

Ethnic Minority Analysts' Participation in Public Earnings Conference Calls

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ABSTRACT

We investigate ethnic minority and nonminority sell-side analysts' participation in public earnings conference calls. We find that minority analysts are underrepresented in conference call Q&A sessions, and minority analysts who do participate on the calls experience lower levels of prioritization than do nonminority analysts. Minority analysts' lower participation rates are partially but not fully mediated by characteristics such as experience, work environment, and stock rating favorability. Additionally, firm and conference call fixed effects mediate approximately half the magnitude of lower minority participation rates. Extroverted minority analysts participate at higher rates, but the negative association between minority status and conference call participation is exacerbated when calls are more time constrained, when executive teams are less diverse, and when analysts are from less prestigious brokerage houses. Overall, we document the underrepresentation of minority analysts

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on earnings conference calls and provide evidence suggesting both analysts' and managers' choices influence minority analysts' participation rates.

JEL codes: D22, G02, G20, G23, G24, G28, J15, J71, M40

Keywords: ethnic diversity; financial analysts; earnings conference calls

1. *Introduction*

Access to management of the companies they cover is among the most highly valued services sell-side analysts provide to their institutional-investor clients (Brown et al. [2016]). Sell-side analysts with management access attract greater interest from institutional investors who depend on them to facilitate access to management, and these analysts garner greater trading and other commissions (Jackson [2005], Juergens and Lindsay [2009]). In our study, we investigate whether access to management differs for ethnic minority versus nonminority sell-side analysts. Specifically, we examine whether ethnicity is associated with analysts' participation on public earnings conference calls and, if so, what factors drive any disparities in participation rates for ethnic minority versus nonminority analysts.

Our study is important because ethnic minorities continue to be under-represented in many corporate settings. For example, recent studies conclude that the C-Suites of the Fortune 100 reflect a "dismal state of diversity" (Larcker and Tayan [2020]), and corporate leadership opportunities continue to elude even highly qualified ethnic minorities (Field, Souther, and Yore [2020]). We focus on analysts' participation in conference calls because analysts play a significant role in information and price discovery in capital markets (e.g., Brav and Lehavy [2003], Asquith, Mikhail, and Au [2005], Beyer et al. [2010], Matsumoto, Pronk, and Roelofsen [2011], Derrien and Kecskés [2013]), and because access to management is a key input to their production function (Mayew, Sharp, and Venkatachalam [2013], Green et al. [2014], Brown et al. [2015]).

We gather a sample of 8,112 sell-side analysts and 94,582 quarterly earnings conference calls between 2002 and 2017. To determine the ethnicity of each analyst in our sample, we follow prior research and use the expertise of List Service Direct in matching analysts' names to distinct ethnic groups (Brochet et al. [2019]).¹ We classify each analyst as an ethnic minority or nonminority using a classification based on the U.S. Census Bureau's definitions.

We then investigate whether ethnic minority and nonminority analysts have similar rates of participation (i.e., asking a question) in the Q&A

¹ Our measurement of ethnicity is similar to the way other papers use names to classify financial professionals (Kumar, Niessen-Ruenzi, and Spalt [2015], Brochet et al. [2019]). However, recognizing that name-based ethnicity classification can be prone to error, we also collect LinkedIn profile pictures for 4,233 analysts (52% of the analysts in our sample) and manually examine whether List Service Direct's categorizations appear to be accurate. Our extensive manual verification suggests an error rate of less than 3.5% (see section 2.2).

session of public earnings conference calls. In this setting, which is often carefully scripted by the management team (Lee [2016], Brown et al. [2019], Cen et al. [2021]), we test whether analyst ethnicity is associated with the likelihood that an analyst asks a question on the call. We also consider whether analyst ethnicity is associated with different levels of interactions with management in the form of the ordering on the call, asking follow-up questions, or speaking more words.

We first examine whether differences exist in the conference call participation rates between minority and nonminority analysts, because disparities based on ethnicity are important to identify regardless of the reason the disparities exist. The null hypothesis is that there are no differences in the conference call participation rates of the two groups. This null hypothesis relies on several critical assumptions: that minority analysts are not less qualified or less willing to participate in conference calls; that minority analysts do not differ in their experience, reputation, or performance from nonminority analysts; and that managers do not favor nonminority analysts over minority analysts in their conference call decisions. We later test these assumptions to provide evidence on potential drivers of observed differences in conference call participation. Our primary result is that minority analysts do not participate on conference calls at the same rate as nonminority analysts. Specifically, for minority analysts who cover a company, the percentage who participate on a call, ask the first question, or ask a follow-up question is lower than the same percentage for nonminorities.² Minority analysts also speak later and speak less. When we consider only underrepresented minorities (Black, Latino, and Indigenous), we find that underrepresented minority analysts also participate at lower rates than nonminority White analysts.

For the call participation variables we measure, the difference in participation rates between minority and nonminority analysts may appear small at first. For example, of analysts that cover a firm, 42.4% of minority analysts participate on a call versus 44.1% of nonminority analysts. This 1.7% difference is statistically significant, but interpreting what this magnitude means in terms of its economic effects on analysts, firms, or society is difficult. Prior research argues that even when inequalities in outcomes might be small for a single event, it is the cumulative effect of these small occurrences that better reflects the impact of any difference (Blank [2005], Stolzenberg, D'Alessio, and Eitle [2013], Greenwald et al. [2015], Wallace,

²For discrete participation variables, we test the rate differences between minorities and nonminorities. In the test of means, this is a test of the differences in the percent of minorities versus the percent of nonminorities. Similarly, in regressions, we test probability models. The estimated coefficients in these models on the indicator variable for whether an analyst is a minority compare the probability that the dependent variable is equal to one for minority analysts with the probability that the dependent variable is equal to one for nonminority analysts. By comparing *probabilities* rather than the *number* of minority and nonminority analysts, our analyses control for the mechanical differences in each subpopulation of analysts.

Nazroo, and Becares [2016]). For example, consider a typical analyst who works for 11 years, covering 16 companies each year (see table 2). With four conference calls per company-year, the analyst covers 704 conference calls over the course of his/her career. During this period, a minority analyst would participate on 12 fewer conference calls than a nonminority analyst. It is also important to consider that on-average effects can mask larger disparities in the data. For example, if a minority analyst covers firms in the top quartile of analyst following, the analyst is 3.4% less likely to participate on an individual earnings conference call (see table 9), corresponding to 24 fewer conference call appearances over the analyst's career. Underrepresented minority analysts face more severe disparities: For the same period, an underrepresented minority analyst would participate on 43 fewer conference calls.³

Although our primary tests provide evidence that minority analysts have lower representation on conference calls than nonminority analysts, these tests cannot identify the mechanism by which the underrepresentation occurs (see Lang and Kahn-Lang Spitzer [2020]). Therefore, we design our remaining tests to provide evidence on various explanations for the differences in conference call participation. First, we explore potential mediating variables in our analyses. Differences in participation could be caused by differences in experience, expertise, or other factors developed over the course of an analysts' career that are correlated with analysts' race or ethnicity. We start by progressively adding mediating variables to our models that capture observable differences among analysts. Following prior research, we consider measures of general and firm-specific experience, reputation, work environment, and favorability toward the covered firm. We also consider variables that measure the call environment: the size of the company, number of analysts following a company, and the number of participants on the call.

We find that adding these mediating variables affects the coefficient on minority analysts without fully explaining the disparities between minority and nonminority analysts. Adding experience- and reputation-related variables (firm experience, career experience, All-star status, broker size) reduces the estimated difference between minority and nonminority participation by approximately 30% (from -1.7% to -1.2%). On the other hand, adding work-related variables (number of companies the analyst covers and the number of industries the analyst covers) increases the estimated difference between minority and nonminority participation by approximately 30% (from -1.7% to -2.4%). The mediating variables have a larger effect on three of the four on-call tests. After the inclusion of all mediating variables, the difference in the probability of asking the first question is reduced by approximately 50% (-1.5% to -0.7%). The order in which analysts ask a question and the number of words they speak on the call

³We explore outcomes for underrepresented minority analysts in section 5.

are also similarly affected. These mediation tests suggest that minority and nonminority analysts differ in their experience and work environment and that these differences matter when evaluating the magnitude of the differences in conference call participation between minority and nonminority analysts. However, after controlling for these variables, we continue to find that minority analysts are less likely to participate on conference calls and have less on-call participation than nonminority analysts.

Our tests to evaluate potential mediators of lower minority analyst participation on conference calls rely on observable variation in analysts, brokerage houses, managers, and companies. To investigate the sources of unobserved variation that might explain minority analysts' lower participation, we also employ fixed effects. We use different fixed effects to test whether omitted variables related to analysts' selection (industry and brokerage fixed effects) or manager choices (firm fixed effects and conference call fixed effects) can explain minority analysts' lower conference call participation rates. If minority analysts differ in the industries and brokerages they select into, we would expect industry and/or brokerage fixed effects to mediate the coefficient on minority analysts. If managers choose minority analysts less for participation in conference calls or minority analysts selectively cover certain firms, we would expect firm and/or conference call fixed effects to mediate the coefficient on minority analysts. When testing whether fixed effects explain differences in the probability of participating on a call, we find that firm or conference call fixed effects, but not industry or brokerage fixed effects, explain approximately half of the magnitude of the minority analyst coefficient. This finding suggests that managers' selection when allowing analysts to participate or analysts' selection in which companies or calls to cover explains half of the lower participation rate for minority analysts. Based on this evidence, we cannot determine whether this portion of the lower participation is driven by managers' or analysts' choices. However, after including these fixed effects, approximately 50% of the effect remains unexplained. The on-call variable results are again different. Industry or brokerage fixed effects explain a large portion of the minority analyst coefficients and firm or conference call fixed effects substantially reduce the coefficients for all but the regression testing whether an analyst asks a follow-up question.

We next investigate potential moderators for lower minority analyst participation in and on conference calls. Because managers direct conference call participation, they may select minority analysts for participation at a lower rate than nonminority analysts.⁴ We cannot directly observe managers' intentions or actions that might limit participation. Thus, any results

⁴ Managers are ordinarily able to make decisions with respect to individual analysts, as managers observe a queue with the analysts' names and their employers. Brown et al. [2019] report that approximately 60% of firms allow all participants in the queue to ask questions or select the ordering in the queue based on a first-come-first-served basis, whereas approximately 40% of investor relations officers typically refuse questions from some analysts. Thus, there is

we might find related to this contributor to lower minority analyst participation must be interpreted with caution. However, because of the importance of this possible driver, we design moderation tests that together might lead to a reasonable inference about managers' influence on minority analyst participation. If minority analysts' lower participation is, in part, driven by managers' tendency to allow nonminority analysts greater conference call access, some actions and circumstances could moderate managers' decisions. Prior research demonstrates moderators for racial bias in various settings (e.g., Ziegert and Hanges [2005], Guillaume et al. [2017]). We propose and test four potential moderators. First, differences in social or cultural norms and behavioral characteristics may strengthen or weaken the association between minority status and conference call participation. To capture one aspect of individual differences that may influence analysts' choice to participate, we examine whether the associations that we document are influenced by analysts' personality traits. Specifically, we test whether extroverted minority analysts are more likely to participate than nonextroverted minority analysts (Harrison et al. [2019]). If social norms influence the participation rates of minority analysts, then extroversion may counteract these norms. We find some evidence that minority analysts who are extroverted have a higher likelihood of asking a follow-up question on a call than minority analysts who are not extroverted. However, we do not find any evidence that extroversion changes the likelihood of minority analysts participating on a call, asking the first question, or appearing earlier on the call.

Second, because managers may rely on observable signals of analyst quality in their selection decisions (Bohren, Imas, and Rosenberg [2019]), we capture whether an analyst is employed by one of the ten largest brokerage houses each year. We find some evidence that minority analysts from a top-10 brokerage house appear earlier and speak more on the call than other minority analysts, conditional on appearing on the conference call. Third, we identify the ethnicities of managers who appear on conference calls in our sample and test whether the effect size declines when the company hosting the conference call has at least one executive on the call who shares the same ethnicity as the minority analyst (Brewer [1979], Efferson, Lalive, and Fehr [2008]). Managers' engagement with minority analysts who participate on the call is higher when there is at least one executive of the same ethnicity on the call, but having an executive who shares a minority analyst's ethnicity is not associated with a higher likelihood that the minority analyst appears on the call in the first place. Fourth, we consider managers' time constraints, finding that the association between minority status and participation is heightened when more analysts follow the firm and when managers do not explicitly signal that they have time

likely to be significant heterogeneity in managers' approaches to managing the conference call queue.

for additional questions. Together, these results suggest that managers play a role in lower minority analyst conference call participation.

We contribute to the literature on ethnic disparities by documenting minority analysts' unequal interactions with corporate managers. Although a long literature examines inequality in hiring outcomes (e.g., Becker [1957], Aigner and Cain [1977], Reimers [1983], Bertrand and Mullainathan [2004], Bertrand et al. [2019]), we contribute empirical evidence to a less-developed literature on disparities for minorities after hiring. We also contribute to the literature on earnings conference calls. Prior research examines selective access to management on earnings conference calls using analyst views of the firm (Mayew [2008], Cohen, Lou, and Malloy [2019]) and analyst gender (Francis, Shohfi, and Xin [2020]). In our study, we provide evidence that ethnic minority analysts participate less on earnings conference calls, after controlling for known determinants of participation.

2. Data and Measurement of Ethnicity

2.1 DATA

We collect analyst and manager names from the conference call transcripts in Factiva's Fair Disclosure (FD) Wire. To capture analyst characteristics, we use fuzzy matching to link analysts from the conference call transcripts to the I/B/E/S recommendations file, which provides a first initial and last name. If an analyst's full name is not available within the transcripts, we capture the last name and first initial from I/B/E/S and identify the analyst's full name using LinkedIn or brokerage web sites when available. To identify analysts who cover a firm but do not appear on the earnings conference call, we include all analysts with an outstanding I/B/E/S EPS forecast for firm i in quarter q within 365 days prior to firm i 's quarter q conference call date. The final sample spans 2002–17 and contains 1,045,419 analyst-conference call observations, including 8,112 unique analysts covering 5,158 unique firms and 117,922 unique firm-quarters. About 14.5% of the firm-quarters in our sample are from companies in the S&P 500 index.

2.2 MEASUREMENT OF ANALYST AND MANAGER ETHNICITY

To examine minority analysts' access to managers, we follow prior research (e.g., Brochet et al. [2019]) and use List Service Direct to identify analysts' ethnicity. We also separately identify managers' ethnicity for use in our cross-sectional tests. List Service Direct provides ethnic encoding based on first names and surnames, as certain surnames or first name and surname combinations are highly likely to be associated with specific ethnicities. Their process classifies individuals into 13 ethnic groups.⁵ Using a

⁵List Service Direct returns only a single ethnicity for each name in the sample.

classification based on the U.S. Census' definitions, we aggregate these ethnicities into two groups: minority and nonminority. Minority individuals are those belonging to the following ethnic groups: Black or African American, Central/Southwest Asian, Far Eastern, Hispanic or Latino, Middle Eastern, Indigenous, Polynesian, and Southeast Asian. Members of the remaining ethnic groups—Eastern European, Jewish, Mediterranean, Scandinavian, and Western European—are classified as nonminority. We use this minority/nonminority split throughout our empirical tests.⁶

The List Service Direct classification is highly sophisticated, and prior research notes that its name-ethnicity database is effective for identifying ethnicities (Kerr [2008], Brochet et al. [2019]). For our sample of names, List Service Direct identifies the ethnicity of all but a small percentage of the names. However, we recognize that name-ethnicity matching procedures are imperfect, and moreover they commonly underrepresent Black individuals. Therefore, to supplement the ethnicity coding provided by List Service Direct, we manually search for LinkedIn profile photos for every analyst in our sample. We successfully find photos for 4,233 analysts (52% of the analysts in our sample). We then use a combination of analysts' photos and names to manually classify as minority or nonminority analysts the 370 analysts for whom List Service Direct could not identify an ethnicity. With the photos we collect, we also crosscheck the classification provided by List Service Direct for the other 3,863 analysts. In the end, we reclassify the ethnicity of just 134 of the analysts with photos for whom List Service Direct returned an ethnicity, which corresponds to an estimated error rate of approximately 3.5%.⁷ Given the low error rate, we do not perform a similar LinkedIn validation for manager names.

3. *Sample Description*

We first provide descriptive evidence on the ethnic diversity of sell-side analysts. Table 1 presents the distribution of analysts in our sample by ethnic group. We compare the List Service Direct classification of analysts in our sample to population data in the United States using the 2010 U.S. Census (approximately the midpoint of our sample).⁸ Within our full sample, we identify 20.94% of analysts as members of an ethnic minority group. Analysts are significantly less diverse than the U.S. population, of which

⁶In untabulated robustness tests, we explore two alternative definitions for minority/nonminority status. We restrict nonminority analysts to only those of Western European origin, and separately we remove the most overrepresented minority group from the minority sample (i.e., analysts of Asian descent). Our inferences are similar using both of these alternative definitions.

⁷Regarding the misclassification of Black analysts, we find that among the 3,154 analysts coded by List Service Direct as nonminority ethnicities for which we were able to locate a picture on LinkedIn, we reclassified 35 (1.1%) as Black.

⁸Due to summarization in the U.S. Census data, we are unable to present some of the classifications at the same level of granularity provided by List Service Direct.

TABLE 1
Breakdown of Ethnic Groups

Ethnic Group	Number of Analysts	Percentage of Analysts	Number of Observations	Percentage of Observations	US Census (2010)
Nonminority:					
Western European	4,407	54.33%	607,605	58.12%	
Jewish	590	7.27%	93,621	8.96%	
Mediterranean	429	5.29%	63,198	6.05%	
Eastern European	376	4.64%	49,644	4.75%	
Scandinavian	259	3.19%	27,538	2.63%	
Unknown (Manually Classified)	352	4.34%	52,514	5.02%	
Total Nonminority	6,413	79.06%	894,120	85.53%	63.73%
Minority:					
Hispanic or Latino	257	3.17%	19,858	1.90%	16.35%
Middle Eastern	140	1.73%	17,210	1.65%	
Black or African American	49	0.60%	3,131	0.30%	12.21%
Polynesian	19	0.23%	2,477	0.24%	0.16%
Indigenous Asian	4	0.05%	625	0.06%	0.73%
<i>Far Eastern</i>	605	7.46%	46,866	4.48%	
<i>Southeast Asian</i>	460	5.67%	46,754	4.47%	
<i>Central & Southwest Asian</i>	13	0.16%	1,332	0.13%	
Total Asian	1,078	13.29%	94,952	9.08%	4.69%
Unknown (Manually Classified)	152	1.87%	13,046	1.25%	2.13%
Total Minority	1,699	20.94%	151,299	14.47%	36.27%

This table presents the number and percentages of analysts and observations in our sample by ethnic group.

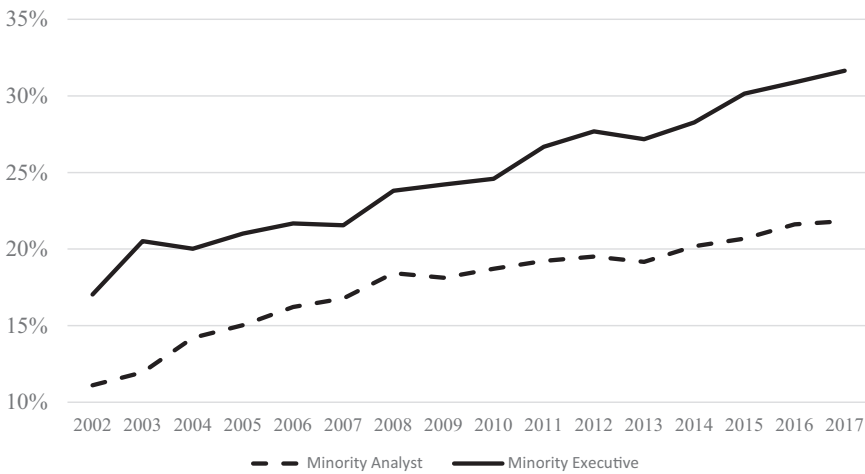


FIG. 1.—Percentage of minority analysts and executives over time.

36.27% identify as minority according to the 2010 U.S. Census. When we compare the distribution of specific ethnic minority analysts to the population (for which data are available), we find that this disparity is largely driven by the Latino and Black ethnicities, who represent a sizable minority in the U.S. population but a very small minority of analysts. Latino (Black) individuals comprise 16.35% (12.21%) of the U.S. population but only 3.17% (0.6%) of analysts in our sample. In contrast, Asians are overrepresented in our sample (13.29%) compared to their representation in the U.S. population at large (4.69%). Although we benchmark our descriptive statistics against the population, we note that the disparities we document are likely to be related to disparities that occur well before career selection. For example, prior research indicates that Asian Americans tend to achieve higher levels of formal education than Black, Latino, and Native American individuals (Espinosa et al. [2019]).

Although the analyst population is less diverse than the population overall, we note that there is a positive trend in the representation of minority analysts during our sample period. Figure 1 presents the share of minority analysts as a percentage of total analysts for the years in our sample. Throughout our sample, there is a consistent upward trend in the share of minority analysts. Minority individuals comprised 11% of analysts in 2002. By 2017, this number doubled to 22%. This increase translates to an average annual growth rate of about 4%.⁹ As a comparison, minority individuals comprised 30.87% of the U.S. population in 2000 and 42.20% in 2020, which translates to a 44% increase in minority representation over a

⁹ Untabulated analyses reveal that the increase in minority representation over time is driven largely by an increase in Asian analysts (5% average annual growth rate) and Hispanic or Latino analysts (4% average annual growth rate).

similar time period (U.S. Census Bureau [2000, 2021]).¹⁰ Thus, minority representation among sell-side analysts increased at about twice the rate of minority representation in the population. Figure 1 also presents changes in minority representation for managers in our sample, which shows a similar upward trend over time. Executives have larger minority representation than analysts; however, even in the last year of our sample, our data indicate that more than 65% of firms have no ethnic minority executives appearing on their earnings conference calls.

We also examine the distribution of minority analysts by the Fama-French 48 industry classifications in figure 2. Minority analysts are more highly represented (relative to the average industry) in electronic equipment, pharmaceutical products, measuring and control equipment, computers, nonmetallic and industrial metal mining, precious metals, business services, and medical equipment. At the other end of the spectrum, restaurants, hotels, motels, textiles, entertainment, and tobacco products have the lowest diversity in analyst coverage. In figure 2, we also examine the distribution of minority analyst *participation* by industry. We find that in 30 of the Fama-French 48 industries, minority participation on earnings conference calls is lower than minority representation in the industry. That is, minorities appear to be underrepresented on the earnings conference calls of 30 industries. However, we find that for the remaining 18 industries, including business supplies, utilities, and healthcare, minority analysts are overrepresented on earnings conference calls relative to the population of analysts.

4. Research Design and Empirical Results

4.1 MINORITY VERSUS NONMINORITY ANALYST CONFERENCE CALL PARTICIPATION

We next turn to empirical tests, centered on the rates of participation on conference calls. We first compare the percentage of minority analysts who participate on a call with the percentage of nonminority analysts who participate on a call, which controls for the differing sizes of the minority and nonminority analyst populations. After we test for differences in the participation rates of minority and nonminority analysts, we examine measures of participation that are conditional on appearing on the earnings conference call. For statistical tests, we cluster standard errors by firm and by year-quarter.

Table 2 presents the results of these univariate tests. Table 2, panel A, presents differences in means for minority and nonminority analysts. We consider two definitions of *MINORITY*: all non-White minority analysts and

¹⁰We note that due to limited data availability we are not able to benchmark our results to the exact time period (i.e., U.S. Census data are available for 2000–20, whereas our sample covers 2002–17).

TABLE 2
Descriptive Statistics

Panel A: Outcome variables									
Variable	Minority			Nonminority			Difference in Means		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	Difference	t-stat	
<i>PARTICIPATE</i> _{a,i,q}	151,299	0.424	0.494	894,120	0.441	0.496	-0.017	-3.87***	
<i>FIRST QUESTION</i> _{a,i,q}	64,093	0.152	0.359	394,169	0.166	0.372	-0.015	-4.26***	
<i>FOLLOW UP</i> _{a,i,q}	64,093	0.064	0.245	394,169	0.080	0.272	-0.016	-7.77***	
<i>ORDER</i> _{a,i,q}	64,093	0.605	0.280	394,169	0.623	0.278	-0.018	-6.34***	
<i>WCANALYST</i> _{a,i,q}	64,093	173.610	99.822	394,169	184.688	108.053	-11.078	-7.70***	
Black, Latino, Indigenous									
Variable	Black, Latino, Indigenous			Nonminority			Difference in Means		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	Difference	t-stat	
<i>PARTICIPATE</i> _{a,i,q}	36,588	0.380	0.485	894,120	0.441	0.496	-0.061	-8.30***	
<i>FIRST QUESTION</i> _{a,i,q}	13,892	0.140	0.347	394,169	0.166	0.372	-0.026	-5.12***	
<i>FOLLOW UP</i> _{a,i,q}	13,892	0.073	0.259	394,169	0.080	0.272	-0.008	-2.03**	
<i>ORDER</i> _{a,i,q}	13,892	0.598	0.280	394,169	0.623	0.278	-0.026	-5.05***	
<i>WCANALYST</i> _{a,i,q}	13,892	183.440	115.043	394,169	184.688	108.053	-1.248	-0.42	

(Continued)

TABLE 2—(Continued)

Variable	Minority			Nonminority			Difference in Means		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	Difference	t-stat	
<i>MVE</i> _{it,q}	151,299	12,914.850	29,252.430	894,120	11,665.690	26,630.810	1,249.160	2.27***	
<i>ANALYST FOLLO</i> _{it,q}	151,299	13.995	8.527	894,120	13.744	8.143	0.251	1.47	
<i>NUM PARTICIPANTS</i> _{it,q}	151,299	8.809	3.976	894,120	8.604	3.829	0.205	2.97***	
<i>NUM PRIOR CALLS</i> _{it,q}	151,299	20.012	15.643	894,120	22.398	16.565	-2.387	-10.31***	
<i>ALL STAR</i> _{it,q}	151,299	0.080	0.270	894,120	0.140	0.340	-0.060	-12.78***	
<i>FIRM EXP</i> _{it,q}	151,299	3.545	3.685	894,120	4.681	4.742	-1.136	-18.03***	
<i>GENERAL EXP</i> _{it,q}	151,299	10.659	8.541	894,120	13.990	9.224	-3.331	-22.01***	
<i>FOR FREQU</i> _{it,q}	151,299	20.132	14.490	894,120	19.644	14.247	0.487	2.74***	
<i>COVERAG</i> _{it,q}	151,299	15.724	7.595	894,120	17.376	7.537	-1.653	-16.25***	
<i>BROKER SIZE</i> _{it,q}	151,299	53.378	39.531	894,120	54.412	39.403	-1.034	-1.98*	
<i>NUM INDUSTRIES</i> _{it,q}	151,299	3.186	1.997	894,120	3.848	2.346	-0.663	-21.49***	
<i>REC HORIZON</i> _{it,q}	151,299	1.176	1.197	894,120	1.306	1.325	-0.130	-9.70***	
<i>REC (STRONG BUY)</i> _{it,q}	151,299	0.221	0.415	894,120	0.229	0.420	-0.008	-1.98*	
<i>REC (BUY)</i> _{it,q}	151,299	0.310	0.462	894,120	0.285	0.452	0.024	4.46***	
<i>REC (UNDERPERFORM)</i> _{it,q}	151,299	0.050	0.219	894,120	0.047	0.211	0.004	2.06***	
<i>REC (SELL)</i> _{it,q}	151,299	0.013	0.112	894,120	0.012	0.110	0.001	0.64	
<i>TOP TEN BROKER</i> _{it,q}	151,299	0.305	0.461	894,120	0.308	0.462	-0.003	-0.48	
<i>SAME ETHNICITY EXEC</i> _{it,q}	151,043	0.146	0.353	892,385	0.691	0.462	-0.545	-64.10***	
<i>EXTRAVERSION</i> _{it}	141,443	0.544	0.498	846,202	0.493	0.500	0.051	7.06***	

This table presents the descriptive statistics for the variables used in the main empirical analyses. Panel A presents outcome variables, and panel B presents control variables. All variables are defined in the appendix. All continuous variables are winsorized at the 1st and 99th percentiles. The sample spans 2002 to 2017. The reported two-sided *t*-statistics are based on standard errors clustered by firm and by year-quarter. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

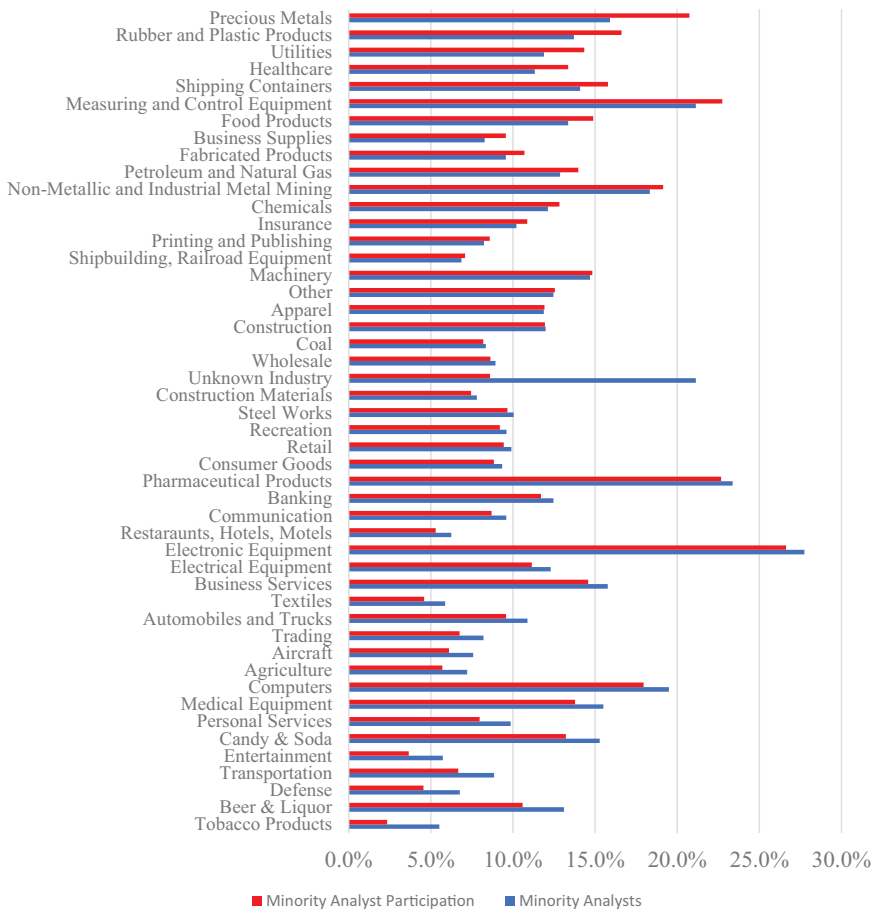


FIG. 2.—Percentage of minority analysts and participation by Fama-French 48 industry.

underrepresented minority analysts (i.e., Black, Latino, and Indigenous analysts). The evidence in table 2, panel A, indicates that a lower proportion of minority analysts participate on conference calls (*PARTICIPATE*), ask the first question on the conference call (*FIRST QUESTION*), and ask a follow-up question on the call (*FOLLOW UP*). Minority analysts also appear later on the calls (*ORDER*) and speak fewer total words on the call ($\ln[WC ANALYST]$).¹¹ These disparities remain whether we define *MINORITY* as

¹¹ The queue is unobservable to researchers. If analysts who participate are different from analysts managers see listed in the queue, this would introduce noise into our results. For example, a junior analyst may join the call in place of a lead analyst. To identify how often this occurs, we search the transcripts to identify instances in which the analyst on the call differs from the name the operator uses to introduce the analyst. For example, the operator might introduce “Jane Smith” but “David Jones” is listed as the analyst on the call. These instances

all non-White analysts or as only underrepresented minority analysts. Although these initial tests for differences in means are consistent with different rates of participation for minority and nonminority analysts, they do not control for other characteristics that might explain differences in analysts' participation.

More specifically, the tests for mean differences speak to whether differences exist, but they do not speak to why differences exist. Therefore, our subsequent tests are designed to examine the underlying reasons for the differences in means. To do so, we examine a variety of analyst, firm, and conference call characteristics. We present differences in means for these explanatory variables in table 2, panel B. Minority analysts tend to have less firm-specific and general experience than nonminority analysts (*FIRMEXP* and *GENEXP*), and they work for smaller brokerage houses, on average (*BROKER SIZE*). We also examine the ethnicity of the covered firm's executives, finding that only about 15% of minority analysts share ethnicity with at least one executive of the covered firm, compared to nearly 70% of nonminority analysts (*SHARED ETHNICITY EXEC*). We explore the implications of these differences in multiple regression tests below.

4.2 ANALYST, COVERED FIRM, OR CALL CHARACTERISTICS AS EXPLANATIONS FOR LOWER MINORITY PARTICIPATION

Moving to a multiple regression framework, we estimate regressions where the dependent variable is a measure of analysts' participation on conference calls. For discrete dependent variables, we use linear probability models. Importantly, our empirical approach considers the different population sizes of minority and nonminority analysts. The estimated coefficient on the minority indicator variable (*MINORITY*) in these regressions is related to the likelihood—among minority analysts—of observing conference call participation. In other words, the coefficient on *MINORITY* measures how much the likelihood *for minority analysts* differs from the likelihood for nonminority analysts. For our continuous dependent variables, we use ordinary least squares regression, and the coefficient on *MINORITY* again estimates differences in likelihood conditional on minority status.

We consider the possibility that analyst characteristics (which may be correlated with minority status) mediate differences in participation rates. To test this possibility, we include variables from prior research that capture analysts' experience, reputation, work environment, and favorability toward the covered firm, as well as characteristics of the covered firm and the earnings conference call. We then test the mediating effects of these variables on the coefficient estimate for *MINORITY*. We first model the likelihood

are often accompanied by the analyst correcting the operator by saying something like "This is actually David on for Jane." Our search identified only 0.20% of all analyst interactions in which the analyst differs from the analyst in the queue. Our results are unaffected when we exclude these observations from our on-call analyses.

that an analyst participates on the earnings conference call. Our full model estimation takes the following form:

$$\begin{aligned}
 PARTICIPATE_{a,i,q} = & \beta_0 + \beta_1 MINORITY_a + \beta_2 \ln(FIRM EXP)_{a,i,q} \\
 & + \beta_3 \ln(GENERAL EXP)_{a,i,q} + \beta_4 ALL STAR_{a,i,q} + \beta_5 \ln(BROKER SIZE)_{a,i,q} \\
 & + \beta_6 \ln(NUM PRIOR CALLS)_{a,i,q} + \beta_7 \ln(FOR FREQ)_{a,i,q} + \beta_8 \ln(COVERAGE)_{a,i,q} \\
 & + \beta_9 \ln(NUM INDUSTRIES)_{a,i,q} + \beta_{10} \ln(REC HORIZON)_{a,i,q} \\
 & + \beta_{11} REC(STRONG BUY)_{a,i,q} + \beta_{12} REC(BUY)_{a,i,q} \\
 & + \beta_{13} REC(UNDERPERFORM)_{a,i,q} \\
 & + \beta_{14} REC(SELL)_{a,i,q} + \beta_{15} \ln(MVE)_{i,q} \\
 & + \beta_{16} ANALYST FOLL(2ND QUARTILE)_{i,q} \\
 & + \beta_{17} ANALYST FOLL(3RD QUARTILE)_{i,q} \\
 & + \beta_{18} ANALYST FOLL(4TH QUARTILE)_{i,q} \\
 & + \beta_{19} NUM PARTICIPANTS(2ND QUARTILE)_{i,q} \\
 & + \beta_{20} NUM PARTICIPANTS(3RD QUARTILE)_{i,q} \\
 & + \beta_{21} NUM PARTICIPANTS(4TH QUARTILE)_{i,q} + e,
 \end{aligned} \tag{1}$$

where *PARTICIPATION* is equal to one if the analyst asks a question on the conference call and zero otherwise. *MINORITY* is our variable of interest, equal to one if the analyst belongs to one of the ethnic minority groups and zero otherwise. If the coefficient on *MINORITY* is negative, the likelihood of participating in the Q&A session of an earnings conference call is lower for minority analysts. Throughout our tests of management access, we cluster standard errors by firm and by year-quarter to address residual dependence (Petersen [2009]).

We take a stepwise approach to this model, beginning with a simple correlation then adding characteristics that may explain the lower participation for minority analysts. If these additional control variables explain differences in conference call participation for minority analysts, we expect a potentially negative coefficient on *MINORITY* to be weakened with the inclusion of these variables.

The results of these tests are presented in table 3. We first estimate a simple regression of *PARTICIPATE* on *MINORITY*. In this specification, the coefficient on *MINORITY* is -0.017 , replicating the difference in participation from the univariate tests in section 5.1. Next, to test whether disparities in minority analyst participation are driven by other characteristics of the analysts, firm, or call, we begin to add potential mediating variables to the model.

The first construct we attempt to capture is experience. To measure experience, we use experience covering the company with the conference call (*FIRM EXP*) and experience as an analyst (*GENERAL EXP*). In column 2, we continue to observe a negative and significant coefficient on *MINORITY* in this specification, though it attenuates slightly to -0.015 . We next measure reputation using an indicator for an analyst voted as an All Star by institutional investors (*ALL STAR*) and a measure of the size of the brokerage where the analyst works ($\ln(BROKER SIZE)$). The addition of these

TABLE 3
Analyst Conference Call Participation and Minority Status—Stepwise

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
<i>Intercept</i>	0.441 ^{***} (83.102)	0.421 ^{***} (60.493)	0.320 ^{***} (28.086)	0.125 ^{***} (10.658)	0.085 ^{***} (6.240)	0.439 ^{***} (27.985)	0.366 ^{***} (22.887)	0.431 ^{***} (19.890)	0.398 ^{***} (24.592)
<i>MINORITY_{it}</i>	-0.017 ^{***} (-3.872)	-0.015 ^{***} (-3.234)	-0.012 ^{***} (-2.502)	-0.012 ^{***} (-3.248)	-0.013 ^{***} (-3.376)	-0.024 ^{***} (-6.791)	-0.024 ^{***} (-7.025)	-0.022 ^{***} (-6.986)	-0.024 ^{***} (-8.657)
<i>ln(FIRM EXP_{it,q})</i>		-0.002 ^{***} (-0.726)	-0.007 ^{***} (-2.436)	-0.021 ^{***} (-7.264)	-0.024 ^{***} (-8.517)	-0.023 ^{***} (-8.702)	0.005 ^{***} (2.185)	0.017 ^{***} (7.976)	0.021 ^{***} (10.939)
<i>ln(GENERAL EXP_{it,q})</i>		0.009 ^{***} (4.464)	0.000	-0.038 ^{***} (-16.460)	-0.037 ^{***} (-16.325)	-0.009 ^{***} (-4.033)	-0.012 ^{***} (-5.917)	-0.014 ^{***} (-7.246)	-0.016 ^{***} (-8.873)
<i>ALL STAR_{it,q}</i>			0.106 ^{***} (15.336)	0.052 ^{***} (7.872)	0.055 ^{***} (8.127)	0.072 ^{***} (12.626)	0.073 ^{***} (13.299)	0.084 ^{***} (15.024)	0.080 ^{***} (14.177)
<i>ln(BROKER SIZE_{it,q})</i>			0.032 ^{***} (13.210)	0.000	-0.000	0.006 ^{***} (2.388)	0.016 ^{***} (7.360)	0.018 ^{***} (8.686)	0.018 ^{***} (8.438)
<i>ln(NUM PRIOR CALLS_{it,q})</i>				0.158 ^{***} (46.795)	0.156 ^{***} (46.886)	0.187 ^{***} (44.751)	0.188 ^{***} (49.501)	0.182 ^{***} (52.001)	0.176 ^{***} (48.760)
<i>ln(FOR FREQ_{it,q})</i>					0.018 ^{***} (5.595)	0.033 ^{***} (12.134)	0.028 ^{***} (10.564)	0.040 ^{***} (16.300)	0.042 ^{***} (21.342)
<i>ln(COVERAGE_{it,q})</i>						-0.211 ^{***} (-43.953)	-0.206 ^{***} (-44.716)	-0.197 ^{***} (-46.896)	-0.179 ^{***} (-44.352)
<i>ln(NUM INDUSTRIES_{it,q})</i>						0.011 ^{**} (2.564)	0.015 ^{***} (3.410)	0.000 (0.042)	-0.002 (-0.575)
<i>ln(REC HORIZON_{it,q})</i>							-0.096 ^{***} (-18.043)	-0.096 ^{***} (-18.828)	-0.090 ^{***} (-18.398)
<i>REC (STRONG BUY)_{it,q}</i>							0.140 ^{***} (46.196)	0.138 ^{***} (48.744)	0.136 ^{***} (46.173)
<i>REC (BUY)_{it,q}</i>							0.116 ^{***} (39.553)	0.119 ^{***} (42.682)	0.118 ^{***} (44.061)
<i>REC (UNDERPERFORM)_{it,q}</i>							-0.063 ^{***} (-15.032)	-0.069 ^{***} (-17.144)	-0.068 ^{***} (-17.567)
<i>REC (SELL)_{it,q}</i>							-0.032 ^{***} (-4.204)	-0.033 ^{***} (-4.507)	-0.034 ^{***} (-4.809)

(Continued)

TABLE 3—(Continued)

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
$ln(MVE)_{i,t,q}$								-0.008***	-0.017***
ANALYST FOLL (2ND QUARTILE) $_{i,t,q}$								(-4.066)	(-10.887)
								-0.020***	-0.088***
ANALYST FOLL (3RD QUARTILE) $_{i,t,q}$								(-6.372)	(-25.045)
								-0.050***	-0.168***
ANALYST FOLL (4TH QUARTILE) $_{i,t,q}$								(-11.373)	(-33.103)
								-0.123***	-0.259***
NUM PARTICIPANTS (2ND QUARTILE) $_{i,t,q}$								(-18.028)	(-38.378)
									0.119***
NUM PARTICIPANTS (3RD QUARTILE) $_{i,t,q}$									(26.732)
									0.194***
NUM PARTICIPANTS (4TH QUARTILE) $_{i,t,q}$									(33.540)
									0.288***
Difference in MINORITY from previous model		0.002***	0.003***	0.000	-0.001***	-0.011***	0.000	0.002***	-0.002***
Adjusted R ²	0.000	0.000	0.012	0.123	0.124	0.153	0.176	0.188	0.212
N	1,045,419	1,045,419	1,045,419	1,045,419	1,045,419	1,045,419	1,045,419	1,045,419	1,045,419

This table estimates ordinary least squares regression including all analyst-firm-quarter observations from 2002 to 2017 with sufficient data to calculate the dependent and independent variables. The dependent variable is equal to $PARTICIPATE_{i,t,q}$. Standard errors are clustered by firm and by year-quarter. All variables are defined in the appendix. All continuous variables are winsorized at the 1% and 99% levels. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

variables in column 3 further attenuates the coefficient on *MINORITY* to -0.012 , though the effect remains statistically significant. Thus, some of the association between *MINORITY* and analyst participation on conference calls is driven by measures of experience and reputation. This finding suggests that minority analysts in our sample differ from nonminority analysts in their experience and reputation and that these characteristics explain approximately 30% of the difference between minority and nonminority analysts' participation on conference calls.

Another explanation for why minority analysts might participate less on conference calls is that their current working environment differs, on average, from that of nonminority analysts. If this is the case, disparities in conference call participation are driven by differences in work environments. We include variables for the number of calls that an analyst participates on, the frequency of forecasts, the number of companies an analyst covers, and the number of industries an analyst covers ($\ln(\text{NUM PRIOR CALLS})$, $\ln(\text{FOR FREQ})$, $\ln(\text{COVERAGE})$, $\ln(\text{NUM INDUSTRIES})$). After the inclusion of these explanatory variables in columns 4–6, the coefficient on *MINORITY* remains stable or even increases in magnitude to -0.024 in column 6. The strengthened coefficient in column 6 suggests that minority analysts differ from nonminority analysts in the number of companies and industries they cover and controlling for these differences strengthens the magnitude of the differences in participation between minority and nonminority analysts.

Another potential explanation is that minority analysts might provide less favorable recommendations, which prior research indicates negatively influences their access to management (Chen and Matsumoto [2006]). We include the horizon and levels of analysts' recommendations to test this possibility ($\ln(\text{REC HORIZON})$, $\text{REC}(\text{STRONG BUY})$, $\text{REC}(\text{BUY})$, $\text{REC}(\text{UNDERPERFORM})$, $\text{REC}(\text{SELL})$) in column 7. The coefficient on *MINORITY* remains -0.024 and is statistically significant after the inclusion of these variables.

Lastly, we include other variables that capture variation in the firm and conference call environment that might also influence conference call participation: firm size ($\ln(\text{MVE})$), quartiles of analyst following (*ANALYST FOLL*), and quartiles of the number of participants on the call (*NUM PARTICIPANTS*). The coefficient on *MINORITY* in our final model remains -0.024 and is statistically significant at the 1% level.

The results of table 3 indicate that the disparities between minority and nonminority analysts vary with some observable characteristics, in particular analyst experience and reputation. However, these differences do not fully mediate the association between *MINORITY* and *PARTICIPATE*. Thus, disparities in minority analyst conference call participation are not fully explained by observable analyst, firm, and conference call characteristics.

4.3 TESTS OF ON-CALL PARTICIPATION

Following prior research (Call, Sharp, and Shohfi [2021]), we also test analysts' participation conditional on appearing on the call. First, we test whether analyst ethnicity influences the order in which analysts appear on the call. Evidence from practice suggests that investor relations officers manage question queues to take more important questions first (e.g., Stewart [2007]), and analysts who appear earlier in the call have stronger relationships with management (Cen et al. [2021]). Specifically, we capture whether the analyst appears first on the call (*FIRST QUESTION*), as well as a variable that measures the sequential order in which the analyst appears on the call (*ORDER*). Second, we consider whether analysts ask a follow-up question (*FOLLOW UP*), which serves as a proxy for the analyst's continuing interactions with firm managers. Third, we measure the total word count of the analyst's comments throughout the call (*WC ANALYST*), which is a proxy for the total time an analyst interacts with managers on the call by asking an initial question and any follow-up questions. Using the subsample of analysts who ask a question on the earnings conference call, we reestimate equation (1) using each of the on-call participation variables above.

The results of this test are presented in table 4. For brevity, we present only the simple correlations and the full model. In columns 1–4, we present simple correlations between *MINORITY* and our on-call participation outcomes, which reflect the disparities documented in table 2. Columns 5–8 present the results of the full model, including all of the explanatory variables described in section 4.2. The inclusion of these explanatory variables attenuates the coefficient on *MINORITY* from -0.015 to -0.007 when the outcome is *FIRST QUESTION*, from -0.018 to -0.010 when the outcome is *ORDER*, and from -0.055 to -0.033 when the outcome is $\ln(\text{WC ANALYST})$. Thus, observable characteristics appear to partially mediate the disparities in on-call participation for these outcome variables. The coefficient estimate for *MINORITY* (-0.016) does not change when the outcome is *FOLLOW UP*. Further, in each of the intermediate specifications for the four on-call outcome variables, the coefficient on *MINORITY* remains negative and significant (untabulated). Therefore, although there is partial mediation, we do not find that analyst, covered firm, or conference call characteristics fully explain the disparities in on-call participation for minority analysts.¹²

¹² A related concern may be that the difference in participation rates between minority and nonminority analysts may arise from random chance. To address this concern, we conduct a simulation where we randomly assign the *MINORITY* indicator variable across the analyst-conference call observations in our sample, ensuring the percentage of simulated minority observations is equal to the true sample average of 14.5%. We then rerun equation (1) using the true outcome variable and control variables but replacing *MINORITY* with the simulated indicator. The range of estimated coefficients are in the range $[-0.0048, 0.0047]$ (untabulated). As none of the estimated coefficients has a higher absolute magnitude than the coefficient we

TABLE 4
Analyst Conference Call Participation and Minority Status

	FIRST QUESTION	FOLLOW UP	ORDER	ln(WC ANALYST)	FIRST QUESTION	FOLLOW UP	ORDER	ln(WC ANALYST)
<i>Intercept</i>	0.166*** (67.039)	0.080*** (18.929)	0.623*** (244.836)	5.073*** (729.697)	0.269*** (26.276)	0.203*** (17.290)	0.615*** (52.462)	5.316*** (196.245)
MINORITY _a	-0.012*** (-4.258)	-0.016*** (-7.771)	-0.018*** (-6.343)	-0.055*** (-7.181)	-0.007** (-2.612)	-0.016*** (-8.367)	-0.010*** (-4.188)	-0.033*** (-5.490)
ln(FIRM EXP) _{a,i,q}					0.021*** (12.472)	0.013*** (9.369)	0.024*** (14.734)	0.053*** (15.620)
ln(GENERAL EXP) _{a,i,q}					-0.009*** (-6.939)	0.002* (1.825)	-0.009*** (-7.104)	0.002 (0.595)
ALL STAR _{a,i,q}					0.043*** (14.921)	0.008*** (3.920)	0.072*** (22.265)	0.105*** (14.772)
ln(BROKER SIZE) _{a,i,q}					0.027*** (21.750)	0.000 (0.273)	0.036*** (28.729)	0.017*** (6.332)
ln(NUM PRIOR CALLS) _{a,i,q}					0.018*** (8.176)	0.004 (1.521)	0.028*** (8.892)	0.075*** (13.194)
ln(FOR FREQ) _{a,i,q}					-0.004** (-2.620)	0.002* (1.723)	0.000 (0.233)	0.029*** (7.615)
ln(COVERAGE) _{a,i,q}					0.009*** (3.067)	-0.014*** (-4.811)	-0.003 (-0.859)	-0.073*** (-8.652)
ln(NUM INDUSTRIES) _{a,i,q}					-0.003 (-1.516)	0.001 (0.238)	-0.002 (-1.171)	0.019** (2.476)
ln(REC HORIZON) _{a,i,q}					0.006*** (2.914)	-0.017*** (-9.334)	-0.004** (-2.326)	-0.032*** (-8.425)
REC (STRONG BUY) _{a,i,q}					0.040*** (18.280)	0.016*** (8.960)	0.055*** (26.095)	0.028*** (6.103)
REC (BUY) _{a,i,q}					0.061*** (27.346)	0.010*** (6.901)	0.070*** (29.093)	0.018*** (4.094)
REC (UNDERPERFORM) _{a,i,q}					-0.031*** (-8.163)	-0.001 (-0.397)	-0.046*** (-11.692)	-0.000 (-0.001)

(Continued)

TABLE 4—(Continued)

	FIRST QUESTION		FOLLOW UP		ln(WC ANALYST)		FIRST QUESTION		FOLLOW UP		ln(WC ANALYST)	
REC (SELL) _{a,i,q}								-0.027***	-0.002			
								(-4.150)	(-0.332)			
ln(MVE) _{i,q}								-0.019***	-0.010***			
								(-26.907)	(-11.223)			
ANALYST FOLL (2ND QUARTILE) _{i,q}								-0.054***	-0.054***			
								(-23.134)	(-15.164)			
ANALYST FOLL (3RD QUARTILE) _{i,q}								-0.059***	-0.084***			
								(-21.638)	(-17.842)			
ANALYST FOLL (4TH QUARTILE) _{i,q}								-0.060***	-0.101***			
								(-19.709)	(-19.109)			
NUM PARTICIPANTS (2ND QUARTILE) _{i,q}								-0.135***	0.007**			
								(-51.498)	(2.181)			
NUM PARTICIPANTS (3RD QUARTILE) _{i,q}								-0.164***	0.010**			
								(-61.243)	(2.474)			
NUM PARTICIPANTS (4TH QUARTILE) _{i,q}								-0.185***	0.018**			
								(-65.984)	(3.896)			
Difference in MINORITY from previous model								0.008***	0.000			
Adjusted R ²	458,262		458,262		458,262		458,262		458,262			
N	0,000		0,000		0,001		0,001		0,031			

This table estimates ordinary least squares regression including all analyst-firm-quarter observations from 2002 to 2017 with sufficient data to calculate the dependent and independent variables. The dependent variables are equal to *FIRST QUESTION*_{a,i,q}, *FOLLOW UP*_{a,i,q}, *ORDER*_{a,i,q}, and *ln(WC ANALYST)*_{a,i,q} in columns 1–4 and columns 5–8, respectively. Standard errors are clustered by firm and by year-quarter. All variables are defined in the appendix. All continuous variables are winsorized at the 1% and 99% levels. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

4.4 FIXED EFFECTS FOR TESTING SOURCE OF CONFERENCE CALL VARIATION

Our tests up to this point rely on observable characteristics of analysts, managers, brokerage houses, and covered firms. In this section, we take an alternative approach that uses various fixed effects as controls for unobservable variation that may mediate disparities in analysts' participation on earnings conference calls. We select fixed effects that might plausibly correspond with our earlier tests of the drivers of minority analyst participation. Specifically, we investigate whether our results are explained by fixed effects related to analysts' self-selection into covering specific industries or working at specific brokerages or managers' or analysts' firm-specific or conference call-specific choices. Where possible, we also include year fixed effects to control for changes over time. Our selection of fixed effects follows recent calls for researchers to carefully motivate fixed-effect design choices (Armstrong et al. [2022]).

The results using various fixed effects structures are presented in table 5. We first include industry fixed effects. As shown in the descriptive statistics, minority analysts may choose to cover some industries more or less than nonminority analysts do. If industry selection is associated with conference call practices, then industry fixed effects may explain the lower minority analyst participation we document. Table 5, panel A, presents the results using industry fixed effects. We test the coefficient on *MINORITY* after including fixed effects, and we test for a change in the coefficient from the model without fixed effects. For brevity, in this section we only discuss the results when using *PARTICIPATE* as the dependent variable.

The coefficient on *MINORITY* in the first column when *PARTICIPATE* is the dependent variable is -0.017 . The coefficient is the same as the coefficient in table 3 in the model without control variables. Relative to the model with control variables, the industry fixed effects partially mediate the coefficient on *MINORITY*. The 0.007 increase in the coefficient with the inclusion of industry and year fixed effects shows that about 30% of the magnitude of the lower minority analyst participation can be explained by industry fixed effects, suggesting that analysts' industry-related coverage choices may partially explain lower minority analyst participation.

Second, we turn to analysts' selection into brokerage houses. Minority analysts may choose to work at some brokerages or some brokerages may employ minority analysts more or less frequently than they employ nonminority analysts. Managers may also rely on brokerage house prestige when directing conference calls and this may generate variation in participation across brokerages that is correlated with *MINORITY*. If brokerage selection explains lower minority analyst conference call participation rates, then we would expect brokerage fixed effects to weaken the effect we find for *MI-*

estimate using the true data (-0.024 , $p < 0.00$), the simulation suggests that our result does not occur by chance.

TABLE 5
Analyst Conference Call Participation and Minority Status—Different Fixed Effects Structures

	<i>PARTICIPATE</i>	<i>FIRST QUESTION</i>	<i>FOLLOW UP</i>	<i>ORDER</i>	<i>ln(WC ANALYST)</i>
Panel A: Industry and year fixed effects					
<i>Intercept</i>	0.342 ^{***} (25.577)	0.258 ^{***} (28.169)	0.154 ^{***} (18.863)	0.584 ^{***} (68.460)	5.335 ^{***} (200.533)
<i>MINORITY_a</i>	-0.017 ^{***} (-6.467)	-0.005 (-1.633)	-0.010 ^{***} (-6.050)	-0.005 [*] (-1.882)	-0.024 ^{***} (-4.199)
<i>CONTROLS</i>	Yes	Yes	Yes	Yes	Yes
Difference in <i>MINORITY</i> from no fixed effects model	0.007 ^{***}	0.002 ^{***}	0.006 ^{***}	0.005 ^{***}	0.009 ^{***}
Adjusted <i>R</i> ²	0.219	0.083	0.046	0.105	0.148
<i>N</i>	1,045,419	458,262	458,262	458,262	458,262
Panel B: Brokerage and year fixed effects					
	<i>PARTICIPATE</i>	<i>FIRST QUESTION</i>	<i>FOLLOW UP</i>	<i>ORDER</i>	<i>ln(WC ANALYST)</i>
<i>Intercept</i>	0.455 ^{***} (22.537)	0.379 ^{***} (22.564)	0.171 ^{***} (11.265)	0.733 ^{***} (55.548)	5.471 ^{***} (137.883)
<i>MINORITY_a</i>	-0.016 ^{***} (-6.169)	-0.004 (-1.490)	-0.006 ^{***} (-3.370)	-0.006 ^{***} (-2.476)	-0.021 ^{***} (-3.650)
<i>CONTROLS</i>	Yes	Yes	Yes	Yes	Yes
Difference in <i>MINORITY</i> from no fixed effects model	0.008 ^{***}	0.003 ^{***}	0.01 ^{***}	0.004 ^{***}	0.012 ^{***}
Adjusted <i>R</i> ²	0.225	0.092	0.049	0.125	0.151
<i>N</i>	1,045,396	458,219	458,219	458,219	458,219

(Continued)

TABLE 5—(Continued)

Panel C: Firm and year fixed effects					
	PARTICIPATE	FIRST QUESTION	FOLLOW UP	ORDER	ln(WC ANALYST)
<i>Intercept</i>	0.294 ^{***} (10.342)	0.279 ^{***} (18.578)	0.089 ^{***} (6.777)	0.551 ^{***} (42.392)	5.111 ^{***} (153.321)
<i>MINORITY_a</i>	-0.008 ^{***} (-3.035)	-0.004 (-1.241)	-0.009 ^{***} (-5.016)	-0.004 (-1.492)	-0.002 (-0.287)
<i>CONTROLS</i>	Yes	Yes	Yes	Yes	Yes
Difference in <i>MINORITY</i> from no fixed effects model	0.016 ^{***}	0.003 ^{***}	0.007 ^{***}	0.006 ^{***}	0.031 ^{***}
Adjusted <i>R</i> ²	0.239	0.102	0.090	0.125	0.241
<i>N</i>	1,045,333	458,101	458,101	458,101	458,101
Panel D: Conference call fixed effects					
	PARTICIPATE	FIRST QUESTION	FOLLOW UP	ORDER	ln(WC ANALYST)
<i>Intercept</i>	0.241 ^{***} (23.076)	-0.157 ^{***} (-16.311)	0.010 [*] (1.764)	0.211 ^{***} (23.416)	4.748 ^{***} (282.561)
<i>MINORITY_a</i>	-0.007 ^{***} (-2.682)	-0.004 (-1.061)	-0.004 (-4.923)	-0.004 (-1.358)	-0.003 (-0.459)
<i>CONTROLS</i>	Yes	Yes	Yes	Yes	Yes
Difference in <i>MINORITY</i> from no fixed effects model	0.017 ^{***}	0.003 [*]	0.007 ^{***}	0.006 ^{***}	0.03 ^{***}
Adjusted <i>R</i> ²	0.236	-0.066	0.192	0.006	0.270
<i>N</i>	1,037,560	439,867	439,867	439,867	439,867

This table estimates ordinary least squares regressions including all analyst-firm-quarter observations from 2002 to 2017 with sufficient data to calculate the dependent and independent variables. The dependent variables are equal to *PARTICIPATE*_{*a*,*t*,*q*}, *FIRST QUESTION*_{*a*,*t*,*q*}, *FOLLOW UP*_{*a*,*t*,*q*}, *ORDER*_{*a*,*t*,*q*} and *ln(WC ANALYST)*_{*a*,*t*,*q*} in columns 1 to 5, respectively. Standard errors are clustered by firm and by year-quarter. In panel A, year and firm fixed effects are included (untabulated). In panel B, year, industry, and brokerage fixed effects are included (untabulated). In panel C, conference call fixed effects are included (untabulated). All variables are defined in the appendix. All continuous variables are winsorized at the 1% and 99% levels. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

NORITY. Panel B shows that brokerage fixed effects have similar effects as industry fixed effects on the magnitude of the coefficient on *MINORITY*.

Third, managers at some firms may allow more or less minority analyst participation than managers at other firms. Minority analysts may also selectively cover some firms more or less than nonminority analysts do. If firm selection is an important driver of disparities in minority analyst participation, we expect the inclusion of firm fixed effects to mediate the effect of *MINORITY*. The results are presented in panel C. The coefficient on *MINORITY* remains negative and significant (-0.008). However, the inclusion of firm fixed effects has a large effect on the coefficient on *MINORITY*, reducing the magnitude by approximately 60%. These results raise the possibility that an important driver of lower minority analyst participation on conference calls is managers' choices in directing conference calls or analysts' selection of which firms to cover.

Fourth, to test the possibility that some managers may select minority analysts to participate more or less than other managers do, we include conference call fixed effects. Because managers have direct control over conference call participation, we expect conference call fixed effects to control for differences in how managers run their conference calls and for variation over time in how those conference calls may be run. However, we cannot rule out the possibility that minority analysts may choose to participate on some conference calls at different rates than on other conference calls. Panel D presents the results. The coefficient on *MINORITY* remains significant, and the mediation effect from including conference call fixed effects is similar to panel C when using firm fixed effects.

Together, the fixed effects tests show that even when controlling for various fixed effects, minority analysts remain less likely to participate in conference calls. Additionally, variation within the firm and the conference call explains the greatest magnitude of the lower participation rate, whereas analysts' selection into industries and companies plays an important but lesser role. The mediation effect of firm and conference call fixed effects suggests that managers may play a role in lower minority analyst participation rates; however, our tests are only suggestive and cannot identify causality. To further evaluate the possibility that managers may influence lower analyst participation, we turn to tests that evaluate potential moderating effects.

4.5 VARIATION IN DIFFERENTIAL MINORITY ANALYST PARTICIPATION

In this section, we move to moderating tests by including interactions between *MINORITY* and observable characteristics that may influence the association between minority status and conference call participation. Prior research finds evidence that racial bias may be moderated by other forces that expose bias or act to reduce the effects of bias (e.g., Ziegert and Hanges [2005], Guillaume et al. [2017]). If some of the differences in analysts' conference call participation are driven by bias, we should observe moderating effects from forces that counteract bias. We introduce various moderating variables to test their effects on minority analysts' lower participation in and

on conference calls. Evidence from these tests may be suggestive of managerial bias but because we cannot observe managers' mindset or conclusively rule out alternative explanations, we cannot confidently conclude that bias causes the differential participation rates we observe. We first test whether minority analysts' personality traits (extroversion) or reputation (broker prestige) moderate the lower participation rate. We then test whether manager traits (ethnicity) or constraints (analyst coverage or conference call constraints) moderate the lower participation rate.

Some minority analysts may have cultural or social backgrounds that are associated with personality traits that reinforce or counteract lower conference call participation rates. Although there are many individual characteristics that could reduce the effects of bias, we focus on analyst extroversion because extroverted individuals tend to enjoy greater job market success (Green, Jame, and Lock [2019]) and because extroverts usually behave in ways that attract social attention (Ashton, Lee, and Paunonen [2002]). Further, because extroversion varies across individual analysts, this allows us to investigate whether individual personality differences may prevail over broad ethnicity-related cultural or social norms. We investigate whether extroverted minority analysts participate more than nonextroverted minority analysts, using the following equation:

$$\begin{aligned} PARTICIPATION_{a,i,q} = & \beta_0 + \beta_1 MINORITY_a + \beta_2 EXTROVERT_a \\ & + \beta_3 MINORITY_a \times EXTROVERT_a \quad , \quad (2) \\ & + \sum Controls + \varepsilon \end{aligned}$$

where *PARTICIPATION* is equal to *PARTICIPATE* or one of the four on-call participation outcomes. *EXTROVERT* is an indicator variable equal to 1 if an analyst has an extroversion score above the median extroversion score, and equal to zero otherwise. We estimate analyst extroversion following the approach by Harrison et al. [2019], who develop a text-based tool to measure Big Five personality traits. To develop this measurement tool, they use spoken words from 207 CEOs for which they obtain Big Five personality trait data using a psychometrically validated instrument. Then, using spoken text from earnings conference call transcripts, they use machine learning to train and validate a model for prediction based on spoken text. We use the final model to estimate analysts' level of extroversion based on words spoken on earnings conference calls.¹³ A positive and significant coefficient on *MINORITY* × *EXTROVERT* would suggest that the disparities we document for ethnic minority analysts are mitigated when minority analysts have high levels of extroversion.

The results of these tests are presented in table 6. In column 1, as expected, we find that analyst extroversion is positively related to the likelihood of appearing on an earnings conference call. We also continue to find a negative and significant coefficient on *MINORITY* (−0.018, $p < 0.01$), but we find no evidence that extroversion mitigates the underrepresentation of

¹³ Following Harrison et al. [2019], we require a minimum of 1,000 spoken words to measure extroversion for individual analysts.

TABLE 6
Analyst Conference Call Participation and Minority Status—Analyst Extroversion

	<i>PARTICIPATE</i>	<i>FIRST QUESTION</i>	<i>FOLLOW UP</i>	<i>ORDER</i>	<i>ln(WC ANALYST)</i>
<i>Intercept</i>	0.440*** (22.764)	0.269*** (26.058)	0.215*** (17.704)	0.619*** (52.754)	5.344*** (195.660)
<i>MINORITY_a</i>	-0.026*** (-6.599)	-0.006 (-1.278)	-0.019*** (-6.557)	-0.008** (-2.138)	-0.047*** (-4.954)
<i>EXTROVERT_a</i>	0.018*** (5.884)	0.005** (2.089)	-0.019*** (-10.513)	-0.002 (-1.234)	-0.007 (-1.008)
<i>MINORITY_a × EXTROVERT_a</i>	0.004 (0.722)	-0.003 (-0.608)	0.007* (1.991)	-0.004 (-0.757)	0.024* (1.981)
<i>CONTROLS</i>	Yes	Yes	Yes	Yes	Yes
Adjusted <i>R</i> ²	0.189	0.081	0.032	0.095	0.123
<i>N</i>	987,645	456,055	456,055	456,055	456,055

This table estimates ordinary least squares regressions including all analyst-firm-quarter observations from 2002 to 2017 with sufficient data to calculate the dependent and independent variables. The dependent variables are equal to *PARTICIPATE*_{*a,i,q*}, *FIRST QUESTION*_{*a,i,q*}, *FOLLOW UP*_{*a,i,q*}, *ORDER*_{*a,i,q*}, and *ln(WC ANALYST)*_{*a,i,q*} in columns 1 to 5, respectively. Standard errors are clustered by firm and by year-quarter. All variables are defined in the appendix. All continuous variables are winsorized at the 1% and 99% levels. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

minority analysts appearing on earnings conference calls. In columns 2–5, we examine whether analyst extroversion influences on-call participation attributes. In columns 3 and 5, the positive coefficient on *MINORITY × EXTROVERT* indicates that extroverted minority analysts are more likely to ask a follow-up question and speak more words than minority analysts who are not extroverted. Thus, we find some limited evidence consistent with individual personality differences influencing the association between *MINORITY* and conference call participation.

Our next potential moderator is brokerage size. If managers rely on brokerage reputation as a heuristic in their selection decisions (Aigner and Cain [1977], Bohren, Imas, and Rosenberg [2019]), being at a high reputation brokerage may mitigate the lower participation rate for minority analysts. We capture whether the analyst is employed by one of the ten largest brokerage houses (*TOP TEN BROKER*) by number of analysts employed each quarter, and we measure *TOP TEN BROKER* using the analyst’s employer at the conference call date (Hong and Kubik [2003], Harford et al. [2019]). We estimate the following equation:

$$\begin{aligned}
 PARTICIPATION_{a,i,q} = & \beta_0 + \beta_1 MINORITY_a + \beta_2 TOP TEN BROKER_{a,i,q} \\
 & + \beta_3 MINORITY_a \times TOP TEN BROKER_{a,i,q} \quad (3) \\
 & + \sum Controls + \varepsilon.
 \end{aligned}$$

If minority analysts from higher reputation brokerage houses are more likely to participate than other minority analysts, we expect the coefficient on *MINORITY × TOP TEN BROKER* to be positive.

Table 7 presents the results of estimating equation (3). In table 7, column 1, we examine the likelihood of participation on the earnings confer-

TABLE 7
Analyst Conference Call Participation and Minority Status—Broker Prestige

	<i>PARTICIPATE</i>	<i>FIRST QUESTION</i>	<i>FOLLOW UP</i>	<i>ORDER</i>	<i>ln(WC ANALYST)</i>
<i>Intercept</i>	0.342*** (25.205)	0.254*** (26.217)	0.146*** (17.790)	0.588*** (66.158)	5.334*** (196.048)
<i>MINORITY_a</i>	-0.018*** (-5.780)	-0.008** (-2.410)	-0.011*** (-5.031)	-0.009*** (-2.983)	-0.030*** (-4.434)
<i>TOP TEN BROKER_{a,q}</i>	-0.000 (-0.100)	-0.006* (-1.922)	-0.010*** (-5.376)	0.002 (0.636)	-0.004 (-0.708)
<i>MINORITY_a × TOP TEN BROKER_{a,q}</i>	0.003 (0.491)	0.011** (2.046)	0.003 (0.808)	0.013*** (2.829)	0.018* (1.864)
<i>CONTROLS</i>	Yes	Yes	Yes	Yes	Yes
Adjusted <i>R</i> ²	0.219	0.083	0.046	0.105	0.148
<i>N</i>	1,045,419	458,262	458,262	458,262	458,262

This table estimates ordinary least squares regressions including all analyst-firm-quarter observations from 2002 to 2017 with sufficient data to calculate the dependent and independent variables. The dependent variables are equal to *PARTICIPATE_{a,i,q}*, *FIRST QUESTION_{a,i,q}*, *FOLLOW UP_{a,i,q}*, *ORDER_{a,i,q}*, and *ln(WC ANALYST)_{a,i,q}* in columns 1 to 5, respectively. Standard errors are clustered by firm and by year-quarter. All variables are defined in the appendix. All continuous variables are winsorized at the 1% and 99% levels. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

ence call. Consistent with our primary tests, we find a negative association between *MINORITY* and *PARTICIPATE* ($-0.018, p < 0.01$). We find no evidence that this negative association is moderated by brokerage house prestige, as the coefficient on *MINORITY × TOP TEN BROKER* is statistically insignificant. In columns 2–5 of table 6, we explore whether employment at a top brokerage house has a moderating effect on analyst participation, conditional on participating on the call. Consistent with table 4, we find a negative coefficient on *MINORITY* in columns 2, 4, and 5. The positive and significant coefficients on *MINORITY × TOP TEN BROKER* when the outcome variables are *FIRST QUESTION*, *ORDER*, and *ln(WC ANALYST)* indicate that brokerage house prestige moderates minority analysts' reduced likelihood of engagement with managers, conditional on appearing on the conference call. Thus, although we do not find evidence that employment at a prestigious brokerage house influences the likelihood that a minority analyst appears on the conference call, we do find a higher likelihood of on-call prioritization and engagement for minority analysts employed at a top brokerage, conditional on participation.

Next, we test whether managers who are ethnic minorities are more likely to select minority analysts for participation than are nonminority managers (Brewer [1979], Efferson, Lalive, and Fehr [2008], Price and Wolfers [2010], Parsons et al. [2011]). If managers have a role in minority analysts' disparate participation in our setting, firms with minority managers may be more likely to call on minority analysts who share their ethnicity. We estimate the following equation:

$$\begin{aligned}
 PARTICIPATION_{a,i,q} = & \beta_0 + \beta_1 MINORITY_a + \beta_2 SHARED ETHNICITY EXEC_{a,i,q} \\
 & + \beta_3 MINORITY_a \times SHARED ETHNICITY EXEC_{a,i,q} \quad (4) \\
 & + \sum Controls + \varepsilon.
 \end{aligned}$$

TABLE 8
Analyst Conference Call Participation and Minority Status—Manager Ethnicity

	<i>PARTICIPATE</i>	<i>FIRST QUESTION</i>	<i>FOLLOW UP</i>	<i>ORDER</i>	<i>ln(WC ANALYST)</i>
<i>Intercept</i>	0.399*** (24.116)	0.271*** (25.988)	0.204*** (17.273)	0.615*** (50.959)	5.330*** (195.912)
<i>MINORITY_a</i>	-0.023*** (-6.380)	-0.010*** (-2.950)	-0.018*** (-7.878)	-0.012*** (-4.255)	-0.045*** (-6.352)
<i>SHARED ETHNICITY</i>	-0.002 (-0.615)	-0.002 (-0.852)	-0.002 (-0.891)	-0.001 (-0.302)	-0.021*** (-4.460)
<i>EXEC_{a,i,q}</i>					
<i>MINORITY_a × SHARED ETHNICITY EXEC_{a,i,q}</i>	-0.014* (-1.836)	0.012* (1.784)	0.008 (1.450)	0.014** (2.184)	0.002 (0.097)
<i>CONTROLS</i>	Yes	Yes	Yes	Yes	Yes
Adjusted <i>R</i> ²	0.212	0.081	0.031	0.096	0.124
<i>N</i>	1,043,428	457,329	457,329	457,329	457,329

This table estimates ordinary least squares regressions including all analyst-firm-quarter observations from 2002 to 2017 with sufficient data to calculate the dependent and independent variables. The dependent variables are equal to *PARTICIPATE_{a,i,q}*, *FIRST QUESTION_{a,i,q}*, *FOLLOW UP_{a,i,q}*, *ORDER_{a,i,q}*, and *ln(WC ANALYST)_{a,i,q}* in columns 1 to 5, respectively. Standard errors are clustered by firm and by year-quarter. All variables are defined in the appendix. All continuous variables are winsorized at the 1% and 99% levels. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

SHARED ETHNICITY EXEC is an indicator variable equal to 1 if a member of the executive team has the same ethnicity as the analyst, and 0 otherwise. A positive coefficient on *MINORITY × SHARED ETHNICITY EXEC* suggests that managers who are ethnic minorities select minority analysts at higher rates (i.e., that nonminority managers select minority analysts at lower rates).

The results of these tests are presented in table 8. Throughout these tests, we find a persistent negative and significant coefficient on *MINORITY*, consistent with our primary results. In column 1, the negative and significant coefficient on *MINORITY × SHARED ETHNICITY EXEC* indicates that the presence of an executive who shares the minority analyst's ethnicity is associated with a lower likelihood that a minority analyst participates on the earnings conference call. These results are inconsistent with the idea of in-group bias playing a role in the selection of analysts who appear on the earnings conference call. However, the positive and significant coefficients on *MINORITY × SHARED ETHNICITY EXEC* ($p < 0.10$) in columns 2 and 4 indicate that the presence of an executive who shares a minority analyst's ethnicity fully moderates minority analysts' lower likelihood of appearing first (*FIRST QUESTION*) or earlier on the call (*ORDER*). The results of this test provide some evidence that minority analysts' on-call access to management is improved when an executive shares the same ethnicity.

Next, we test whether managers disproportionately select fewer minority analysts to participate when there are greater constraints on participation. For the first test of constraints, we examine whether minority analysts participate less when there are more analysts following the firm (i.e., more analysts for managers to choose from). When a large number of analysts follow a firm, managers are likely able to answer only a subset of analyst ques-

tions due to time constraints on the call. For the second test, we explore whether minority analysts participate more when it appears managers did not face participation constraints (i.e., when the operator specifically indicates there are no further questions). We estimate the following equation:

$$\begin{aligned} PARTICIPATE_{a,i,q} = & \beta_0 + \beta_1 MINORITY_a + \beta_2 CONSTRAINT_{i,q} \\ & + \beta_3 MINORITY_a \times CONSTRAINT_{i,q} \\ & + \sum Controls + \varepsilon. \end{aligned} \quad (5)$$

Because these tests focus on the likelihood that an analyst is permitted to ask a question on the call, we do not consider on-call outcomes. For our first test of constraints, *CONSTRAINT* is equal to an indicator variable for the top quartile of analyst following (*HIGH ANALYST FOLL*). For our second test, *CONSTRAINT* is equal to *NO FURTHER QUESTIONS*, an indicator variable equal to one if the conference call operator explicitly states that “there are no further questions” in the queue.

The results of these tests are presented in table 9. In panel A, the main effect for minority analysts continues to be negative and statistically significant (-0.020 , $p < 0.01$). Consistent with heightened disparities in minority analyst access with a larger analyst following, we find that the interaction term for minority analysts in the fourth quartile of analyst following is incrementally negative and significant (-0.014 , $p < 0.05$). Thus, when managers have the greatest need to select a subset of analysts for participation on the call, minority analysts experience the lowest participation rate.

Table 9, panel B, presents the results of our tests using *NO FURTHER QUESTIONS*. The coefficient on *MINORITY* remains significantly negative (-0.028 , $p < 0.01$). The coefficient on *NO FURTHER QUESTIONS* is positive, which provides some validation for our measurement approach: The average analyst participates more when managers appear to allow time for all questions that analysts have. The coefficient on the interaction term of *MINORITY* \times *NO FURTHER QUESTIONS* is significantly positive (0.009), indicating that minority analysts are incrementally more likely to participate in greater numbers when managers allow all analysts in the queue to ask a question. Consistent with the findings in panel A, when managers constrain participation less, the probability of minority analyst participation changes more than the probability of nonminority analyst participation. The sum of the coefficients *MINORITY* and *MINORITY* \times *NO FURTHER QUESTIONS* remains statistically less than zero (untabulated). This indicates that our measure does not fully moderate disparities in minority analyst participation, perhaps due to analyst choice or measurement error in our variable of interest.

Overall, our cross-sectional tests shed some light on the mechanism behind the disparities faced by ethnic minority analysts on earnings conference calls. We identify factors that to a limited extent moderate the underrepresentation of minority analysts on earnings calls. Specifically, minority analysts with extroverted personalities have more interactions with management during earnings conference calls; however, they are no more likely

TABLE 9
Analyst Conference Call Participation and Minority Status—Analyst Following

Panel A: Analyst following	
	<i>PARTICIPATE</i>
<i>Intercept</i>	0.397*** (24.443)
<i>MINORITY_a</i>	−0.020*** (−6.265)
<i>HIGH ANALYST FOLL_{i,q}</i>	−0.257*** (−38.306)
<i>MINORITY_a × HIGH ANALYST FOLL_{i,q}</i>	−0.014** (−2.314)
<i>CONTROLS</i>	Yes
Adjusted <i>R</i> ²	0.212
<i>N</i>	1,045,419
Panel B: Calls with no further questions	
	<i>PARTICIPATE</i>
<i>Intercept</i>	0.390*** (23.915)
<i>MINORITY_a</i>	−0.028*** (−8.179)
<i>NO FURTHER QUESTIONS_{i,q}</i>	0.007*** (3.512)
<i>MINORITY_a × NO FURTHER QUESTIONS_{i,q}</i>	0.009** (2.236)
<i>CONTROLS</i>	Yes
Adjusted <i>R</i> ²	0.212
<i>N</i>	1,045,419

This table estimates ordinary least squares regressions including all analyst-firm-quarter observations from 2002 to 2017 with sufficient data to calculate the dependent and independent variables. The dependent variable is equal to *PARTICIPATE_{a,i,q}*. Standard errors are clustered by firm and by year-quarter. All variables are defined in the appendix. All continuous variables are winsorized at the 1% and 99% levels. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

than other minority analysts to appear on the call in the first place. In addition, brokerage house prestige moderates the negative association between minority analysts and their interactions with management during the call but has no effect on minority analysts' likelihood of asking a question on the call. We also find that the presence of a minority executive who shares the same ethnicity as a minority analyst on the call improves some on-call outcomes for minority analysts. We find some evidence that minority analysts are less likely to participate on the conference calls of companies with a large analyst following, and they are more likely to participate on earnings calls when managers appear to allow all analysts who wish to ask a question to do so. Together, these results provide limited evidence that the underrepresentation of minority analysts on conference calls may be partially driven by manager bias; however, the observable characteristics we test are unable to fully explain the disparities we document. We caution that these tests do

not allow us to make causal conclusions, and we cannot rule out alternative explanations.

5. Additional Tests

5.1 UNDERREPRESENTED MINORITIES

We performed our primary tests in table 2 using two definitions: all non-White minority analysts and underrepresented minority analysts (i.e., Black, Latino, and Indigenous analysts). For parsimony, we conducted our multiple regression tests using all non-White analysts to define *MINORITY*. Here, we test the robustness of our regression results to defining *MINORITY* using only underrepresented minority analysts. We repeat the regression tests from tables 3 and 4 with all control variables using this definition of minority analysts. These results are presented in table 10. In column 1, we find that underrepresented minority analysts are less likely to participate on earnings conference calls. Specifically, the coefficient on *MINORITY* in table 10 is -0.031 and significant at the 1% level. We also find that underrepresented minority analysts are less likely to ask the first question. However, the results for the other on-call attributes of analyst participation differ from our primary findings. We find no evidence of these analysts having a reduced likelihood of appearing first on the call or appearing earlier on the call. Additionally, our results indicate that underrepresented minority analysts speak more on the call, as the coefficient on *MINORITY* is significantly positive when $\ln(WC\ ANALYST)$ is the outcome (0.022 , $p < 0.10$).

We offer two potential explanations for these results. First, similar to the female analysts in Kumar [2010], it is possible that, on average, underrepresented individuals with superior abilities self-select into the sell-side analyst profession. The lack of statistically significant results for some on-call outcomes may also be related to a reduction in statistical power due to the small number of underrepresented analysts. Nevertheless, we caution that all of the inferences from our primary tests may not fully generalize to these groups.

5.2 ALTERNATIVE ANALYST SAMPLE

Because the conference call queue is unobservable to researchers, we rely on the assumption that minority and nonminority analysts want to participate at equal rates when interpreting the results of our empirical tests. An alternative explanation is that minority analysts choose not to participate for other reasons that may be correlated with both minority status and conference call participation. To address this concern, we rerun our analyses using only analysts who participated in the Q&A session of at least one earnings conference call in the previous 90 days (see online appendix table A1). Our assumption in this test is that if a minority analyst chose to participate on at least one earnings conference call in the last 90 days, that analyst is not averse to participating on earnings conference calls in general. Our inferences using this subsample are unchanged.

TABLE 10
Analyst Conference Call Participation and Minority Status—Underrepresented Minorities

	<i>PARTICIPATE</i>	<i>FIRST QUESTION</i>	<i>FOLLOW UP</i>	<i>ORDER</i>	<i>ln(WC ANALYST)</i>
<i>Intercept</i>	0.397*** (24.700)	0.271*** (24.658)	0.204*** (16.841)	0.618*** (51.847)	5.309*** (190.817)
<i>MINORITY_a</i>	-0.031*** (-5.748)	-0.008* (-1.792)	-0.003 (-0.845)	-0.006 (-1.138)	0.022* (1.713)
<i>ln(MVE)_{i,q}</i>	-0.016*** (-10.291)	-0.019*** (-24.367)	-0.010*** (-11.090)	-0.022*** (-26.361)	-0.045*** (-13.040)
<i>ANALYST FOLL (2ND QUARTILE)_{i,q}</i>	-0.089*** (-24.996)	-0.055*** (-22.816)	-0.056*** (-15.294)	-0.065*** (-23.484)	-0.086*** (-11.749)
<i>ANALYST FOLL (3RD QUARTILE)_{i,q}</i>	-0.169*** (-32.105)	-0.059*** (-19.447)	-0.088*** (-18.307)	-0.093*** (-23.429)	-0.152*** (-12.851)
<i>ANALYST FOLL (4TH QUARTILE)_{i,q}</i>	-0.259*** (-38.375)	-0.060*** (-17.518)	-0.106*** (-19.588)	-0.106*** (-22.154)	-0.246*** (-15.164)
<i>NUM PARTICIPANTS (2ND QUARTILE)_{i,q}</i>	0.118*** (25.659)	-0.135*** (-51.150)	0.008** (2.286)	-0.037*** (-17.593)	-0.045*** (-7.156)
<i>NUM PARTICIPANTS (3RD QUARTILE)_{i,q}</i>	0.193*** (32.676)	-0.166*** (-61.047)	0.011** (2.513)	-0.040*** (-13.587)	-0.091*** (-10.050)
<i>NUM PARTICIPANTS (4TH QUARTILE)_{i,q}</i>	0.286*** (40.168)	-0.188*** (-65.117)	0.019*** (3.859)	-0.037*** (-9.466)	-0.190*** (-14.018)
<i>ALL STAR_{a,q}</i>	0.077*** (13.208)	0.043*** (14.038)	0.009** (4.085)	0.073*** (21.327)	0.103*** (14.572)
<i>ln(NUM PRIOR CALLS_{a,i,q})</i>	0.175*** (47.849)	0.019*** (7.694)	0.005* (1.755)	0.028*** (8.517)	0.075*** (12.462)
<i>ln(FIRM EXP_{a,i,q})</i>	0.022*** (10.928)	0.021*** (12.222)	0.013*** (9.060)	0.024*** (14.554)	0.051*** (14.043)
<i>ln(GENERAL EXP_{a,i,q})</i>	-0.017*** (-8.915)	-0.008*** (-5.777)	0.003** (2.137)	-0.008*** (-6.184)	0.004 (1.200)
<i>ln(FOR FREQ_{a,i,q})</i>	0.041*** (20.176)	-0.004** (-2.351)	0.001 (1.188)	0.001 (0.393)	0.031*** (8.156)
<i>ln(COVERAGE_{a,i,q})</i>	-0.179*** (-43.919)	0.009** (2.585)	-0.016*** (-5.205)	-0.002 (-0.659)	-0.075*** (-8.277)
<i>ln(BROKER SIZE_{a,i,q})</i>	0.018*** (8.299)	0.026*** (20.287)	0.000 (0.204)	0.035*** (26.068)	0.016*** (5.282)
<i>ln(NUM INDUSTRIES_{a,i,q})</i>	-0.002 (-0.695)	-0.004* (-1.714)	0.004 (1.664)	-0.004* (-1.920)	0.021*** (2.775)
<i>ln(REC HORIZON_{a,i,q})</i>	-0.089*** (-17.739)	0.006*** (3.119)	-0.017*** (-9.109)	-0.004** (-2.175)	-0.030*** (-7.630)
<i>REC (STRONG BUY)_{a,i,q}</i>	0.136*** (45.444)	0.040*** (17.851)	0.016*** (8.837)	0.055*** (24.756)	0.028*** (5.696)
<i>REC (BUY)_{a,i,q}</i>	0.117*** (41.364)	0.061*** (26.313)	0.010*** (6.645)	0.069*** (28.165)	0.019*** (4.306)
<i>REC (UNDERPERFORM)_{a,i,q}</i>	-0.068*** (-16.597)	-0.031*** (-7.657)	-0.000 (-0.135)	-0.043*** (-10.425)	0.000 (0.005)
<i>REC (SELL)_{a,i,q}</i>	-0.033*** (-4.324)	-0.023*** (-3.388)	0.000 (0.031)	-0.035*** (-4.832)	0.051*** (3.168)
Adjusted R ²	0.212	0.082	0.032	0.095	0.121
N	929,205	407,437	407,437	407,437	407,437

This table estimates ordinary least squares regressions including all analyst-firm-quarter observations from 2002 to 2017 with sufficient data to calculate the dependent and independent variables. The dependent variables are equal to *PARTICIPATE_{a,i,q}*, *FIRST QUESTION_{a,i,q}*, *FOLLOW UP_{a,i,q}*, *ORDER_{a,i,q}*, and *ln(WC ANALYST)_{a,i,q}* in columns 1 to 5, respectively. Standard errors are clustered by firm and by year-quarter. All variables are defined in the appendix. All continuous variables are winsorized at the 1% and 99% levels. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

5.3 ALTERNATIVE MEASURES BASED ON EXECUTIVE ETHNICITY

Our primary tests including executive ethnicity use *SHARED ETHNICITY EXEC*, an indicator variable equal to 1 if a member of the executive team is of the same ethnicity as the analyst, and 0 otherwise. We run two additional regressions to examine alternative definitions of minority status for executives. Recognizing that lower level executives may have less power to choose conference call participants, we examine the robustness of our primary tests using *SHARED ETHNICITY CEO*, an indicator variable equal to 1 if the CEO shares the same ethnicity as the analyst, and 0 otherwise. Second, we consider whether minority analysts' access to managers is improved when there is an executive of *any* minority ethnicity on the call. For this test, we use *MINORITY EXEC*, which is an indicator variable equal to 1 if at least one executive on the call is an ethnic minority, and 0 otherwise. The results of these tests are presented in online appendix table A2 and are largely consistent with those reported in table 8.

5.4 SUBSAMPLE EXCLUDING FIRMS WITH NO MINORITY ANALYST COVERAGE

Because a minority analyst's decision not to cover a specific company could be a reaction to perceived or actual disparities at that company, our primary sample includes all analyst-conference call observations with sufficient data to calculate our outcome and control variables, regardless of the level of minority analyst coverage. Knowing minority analyst coverage is not constant across firms, we rerun our primary analyses using a subsample of firms that have at least one minority analyst covering the firm (see online appendix table A3). In this reduced subsample, we continue to find evidence that minority analysts are less likely to appear on the call and experience lower prioritization and engagement conditional on appearing on the call. For the *FIRST QUESTION* outcome, the coefficient on *MINORITY* is negative but statistically insignificant. One explanation for this weaker result is that minority analysts may choose not to cover firms if they believe that they will have lower levels of access to management. Thus, we do not use this reduced sample for our primary tests because we could potentially be excluding the very firms that represent the greatest amount of inequality in participation for ethnic minority analysts.¹⁴

¹⁴ If minority analysts choose not to follow a company for reasons related to their minority status, these companies are likely to be among those at which minority analysts are likely to have reduced access. Thus, the omitted observations due to selection bias in our reduced sample are likely to include a greater proportion of non-participating minority analysts. If we were able to include these unobservable observations, the magnitude of the disparities we document would likely increase; thus, our results likely represent a lower bound on the magnitude of the disparities that minority analysts experience.

6. Conclusion

We examine the impact of ethnicity on sell-side analysts' participation in earnings conference calls. We find that individuals who are part of ethnic minority groups participate at lower rates on conference calls. Minority analysts are less likely to ask a question on earnings conference calls, and those who participate on these calls experience lower levels of prioritization and fewer opportunities to engage with managers during the calls. For example, minority analysts appear later on the calls and are less likely to ask a follow-up question than nonminority analysts.

We also seek to identify potential explanations for minority analysts' lower conference call participation by examining observable and unobservable mediating factors as well as testing moderators of minority analysts' participation rates. Analysts' experience and reputation are correlated with but do not fully mediate minority analysts' lower participation on conference calls. Industry and brokerage fixed effects mediate approximately 30% of the lower minority analyst participation rate, whereas firm and conference call fixed effects mediate approximately 60% of the effect size. We also conduct moderation tests for forces that might mitigate the effects of managers' bias if bias influences the conference call disparities we document. We find limited evidence for moderating effects that lower conference call participation rates. Extroverted minority analysts ask more follow-up questions than nonextroverted minority analysts, suggesting that analyst personality can improve minority access to management. On-call disparities are somewhat mitigated for minority analysts from top brokerage firms and for minority analysts who share the same ethnicity as an executive on the call. The disparities in access are heightened for minority analysts on calls with greater time constraints. Overall, our study provides evidence on the lower participation rate of minority analysts on earnings conference calls and suggests that analysts and managers both contribute to this disparity in participation rates and that some factors may have limited effects on mitigating the lower participation rates for minority analysts.

APPENDIX: VARIABLE DEFINITIONS

Variable	Definition
$ALL\ STAR_{a,i,q}$	An indicator variable equal to 1 if analyst a is an <i>Institutional Investor</i> All-Star analyst as of the conference call date of firm i in quarter q , and equal to zero otherwise.
$ANALYST\ FOLL_{i,q}$	The number of analysts providing an earnings per share for firm i in quarter q . In our multiple-regression tests, we rank this variable by quartile. The first quartile is omitted and serves as the baseline.
$BROKER\ SIZE_{a,i,q}$	The brokerage size of analyst a in quarter q , calculated as the total number of analysts employed by the brokerage house of analyst a in 12 months prior to the conference call for firm i in quarter q .
$COVERAGE_{a,i,q}$	The total number of firms covered by analyst a in the 12 months prior to the conference call for firm i in quarter q .
$EXTROVERT_a$	An indicator variable equal to 1 if analyst a has an extroversion score above the media extroversion score, and equal to zero otherwise. We estimate analyst extroversion following Harrison et al. [2019].
$FIRM\ EXP_{a,i,q}$	The firm experience of analyst a following firm i in quarter q , calculated as the difference between the conference call date for firm i in quarter q and the date of the first forecast issued by analyst a for firm i , divided by 365.
$FIRST\ QUESTION_{a,i,q}$	An indicator equal to 1 if analyst a asks the first question on the conference call of firm i in quarter q , and equal to 0 otherwise.
$FOLLOW\ UP_{a,i,q}$	An indicator equal to 1 if analyst a asks a follow up question on the conference call of firm i in quarter q , and equal to 0 otherwise. Follow up questions are defined as questions asked by an analyst after a different analyst is permitted to ask a question during the conference call.
$FOR\ FREQ_{a,i,q}$	The forecasting frequency of analyst a in quarter q , calculated as the total number of quarterly earnings per share forecasts issued by analyst a for any firm in the 12 months prior to the conference call date for firm i in quarter q .
$GENERAL\ EXP_{a,i,q}$	The general experience of analyst a following firm i in quarter q , calculated as the difference between the conference call date for firm i in quarter q and the date of the first forecast issued by analyst a for any firm, divided by 365.
$HIGH\ ANALYST\ FOLL_{i,q}$	An indicator variable equal to 1 if the number of analysts providing an earnings per share for firm i in quarter q is in the top quartile, and equal to zero otherwise.
$MINORITY_a$	An indicator variable equal to 1 if analyst a is identified as a racial/ethnic minority, and equal to zero otherwise.
$MVE_{i,q}$	The market value of equity of firm i in quarter q , calculated as the number of shares outstanding multiplied by the stock price as of the fiscal quarter end of firm i in quarter q .
$NUM\ INDUSTRIES_{a,i,q}$	The total number of two-digit SIC industries covered by analyst a in the 12 months prior to the conference call for firm i in quarter q .

Variable	Definition
<i>NUM PARTICIPANTS_{i,q}</i>	The number of analysts who ask questions during the conference call of firm <i>i</i> in quarter <i>q</i> . In our multiple-regression tests, we rank this variable by quartile. The first quartile is omitted and serves as the baseline.
<i>NUM PRIOR CALLS_{a,i,q}</i>	Analyst <i>a</i> 's participation on other firms' conference calls, calculated as the number of conference calls for any firm in the 12 months prior to the conference call date for firm <i>i</i> in quarter <i>q</i> in which analyst <i>a</i> asks a question.
<i>ORDER_{a,i,q}</i>	Analyst <i>a</i> 's order on the conference call of firm <i>i</i> in quarter <i>q</i> , where a higher value indicates that the analyst appeared earlier on the call. <i>ORDER</i> is calculated as $[1 - (POSITION / NUM POSITIONS)]$ where <i>POSITION</i> is the analyst's position on the call with 0 representing the lowest position (i.e., 0, 1, 2, etc.), and <i>NUM POSITIONS</i> is the total number of total positions on the call.
<i>PARTICIPATE_{a,i,q}</i>	An indicator variable equal to 1 if analyst <i>a</i> asks a question on the conference call of firm <i>i</i> in quarter <i>q</i> , and equal to zero otherwise.
<i>REC_{a,i,q}</i>	Recommendation level of analyst <i>a</i> 's outstanding stock recommendation for firm <i>i</i> in quarter <i>q</i> . Recommendation levels (ordered from most positive to most negative) are strong buy, buy, hold, underperform, and sell. In our multiple-regression tests, hold recommendations are omitted and serve as the baseline.
<i>REC HORIZON_{a,i,q}</i>	The relative horizon of analyst <i>a</i> 's outstanding recommendation for firm <i>i</i> in quarter <i>q</i> , calculated as the difference between the conference call date for firm <i>i</i> in quarter <i>q</i> minus the date of analyst <i>a</i> 's outstanding recommendation as of the conference call date for firm <i>i</i> in quarter <i>q</i> , with this difference scaled by 365.
<i>SHARED ETHNICITY EXEC_{a,i,q}</i>	An indicator variable equal to 1 if at least one member of firm <i>i</i> 's executive team in quarter <i>q</i> has the same ethnicity as analyst <i>a</i> , and equal to zero otherwise.
<i>TOP TEN BROKER_{a,i,q}</i>	An indicator variable equal to 1 if analyst <i>a</i> is employed by one of the top ten largest brokerage by analysts employed as of the conference call date of firm <i>i</i> in quarter <i>q</i> , and equal to zero otherwise.
<i>WC ANALYST_{a,i,q}</i>	The word count of analyst <i>a</i> during firm <i>i</i> 's conference call in quarter <i>q</i> , calculated as the total number of words spoken by analyst <i>a</i> during the conference call of firm <i>i</i> in quarter <i>q</i> .

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