equal-weighted market returns are from CRSP. Results are similar using value-weighted returns.

[34] To ensure that unbundling rather than execution-related components from MiFID II drives the market response, our market outcome tests include controls for dark trading suspensions and tick size changes, which were significant components of MiFID II. Dark trading suspensions are from the European Securities and Market Authority suspensions file, while tick size changes are from the Cboe European Equities database.

Table 7
Forecast informativeness, forecast level.

	CAR	CAR	CAR
I (Treat)*I(Post)	0.003***	−0.002	0.002**
	(3.44)	(-1.54)	(2.18)
ManyVar		0.002***	
		(8.96)	
I (Treat)*I(Post)*ManyVar		0.007***	
		(5.09)	
Recommend			−0.002***
			(-6.32)
I (Treat)*I(Post)*Recommend			0.012***
			(4.83)
BroSize	0.000	0.000	0.000
	(0.15)	(0.04)	(0.17)
GExp	−0.000	−0.000	−0.000
	(-0.84)	(-0.85)	(-0.84)
FHor	0.000***	0.000***	0.000***
	(70.04)	(69.63)	(69.64)
NInd	−0.001*	−0.001*	−0.001
	(-1.68)	(-1.67)	(-1.63)
NFirm	−0.000	−0.000	−0.000
	(-0.35)	(-0.29)	(-0.60)
Dark_Trading_Susp	0.001	0.001	0.001
	(1.10)	(0.83)	(1.09)
Tick_Size_Change	0.003	0.004	0.004
	(1.23)	(1.32)	(1.30)
GDP_Percap	0.150***	0.151***	0.149***
	(6.14)	(6.21)	(6.13)
GDP_Growth	−0.001***	−0.001**	−0.001***
	(-2.68)	(-2.57)	(-2.78)
N	491,890	491,890	491,890
R^2	0.46	0.46	0.46
Firm-Level Controls	Y	Y	Y
Firm FE	Y	Y	Y
Analyst FE	Y	Y	Y
Broker FE	Y	Y	Y
Year-Qtr FE	Y	Y	Y

This table presents the effects of MiFID II on analyst forecast informativeness at the forecast level. Specifically, we estimate OLS regressions of the 3-days cumulative market reaction to an analyst forecast post-MiFID II. Our main variable of interest is the average treatment effect captured by the coefficient of I(Treat)*I(Post). In Columns 2 (3), we examine whether market reaction varies with the number of line items (recommendations) included in forecasts, *ManyVar* (*Recommend*). Although all firm-level control variables from Table 5 are included in the specifications in Table 6, coefficients are not tabulated for parsimony. In addition, we include two firm-level control variables for dark trading suspensions (*Dark_Trading_Susp*) and tick size changes (*Tick_Size_Change*). All variables are defined in the Appendix A. Standard errors are clustered by firm. ***, **, * indicates significance at the 0.01, 0.05, 0.10 level, respectively.

In Table 7, Column 3, we run the same specification, except that we examine the presence of recommendations by interacting *I(Treat)*I(Post)*Recommend*. The coefficient is significantly positive, indicating that the increase in informativeness was most pronounced for forecasts that included recommendations. Coupled with the prior evidence, this result reinforces the conclusion that, while MiFID II reduced analyst coverage, the remaining reports became more accurate and informative, likely reflecting the increased pressure to justify the value added by sell-side research.[35]

4.5.2. Firm-level analysis

The preceding suggests two countervailing forces potentially affecting the firm-level information environment post-MiFID II. On the one hand, analyst following decreased. On the other hand, the remaining analyst reports became more informative. While the overall effect is ambiguous, the ZZ (2022) framework suggests that the substitution effect will be incomplete, and overall information content will be reduced. To assess that prediction, we aggregate analyst informativeness (*Analy_Info*) by summing the absolute value of market-adjusted returns for all forecast revisions in a quarter scaled by the sum of the absolute value of all market-adjusted returns in the quarter (Frankel et al., 2006; Lehavy et al., 2011; Merkley et al., 2017). Loosely speaking, *Analy_Info* measures the proportion of information during the month provided through sell-side analysts' reports. The significant negative coefficient on *I(TREAT)*I(POST)* for *Analy_Info* reported in Table 8, Column 1, indicates decreased aggregate informativeness of sell-side analyst reports post-MiFID II. Taken as a whole, the results suggest that, while

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[35] This also helps alleviate potential concerns that the increase in disaggregation post-MiFID II simply reflected changes in items reported to I/B/E/S as opposed to more intensive analysis.

Table 8

Aggregate analyst informativeness, firm level.

	Analy_Info	EPSOnly_Info	Recommend_Info
I (Treat)*I(Post)	−0.010***	−0.010***	0.001**
	(−6.48)	(−7.34)	(2.51)
Ret_Vol	0.511***	0.359***	0.120***
	(15.52)	(12.87)	(12.99)
Earn_Vol	−0.042***	−0.042***	0.002
	(−4.09)	(−4.72)	(0.67)
Loss	−0.002	−0.001	0.000
	(−1.63)	(−1.56)	(1.57)
Intan	0.000	0.000	0.000*
	(1.55)	(1.29)	(1.90)
Size	0.022***	0.020***	0.002***
	(13.52)	(14.25)	(5.00)
Lev	−0.009**	−0.004	−0.002***
	(−2.36)	(−1.31)	(−2.69)
ROA	−0.027***	−0.022***	−0.002
	(−2.69)	(−2.72)	(−0.88)
Firm_Age	−0.001	−0.002	0.001
	(−0.37)	(−0.92)	(1.64)
MtB	0.000	0.000	0.000
	(1.30)	(1.44)	(1.35)
Dark_Trading_Susp	0.003	0.001	0.001
	(1.00)	(0.63)	(0.89)
Tick_Size_Change	0.004*	0.003	0.002
	(1.79)	(1.23)	(1.33)
GDP_Percap	−0.027	−0.023	−0.013
	(−0.70)	(−0.69)	(−1.40)
GDP_Growth	−0.002***	−0.002***	0.000
	(−4.04)	(−4.54)	(0.51)
N	59,425	59,425	59,425
R^2	0.72	0.72	0.18
Firm FE	Y	Y	Y
Year-Qtr FE	Y	Y	Y

This table presents the effects of MiFID II on analyst forecast informativeness at the firm level. Specifically, we estimate OLS regressions of aggregate analyst informativeness (*Analy_Info*), aggregate analyst informativeness using only forecasts that do not contain recommendations (*EPSOnly_Info*), and aggregate analyst informativeness using only forecasts that contain recommendations (*Recommend_Info*), on indicator variables of whether the firm is affected by MiFID II (I(Treat)) and post-MiFID II (I(Post)), controlling for firm and country characteristics. Our main variable of interest is the average treatment effect captured by the coefficient of I(Treat)*I(Post). All variables are defined in the Appendix A. Standard errors are clustered by firm. ***, **, * indicates significance at the 0.01, 0.05, 0.10 level, respectively.

individual analyst reports became more informative (Table 7), sell-side analyst reports in aggregate became less informative (Table 8) because of the decrease in analyst coverage (Table 3).

Table 8, Columns 2 and 3, splits analyst reports into two categories based on whether they contained recommendations. The significant negative coefficient on *I(Treat)*I(Post)* in Column 2 indicates that the aggregate information in reports without recommendations decreased post-MiFID II. In contrast, results in Column 3 for *Recommend_Info* indicate that the aggregate informativeness of reports containing recommendations significantly increased, reflecting the combination of the increase in the number of analyst reports with recommendations and the increased information content of each recommendation. However, only about 11% of post-MiFID II reports included recommendations, so their relative increase in information content was not sufficient to offset the decrease in information content from reports without recommendations.

4.6. Firm media events

Our results suggest that sell-side information production decreased following MiFID II, and there was a substitution to buy-side research. A related question is whether the decreased information production by sell-side brokerages increased firms' incentives to provide information, particularly in terms of media events such as earnings calls and analyst/investor days, which have been shown to convey information (Matsumoto et al., 2011; Kirk and Markov, 2016).[36]

We estimate firm-level difference-in-differences regressions to examine if firms participated more intensely in media events post-MiFID II (relative to control firms), particularly for firms that lost analyst coverage. We gather corporate events and transcripts from Capital IQ Global Transcripts, which covers English-language conference calls of more than 8000

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[36] Surveys of analysts and investor relations personnel predicted a post-MiFID II increased role for direct contact through firm-initiated presentations to substitute for reduced sell-side coverage (e.g., Exane BNP Paribas, 2017).

Table 9
MiFID II and corporate events. Panel A − event frequency.

	All_Events	EarnCalls	AnalystDays
I (Treat)*I(Post)	0.111***	0.108***	0.007***
	(10.39)	(11.11)	(2.95)
Ret_Vol	0.434***	−0.201*	0.082**
	(2.81)	(−1.70)	(2.12)
Earn_Vol	−0.299***	−0.181***	−0.021*
	(−4.71)	(−3.50)	(−1.94)
Loss	−0.013***	−0.008***	−0.003
	(−3.27)	(−2.72)	(−1.61)
Intan	−0.001***	−0.001**	0.000
	(−2.79)	(−2.30)	(1.54)
Size	0.062***	0.047***	0.007***
	(6.97)	(6.40)	(3.92)
Lev	0.078***	0.070***	0.001
	(3.77)	(4.34)	(0.30)
ROA	−0.154***	−0.139***	−0.008
	(−3.24)	(−4.03)	(−0.59)
Firm_Age	0.027***	0.018***	0.010***
	(3.36)	(3.10)	(2.68)
MtB	0.002**	−0.000	0.000
	(2.55)	(−0.34)	(1.16)
Coverage	0.041***	0.032***	0.003**
	(8.25)	(7.69)	(2.41)
GDP_Percap	−0.397	−0.390	−0.007
	(−1.26)	(−1.33)	(−0.14)
GDP_Growth	−0.009**	−0.000	0.000
	(−2.56)	(−0.05)	(0.47)
N	59,430	59,430	59,430
R^2	0.76	0.80	0.12
Firm FE	Y	Y	Y
Year-Qtr FE	Y	Y	Y

Panel B − Event Frequency Conditional on Losing Analyst Coverage

	Ln_All_Events	lnEarnCalls	lnAnalystDays
I (Treat)*I(Post)	0.090***	0.092***	0.003
	(7.39)	(8.39)	(0.87)
Lose_Cov	0.003	0.005**	−0.001
	(0.92)	(2.10)	(−0.85)
I (Treat)*I(Post) *Lose_Cov	0.046***	0.034***	0.010**
	(3.20)	(2.59)	(2.23)
Ret_Vol	0.441***	−0.193	0.082**
	(2.86)	(−1.63)	(2.12)
Earn_Vol	−0.297***	−0.178***	−0.021*
	(−4.68)	(−3.45)	(−1.94)
Loss	−0.013***	−0.008***	−0.003
	(−3.29)	(−2.74)	(−1.63)
Intan	−0.001***	−0.001**	0.000
	(−2.79)	(−2.31)	(1.54)
Size	0.062***	0.047***	0.007***
	(6.93)	(6.36)	(3.89)
Lev	0.079***	0.071***	0.001
	(3.78)	(4.35)	(0.31)
ROA	−0.152***	−0.137***	−0.008
	(−3.20)	(−3.98)	(−0.57)
Firm_Age	0.027***	0.018***	0.010***
	(3.29)	(3.03)	(2.65)
MtB	0.002***	−0.000	0.000
	(2.59)	(−0.31)	(1.19)
Coverage	0.047***	0.039***	0.002
	(7.15)	(7.10)	(1.28)
GDP_Percap	−0.341	−0.346	0.003
	(−1.08)	(−1.18)	(0.05)
GDP_Growth	−0.008**	0.000	0.001
	(−2.42)	(0.05)	(0.58)

N	59,430	59,430	59,430
R^2	0.76	0.80	0.12
Firm FE	Y	Y	Y
Year-Qtr FE	Y	Y	Y

This table presents the effects of MiFID II on corporate events at the firm level. Specifically, we estimate OLS regressions of the number of all corporate events participated in by a firm in a given quarter (*All_Events*), the number of earnings calls held (*EarnCalls*), and the number of analyst days (*AnalystDays*), on indicator variables of whether the firm is affected by MiFID II (I(Treat)) and post-MiFID II (I(Post)), controlling for firm and country characteristics. All dependent variables are log-transformed. Our main variable of interest is the average treatment effect captured by the coefficient of I(Treat)*I(Post). Panel A presents the results for the number of total events, earnings calls, and analyst days. Panel B presents cross-sectional effects of MiFID II on number of events based on losing analyst coverage post-MiFID II (*Lose_Cov*). All variables are defined in the Appendix A. Standard errors are clustered by firm. ***, **, * indicates significance at the 0.01, 0.05, 0.10 level, respectively.

companies from 93 countries starting in 2004. We use transcript data to identify the number and length of calls, as well as the number of executives participating for a firm in a given quarter.[37]

Results in Table 9, Panel A, suggest that EU firms increased participation in events post-MiFID II. Column 1 reports results for the logged total number of all events (*All_Events*), Column 2 for logged quarterly earnings calls (*EarnCalls*), and Column 3 for logged analyst days (*AnalystDays*). In all three columns, the coefficient on I(Treat)*I(Post) is significantly positive, indicating an increased overall frequency of corporate events, as well as increases in earnings calls and analyst days. The average EU firm increased participation in all media events by 39.8%, earnings calls by 44.9%, and analyst days by 48.8% relative to pre-MiFID II levels.

If lost coverage explains the increase in media events, we expect a greater response for firms that lost sell-side coverage post-MiFID II. In Panel B, we include an interaction between I(Treat)*I(Post) and an indicator for firms that lost coverage (*Lose_Cov*). If firms that lost coverage increased the frequency of events to a greater extent, we expect the triple interaction to be positive. The coefficient on I(Treat)*I(Post)*Lose_Cov is significantly positive for overall media events, as well as for earnings calls and analyst days measured separately, providing evidence that firms that lost analyst coverage responded, at least in part, by increasing the frequency of media events.

We also observe characteristics of media events based on transcripts. We focus on audio length, the number of words spoken, and the identity of speakers. Table 10, Panel A presents results for the length of calls (in seconds). In Column 1, we find that all calls (all events in the Global Transcripts database) became longer for EU firms following MiFID II relative to controls (*All_Events_Sec*). Importantly, results in Column 2 confirm that effects are most pronounced for firms that lost analyst coverage post-MiFID II. Columns 3−6 present similar results when disaggregating *All_Events_*Sec into the length of earnings calls (*EarnCalls_Sec*) and analyst days (*AnalystDays_Sec*). Results indicate an increase in length of earnings calls and analyst days for EU firms relative to control firms, with results especially pronounced for firms that lost coverage. For the average EU firm that lost analyst coverage, calls increased by 21.2% in length.

Panel B presents analyses based on word counts in the presentation, question, and answer components of calls from transcripts. If MiFID II reduced resources available for analyst research, we expect firms to respond by increasing detail in presentations and participants to respond by asking more questions. Consistent with predictions, results in Table 10, Panel B, indicate that the number of words in presentations, questions, and answers in earnings calls and analyst days all significantly increased post-MiFID II. The increase is significantly greater for EU firms that lost coverage. The number of words in all three sections increase by about 20% following MiFID II.

Prior research (Balakrishnan et al., 2014) suggests that firms respond to exogenous decreases in analyst coverage (e.g., brokerage closures) by increasing forward guidance. To investigate that possibility, we examine the change in the percentage of forward-looking language in earnings calls and analyst days (*PctFwdLook_EC* and *PctFwdLook_AD*) for EU firms post-MiFID II.[38] Results reported in Panel C, Columns 1 and 3 indicate that EU firms increased forward-looking disclosure post-MiFID II. The increases are statistically significant for earnings calls and marginally significant for analyst days. Columns 2 and 4 show that the effect for both earnings calls and analyst days was significantly driven by EU firms that lost coverage.

Another measure of the intensity of firm involvement in media events is the number of executives participating. We create two variables, *AvgExecsEC* and *AvgExecsAD,* defined as the log of one plus the number of executives participating in earnings calls and analyst days. Results in Table 10, Panel D suggest that post-MiFID II, EU firms had a significantly greater number of executives participating in earnings calls (Column 1) and analyst days (Column 3). Columns 2 and 4 suggest that the effect was more pronounced for firms that lost coverage post-MiFID II, although the coefficient is insignificant for analyst days. Untabulated results suggest that the effects were greatest for medium and large firms, consistent with medium and large firms experiencing the greatest decrease in coverage and responding by increasing participation media events. Taken together, the evidence in Tables 9 and 10 suggests that firms responded to decreased sell-side coverage by participating more intensively in media events, especially for EU firms that lost sell-side coverage post-MiFID II.

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[37] Capital IQ transcripts include a variety of events, with earnings calls being the most common. Transcripts are generated as soon as the event ends and are reviewed by at least two individuals for accuracy.

[38] Following prior studies (Li, 2010; Matsumoto et al., 2011), we measure forward-looking disclosure using linguistic traits that express future focus (e.g., may, will, shall) as captured by the software Linguistic Inquiry and Word Count 2015 (Pennebaker et al., 2015).

Table 10

MiFID II and event characteristics. Panel A — audio length.

	All_Events _Sec	All_Events _Sec	EarnCalls _Sec	EarnCalls _Sec	AnalystDays_Sec	AnalystDays_Sec
I (Treat)*I(Post)	1.282***	1.086***	1.229***	1.045***	0.102***	0.037
	(11.60)	(8.67)	(11.26)	(8.47)	(3.13)	(0.95)
Lose_Cov		0.034		0.045		−0.015
		(1.23)		(1.62)		(-0.74)
I (Treat)*I(Post)*Lose_Cov		0.424*** (2.83)		0.398*** (2.70)		0.140** (2.31)
N	59,430	59,430	59,430	59,430	59,430	59,430
R^2	0.81	0.81	0.81	0.81	0.12	0.12
Controls	Y	Y	Y	Y	Y	Y
Fixed Effects	F, Y-Q	F, Y-Q	F, Y-Q	F, Y-Q	F, Y-Q	F, Y-Q

Panel B — Number of Words Spoken During Presentations, Questions, and Answers

	Present_ Words	Present_ Words	Question_Words	Question_Words	Answer_ Words	Answer_ Words
I (Treat)*I(Post)	1.229***	1.030***	0.989***	0.825***	1.131***	0.938***
	(11.13)	(8.41)	(10.87)	(8.17)	(10.89)	(8.11)
Lose_Cov		0.061**		0.072***		0.071**
		(2.04)		(2.80)		(2.47)
I (Treat)*I(Post)*Lose_Cov		0.431*** (2.83)		0.356*** (2.87)		0.417*** (2.94)
N	59,430	59,430	59,430	59,430	59,430	59,430
R^2	0.80	0.80	0.81	0.81	0.82	0.82
Controls	Y	Y	Y	Y	Y	Y
Fixed Effects	F, Y-Q	F, Y-Q	F, Y-Q	F, Y-Q	F, Y-Q	F, Y-Q

Panel C — Forward Looking Statements

	PctFwdLook _EC	PctFwdLook _EC	PctFwdLook _AD	PctFwdLook _AD
I (Treat)*I(Post)	0.045***	0.035*	0.004*	0.000
	(4.19)	(1.83)	(1.69)	(0.09)
Lose_Cov		−0.004		−0.000
		(-1.18)		(-0.08)
I (Treat)*I(Post)*Lose_Cov		0.021***		0.008**
		(3.43)		(2.69)
N	59,430	59,430	59,430	59,430
R^2	0.80	0.80	0.12	0.12
Controls	Y	Y	Y	Y
Fixed Effects	F, Y-Q	F, Y-Q	F, Y-Q	F, Y-Q

Panel D — Number of Executives Participating

	AvgExecsEC	AvgExecsEC	AvgExecsAD	AvgExecsAD
I (Treat)*I(Post)	0.170***	0.141***	0.018***	0.010
	(10.60)	(7.89)	(2.84)	(1.25)
Lose_Cov		0.014***		−0.002
		(2.83)		(-0.58)
I (Treat)*I(Post)*Lose_Cov		0.064***		0.019
		(2.87)		(1.55)
N	59,430	59,430	59,430	59,430
R^2	0.80	0.80	0.12	0.12
Controls	Y	Y	Y	Y
Fixed Effects	F, Y-Q	F, Y-Q	F, Y-Q	F, Y-Q

This table presents the effects of MiFID II on corporate event characteristics at the firm level. Specifically, we estimate OLS regressions of earnings call lengths (Panel A), number of words spoken (Panel B), percentage of forward-looking statements (Panel C), and number of firm executives participating in calls (Panel D), on indicator variables of whether the firm is affected by MiFID II (I(Treat)) and post-MiFID II (I(Post)). Our main variable of interest is the average treatment effect captured by the coefficient of I(Treat)*I(Post), and the interaction between I(Treat)*I(Post) and *Lose_Cov*, an indicator for a firm that lost analyst coverage after MiFID II. All control variables from Table 9 are also included in Table 10, but coefficients are omitted from the tables for parsimony. All variables are defined in Appendix A. Standard errors are clustered by firm. ***, **, * indicates significance at the 0.01, 0.05, 0.10 level, respectively.

5. Conclusion

The unbundling of "soft dollars" associated with MiFID II represents a controversial and important legislative change with potential implications for sell-side research, buy-side research, investor communications, and market functioning. However, the overall effect is difficult to predict for at least two reasons. First, the regulation did not directly affect how research was priced but, rather, how spending was disclosed. Second, the legislation likely had spillover effects on other sectors such as the labor market for analysts, incentives for buy-side investors, and investor relations by firms.

Guided by predictions from recent theoretical research, our results suggest the following. First, sell-side analyst coverage decreased, reflecting reduced demand for research when costs became more transparent and contractible. Second, the

primary firms losing sell-side coverage were those for which the incremental benefit from the marginal analyst was lower. Third, there was a net outflow of individual analysts from the sell-side, primarily to the buy-side, concentrated among the highest-quality analysts. Fourth, remaining sell-side analysts focused on a narrower set of firms, and reports became more thorough and informative. However, while individual reports became more informative, at an aggregate firm level, total sell-side analyst informativeness declined, suggesting that the effects of declining analyst coverage outweighed the improvement in remaining sell-side research quality. Fifth, firms responded to the decline in sell-side coverage by increasing the quantity and intensity of firm-initiated media events, especially for firms that lost coverage. Moreover, while the press and policy-makers generally assumed that small firms would be most affected by MiFID II, our evidence suggests otherwise. Medium and large firms experienced the largest decline in coverage, as well as the largest increases in analyst effort, forecast quality, and participation in corporate media events.

While we cannot draw normative conclusions given that we do not observe all costs and benefits, our results have potential relevance for the EU in its ongoing assessment of the effectiveness of MiFID II and whether it should roll back portions for specific constituencies. In addition, the results are potentially relevant to the SEC's ongoing deliberations on whether to implement a similar system in the US, and for analysts, fund managers, firms, and investors in EU markets. However, our results are subject to caveats. The evidence is specific to MiFID II and may not translate to unbundling in other settings. Further, unbundling was only one component of MiFID II, and we cannot entirely eliminate potential effects of other aspects of the regulation. That said, our results match well with the theoretical predictions on unbundling and are robust to a wide range of controls.

Acknowledgments

Appendix A. Variable Definitions

Firm/Country Level Variables	
Coverage	Natural log of 1+ the number of sell-side analysts who issue a quarterly forecast for a given firm for the given quarter
Ret_Vol	Standard Deviation of daily returns over a quarter
ROA	Quarterly net income before extraordinary items scaled by quarterly assets
Earn_Vol	Rolling standard deviation of ROA (defined above) in the last five quarters, with a minimum of three ROA observations
Loss	Indicator that equals 1 if quarterly ROA is negative, and 0 otherwise
Intan	Quarterly intangibles scaled by quarterly total assets
Size	Natural log of quarterly total assets, in US dollars
Lev	Total quarterly liabilities divided by total quarterly assets
Firm_Age	The fiscal year of the firm observation minus the first year in which the firm shows up in *CRSP* (U.S. firms) or *Compustat Global* (European firms)
MtB	Market value of equity at quarter end divided by quarterly book value of equity
GDP_Percap	Natural log of GDP per capita in the firm's country
GDP_Growth	Difference between a firm's country's GDP and previous year GDP, divided by the previous year GDP
Avg_Analyst_Firms	Natural log of 1 + number of firms forecasted by the average analyst that covers a given firm in a given quarter.
Avg_Analyst_Forecasts	Natural log of 1 + the number of EPS forecasts made by the average analyst that covers a given firm in a given quarter.
Analy_Info	Informativeness of analysts, calculated by summing the absolute market-adjusted returns for all analyst EPS forecast revision dates in a given quarter and dividing by the sum of all absolute market-adjusted returns for all trading days in the quarter
EPSOnly_Info	Informativeness of analyst forecasts that are not supplemented by a stock price recommendation, calculated by summing the absolute market-adjusted returns for all analyst no-recommendation EPS forecast revision dates in a given quarter and dividing by the sum of all absolute market-adjusted returns for all trading days in the quarter
Recommend_Info	Informativeness of analyst forecasts supplemented by a stock price recommendation, calculated by summing the absolute market-adjusted returns for all recommendation-included EPS forecast revision dates in a given quarter and dividing by the sum of all absolute market-adjusted returns for all trading days in the quarter
Analyst_Forecasts	Natural log of 1 + the total number of quarterly forecasts made by analysts for a firm in a given quarter
Dark_Trading_Susp	Indicator that equals 1 if the firm was suspended from dark trading in a given quarter, and 0 otherwise
Tick_Size_Change	Indicator that equals 1 if the firm underwent a tick size change in a given quarter, and 0 otherwise
All_Events	Natural log of 1 + the total number of events that a firm participated in during a given quarter from the S&P Global Transcripts database
EarnCalls	Natural log of 1 + the number of earnings calls for a given a firm in a given quarter
AnalystDays	Natural log of 1 + the number of analyst days for a given a firm in a given quarter
Lose_Cov	Indicator that equals 1 if the firm lost analyst coverage in the post-MiFID period relative the average quarterly analyst coverage in 2017, and 0 otherwise
All_Events_Sec	Natural log of 1 + the number of seconds of a call among all events in the S&P Global Transcripts database for a given firm in a given quarter
EarnCalls_Sec	Natural log of 1 + the number of seconds of earnings calls for a given firm in a given quarter

(continued)

Firm/Country Level Variables	
AnalystDays_Sec	Natural log of 1 + the number of seconds of analyst days for a given firm in a given quarter
Present_Words	Natural log of 1 + the total number of words spoken during presentations during earnings calls and analyst days for a given firm in a given quarter
Question_Words	Natural log of 1 + the total number of words spoken during questions made during earnings calls and analyst days for a given firm in a given quarter
Answer_Words	Natural log of 1 + the total number of words spoken during answers to questions made during earnings calls and analyst days for a given firm in a given quarter
PctFwdLook_EC	Percentage of forward-looking words spoken relative to the total number of words spoken during earnings calls for a given firm in a given quarter
PctFwdLook_AD	Percentage of forward-looking words spoken relative to the total number of words spoken during analysts days for a given firm in a given quarter
AvgExecsEC	Natural log of 1 + the total number of executives who participated in earnings calls for a given firm in a given quarter
AvgExecsAD	Natural log of 1 + the total number of executives who participated in analyst days
Analyst/Brokerage/Forecast Level Variables	
Stay_At_Firm	Indicator that equals 1 if the analyst worked for the same brokerage in a given quarter as the prior quarter, and 0 otherwise
Leave_SellSide	Indicator that equals 1 if the analyst moved to a non-sell-side firm in a given quarter, and 0 otherwise
Buy_Side	Indicator that equals 1 if the analyst moved to a buy-side firm in a given quarter, and 0 otherwise
Higher_Pos	Indicator that equals 1 if the analyst took a higher position at the new firm in a given quarter, and 0 otherwise
CSuite	Indicator the equals 1 if the analyst took a position in the C-Suite at the new firm in a given quarter, and 0 otherwise
RelAccuracy	Relative forecast accuracy, measured for each analyst i as the analyst's average forecast accuracy in year-quarter t, $Accuracy_{it}$. $Accuracy_{it}$ is computed by averaging $Accuracy_{ijt}$ across all firms followed by analyst i in year-quarter t as $100 - 100 \times \{(Rank_{ijt} - 1)/(NumberFollowing_{jt} - 1)\}$, where $Rank_{ijt}$ if analyst i's forecast accuracy rank for firm j in year-quarter t and $NumberFollowing_{jt}$ being the number of analysts following company j in year-quarter t. We use the last forecast made by each analyst for a given firm-quarter
RF_Opt	Relative forecast optimism, calculated as the mean relative optimism of all forecasts made by a given analyst in a given quarter, where relative optimism is computed as the EPS forecast made for a given firm less the mean of all forecasts made for the given firm during the quarter, divided by the standard deviation of all forecasts made for the given firm during the quarter.
GExp	Number of years for which the analyst has been active on the sell-side, computed by taking the difference between the given fiscal year and the first year in which the analyst makes a forecast for any firm on I/B/E/S
NInd	Natural log of the number of 2-digit SIC industries covered by a given analyst during a given quarter
NFirms	Natural log of the number of total firms that an analyst issues a quarterly EPS forecast for in a given quarter
BroSize	Natural log of the number of analysts employed by the brokerage in a given quarter from I/B/E/S
Sale_Forecast	Indicator that equals 1 if the forecast includes a supplementary sales forecast, and 0 if otherwise
Num_OtherVars	For a given analyst report, the logged total number of variable forecasts (other than EPS) that is included
Accuracy	The absolute value of the difference between the estimated EPS and the actual EPS for the quarter-end, divided by the stock price two days prior to the EPS forecast, all multiplied by −1.
Recommend	Indicator that equals 1 if the forecast includes a stock recommendation, and 0 otherwise
Rec_Change	Indicator that equals 1 if the stock recommendation has changed since the previous recommendation made for the same firm by the same analyst, and 0 otherwise
Nonhold_Rec	Indicator that equals 1 if the stock recommendation is not a "hold", and 0 otherwise
Extreme_Rec	Indicator that equals 1 if the recommendation is either a "strong sell" or a "strong buy", and 0 otherwise
CAR	Three day market-adjusted cumulative abnormal daily return around the analyst forecast
FExp	Number of years for which the analyst has been covering the given firm, computed by taking the difference between the given fiscal year and the first year in which the analyst makes a forecast for that firm on I/B/E/S
FHor	Difference between the given forecast revision date and the subsequent quarterly earnings announcement date

IA.1. Analyst Employment Data Gathering

We use LinkedIn to gather data on analyst movements around MiFID II adoption. We first gather all analysts who cover firms in our sample as identified in I/B/E/S.[39] We then identify "Treatment" (European) and "Control" (non-European) analysts for our analyst-level empirical tests. We categorize an analyst in the treatment group if at least 70% of firms covered during the sample period are domiciled and listed in Europe, and as in the control group, if no more than 30% of firms covered during the sample period are European. We delete analysts who were not placed in either category.

The next task is to find the analyst's full name to enable a LinkedIn search. Because I/B/E/S does not provide the full names of analysts (it only provides the analyst's first initial and last name) or in some instances, does not provide any data on the name (especially for foreign analysts), we use Bloomberg to identify the analyst's full name. If I/B/E/S has information for a given analyst, we find the full name from Bloomberg based on the forecasted firm and the analyst's first initial and last name. If there is missing information on I/B/E/S for a given analyst, we create a match if the same recommendation (e.g., buy, strong

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[39] There is not a perfect overlap between the analysts in our analyst-level tests and our forecast-level tests because our forecast-level tests require the same analyst to make a forecast for a given firm before and after MiFID II. Since we are tracking analyst employment in our analyst-level tests, we want to include analysts who may have moved to a different brokerage or out of the sell-side industry before MiFID II adoption.

sell) was made on the same date for the same firm on Bloomberg. We match these analysts by hand because I/B/E/S sometimes has spelling errors and different first names from Bloomberg (e.g., Bob and Robert).

Once we compile the list of analysts' full names, we search for each analyst on LinkedIn and track their employment during our sample period. If the analyst moved during the sample period, we look up the new company to accurately categorize it as sell-side, buy-side, or neither. We also cross-check this information with I/B/E/S to see if there was a change in brokerage (the ESTIMATOR variable in I/B/E/S) or if the analyst was no longer in the I/B/E/S database (indicating that the analyst left the sell-side industry). In addition, we re-categorize a few analysts from the control group to the treatment group and vice versa if it is clear from the analyst's LinkedIn profile that the analyst is European (or non-European).

We record the analyst or ex-analyst's position at the new company (new brokerage or new company outside of the sell-side industry) to examine whether analysts who moved following MiFID II take "higher" positions at their new companies and whether this employment move depends on the quality of the analyst. While different companies use different position names, we do our best to identify promotions by the appearance of "Head," "Director," "Senior," "Chief," "President," etc., in a new title for a former "Equity Analyst," "Analyst," etc.

After gathering the necessary data, we check in I/B/E/S to see if the necessary control variables (e.g., experience, historical accuracy) for our analyst-level tests are non-missing. After deleting the analysts who fail to meet this criterion (and analysts for whom we were unable to find a LinkedIn profile or the profile did not contain useable information), we are able to collect LinkedIn employment data for 57.3% of analysts and 72.2% of analyst-quarters from our original analyst sample.

Table IA.1
Descriptive Statistics — US/EU Split

Variable	EU			US		
	N	Mean	Std Dev	N	Mean	Std Dev
Firm Level Variables						
Coverage	10,507	1.781	2.399	48,923	7.134	6.936
Ret_Vol	10,507	0.020	0.012	48,923	0.025	0.015
Earn_Vol	10,507	0.012	0.019	48,923	0.023	0.044
Loss	10,507	0.160	0.367	48,923	0.329	0.470
Intan	10,507	22.284	21.989	48,923	17.136	21.491
Size	10,507	7.200	2.265	48,923	7.259	2.113
Lev	10,507	0.580	0.204	48,923	0.579	0.277
ROA	10,507	0.010	0.029	48,923	−0.011	0.062
Firm_Age	10,507	16.976	6.869	48,923	22.307	16.899
MtB	10,507	3.100	3.186	48,923	2.819	3.345
GDP_Percap	10,507	10.635	0.399	48,923	10.861	0.016
GDP_Growth	10,507	2.223	1.319	48,923	2.281	0.519
Avg_Analyst_Firms	6476	7.210	7.243	44,463	14.735	5.243
Avg_Analyst_Forecasts	6476	9.982	10.238	44,463	19.786	8.256
Analy_Info	10,506	0.027	0.058	48,919	0.113	0.129
EPSOnly_Info	10,506	0.023	0.052	48,919	0.102	0.110
Recommend_Info	10,506	0.003	0.014	48,919	0.009	0.022
Dark_Trading_Susp	10,507	0.086	0.280	48,923	0.000	0.000
Tick_Size_Change	10,507	0.010	0.098	48,923	0.000	0.000
All_Events	10,507	0.385	0.596	48,923	1.172	0.993
Earn_Calls	10,507	0.326	0.477	48,923	0.773	0.432
Analyst_Days	10,507	0.018	0.134	48,923	0.028	0.168
Lose_Cov	10,507	0.408	0.491	48,923	0.422	0.494
All_Events_Sec	10,507	1449.260	2867.700	48,923	3374.120	3691.330
Earn_Calls_Sec	10,507	1102.680	1756.180	48,923	2199.870	1483.250
Analyst_Days_Sec	10,507	204.658	1691.470	48,923	328.971	2110.160
Present_Words	10,507	1516.730	3870.500	48,923	3595.220	5038.880
Question_Words	10,507	426.049	801.569	48,923	1084.600	1134.080
Answer_Words	10,507	1161.090	2382.270	48,923	3327.000	4016.900
PctFwdLook_EC	10,507	0.085	0.181	48,923	0.248	0.204
PctFwdLook_AD	10,507	0.005	0.047	48,923	0.005	0.056
Avg_Execs_EC	10,507	0.808	1.317	48,923	2.029	1.507
Avg_Execs_AD	10,507	0.091	0.784	48,923	0.160	1.080
Analyst/Brokerage Level Variables						
Stay_At_Firm	4588	0.970	0.171	29,729	0.968	0.177
Leave_SellSide	4588	0.014	0.116	29,729	0.011	0.104
Buy_Side	4588	0.005	0.067	29,729	0.003	0.055
Higher_Pos	4588	0.014	0.116	29,729	0.010	0.097
CSuite	4588	0.004	0.060	29,729	0.001	0.037
RF_Opt	4588	−0.020	0.382	29,729	0.003	0.342
GExp	4588	5.387	3.928	29,729	8.131	7.201
N_Ind	4588	2.112	1.593	29,729	3.036	2.428

N_Firms	4588	3.920	3.076	29,729	10.745	6.912
Bro_Size	4588	47.102	53.902	29,729	44.474	45.947
Forecast Level Variables						
Sale_Forecast	24,908	0.721	0.448	471,601	0.559	0.496
Num_OtherVars	24,908	3.684	2.437	471,601	3.383	3.086
Accuracy	23,857	0.431	0.675	455,820	0.430	0.718
Recommend	24,908	0.109	0.311	471,601	0.070	0.256
Rec_Change	24,908	0.102	0.303	471,601	0.061	0.240
Nonhold_Rec	24,908	0.067	0.249	471,601	0.040	0.197
Extreme_Rec	24,908	0.020	0.138	471,601	0.014	0.117
CAR	24,908	0.052	0.042	467,547	0.061	0.043
FExp	24,908	9.604	3.809	471,601	9.158	8.607
FHor	24,908	51.219	39.140	471,601	66.817	33.220

Table IA.2
MiFID II and Analyst Following — Alternate Control Groups.

Control Group	Coverage All non-Europe	Coverage All non-US non-Europe
I (Treat)*I(Post)	−0.056***	−0.112***
	(−3.74)	(−6.12)
Ret_Vol	−0.289	1.176***
	(−1.26)	(3.24)
Earn_Vol	−1.006***	−0.523
	(−6.54)	(−1.23)
Loss	−0.020***	−0.003
	(−3.56)	(−0.27)
Intan	−0.002***	−0.000
	(−3.58)	(−0.15)
Size	0.294***	0.193***
	(19.63)	(7.62)
Lev	0.016	−0.082
	(0.54)	(−0.93)
ROA	−0.444***	0.415**
	(−6.93)	(2.15)
Firm_Age	−0.016**	−0.108***
	(−2.24)	(−4.16)
MtB	0.002***	0.004*
	(3.86)	(1.65)
GDP_Percap	0.496***	0.504***
	(3.37)	(2.74)
GDP_Growth	−0.001	−0.024***
	(−0.29)	(−5.38)
N	79,588	27,313
R^2	0.86	0.67
Firm FE	Y	Y
Year-Qtr FE	Y	Y

This table presents the effects of MiFID II on analyst coverage at the firm-quarter level. Specifically, we estimate OLS regressions of coverage on indicator variables of whether the firm is affected by MiFID II (I(Treat)) and post-MiFID II (I(Post)), controlling for firm and country characteristics. Our main variable of interest is the average treatment effect captured by the coefficient of I(Treat)*I(Post). Standard errors are clustered by firm. ***, **, * indicates significance at the 0.01, 0.05, 0.10 level, respectively.

Table IA.3
MiFID II and Analyst Following — Subsample Analyses.

Subsample	Coverage Europe	Coverage USA
I(Post)	−0.033**	−0.005
	(−2.43)	(−0.54)
Ret_Vol	0.089	−0.195
	(0.18)	(−0.75)
Earn_Vol	−0.180	−0.542***
	(−0.49)	(−5.06)
Loss	−0.023	−0.024***
	(−1.58)	(−4.02)
Intan	0.001	−0.001

Table IA.3 (*continued*)

Subsample	Coverage Europe	Coverage USA
	(0.89)	(-1.03)
Size	0.227***	0.331***
	(6.82)	(20.19)
Lev	−0.029	0.073**
	(-0.32)	(2.24)
ROA	0.175	−0.563***
	(0.88)	(-8.11)
Firm_Age	−0.036***	−0.041***
	(-3.18)	(-2.58)
MtB	0.012***	0.005***
	(2.82)	(4.39)
GDP_Percap	0.322	1.117
	(0.56)	(1.20)
GDP_Growth	−0.012	−0.003
	(-1.40)	(-0.47)
N	10,507	48,923
R^2	0.78	0.90
Firm FE	Y	Y

This table presents the effects of MiFID II on analyst coverage at the firm-quarter level. Specifically, we estimate OLS regressions of coverage on indicator variables of the post-MiFID II period (I(Post)), controlling for firm and country characteristics. Column 1 tests European countries, while Column 2 tests US countries. Our main variable of interest is the average treatment effect captured by the coefficient of I(Post). Standard errors are clustered by firm. ***, **, * indicates significance at the 0.01, 0.05, 0.10 level, respectively.

Table IA.4
MiFID II and Analyst Following − Alternate Sample Period (2012−2019).

	Coverage	Coverage Europe Only	Coverage
I (Treat)*I(Post)	−0.031**		−0.036**
	(-1.97)		(-2.54)
I(Post)		−0.086***	
		(-5.05)	
Ret_Vol		1.044**	−0.860***
		(2.11)	(-3.76)
Earn_Vol		0.140	−0.718***
		(0.33)	(-7.06)
Loss		−0.020	−0.032***
		(-1.29)	(-5.62)
Intan		0.001	−0.001
		(1.34)	(-1.39)
Size		0.192***	0.303***
		(5.93)	(25.86)
Lev		0.069	−0.003
		(0.76)	(-0.09)
ROA		0.264	−0.512***
		(1.21)	(-8.14)
Firm_Age		0.000	0.007
		(0.07)	(1.08)
MtB		0.006*	0.004***
		(1.82)	(5.85)
GDP_Percap		−0.154	−0.382
		(-0.42)	(-1.11)
GDP_Growth		0.030***	0.021***
		(6.10)	(4.97)
N	102,670	16,594	102,670
R^2	0.86	0.71	0.87
Firm FE	Y	Y	Y
Year-Qtr FE	Y	N	Y

This table presents the effects of MiFID II on analyst coverage at the firm-quarter level. Specifically, we estimate OLS regressions of coverage on indicator variables of whether the firm is affected by MiFID II (I(Treat)) and post-MiFID II (I(Post)), controlling for firm and country characteristics. Our main variable of interest is the average treatment effect captured by the coefficient of I(Treat)*I(Post). Standard errors are clustered by firm. ***, **, * indicates significance at the 0.01, 0.05, 0.10 level, respectively.

Table IA.5
MiFID II and Analyst Following — Additional Controls.

	Coverage *Firm, Quarter* *Fixed Effects*	Coverage *Must have nonzero analyst following in pre-MiFID period*
I (Treat)*I(Post)	−0.043***	−0.111***
	(-3.30)	(-4.70)
Dark_Trading_Susp	−0.061***	−0.003
	(-2.84)	(-0.09)
Tick_Size_Change	−0.067**	−0.007
	(-2.21)	(-0.09)
Ret_Vol	−0.166	0.572**
	(-0.67)	(2.03)
Earn_Vol	−0.525***	−0.429***
	(-5.02)	(-3.18)
Loss	−0.026***	−0.018***
	(-4.54)	(-3.10)
Intan	−0.000	−0.002***
	(-0.84)	(-3.16)
Size	0.320***	0.316***
	(21.49)	(19.99)
Lev	0.063**	0.104***
	(2.04)	(3.07)
ROA	−0.512***	−0.488***
	(-7.76)	(-6.20)
Firm_Age	−0.022**	−0.008
	(-2.31)	(-0.75)
MtB	0.005***	0.005***
	(4.83)	(4.14)
GDP_Percap	0.172	−0.681
	(0.32)	(-0.98)
GDP_Growth	−0.013**	−0.003
	(-2.11)	(-0.53)
N	59,430	39,165
R^2	0.90	0.88
Firm FE	Y	Y
Year-Qtr FE	Y	Y

This table presents the effects of MiFID II on analyst coverage at the firm-quarter level. Specifically, we estimate OLS regressions of coverage on indicator variables of whether the firm is affected by MiFID II (I(Treat)) and post-MiFID II (I(Post)), controlling for firm and country characteristics. Our main variable of interest is the average treatment effect captured by the coefficient of I(Treat)*I(Post). Standard errors are clustered by firm. ***, **, * indicates significance at the 0.01, 0.05, 0.10 level, respectively.

Table IA.6
Entropy Balancing. Panel A — Effect of MiFID II on Analyst Coverage.

Specification	Coverage *No controls*	Coverage *Country, Industry, Quarter Fixed Effects*	Coverage *Firm, Quarter Fixed Effects*	Coverage *Must have nonzero analyst following in pre-MiFID period*
I (Treat)*I(Post)	−0.041***	−0.042***	−0.046***	−0.105***
	(-4.04)	(-4.06)	(-4.73)	(-6.28)

Panel B — Cross-Sectional Tests of Analyst Coverage following MiFID II

	Coverage	Coverage	Coverage	Coverage	Coverage
I (Treat)*I(Post)	0.031*	−0.043***	−0.024	−0.067***	−0.021
	(1.68)	(-4.06)	(-1.61)	(-5.78)	(-1.29)
I (Treat)*I(Post)*Large	−0.105***				
	(-4.24)				
I (Treat)*I(Post)*Medium	−0.125***				
	(-5.25)				
I (Treat)*I(Post)*High_Cov			−0.042		
			(-1.56)		
I (Treat)*I(Post)*High_Age				−0.039**	

Table IA.6 (*continued*)

Panel B — Cross-Sectional Tests of Analyst Coverage following MiFID II

	Coverage	Coverage	Coverage	Coverage	Coverage
			(-2.03)		
I (Treat)*I(Post)*High_Vol				0.062***	
				(3.06)	
I (Treat)*I(Post)*High_Acc					−0.042**
					(-2.13)

Panel C — Analysts Who Stay At Brokerage

Dep. Variable	Stay_At_Firm	Stay_At_Firm	Stay_At_Firm	Stay_At_Firm
Quality Measure		*RelAccuracy*	*Experience*	*Seniority*
I (ATreat)*I(Post)	−0.036***	−0.013	−0.015	0.021***
	(-4.05)	(-1.11)	(-1.36)	(2.98)
I (ATreat)*I(Post)*HighQuality		−0.033**	−0.041**	−0.094***
		(-2.02)	(-2.18)	(-5.65)
I (ATreat)*I(Post)*LowQuality		−0.014	−0.005	
		(-0.79)	(-0.35)	

Panel D — Analysts Who Leave the Sell-Side Industry

	Leave_SellSide	Leave_SellSide	Leave_SellSide	Leave_SellSide
Quality Measure		*RelAccuracy*	*Experience*	*Seniority*
I (ATreat)*I(Post)	2.735***	1.003	1.103*	−0.468***
	(5.08)	(1.58)	(1.82)	(-5.14)
I (ATreat)*I(Post)* HighQuality		3.406***	4.013***	5.790***
		(2.89)	(2.79)	(5.78)
I (ATreat)*I(Post)* LowQuality		0.884	0.712	
		(0.90)	(0.69)	

Panel E — Analysts Who Move to the Buy-Side

	Buy_Side	Buy_Side	Buy_Side	Buy_Side
Quality Measure		*RelAccuracy*	*Experience*	*Seniority*
I (ATreat)*I(Post)	3.895***	1.418	0.242	−0.353***
	(2.81)	(0.92)	(0.25)	(-2.64)
I (ATreat)*I(Post)* HighQuality		6.366***	7.629**	7.479***
		(2.63)	(2.23)	(3.03)
I (ATreat)*I(Post)* LowQuality		−0.740	3.042	
		(-0.42)	(1.27)	

Panel F — Analysts Who Are Promoted At Their new Firms

	Higher_Pos	Higher_Pos	CSuite	CSuite
I (Treat)*I(Post)	1.852***	1.027	6.810***	3.185
	(3.56)	(1.44)	(3.17)	(1.11)
I (Treat)*I(Post)*TopAccu		2.078**		10.163*
		(2.07)		(1.85)
I (Treat)*I(Post)*BotAccu		−0.097		−1.591
		(-0.10)		(-0.49)

Panel G — Focus of Remaining Analysts

	Avg_Analyst_Firms	Avg_Analyst_Forecasts
I (Treat)*I(Post)	−0.023***	−0.021**
	(-2.97)	(-2.11)

Panel H — Analyst Effort and Forecast Accuracy

	Sale_Forecast	Num_OtherVars	Accuracy
I (Treat)*I(Post)	0.078***	0.065***	0.072**
	(5.88)	(6.33)	(2.35)

Panel I — Recommendations Included in Forecasts

	Recommend	Rec_Change	Nonhold_Rec	Extreme_Rec
I (Treat)*I(Post)	0.572***	0.954***	0.495**	0.208
	(6.02)	(6.62)	(2.36)	(1.38)

Panel J — Forecast Informativeness, Forecast Level

	CAR	CAR	CAR
I (Treat)*I(Post)	0.003***	−0.001	0.002***
	(4.31)	(-1.35)	(2.80)
ManyVar		0.002***	
		(8.93)	
I (Treat)*I(Post)*ManyVar		0.006***	
		(4.77)	
Recommend			−0.002***
			(-6.36)
I (Treat)*I(Post)*Recommend			0.010***
			(5.07)

Panel K — Aggregate Analyst Informativeness, Firm Level

	Analy_Info	EPSOnly_Info	Recommend_Info
I (Treat)*I(Post)	−0.038**	−0.046***	0.134**
	(−2.14)	(−2.69)	(2.22)

Panel L — Event Frequency

	All_Events	EarnCalls	AnalystDays
I (Treat)*I(Post)	0.403***	0.403***	0.421***
	(13.73)	(13.42)	(3.13)

Panel M — Event Frequency Conditional on Losing Analyst Coverage

	Ln_All_Events	lnEarnCalls	lnAnalystDays
I (Treat)*I(Post)	0.357***	0.362***	0.167
	(10.64)	(10.63)	(1.02)
I (Treat)*I(Post)*Lose_Cov	0.100**	0.088**	0.547**
	(2.42)	(2.10)	(2.17)

Panel N — Audio Length

	All_Events_Sec	All_Events _Sec	EarnCalls_Sec	EarnCalls_Sec	AnalystDays_Sec	AnalystDays_Sec
I (Treat)*I(Post)	0.396***	0.356***	0.390***	0.352***	0.455***	0.184
	(13.91)	(10.97)	(13.41)	(10.65)	(3.33)	(1.11)
I (Treat)*I(Post)* LoseCov		0.087**		0.083**		0.583**
		(2.20)		(2.06)		(2.24)

Panel O — Number of Words Spoken During Presentations, Questions, and Answers

	Present_Words	Present_Words	Question_Words	Question_Words	Answer_Words	Answer_Words
I (Treat)*I(Post)	0.390***	0.349***	0.375***	0.341***	5.125***	4.375***
	(13.29)	(10.68)	(13.04)	(10.64)	(11.58)	(8.87)
I (Treat)*I(Post)*Lose_Cov		0.088**		0.074*		1.624***
		(2.13)		(1.84)		(2.66)

Panel P — Forward Looking Statements

	PctFwdLook _EC	PctFwdLook _EC	PctFwdLook _AD	PctFwdLook _AD
I (Treat)*I(Post)	0.317***	0.163***	3.369***	2.217**
	(5.78)	(3.16)	(3.30)	(1.99)
I (Treat)*I(Post)*Lose_Cov		0.185*		2.481*
		(1.82)		(1.69)

Panel Q — Number of Executives Participating

	AvgExecsEC	AvgExecsEC	AvgExecsAD	AvgExecsAD
I (Treat)*I(Post)	0.357***	0.319***	0.429***	0.242
	(12.84)	(10.29)	(3.00)	(1.40)
I (Treat)*I(Post)*Lose_Cov		0.081**		0.404
		(2.87)		(1.55)

Panels A–Q report results to all analyses tabulated in the paper, except the following results employ entropy balancing in each regression. Only the main coefficient(s) magnitudes are tabulated below for parsimony. All control variables and fixed effects are the same as those in the primary regressions.

Table IA.7
MiFID II and Analyst Following — Other Coverage Proxies.

	Lose_Cov	Lose_Cov	Analyst_D	Analyst_D
I (Treat)*I(Post)	0.049***		−0.037**	
	(3.34)		(−2.17)	
I (Treat)*I(Post)*Small		−0.019		0.048
		(−0.75)		(1.23)
I (Treat)*I(Post)*Medium		0.091***		−0.078***
		(3.70)		(−2.83)
I (Treat)*I(Post)*Large		0.080***		−0.053**
		(3.25)		(−2.16)
N	59,430	59,430	47,775	47,775
R^2	0.26	0.26	0.12	0.12
Controls	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Year-Qtr FE	Y	Y	Y	Y

This table presents the effects of MiFID II on analyst coverage at the firm-quarter level. Specifically, we estimate OLS regressions of an indicator variable for whether the firm lost analyst coverage in the quarter relative to the prior quarter (*LoseCov*) and a variable that captures the percentage change of analyst coverage (*Analyst_D*) from the prior quarter on indicator variables of whether the firm is affected by MiFID II (I(Treat)) and post-MiFID II (I(Post)), controlling for firm and country characteristics. Our main variable of interest is the average treatment effect captured by the coefficient of I(Treat)*I(Post). All control variables included in Table 3 and main effects are also included in these specifications, but coefficients are not reported for parsimony. Standard errors are clustered by firm. ***, **, * indicates significance at the 0.01, 0.05, 0.10 level, respectively.

Table IA.8
MiFID II and Analyst Effort — Analyst Forecast Revision Lag.

	RevisionResponse	RevisionLag
I (Treat)*I(Post)	0.024***	0.046**
	(5.22)	(2.13)
Ret_Vol	−0.654***	−2.891***
	(−11.65)	(−13.48)
Earn_Vol	0.044	−0.214***
	(1.64)	(−3.21)
Loss	−0.008***	−0.007
	(−6.13)	(−1.64)
Intan	−0.001***	−0.001**
	(−8.39)	(−2.10)
Size	0.018***	−0.086***
	(8.84)	(−10.60)
Lev	0.016***	0.005
	(2.91)	(0.25)
Lag_ROA	0.033*	0.047
	(1.93)	(0.93)
Firm_Age	−0.091***	0.043***
	(−19.46)	(4.86)
MtB	−0.000	−0.001
	(−0.51)	(−0.93)
FExp	0.000*	0.002
	(1.86)	(0.71)
GExp	0.008***	−0.023*
	(3.35)	(−1.90)
FHor	−0.000	0.007
	(−0.28)	(0.83)
NInd	0.000	−0.001
	(0.50)	(−0.35)
NFirm	0.004**	−0.008
	(2.48)	(−0.93)
GDP_Percap	−3.329***	0.420
	(−7.03)	(0.79)
GDP_Growth	0.016***	0.009
	(6.38)	(1.42)
N	132,215	450,863
R^2	0.68	0.20
Fixed Effects	F, A, B, Y-Q	F, A, B, Y-Q

This table presents the effects of MiFID II on analyst forecast revision lag at the forecast level. We examine whether MiFID II affects the forecast timeliness after an earnings announcement (*RevisionResponse*) and revision timeliness with respect to the prior forecast made by the same analyst for the same firm (*RevisionLag*). Our main variable of interest is the average treatment effect captured by the coefficient of I(Treat)*I(Post). We include a control for prior quarter profitability (*Lag_ROA*). All other variable definitions can be found in Appendix A. We include firm, analyst, brokerage and year-qtr fixed effects in all columns. Standard errors are clustered by firm. ***, **, * indicates significance at the 0.01, 0.05, 0.10 level, respectively.
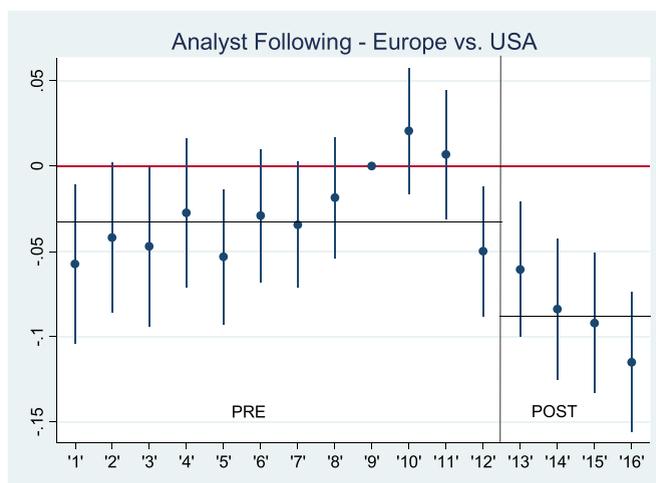
Figure IA.1. Plots of Analyst Coverage for EU vs. US firms (no control variables)
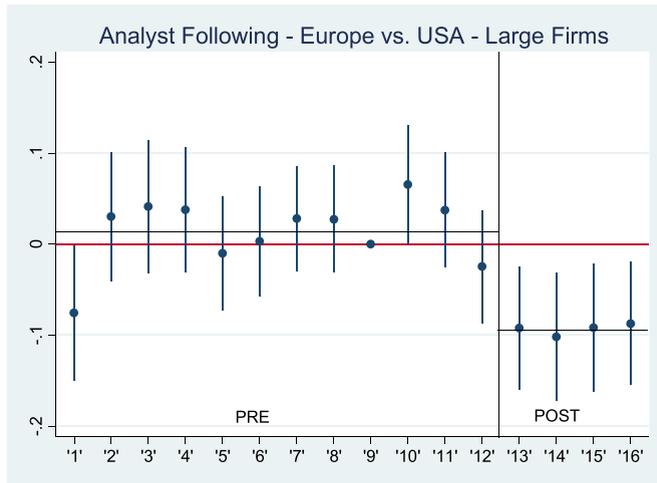
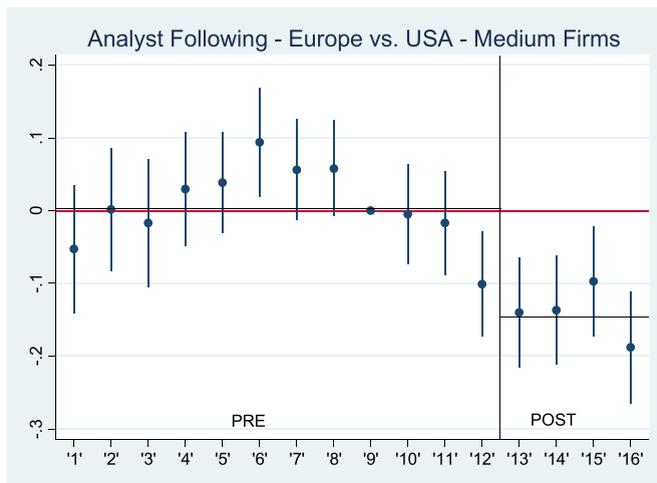**Figure IA.2.** Plots of Analyst Coverage for EU vs. US LARGE Firms

Figure IA.3. Plots of Analyst Coverage for EU vs. US MEDIUM Firms
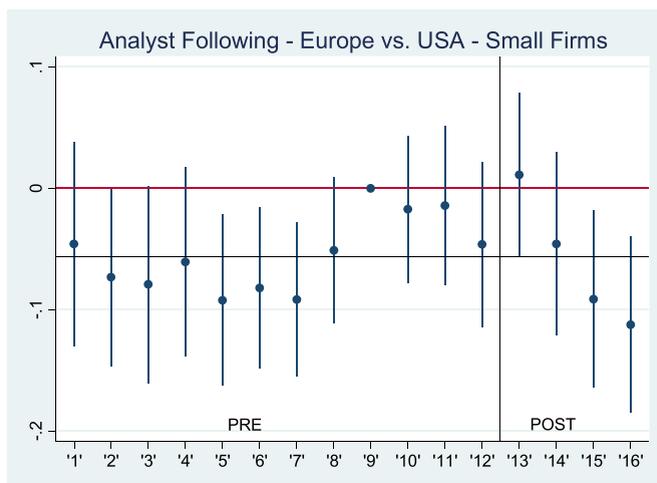
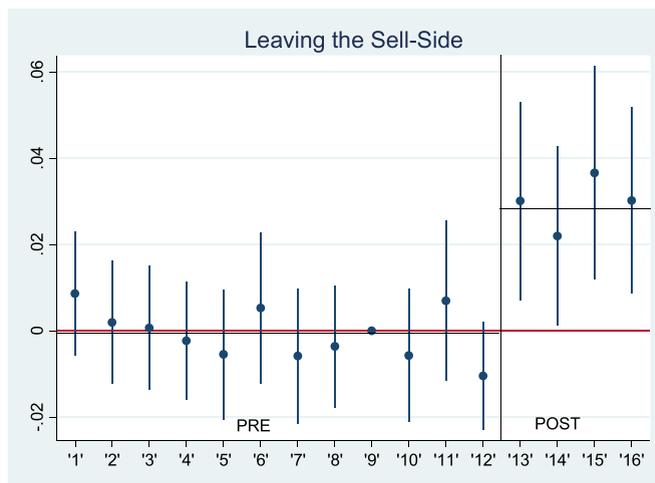**Figure IA.4.** Plots of Analyst Coverage for EU vs. US SMALL Firms

Figure IA.5. Plots of EU vs. US Analysts Leaving the Sell-Side

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