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Gender, Competition, and Performance: International Evidence

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Abstract

Using a hand-collected sample of 18,269 equity analysts from 42 countries over the period of 2004 to 2019, we establish an intriguing negative association between a country's institutional/economic development and its female share of equity analysts. We show that, in individualistic countries only, there is no gender gap in analyst forecast accuracy. We further show that female analysts are more skilled and more likely to drop out when underperforming in individualistic countries compared to peers in collectivistic countries. The evidence supports our hypothesis that the national cultural value of individualism encourages women to make career choices consistent with their general aversion to competition.

I. Introduction

There are well-documented gender differences in preference for competition (men are more competitively inclined than women) and in performance under competition (there is a gender performance gap in favor of men) based on laboratory

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studies and/or relying on participants and samples largely from western industrialized countries (see, e.g., Gneezy, Niederle, and Rustichini (2003), Niederle and Vesterlund (2007), Croson and Gneezy (2009), Niederle and Vesterlund (2011), and Reuben, Sapienza, and Zingales (2024)). There is, however, a scarcity of research on the role of gender differences in preference for competition in women's career choices and job performance in an international setting. This article fills a gap in current research related to our understanding of gender, competition, and performance by assembling an international sample of equity analysts with data on gender. Equity research is known to be a highly competitive and largely male-dominated profession, in which performance is precisely measured (Clement (1999), Hong, Kubik, and Solomon (2000), Hong and Kacperczyk (2010), Kumar (2010), Fang and Huang (2017), and Li, Mai, Wong, Yang, and Zhang (2023)).[1] We first present some new and intriguing evidence on cross-country differences in the female share of equity analysts and in the gender performance gap under competition. We then explore a number of possible explanations for the observed patterns.

Countries differ in their levels of institutional and economic development. For measures of formal institutional and economic development, we employ the Global Gender Gap Index (GGGI) from the World Economic Forum as a marker for gender equality, and GDP per capita as a marker for economic development. For a measure of informal institutions, we employ the individualism dimension in Hofstede's (1980), (2001) national cultural framework, because this dimension, which captures the degree to which individuals are embedded in in-groups, is the most important driver of cultural differences across countries (Triandis (1995), Aggarwal, Faccio, Guedhami, and Kwok (2016)) and is associated with important economic outcomes (e.g., Gorodnichenko and Roland (2011)).

Using a hand-collected sample of 18,269 equity analysts for whom we have determined gender based on their biographies from 42 countries over the period of 2004 to 2019, we first show negative associations between a country's GGGI and its female share of equity analysts, between a country's ln(GDP_PER_CAPITA) and its female share of equity analysts, and between a country's individualism score and its female share of equity analysts.

We next examine whether and how women's on-the-job performance relative to men's under competition varies across countries. To account for time-varying unobservable firm characteristics that could potentially drive analysts' coverage decision and their performance, we include firm times year fixed effects (Clement (1999), Hong and Kacperczyk (2010), Hilary and Shen (2013)). We show that there

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[1]To help establish that equity research is a highly competitive profession in our sample countries, we obtain crowd-sourced pay information for equity analysts and an average job in each country, and compute pay ratios of average equity analyst pay to GDP per capita (average pay in a country). Using pay ratios in the United States as benchmarks, we show that equity analysts achieve significantly higher pay ratios in many countries around the world than in the United States, supporting our premise that equity research is a highly competitive profession in our sample countries.

is no significant variation in the gender performance gap under competition across countries with different gender equality policies or across countries with different levels of economic development. In contrast, we show that in low individualistic countries, female analysts exhibit worse forecast accuracy than male analysts, consistent with experimental evidence on the gender performance gap in favor of men under competition (see, e.g., Gneezy et al. (2003)). We further show that in high individualistic countries, there is no significant difference in forecast accuracy between genders.

In the remainder of the article, we explore a number of possible explanations for the observed patterns: i) There is a negative association between a country's level of institutional/economic development and its female share of equity analysts; and ii) there is no gender performance gap under competition in high individualistic countries.

One possible explanation for the observed patterns is that women face higher barriers to entry into the equity research profession, resulting in both a lower female share of equity analysts and no female underperformance relative to male analysts in high individualistic countries compared to those in low individualistic countries. To explore this possible explanation, we first show that there are positive and significant associations between a country's GGGI and its individualism score and between a country's ln(GDP_PER_CAPITA) and its individualism score, suggesting that high individualistic countries are associated with more gender equality policies and higher levels of economic development. In other words, ceteris paribus, we would expect lower barriers for women entering the labor force (including becoming equity analysts) in high individualistic countries compared to low individualistic countries. In a regression setting when we include all three country-level institutional/economic development measures to explain a country's female share of equity analysts, we show that only the negative and significant association between a country's individualism score and its female share of equity analysts remains. Had the barriers to entry explanation held true, we would have expected a positive and significant association between a country's individualism score and its female share of equity analysts. We conclude that the evidence thus far is inconsistent with the conjecture that women face higher barriers to entry into the equity research profession in high individualistic countries that also score high in gender equality policies and practices and are also more advanced in economic development.

Instead, our international data set allows us to take a national culture lens to gain new insights into the complex relation between gender, competition, and performance. National cultural values define what constitutes appropriate decisions and behaviors in a society (North (1990), Guiso, Sapienza, and Zingales (2006)). Specifically, individualistic societies emphasize independence and equality (Hofstede ((2011), p. 11), Griffin et al. (2018)), whereas collectivistic societies emphasize in-groups' interests and harmony (Trompenaars (1993), Hofstede (2001), (2011)). Ceteris paribus, the national cultural value of individualism encourages women to make career choices more freely based on their preferences (compared to women in collectivistic societies). Given that evidence has shown many women are averse to competition and that equity research is a competitive profession, in high individualistic countries, women may choose to become equity

analysts only if they are good at the job, whereas in low individualistic countries, more women (than women in high individualistic countries) may not have such choice. This alternative explanation, which embeds the role of national culture into the relation between gender, competition, and performance, has two testable implications: i) There is a negative association between a country's individualism score and its female share of equity analysts (because evidence has shown many women are averse to competition and the national cultural value of individualism encourages women to make career choices consistent with their preferences); and ii) there is no gender difference in performance under competition in high individualistic countries (because only capable females may self-select into a competitive profession in those countries). Our empirical evidence thus far is consistent with both implications.

To provide supplemental evidence on the second implication above, we first show that in high individualistic countries, female analysts upon entry, compared to their peers in low individualistic countries, are more likely to work for more prestigious brokerage houses and cover more important stocks than male analysts upon entry. Moreover, we show that female analysts in high individualistic countries, compared to their peers in low individualistic countries, work harder, as measured by their forecast output and timeliness in making earnings forecasts, than male analysts. Consistent with only capable females may self-selecting into the equity research profession in high individualistic countries, we show that in such countries, the market reacts more strongly to forecast revisions made by female analysts than to those by male analysts, compared to the market reaction to those made by their peers in low individualistic countries. Finally, we show that female analysts in high individualistic countries are more likely to drop out when underperforming than male analysts do compared to their peers in low individualistic countries, suggesting that women have more freedom to make career choices, including quitting, in high individualistic countries compared to their peers in low individualistic countries. All these findings are consistent with our alternative explanation that the national cultural value of individualism encourages women to make career choices more freely based on their preferences (compared to women in collectivistic societies); in high individualistic countries, only women who believe they can excel in competition choose to become and/or to continue to work as equity analysts, whereas in low individualistic countries, women may not have those choices.

We conduct a large number of robustness checks of our main empirical findings. First, to address the concern that our findings are not specific to analysts based in the United States and the United Kingdom, which are the two countries with the highest individualism scores as well as the largest number of analysts in our international sample, we repeat our main analysis removing analysts based on those two countries. Second, we include three other national cultural values: masculinity, power distance, and uncertainty avoidance in the analyst performance regression specification. Third, we control a country-level transparency measure. Fourth, we identify high individualistic countries using a different cutoff. Fifth, we employ an updated version of the individualism score using the World Values Survey and European Values Survey. Sixth, we employ standard errors clustered at different levels: analyst country times year, brokerage times year, analyst, or firm. Seventh,

we include high-dimensional fixed effects such as firm times year times month fixed effects to control for time-varying unobservable characteristics within short windows, and/or additional fixed effects such as brokerage times year fixed effects to control for time-varying unobservable brokerage characteristics such as labor market pressure faced by analysts. Finally, we remove individuals from our sample if the individualism ranking of an analyst's country of origin as determined by their name differs from that of their place of work. Our main findings continue to hold across all these additional analyses.

We conclude that there are important cross-country variations in gender differences in performance under competition and that these differences are shaped by national cultures.

Our article is among the first in the economics, finance, and accounting literature, as far as we are aware, to assemble an international data set on equity analysts with gender data and to study the role of country-level factors in attenuating the gender performance gap under competition. We contribute to the literature in two ways.

First, our evidence on the important role of national culture in narrowing the gender gap in performance under competition is new to the literature on gender and competition (see the review articles by Croson and Gneezy (2009) and Niederle and Vesterlund (2011)). Prior work in a laboratory setting typically takes great care in randomly allocating participants (of both genders) to the various treatments, while failing to recognize that in the real world, labor market choices and outcomes are not random. As opposed to samples of individuals largely from western industrialized countries in laboratory settings, our global sample of finance professionals allows us to examine the role of individualism in shaping women's choices to enter competitive professions, which in turn narrows the gender performance gap under competition. Moreover, using a global sample of equity analysts with additional data on job performance and job market outcome allows us to provide novel supplemental evidence on how country-level factors help narrow the gender performance gap under competition.

Second, our article contributes to the large literature on gender differences in labor market outcomes (see, e.g., Goldin and Rouse (2000), Bertrand, Goldin, and Katz (2010), Egan, Matvos, and Seru (2022), Benson, Li, and Shue (2023), Huang, Mayer, and Miller (2024), and a survey by Blau and Kahn (2000)). In a seminal article on equity analysts in the United States, Kumar (2010) finds female analysts outperform their male counterparts and provides supporting evidence for his conjecture that only females with superior forecasting abilities self-select to enter the profession. Our global sample and national culture lens extend Kumar's (2010) seminal work and findings. Kumar (2010) employs a sample of equity analysts in the United States, a country with one of the highest individualism scores, which encourages women to make career choices freely. Given that evidence has shown many women are averse to competition (as cited earlier), U.S. females may self-select into the equity research profession only when they are good at it. Employing an international sample of equity analysts, our article provides new insights into the relation between gender, competition, and performance that are impossible to obtain when employing data from only a single country. In contrast and complementary to Kumar (2010), we show that in low individualistic countries, women

may not have the freedom to choose careers (to avoid competition), resulting in female analysts' poorer performance relative to male analysts in those countries compared to their counterparts in high individualistic countries.

Given the ongoing debate among regulators, policymakers, and institutional investors around the world on the role of female business leaders (i.e., women in another highly competitive profession) in creating shareholder value and societal impact, our findings will inform government policies and business practices promoting female leadership and representation in highly competitive professions.[2]

II. Literature Review and Empirical Setting

A. Literature Review on Gender, Competition, and Performance

Economists have long documented gender differences in consumption, investment, trading, and labor market outcomes (see, e.g., Sundén and Surette (1998), Goldin and Rouse (2000), and Barber and Odean (2001)). In a survey of gender differences in economic experiments, Croson and Gneezy (2009) identify robust differences in risk preferences, altruism, and competitive preferences. Observing participants in a laboratory setting solving an actual task, Niederle and Vesterlund (2007) find that women are generally less keen on being exposed to competition. Running a field experiment on job-entry decisions, Flory, Leibbrandt, and List (2015) show that women disproportionately shy away from competitive work settings as captured by a competitive compensation regime.[3]

There is some suggestive evidence of a gender performance gap in favor of men under competition based on laboratory studies and/or field evidence. Gneezy et al. (2003) present experimental evidence that men's performance increases in competition, whereas women's does not. Shurchkov (2012) finds that while women underperform men in a high-pressure math-based tournament, women greatly increase their willingness to compete and their performance levels in a low-pressure verbal environment, suggesting that in stereotypical male tasks competition does seem to generate a large gender gap in performance.

In summary, based on laboratory studies and/or field evidence, prior work largely shows that in male-dominated tasks/careers, men are more competitively inclined than women and that there is a gender performance gap in favor of men under competition. As far as we are aware, no prior work explores the role of gender differences in preference for competition in women's career choices and job performance in an international setting.

[2]See Bian, Li, and Li (2023) for arguments for and supporting evidence of potentially unintended consequences of such mandates.

[3]Based on field evidence, a number of studies further show that social norms/behaviors affect individuals' preferences for competition. For example, Gneezy, Leonard, and List (2009) find that while women in a patriarchal society are less competitively inclined than men, their counterparts in a matrilineal society are more competitive than men. Booth and Nolen (2012) show that girls from single-sex schools behave more like boys in their preferences for competition. Andersen, Ertac, Gneezy, List, and Maximiano (2013) find that while there is no gender difference in competitiveness at any age in a matrilineal society, girls become less competitive around puberty in a patriarchal society, suggesting that socialization has an impact on gender differences in competitiveness.

B. Our Empirical Setting

There are a number of reasons for us to use equity analysts as our study subject. First and foremost, equity analysts are known to be in a highly competitive profession in the United States (Clement (1999), Hong et al. (2000)). Kaplan and Rauh (2010) find that in the United States, while top executives' representation in the top income brackets has increased from 1994 to 2004, Wall Street's representation, which includes equity analysts, has increased even more. For our purpose, we need to establish that equity research is also a highly competitive profession outside the United States. Using the Eurostat Structure of Earnings Survey, the largest source with harmonized data across 16 European countries for 2010, Denk (2015) finds that financial sector workers, including equity analysts, comprise 19% of the top 1% earners, despite the fact that the overall employment share of finance is only 4%. Table IA1 in the Supplementary Material presents average analyst pay, average pay, and ratios of average analyst pay to GDP per capita and to average pay in our sample countries. The data for average analyst pay come from the Global Salary Calculator (GSC).[4] To properly account for national economic development and labor market conditions, we obtain GDP per capita in 2021 from the World Bank (the latest data available), and average pay in a country from Trading Economics, an online database with historical information for countries around the world.[5] We show that there are wide variations in equity analyst pay ratios across sample countries, with India (8.13), Pakistan (6.66), and Vietnam (6.28) having the highest analyst pay ratios (relative to GDP per capita), and Vietnam (6.77), Turkey (5.14), and Thailand (5.04) having the highest analyst pay ratios (relative to average pay in a country). The mean/median average analyst pay/GDP per capita ratios are 2.43/1.76, and the mean/median average analyst pay/average pay ratios are 2.50/2.03. Compared to the average analyst pay/GDP per capita (average analyst pay/average pay) ratio of 1.54 (2.12) in the United States, the statistics suggest that equity research is highly competitive in our sample countries.

Second, equity research is also known to be a largely male-dominated profession (Green, Jegadeesh, and Tang (2009), Kumar (2010), Fang and Huang (2017), Li et al. (2023)). Prior work finds that male-stereotyped tasks could be important confounding factors that help explain gender differences in selection into competition and performance under competition (see, e.g., Shurchkov (2012), Flory et al. (2015)). Based on laboratory and field studies from mostly western countries that score highly on individualism, Niederle and Vesterlund (2011) find that beliefs about one's relative performance play an important role in women's entry into competition, and call for further research. Our global sample of equity

[4]The GSC, an online database maintained by the Economic Research Institute, supports international salary management; the GSC reports on gross annual salaries in the form of an overall mean and percentiles from their database of occupations and locations. The GSC uses data provided by both employers and employees, salary survey data, government salary data, and other statistics and data sources. The data are collected on an ongoing basis and in local currency. Data can be downloaded at https://www.erieri.com/globalsalarycalculator. We employ exchange rates in 2022 from the World Bank to convert pay in local currency to U.S. dollars.

[5]Data can be downloaded at https://www.erieri.com/globalsalarycalculator. Trading Economics provides average pay in a country in local currency. We employ exchange rates in 2022 from the World Bank to convert pay in local currency to U.S. dollars.

analysts serves as a natural setting for exploring the extent to which the national cultural value of individualism encourages the free expression of women's beliefs about their abilities, with implications for their on-the-job performance relative to men's across countries.

Last but not least, analyst performance, as captured by earnings forecast accuracy using data from the Institutional Brokers Estimates System (IBES) international files, is precisely measured.[6]

To capture important cross-country differences in institutional and economic development that might play a role in the relationship between gender, competition, and performance, we employ three measures: i) the World Economic Forum's (WEF) GGGI, ii) GDP per capita, and iii) the individualism dimension in Hofstede's (1980), (2001) national cultural framework, the most important driver of cultural differences across countries (Triandis (1995), Aggarwal et al. (2016)) and a key determinant of important economic outcomes (e.g., Gorodnichenko and Roland (2011)).

Taken together, our global sample of equity analysts is an important addition to the literature examining the complex relationships between gender, competition, and performance, and complements existing laboratory evidence (see the survey by Niederle and Vesterlund (2011)).

III. Sample Formation and Overview

To explore cross-country patterns in the female share of equity analysts and in the gender performance gap under competition, we assemble a global sample of equity analysts with information on gender, employment location, and performance.

A. Sample Formation

One way to determine an analyst's gender is to use their full name (see, e.g., Green et al. (2009) and Kumar (2010) using U.S. data).[7,8] However, the IBES Detail Recommendations file reports only an analyst's last name and first-name initial, rather than their full name. Regarding an analyst's employment location, one may infer such information from where their brokerage house operates. However, IBES

[6]In the United States, Brown, Call, Clement, and Sharp (2015) show that equity analysts compete on multiple dimensions such as industry knowledge, generating underwriting business and/or trading commissions, broker votes, and accurate earnings forecasts. Hong and Kubik (2003) find that both forecast accuracy and optimism are rewarded in the analyst labor market. Given the international setting of our research, we opted to focus on one objective measure of analyst performance – earnings forecast accuracy, which is generally available across countries and is known to be a key determinant of analyst compensation and career advancement (Brown et al. (2015), Hong and Kubik (2003)).

[7]These authors rely on a number of sources to obtain the full names of analysts: the *Institutional Investor* magazine, Nelson's directory of investment research, and analyst directories available at Yahoo Finance and other financial websites, supplemented with searches of news articles on Factiva and Google.

[8]One caveat of our analysis is that analyst gender data are collected only for the lead analyst, whose identity is recorded in the IBES database.

provides only abbreviated brokerage names.[9] As a result, we cannot determine who the analysts are, the brokerage houses in which they work, and their gender and employment location from IBES.

To form an international sample of equity analysts for our study, we start with a list of brokerages (with abbreviated names) that provide stock recommendations on global equities in the IBES Detail Recommendations file over the period of 2004 to 2019. We start our sample period in 2004 because our key data source—Capital IQ's coverage of analyst biographies—became more comprehensive beginning in 2004.[10] We then conduct manual searches primarily in Capital IQ (supplemented with Bloomberg) to obtain a brokerage's full name; its location, which is used to determine affiliated analysts' respective countries of origin; affiliated analysts' full names; and those analysts' gender information, gleaned from reading their biographies.[11] Appendix IA1 in the Supplementary Material provides a detailed description of our manual search and matching process.

Table 1 reports the impact of various matching steps and data filters to arrive at the final sample of 18,269 (unique) equity analysts affiliated with 1,179 brokerages located in 42 countries/regions.[12] As far as we are aware, ours is one of the largest global samples of equity analysts in the literature (see, e.g., 3,482 analysts in Bae, Stulz, and Tan (2008) and 11,663 analysts in Bradshaw, Huang, and Tan (2019)).

B. Key Variables

At the country-year level, our key variable of interest is FEMALE_RATIO, constructed as the number of unique female analysts divided by the total number of unique analysts in a country-year.

The data for GGGI are obtained from the WEF, measuring progress toward gender parity in four dimensions: economic opportunities, education, health, and political leadership (WEF (2020)). The indicator variable, HIGH_GGGI, takes the value of 1 if a country is in the top quartile among the sample countries in a year, and 0 otherwise. The data for GDP per capita are obtained from the World Bank. The indicator variable, HIGH_GDP_PER_CAPITA, takes the value of 1 if a country is in the top quartile among the sample countries in a year, and 0 otherwise. The data for individualism scores are obtained from the Hofstede Culture Dimension website (https://geerthofstede.com/research-and-vsm/dimension-data-matrix/). A higher value indicates higher individualism (IDV). The indicator variable, HIGH_IDV, takes the value of 1 if a country is in the top quartile of the individualism score among the sample countries, and 0 otherwise. There are 10 countries with the indicator variable HIGH_IDV taking the value of 1: Australia, Belgium, Canada,

[9]Before 2006, researchers could get brokerages' full names using the IBES broker translation file; this translation file is no longer available.

[10]Capital IQ is a market intelligence platform developed by Standard & Poor's Global. It provides detailed business histories for brokerages and personal information on analysts, including employment history, employment location, and gender. Capital IQ obtains such information directly from Thomson Reuters (Lourie (2019)).

[11]Forecasts made by foreign analysts are those covering a firm whose country of primary listing (based on the nation code in Worldscope) differs from the covering analyst's country of employment.

[12]One caveat to our sample formation and variable construction is that we keep only analysts whose gender data are available.

TABLE 1

Sample Formation

Table 1 reports the impact of various matching steps and data filters on the initial sample of analysts covered in the IBES Detail Recommendations file over the period of 2004 to 2019.

	#_ANALYSTS	#_ANALYSTS_REMOVED	#_BROKERAGE	#_BROKERAGE_REMOVED	#_COUNTRIES	#_COUNTRIES_REMOVED
Obtain unique abbreviated brokerage names and analyst names in the IBES Detail Recommendations file from 2004 to 2019.	43,193	5,734	1,687	25		
Match abbreviated brokerage names to full brokerage names in Capital IQ.	29,285		1,557		83	
Remove observations with missing information on analyst gender and employment address, and analysts with multiple employment addresses in a year in Capital IQ.	26,841	2,444	1,535	22	80	3
Match IBES Detail Recommendations file with IBES EPS files.	23,932	2,909	1,448	87	80	0
Match with Worldscope; remove observations with missing Worldscope unique identifier (ws_id).	19,769	4,163	1,316	132	77	3
Remove firms with stock price less than one unit of local currency and market capitalization less than 10 million USD at the end of the fiscal year.	19,539	230	1,307	9	77	0
Remove countries with fewer than 10 firms over the sample period.	19,472	67	1,288	19	71	6
Remove countries with fewer than 10 analysts or fewer than 10 firm–female analyst–year observations over the sample period.	19,397	75	1,270	18	55	16
Remove countries with missing information on GGGI or Hofstede's individualism measure.	18,583	814	1,191	79	42	13
Remove observations with missing analyst forecast variables.	18,269	314	1,179	12	42	0

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Denmark, Hungary, Italy, the Netherlands, New Zealand, the United Kingdom, and the United States.

At the firm-analyst-year level, our key variable of interest is AVERAGE_FORECAST_ERROR, constructed as the average of absolute forecast errors that an analyst makes during a year. Following the extant literature (see, e.g., Clement (1999), Hong and Kacperczyk (2010), and Kumar (2010)), we use analysts' annual earnings per share (EPS) forecasts because annual EPS forecasts have the widest coverage, which is important given our international sample. Absolute forecast error is the absolute value of the difference between an analyst's annual EPS forecast and actual EPS normalized by the stock price at the prior fiscal year end after accounting for stock splits. This measure is expressed as a percentage of the prior year's stock price following Hong and Kacperczyk (2010).

As alternative measures of analyst performance, we employ the absolute first/last forecast error made by an analyst in their first/last annual EPS forecast. As is well established, the timing of forecasts matters for assessing analyst performance (Hong et al. (2000), Clement and Tse (2005)). For example, when an analyst is making their very first forecast, the role of their private information generated by effort and skill is more prominent than when an analyst is making subsequent forecasts. When an analyst is making their last forecast, more information is available, and the role of their private information diminishes, likely resulting in herding among analysts. We thus expect that if any gender difference in performance will ever appear, it will do so during the first forecast and not in the last.

Although we control for the timing of each forecast using FORECAST_HORIZON in our regression analyses, the first/last forecasts do not properly control for the exact timing of those forecasts, especially if female analysts might consistently make their forecasts later than their male counterparts. To level the playing field when assessing gender difference in performance, we also employ the absolute same week forecast error made by an analyst in their forecast that is within 5 days after the prior fiscal year's annual earnings announcement. We expect this measure will give us a clean test of the gender difference in performance after requiring the same timing of those forecasts. The Appendix provides detailed variable definitions.

C. Sample Overview

Panel A of Table 2 presents an overview of our global analyst sample by country. We show that the top three countries with the highest female analyst share (in descending order) are Vietnam (43.1%), Thailand (37.9%), and Portugal (36.8%), and the top three countries with the lowest female analyst share are Norway (4.2%), Denmark (7.8%), and New Zealand (9.7%). The top three countries with the largest number of earnings forecasts are the United States (1,276,283 observations, representing 48.5% of the sample), the United Kingdom (243,251 observations; 9.2%), and Canada (194,929 observations; 7.4%).

Panel B of Table 2 presents an overview of country-level variables. We show that the top three countries in terms of gender equality (GGGI) are Norway, Finland, and Sweden, and the bottom three are Pakistan, Turkey, and the United Arab Emirates. The top three countries in terms of economic development (GDP per

TABLE 2

Sample Overview

Table 2 provides an overview of our sample. Our sample consists of 18,269 equity analysts from 42 countries over the period of 2005 to 2020 for which we have analyst forecast data from IBES, firm-level data from Worldscope, and country-level data from the World Economic Forum, World Bank, and Hofstede Culture Dimension website. Panel A presents an overview of our global analyst sample by country. Panel B presents an overview of country-level variables. Definitions of the variables are provided in the Appendix.

Panel A. Overview of Our Global Analyst Sample

Country	#_FIRM_YEAR_OBS	#_FIRMS	#_ANALYSTS	#_FEMALE_ANALYSTS	%_FEMALE_ANALYSTS	#_FORECASTS	#_FORECASTS_MADE_BY_FEMALE_ANALYSTS	%_FORECASTS_MADE_BY_FEMALE_ANALYSTS
Argentina	328	68	19	5	26.32%	1,204	78	6.48%
Australia	4,619	1,163	597	63	10.55%	62,358	3,814	6.12%
Austria	929	155	53	8	15.09%	3,847	487	12.66%
Belgium	1,648	401	112	19	16.96%	9,582	1,082	11.29%
Brazil	2,521	402	211	35	16.59%	18,894	2,315	12.25%
Canada	9,681	1,840	910	94	10.33%	194,929	12,616	6.47%
Chile	234	63	49	7	14.29%	525	56	10.67%
China	10,266	2,474	1,062	209	19.68%	38,501	8,311	21.59%
Denmark	846	161	64	5	7.81%	8,197	242	2.95%
Finland	1,617	265	148	26	17.57%	22,516	1,873	8.32%
France	8,307	1,323	528	123	23.30%	64,854	15,057	23.22%
Germany	7,964	1,500	668	70	10.48%	76,984	3,822	4.96%
Greece	477	85	88	20	22.73%	3,771	840	22.28%
Hong Kong	8,671	1,879	878	245	27.90%	56,274	13,002	23.10%
Hungary	218	44	20	3	15.00%	995	65	6.53%
India	5,406	1,079	1,057	149	14.10%	94,214	8,681	9.21%
Indonesia	1,085	174	176	48	27.27%	7,747	2,070	26.72%
Ireland	609	151	78	12	15.38%	2,688	134	4.99%
Israel	349	77	34	5	14.71%	1,567	44	2.81%
Italy	2,486	479	145	44	30.34%	22,416	6,451	28.78%
Japan	15,015	2,048	797	113	14.18%	158,187	14,301	9.04%
Malaysia	2,041	424	224	71	31.70%	15,750	5,433	34.50%
Mexico	857	171	48	11	22.92%	4,930	626	12.70%
Netherlands	2,921	852	234	36	15.38%	15,274	592	3.88%
New Zealand	665	91	31	3	9.68%	4,406	349	7.92%
Norway	2,638	498	265	11	4.15%	32,338	582	1.80%
Pakistan	199	56	89	15	16.85%	738	122	16.53%
Philippines	654	88	69	23	33.33%	3,747	1,289	34.40%
Poland	927	200	103	13	12.62%	3,944	241	6.11%
Portugal	616	115	57	21	36.84%	2,430	535	22.02%
Russia	1,140	289	161	44	27.33%	7,716	2,474	32.06%

(continued on next page)

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TABLE 2 (continued)

Sample Overview

Panel A. Overview of Our Global Analyst Sample (continued)

Country	#_FIRM_YEAR_OBS	#_FIRMS	#_ANALYSTS	#_FEMALE_ANALYSTS	%_FEMALE_ANALYSTS	#_FORECASTS	#_FORECASTS_MADE_BY_FEMALE_ANALYSTS	%_FORECASTS_MADE_BY_FEMALE_ANALYSTS
Singapore	3,353	831	251	61	24.30%	19,497	3,659	18.77%
South Korea	2,677	602	526	84	15.97%	44,430	7,501	16.88%
Spain	1,618	285	127	30	23.62%	10,557	2,937	27.82%
Sweden	2,964	525	263	27	10.27%	35,129	1,660	4.73%
Switzerland	4,663	1,277	293	43	14.68%	27,990	2,148	7.67%
Thailand	2,100	357	198	75	37.88%	20,810	8,816	42.36%
Turkey	810	125	116	28	24.14%	5,439	476	8.75%
United Arab Emirates	1,051	232	37	7	18.92%	4,410	606	13.74%
United Kingdom	20,553	3,862	1,985	338	17.03%	243,251	29,017	11.93%
United States	56,816	9,248	5,426	704	12.97%	1,276,283	103,229	8.09%
Vietnam	240	79	72	31	43.06%	628	293	46.66%
Total	192,779	36,038	18,269	2,979		2,629,947	267,926	

Panel B. Overview of Country-Level Variables

Country	FEMALE_RATIO (%)	GGGI	GDP_PER_CAPITA ($000)	ln(GDP_PER_CAPITA)	IDV
Argentina	11.81	0.71	9.64	9.17	0.46
Australia	7.67	0.73	52.00	10.86	0.90
Austria	17.02	0.71	46.83	10.75	0.55
Belgium	8.30	0.73	44.02	10.69	0.75
Brazil	12.89	0.67	10.67	9.27	0.38
Canada	7.97	0.73	47.53	10.77	0.80
Chile	15.87	0.68	12.90	9.47	0.23
China	23.52	0.67	4.66	8.45	0.20
Denmark	4.54	0.76	59.52	10.99	0.74
Finland	10.16	0.82	46.27	10.74	0.63
France	21.87	0.71	41.08	10.62	0.71
Germany	7.31	0.76	42.45	10.66	0.67
Greece	25.56	0.67	25.30	10.14	0.35
Hong Kong	26.49	0.67	32.04	10.37	0.25
Hungary	10.89	0.67	13.79	9.53	0.80
India	12.29	0.63	1.39	7.24	0.48
Indonesia	27.39	0.66	3.18	8.06	0.14
Ireland	9.89	0.77	54.89	10.91	0.70
Israel	7.59	0.70	30.63	10.33	0.54
Italy	31.06	0.68	35.99	10.49	0.76

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TABLE 2 (continued)

Sample Overview

Panel B. Overview of Country-Level Variables (continued)

Country	FEMALE_RATIO (%)	GGGI	GDP_PER_CAPITA ($000)	ln(GDP_PER_CAPITA)	IDV
Japan	12.00	0.65	45.32	10.72	0.46
Malaysia	32.62	0.65	9.37	9.14	0.26
Mexico	17.01	0.67	9.59	9.17	0.30
Netherlands	7.86	0.74	50.78	10.84	0.80
New Zealand	9.94	0.77	34.66	10.45	0.79
Norway	3.36	0.82	88.72	11.39	0.69
Pakistan	18.71	0.55	1.01	6.92	0.14
Philippines	33.20	0.77	2.31	7.74	0.32
Poland	11.36	0.70	12.71	9.45	0.60
Portugal	29.54	0.71	22.24	10.01	0.27
Russia	26.36	0.69	10.39	9.25	0.39
Singapore	20.49	0.68	46.96	10.76	0.20
South Korea	13.89	0.63	22.77	10.03	0.18
Spain	23.77	0.74	30.79	10.33	0.51
Sweden	7.47	0.81	52.90	10.88	0.71
Switzerland	9.21	0.74	76.53	11.25	0.68
Thailand	38.63	0.69	5.06	8.53	0.20
Turkey	17.77	0.60	11.55	9.35	0.37
United Arab Emirates	9.81	0.62	44.62	10.71	0.38
United Kingdom	13.26	0.75	40.57	10.61	0.89
United States	10.09	0.72	49.69	10.81	0.91
Vietnam	35.01	0.69	1.54	7.34	0.20

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capita) are Norway, Switzerland, and Denmark, and the bottom three are India, Vietnam, and Pakistan. The top three countries in terms of the individualism score are the United States, Australia, and the United Kingdom, and the bottom three are Indonesia, Pakistan, and South Korea.

Panel A of Table 3 presents the summary statistics for key country-level variables.[13] We show that the average country-year female share of equity analysts across the 42 sample countries is 16.5%. We further show that the sample average GGGI is 0.71, the sample average GDP per capita is 30.97 thousands, and the sample average individualism score is 0.51.

Panel B of Table 3 presents the summary statistics for key analyst-level variables. The sample comprises 610,847 firm-analyst-year observations over the period of 2005 to 2020. We show that the mean (median) AVERAGE_FORECAST_ERROR (in percentage points) across the 42 sample countries is 2.90% (0.74%). Using a sample of stocks covered by IBES over the period of 1980 to 2005, Hong and Kacperczyk (2010) show that the mean absolute forecast error is 3.31%. Our summary statistics for AVERAGE_FORECAST_ERROR are largely consistent with theirs.[14]

At the firm-analyst-year level, the average female share of equity analysts in the international sample is 11.0%. Compared to the statistics at the country-year level in Panel A of Table 3, the lower share at the firm-analyst-year level is due to a number of factors: i) Female analysts cover fewer firms than male analysts; and ii) countries with a lower female share of equity analysts (such as the United States) have more firm-year observations.

Table IA3 in the Supplementary Material presents the correlation matrix of firm-analyst-level variables. We show that there is no significant association between the indicator variable FEMALE and three of the four performance measures: AVERAGE_FORECAST_ERROR, FIRST_FORECAST_ERROR, and SAME_WEEK_FORECAST_ERROR, whereas there is a positive and significant association between the indicator variable FEMALE and LAST_FORECAST_ERROR. We further show that the indicator variable HIGH_GGGI is positively and significantly correlated with, whereas the indicator variable HIGH_GDP_PER_CAPITA is negatively and significantly correlated with, all four different measures of analyst performance. Moreover, we show that the indicator variable HIGH_IDV is negatively and significantly

[13]In our lead–lag regression analysis, the dependent variables are firm-analyst-year observations over the (fiscal year) period of 2005 to 2020, and the country-level control variables are over the (calendar year) period of 2003 to 2019 due to different fiscal year-ends for sample firms in different sample countries. For example, if a sample firm has a fiscal year-end of June 30, 2005 (its fiscal year is 2005), an analyst could make her first annual forecast on May 15, 2004 for the 2005 fiscal year. In this case, the lagged 1-year country-level control variable will be in 2003, not in 2004.

[14]It is informative to compare our international sample to the U.S. sample, which is well studied in the analyst literature (see, e.g., Clement (1999), Hong et al. (2000), Clement and Tse (2005), Hong and Kacperczyk (2010), Kumar (2010)). Table IA2 in the Supplementary Material presents the summary statistics for key analyst-level variables for the U.S. sample only. We show that across all four analyst performance measures, the U.S. sample exhibits smaller values than those in the international sample, consistent with the findings in Eun, Wang, and Xiao (2015) that firms located in the country with the highest individualism score—the United States—will have information environments that are more transparent than those of firms outside the United States.

TABLE 3

Summary Statistics

Table 3 provides the summary statistics for our global analyst sample. The sample consists of 610,847 firm-analyst-year observations over the fiscal year period of 2005 to 2020. Our country- and analyst-level control variables are lagged by 1 year. Panel A provides the summary statistics of country-level variables. Panel B provides the summary statistics of analyst-level variables. We employ four different measures of analyst forecast performance: AVERAGE_FORECAST_ERROR, FIRST_FORECAST_ERROR, LAST_FORECAST_ERROR, and SAME_WEEK_FORECAST_ERROR. The sample for SAME_WEEK_FORECAST_ERROR consists of 318,622 firm-analyst-year observations because we require those forecasts are made within 5 days after the prior fiscal year's annual earnings announcement. FEMALE is an indicator variable that takes the value 1 if an analyst is a female, and 0 otherwise. Definitions of the variables are provided in the Appendix. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

	Mean	Median	Std. Dev.	P25	P75
	1	2	3	4	5
Panel A. Country-Level Variables					
FEMALE_RATIO (%)	16.545	14.169	12.071	7.703	24.475
GGGI	0.705	0.700	0.059	0.664	0.744
HIGH_GGGI	0.241	0.000	0.428	0.000	0.000
GDP_PER_CAPITA	30.968	32.598	21.728	10.530	47.017
ln(GDP_PER_CAPITA)	3.005	3.484	1.130	2.354	3.851
HIGH_GDP_PER_CAPITA	0.241	0.000	0.428	0.000	0.000
INDIVIDUALISM (IDV)	0.511	0.510	0.238	0.270	0.710
HIGH_IDV	0.241	0.000	0.428	0.000	0.000
N	704				
Panel B. Analyst-Level Variables					
AVERAGE_FORECAST_ERROR	2.902	0.740	7.798	0.276	2.073
FIRST_FORECAST_ERROR	3.684	0.912	9.627	0.300	2.729
LAST_FORECAST_ERROR	1.988	0.370	5.867	0.107	1.240
SAME_WEEK_FORECAST_ERROR	3.322	0.881	8.109	0.301	2.603
FEMALE_RATIO (%)	10.971	0.000	31.253	0.000	0.000
GGGI	0.714	0.718	0.040	0.691	0.740
HIGH_GGGI	0.115	0.000	0.319	0.000	0.000
GDP_PER_CAPITA	41.893	47.403	15.643	40.059	49.856
ln(GDP_PER_CAPITA)	3.533	3.859	0.870	3.690	3.909
HIGH_GDP_PER_CAPITA	0.547	1.000	0.498	0.000	1.000
INDIVIDUALISM (IDV)	0.724	0.890	0.246	0.480	0.910
HIGH_IDV	0.627	1.000	0.483	0.000	1.000
FOREIGN_ANALYST	0.185	0.000	0.388	0.000	0.000
FORECAST_HORIZON	7.559	7.400	1.983	6.367	8.483
FORECAST_FREQUENCY	4.197	4.000	2.518	2.000	5.000
#_FIRMS_FOLLOWED	15.313	14.000	8.299	10.000	19.000
#_INDUSTRIES_FOLLOWED	4.262	4.000	2.792	2.000	6.000
FIRM_EXPERIENCE	4.029	3.000	3.269	2.000	6.000
GENERAL_EXPERIENCE	7.927	7.000	4.778	4.000	11.000
BROKERAGE_SIZE	105.481	43.000	118.575	18.000	173.000
ln(BROKERAGE_SIZE)	3.902	3.761	1.328	2.890	5.153
N	610,847				

correlated with all four different measures of analyst performance. Given that omitted variable bias in univariate correlations can mask the true relations between the variables, we will employ multiple regressions to examine the country-level factors associated with the gender performance gap under competition.

IV. Cross-Country Evidence

In this section, we present some new and intriguing evidence on cross-country differences in the female share of equity analysts and in the gender performance gap under competition.

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A. Cross-Country Differences in the Female Share of Equity Analysts

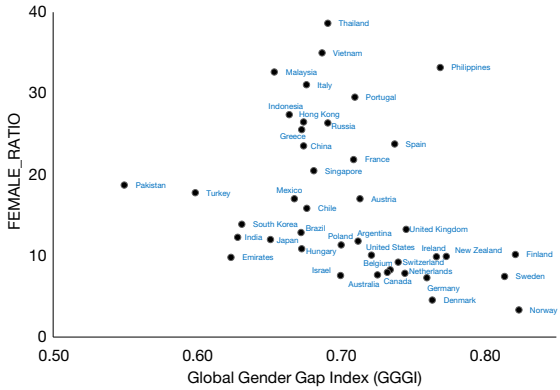
Figure 1 plots the country-mean female share of equity analysts in a country in relation to its institutional and economic development. In Graph A, we show a negative association between a country's GGGI and its female share of equity analysts. In Graph B, we show a negative association between a country's ln(GDP_PER_CAPITA) and its female share of equity analysts. As far as we are

FIGURE 1

Institutional and Economic Development and Female Share of Equity Analysts

Figure 1 presents an overview of country-level institutional and economic development and female share of equity analysts. Graph A plots the relation between the Global Gender Gap Index and country-mean female share of equity analysts. Graph B plots the relation between GDP per capita and country-mean female share of equity analysts. Graph C plots the relation between the individualism (IDV) score and country-mean female share of equity analysts. Our sample consists of 18,269 equity analysts from 42 countries over the period of 2004 to 2019 for which we have analyst forecast data from IBES, firm-level data from Worldscope, and country-level data from the World Economic Forum, World Bank, and Hofstede Culture Dimension website.

Graph A. Global Gender Gap Index and Female Share of Equity Analysts



Graph B. GDP Per Capita and Female Share of Equity Analysts

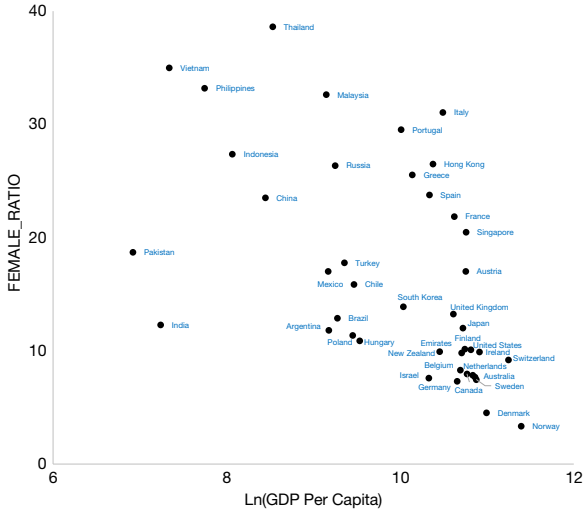


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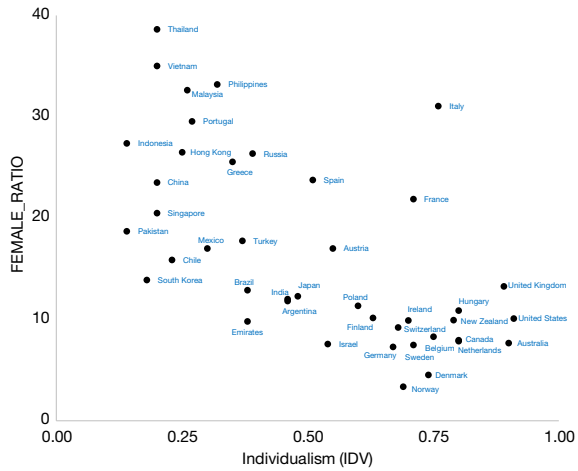
FIGURE 1 (continued)

Graph C. Individualism and Female Share of Equity Analysts



aware, we are the first to show that in the most developed western countries with the most generous gender equality policies in which women are on par or exceed men in higher education and many other dimensions, women have the lowest presence in equity research. In Graph C, we show a negative association between a country's individualism score and its female share of equity analysts. We will explore possible explanations for the observed patterns in Section V.

B. Cross-Country Differences in the Gender Performance Gap Under Competition

We next examine whether there is any cross-country difference in the gender performance gap under competition using the following panel data regression specification:

(1)
$$\begin{aligned}\text{FORECAST\_PERFORMANCE}_{c,i,j,t} &= \alpha + \beta_1 \text{FEMALE}_j + \beta_2 \text{FEMALE}_j \\ &\times \text{HIGH\_COUNTRY\_LEVEL\_MARKER}_{c,t} \\ &+ \beta_3 \text{COUNTRY\_CHARACTERISTICS}_{c,t-1} \\ &+ \beta_4 \text{ANALYST\_CHARACTERISTICS}_{j,t-1} \\ &+ \beta_5 \text{BROKERAGE\_CHARACTERISTICS}_{j,t-1} \\ &+ \text{FIRM}_i \times \text{YEAR}_t \text{FE} + e_{c,i,j,t},\end{aligned}$$

where the dependent variables are different analyst forecast performance measures: AVERAGE_FORECAST_ERROR, FIRST FORECAST ERROR, LAST_FORECAST_ERROR, and SAME_WEEK_FORECAST_ERROR. For example, AVERAGE_FORECAST_ERROR is the average of absolute forecast errors

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made by analyst *j* residing in country *c* on firm *i* when making the current year *t* EPS forecasts. FEMALE is an indicator variable that takes the value of 1 if analyst *j* is a female, and 0 otherwise. HIGH_COUNTRY_LEVEL_MARKER is an indicator variable for the country-level institutional (economic) development: GGGI, ln(GDP_PER_CAPITA), or the individualism score, using its respective top quartile as the cutoff. Our control variables largely follow prior literature, such as Clement (1999), Bae et al. (2008), Hong and Kacperczyk (2010), and Bradshaw et al. (2019). Firm times year fixed effects are included to control for time-varying unobservables that might drive an analyst's coverage decisions as well as their performance (Clement (1999), Hong and Kacperczyk (2010), and Hilary and Shen (2013)). The sample consists of firm-analyst-year observations. Table 4 presents the regression results.

TABLE 4

Cross-Country Gender Differences in Performance Under Competition

Table 4 examines cross-country gender differences in performance under competition using OLS regression with firm times year fixed effects. The sample consists of 610,847 firm-analyst-year observations over the period of 2005 to 2020 (the sample size for SAME_WEEK_FORECAST_ERROR is 318,622 because we require those forecasts are made within 5 days after the prior fiscal year's annual earnings announcement). We use four different measures of analyst forecast performance as the dependent variables: AVERAGE_FORECAST_ERROR, FIRST_FORECAST_ERROR, LAST_FORECAST_ERROR, and SAME_WEEK_FORECAST_ERROR. Panel A examines the impact of GGGI on gender differences in performance. Panel B examines the impact of GDP per capita on gender differences in performance. Panel C examines the impact of individualism on gender differences in performance. FEMALE is an indicator variable that takes the value 1 if an analyst is a female, and 0 otherwise. Definitions of the variables are provided in the Appendix. Heteroscedasticity-consistent standard errors (in parentheses) are clustered at the firm times year level. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

	AVERAGE_ FORECAST_ ERROR	FIRST_ FORECAST_ ERROR	LAST_ FORECAST_ ERROR	SAME_WEEK_ FORECAST_ ERROR
	1	2	3	4
Panel A. The Role of GGGI in Gender Differences in Performance				
FEMALE	−0.002	−0.024*	0.022	0.012
	(0.011)	(0.014)	(0.014)	(0.015)
FEMALE × HIGH_GGGI	0.095	0.105	0.109*	0.149
	(0.059)	(0.071)	(0.061)	(0.095)
HIGH_GGGI	0.074***	0.044	0.144***	0.050*
	(0.026)	(0.030)	(0.030)	(0.029)
ln(GDP_PER_CAPITA)	0.011	0.015	0.017	−0.035*
	(0.017)	(0.021)	(0.018)	(0.021)
INDIVIDUALISM	−0.291***	−0.231***	−0.185**	−0.330***
	(0.073)	(0.082)	(0.074)	(0.112)
FOREIGN_ANALYST	0.062***	0.012	0.082***	0.027
	(0.019)	(0.022)	(0.020)	(0.021)
FORECAST_HORIZON	0.156***	0.081***	0.215***	0.011***
	(0.003)	(0.003)	(0.003)	(0.003)
FORECAST_FREQUENCY	−0.001	0.016***	−0.028***	−0.001
	(0.002)	(0.003)	(0.002)	(0.002)
#_FIRMS_FOLLOWED	0.000	0.001	−0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
#_INDUSTRIES_FOLLOWED	−0.003	−0.005**	0.001	−0.000
	(0.002)	(0.002)	(0.002)	(0.002)
FIRM_EXPERIENCE	−0.003**	−0.004**	−0.003*	−0.001
	(0.001)	(0.002)	(0.002)	(0.002)
GENERAL_EXPERIENCE	−0.003***	−0.000	−0.005***	−0.002
	(0.001)	(0.001)	(0.001)	(0.001)
ln(BROKERAGE_SIZE)	−0.007**	−0.002	−0.011***	−0.011***
	(0.003)	(0.004)	(0.003)	(0.004)
Firm × Year fixed effects	Yes	Yes	Yes	Yes
Intercept	Yes	Yes	Yes	Yes
No. of obs.	610,847	610,847	610,847	318,622
Adj. R^2	0.910	0.915	0.782	0.943

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TABLE 4 (continued)

Cross-Country Gender Differences in Performance Under Competition

	AVERAGE_ FORECAST_ ERROR	FIRST_ FORECAST_ ERROR	LAST_ FORECAST_ ERROR	SAME_WEEK_ FORECAST_ ERROR
	1	2	3	4
Panel B. The Role of GDP Per Capita in Gender Differences in Performance				
FEMALE	0.023	−0.001	0.041**	0.075**
	(0.019)	(0.022)	(0.020)	(0.031)
FEMALE × HIGH_GDP_PER_CAPITA	−0.035	−0.027	−0.020	−0.081**
	(0.023)	(0.028)	(0.026)	(0.035)
HIGH_GDP_PER_CAPITA	−0.006	−0.028	−0.029	−0.024
	(0.024)	(0.027)	(0.025)	(0.028)
GGGI	1.246***	1.328***	1.978***	0.974**
	(0.365)	(0.424)	(0.412)	(0.439)
INDIVIDUALISM	−0.350***	−0.269***	−0.273***	−0.371***
	(0.078)	(0.088)	(0.078)	(0.112)
FOREIGN_ANALYST	0.062***	0.012	0.081***	0.019
	(0.019)	(0.022)	(0.019)	(0.022)
FORECAST_HORIZON	0.156***	0.081***	0.216***	0.011***
	(0.003)	(0.003)	(0.003)	(0.003)
FORECAST_FREQUENCY	−0.001	0.016***	−0.028***	−0.001
	(0.002)	(0.003)	(0.002)	(0.002)
#_FIRMS_FOLLOWED	0.000	0.001	−0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
#_INDUSTRIES_FOLLOWED	−0.003	−0.005**	0.001	−0.001
	(0.002)	(0.002)	(0.002)	(0.002)
FIRM_EXPERIENCE	−0.003**	−0.004**	−0.003*	−0.001
	(0.001)	(0.002)	(0.002)	(0.002)
GENERAL_EXPERIENCE	−0.003***	−0.000	−0.005***	−0.002
	(0.001)	(0.001)	(0.001)	(0.001)
ln(BROKERAGE_SIZE)	−0.007**	−0.002	−0.011***	−0.011***
	(0.003)	(0.004)	(0.003)	(0.004)
Firm × Year fixed effects	Yes	Yes	Yes	Yes
Intercept	Yes	Yes	Yes	Yes
No. of obs.	610,847	610,847	610,847	318,622
Adj. R^2	0.910	0.915	0.782	0.943
Panel C. The Role of Individualism in Gender Differences in Performance				
FEMALE	0.042**	0.033	0.050**	0.111***
	(0.020)	(0.024)	(0.023)	(0.036)
FEMALE × HIGH_IDV	−0.062**	−0.082***	−0.031	−0.122***
	(0.026)	(0.031)	(0.029)	(0.041)
HIGH_IDV	−0.091***	−0.074***	−0.082***	−0.075***
	(0.024)	(0.027)	(0.026)	(0.028)
GGGI	0.853**	0.960**	1.607***	0.897*
	(0.353)	(0.409)	(0.397)	(0.459)
ln(GDP_PER_CAPITA)	−0.013	−0.008	−0.011	−0.060***
	(0.017)	(0.021)	(0.018)	(0.022)
FOREIGN_ANALYST	0.059***	0.010	0.080***	0.023
	(0.019)	(0.022)	(0.020)	(0.021)
FORECAST_HORIZON	0.156***	0.081***	0.215***	0.011***
	(0.003)	(0.003)	(0.003)	(0.003)
FORECAST_FREQUENCY	−0.001	0.016***	−0.028***	−0.001
	(0.002)	(0.003)	(0.002)	(0.002)
#_FIRMS_FOLLOWED	0.000	0.001	−0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
#_INDUSTRIES_FOLLOWED	−0.003	−0.005**	0.001	−0.000
	(0.002)	(0.002)	(0.002)	(0.002)
FIRM_EXPERIENCE	−0.003**	−0.004**	−0.003*	−0.001
	(0.001)	(0.002)	(0.002)	(0.002)
GENERAL_EXPERIENCE	−0.003***	−0.001	−0.005***	−0.002
	(0.001)	(0.001)	(0.001)	(0.001)
ln(BROKERAGE_SIZE)	−0.007**	−0.002	−0.011***	−0.011***
	(0.003)	(0.004)	(0.003)	(0.004)

(continued on next page)

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TABLE 4 (continued)
Cross-Country Gender Differences in Performance Under Competition

	AVERAGE_ FORECAST_ ERROR	FIRST_ FORECAST_ ERROR	LAST_ FORECAST_ ERROR	SAME_WEEK_ FORECAST_ ERROR
	1	2	3	4
Firm × Year fixed effects	Yes	Yes	Yes	Yes
Intercept	Yes	Yes	Yes	Yes
Test if FEMALE + FEMALE × HIGH_IDV = 0				
F–value	1.82	7.70	1.20	0.48
p–Value	0.18	0.01	0.27	0.49
No. of obs.	610,847	610,847	610,847	318,622
Adj. R^2	0.910	0.915	0.782	0.943

In Panel A (B) of Table 4, our variables of interest are the indicator variable, FEMALE, and the interaction term: FEMALE × HIGH_GGGI (FEMALE × HIGH_GDP_PER_CAPITA). We show that across all specifications, the coefficient on the interaction term FEMALE × HIGH_GGGI (FEMALE × HIGH_GDP_PER_CAPITA) is not significantly different from 0 (with only one exception), suggesting that neither social policies promoting gender equality nor economic development plays any significant role in the gender performance gap under competition.

In Panel C of Table 4, we first show that the coefficient on the indicator variable, FEMALE, is positive and significant, suggesting that in low IDV countries, there is a positive and significant association between female analysts and forecast errors (in three out of the four specifications). That is, there is a significant underperformance of female analysts compared to their male counterparts, consistent with findings in controlled experiments that under competition females perform worse than their male counterparts (see, e.g., Gneezy et al. (2003)). In terms of economic significance, using column 1 specification as an example, we show that ceteris paribus, female analysts in low IDV countries, on average, produce AVERAGE_FORECAST_ERROR that is 0.042% larger than their male counterparts. Given that the sample average for AVERAGE_FORECAST_ERROR is 2.902%, the performance gap is economically significant.[15]

Next, we show that the coefficient on the interaction term FEMALE × HIGH_IDV is negative and significant (in three out of the four specifications), suggesting that female analysts in high IDV countries (e.g., the United Kingdom) tend to perform better than their male counterparts compared to their peers in low IDV countries (e.g., Japan)—a difference-in-differences (DID) interpretation. In terms of economic significance, using column 1 specification as an example, we show that ceteris paribus, female analysts in high IDV countries on average produce AVERAGE_FORECAST_ERROR relative to their male counterparts that is 0.062% smaller than their female peers in low IDV countries. Given that the sample

[15]The mean (median) value of sample firms' market capitalization is 1.14 billion USD (0.29 billion USD). The mean (median) value of sample firms' P/E ratio is 28.44 (17.92). In terms of economic significance, when using mean values, a difference of 0.042% in forecast error corresponds to a difference of 0.48 million USD in earnings, and a difference of 13.62 million USD in market value; when using median values, a difference of 0.042% in forecast error corresponds to a difference of 0.13 million USD in earnings, and a difference of 2.18 million USD in market value.

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average for AVERAGE_FORECAST_ERROR is 2.902%, the performance gap is economically significant.[16]

To test whether there are cross-country differences in the gender performance gap when sorting countries by their individualism scores, we employ the *F*-test of the null that the sum of the coefficients on FEMALE and FEMALE × HIGH_IDV is 0, that is, there is no gender performance gap under competition in high IDV countries. The *p*-value shows that we fail to reject the null, suggesting that female analysts in high IDV countries perform the same as their male counterparts.

In addition to the main findings above, we show that the coefficient on HIGH_IDV is negative and significant. Given our inclusion of firm times year fixed effects, this coefficient captures the effect of a home country's individualism score on a foreign analyst's forecast performance of domestic stocks (e.g., a British analyst forecasting the performance of German stocks). We show that for these foreign analysts, AVERAGE_FORECAST_ERROR is, on average, smaller if they are from high IDV countries than if they are from low IDV countries.[17] We also show that the coefficient on GGGI is positive and significant. Given our inclusion of firm times year fixed effects, this coefficient captures the effect of a home country's gender equality politics and practices on a foreign analyst's forecast performance of domestic stocks (e.g., a Norwegian analyst forecasting the performance of French stocks.)

Finally, we show that the indicator variable FOREIGN_ANALYST and FORECAST_HORIZON (i.e., the average number of months between an analyst's forecast date and the date of the annual earnings announcement) are both positively and significantly, whereas firm-specific and general experiences and brokerage size (proxying for resources) are negatively and significantly, associated with AVERAGE_FORECAST_ERROR. All these findings are consistent with prior work (see, e.g., Clement (1999), Clement and Tse (2005), and Bae et al. (2008)).

In summary, using a new international sample of equity analysts with information on gender and performance, we have established two empirical patterns: i) There is a negative association between a country's level of institutional/economic development and its female share of equity analysts; and ii) there is no gender performance gap under competition in high individualistic countries.[18] In the rest of the article, we explore a number of possible explanations for the observed patterns.

[16]In terms of economic significance, when using mean values, a difference of 0.062% in forecast error corresponds to a difference of 0.71 million USD in earnings, and a difference of 20.10 million USD in market value; when using median values, a difference of 0.062% in forecast error corresponds to a difference of 0.18 million USD in earnings, and a difference of 3.22 million USD in market value.

[17]The social psychology literature establishes that people in high IDV countries are more overconfident and exert more effort (Markus and Kitayama (1991), Heine, Lehman, Markus, and Kitayama (1999), Chui, Titman, and Wei (2010), Gervais, Heaton, and Odean (2011)) and have analytical thinking styles (Nisbett, Peng, Choi, and Norenzayan (2001)). The negative coefficient on HIGH_IDV in column 1 is consistent with these interpretations. Our analyses in Section VI provide further supporting evidence for some of those interpretations.

[18]We are aware that the association between individualism and the gender performance gap under competition could be affected by omitted variables (such as the cultural value of masculinity) or certain confounding factors (such as economic development). We employ a multipronged approach to address those concerns in Appendix IA2 in the Supplementary Material.

V. Possible Explanations

A. Barriers to Entry

One possible explanation for the observed patterns is that women face higher barriers to entry into the equity research profession, resulting in both a lower female share of equity analysts and no female underperformance relative to male analysts in high individualistic countries compared to those in low individualistic countries. Table 5 presents the results from our investigation.

Panel A of Table 5 presents the correlation matrix of country-level variables. We show that there is a negative and significant association between a country's female share of equity analysts and its GGGI, between a country's female share of equity analysts and its GDP per capita, and between a country's female share of equity analysts and its individualism score, consistent with the patterns observed in Figure 1. Moreover, we show that there are positive and significant associations among GGGI, GDP per capita, and the individualism score, suggesting that high individualistic countries introduce more gender equality policies and enjoy high levels of economic development. In other words, ceteris paribus, we would expect lower barriers to entry for women joining the labor force (including becoming equity analysts) in high individualistic countries compared to low individualistic countries.

TABLE 5

Cross-Country Gender Differences in Performance Under Competition: Barriers to Entry

Table 5 examines whether the cross-country gender difference in performance under competition is due to barriers to entry. Panel A reports the correlation matrix of country-level variables. Panel B reports the regression results where the dependent variable is FEMALE_RATIO, the share of female analysts in a country-year. Definitions of the variables are provided in the Appendix. Heteroscedasticity-consistent standard errors (in parentheses) are clustered at the firm times year level. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. The Correlation Matrix of Country-Level Variables

		1	2	3	4	5	6	7	8
1	FEMALE_RATIO	1.000							
2	GGGI	−0.272***	1.000						
3	HIGH_GGGI	−0.238***	0.719***	1.000					
4	GDP_PER_CAPITA	−0.466***	0.588***	0.438***	1.000				
5	ln(GDP_PER_CAPITA)	−0.415***	0.528***	0.303***	0.887***	1.000			
6	HIGH_GDP_PER_CAPITA	−0.388***	0.458***	0.349***	0.717***	0.521***	1.000		
7	IDV	−0.478***	0.569***	0.377***	0.646***	0.634***	0.495***	1.000	
8	HIGH_IDV	−0.252***	0.234***	0.077**	0.309***	0.345***	0.302***	0.719***	1.000

Panel B. Country-Level Institutional and Economic Development and Female Share of Equity Analysts

	Dependent Variable: FEMALE_RATIO			
	1	2	3	4
GGGI	−0.558***			0.155
	(0.199)			(0.267)
ln(GDP_PER_CAPITA)		−0.044***		−0.021
		(0.013)		(0.013)
INDIVIDUALISM			−0.243***	−0.201***
			(0.047)	(0.069)
Intercept	Yes	Yes	Yes	Yes
No. of obs.	704	704	704	704
Adj. R^2	0.060	0.162	0.223	0.244

Panel B of Table 5 presents the country-year regression results where the dependent variable is a country's female share of equity analysts. In columns 1–3, we first establish that there is a negative and significant association between a country's level of institutional/economic development and its female share of equity analysts. In column 4, when we include all three country-level institutional/economic development measures to explain a country's female share of equity analysts, we show that only the negative and significant association between a country's individualism score and its female share of equity analysts remains. Had the barriers to entry explanation held true, we would have expected a positive and significant association between a country's individualism score and its female share of equity analysts.

We conclude that the evidence thus far is inconsistent with the conjecture that women face higher barriers to entry into the equity research profession in high individualistic countries that also score high in gender equality policies and practices and are also more advanced in economic development.

B. Individualism Encouraging Women's Self-Selection

Employing a sample of equity analysts in the United States, Kumar (2010) finds that female analysts issue more accurate forecasts than their male counterparts. He further shows that stock market participants are aware of the male–female skill differences in favor of female analysts. He concludes that in the United States, only women with superior forecasting abilities self-select to enter the equity research profession due to a perception of discrimination in the analyst labor market.

Inspired by Kumar's (2010) seminal work and findings, we employ an international data set, which allows us to gain new insights into the complex relation between gender, competition, and performance through a national culture lens. National cultural values define what constitutes appropriate decisions and behaviors in a society (North (1990), Guiso et al. (2006)). Specifically, individualistic societies emphasize independence and equality (Hofstede ((2011), p. 11), Griffin et al. (2018)), whereas collectivistic societies emphasize in-groups' interests and harmony (Trompenaars (1993), Hofstede (2001), (2011)). Ceteris paribus, the national cultural value of individualism encourages women to make career choices more freely based on their preferences compared to women in collectivistic societies. Given that evidence has shown many women are averse to competition and that equity research is a competitive profession, women in high individualistic countries may choose to become equity analysts only if they are good at the job, whereas in low individualistic countries, more women (than women in high individualistic countries) may not have such choice. This alternative explanation, which embeds the role of national culture into the relation between gender, competition, and performance, has two testable implications: i) There is a negative association between a country's individualism score and its female share of equity analysts (because evidence has shown many women are averse to competition and that the national cultural value of individualism encourages women to make career choices consistent with their preferences); and ii) there is no gender difference in performance under competition in high individualistic countries (because only capable

females may self-select into and/or choose to stay in a competitive profession in those countries).

VI. Supplemental Evidence on Individualism Encouraging Women's Self-Selection

In this section, we provide supplemental evidence in support of the second implication above that only capable women may self-select into and/or choose to stay in the equity research profession.

A. Analyst Skills

We employ three proxies for analyst skills: the prestige of the brokerage house with which an analyst upon entry is affiliated, the economic significance of an analyst's stock portfolio upon entry (first-time analysts are identified by their first appearance in the IBES database), and the market's perception of analyst skills.[19] It is worth emphasizing that we focus on the brokerage and stock portfolio characteristics of analysts at the start of their professional careers to help separate out the innate skills of analysts (which helps support our interpretation for the observed patterns in Figure 1 and Panel C of Table 4) from the experience and strong performance accrued from working as analysts.

We employ a univariate DID comparison by first sorting our first-time analysts into high and low IDV country subsamples, then comparing gender differences in brokerage/stock portfolio characteristics within each subsample, and lastly comparing the gender difference in the same characteristic between the two IDV subsamples. Brokerage reputation is based on an annual global ranking using a broker's number of analysts employed.[20] Top stocks are based on a country-year ranking using either total assets or market capitalization. Essentially, we want to explore whether brokerage/stock portfolio characteristics are consistent with our proposed national culture-based explanation, which is that female analysts in high IDV countries are more skilled than their male counterparts compared to their peers in low IDV countries; in high IDV countries, as noted above, only capable women may self-select to enter a competitive profession.

Panel A of Table 6 presents the results. We first show that in high IDV countries, 42% of new female analysts work for the top 10 brokerage houses compared to 28% of new male analysts. In low IDV countries, 21% of new female analysts work for the top 10 brokerage houses compared to 14% of new male analysts. The DID *t*-test in column 13 shows that the gender gap in women's favor for working at the most prestigious brokerage houses in high IDV countries is

[19]IBES has been anonymizing the names of contributing brokers and their analysts since 2006, which makes it almost impossible to study inter-brokerage moves, such as an analyst moving to a more prestigious brokerage as a marker for superior analyst skills (Hong and Kubik (2003)). We therefore resort to alternative measures in this article to proxy for analyst skills.

[20]We rank brokers globally each year instead of within a sample country due to two reasons. First, these brokers (especially the large ones) do compete globally (for talent). Second, in some low IDV countries, there are only a couple of domestic brokers operating during our sample period, and thus not capturing what we intend to measure—an analyst's innate skill.

TABLE 6

Cross-Country Gender Differences in Analyst Skills

Table 6 presents the univariate DID analysis to help explain female analysts' performance. In Panel A, we compare gender differences in analysts' brokerage affiliations and stock portfolios in the high versus low IDV countries for first-time analysts. First-time analysts are identified by their first appearance in the IBES database. We sort analyst-year observations (in their first year) into the high IDV (top quartile) and low IDV (the remainder) country subsamples. Within each subsample, we compare the female and male differences in their brokerage affiliations and the characteristics of the stocks that they first cover. We further conduct DID analysis of the female and male differences between the high IDV and low IDV subsamples. Columns 5 and 6 report the female and male differences in the high IDV subsample. Columns 11 and 12 report the female and male differences in the low IDV subsample. We conduct both the *t*-test and Wilcoxon test for the gender differences. We report the DID analysis comparing columns 5 and 11 in column 13. Panel B examines cross-country gender differences in analysts' other output under competition using OLS regression with firm times year fixed effects. The sample consists of 610,847 firm-analyst-year observations over the period of 2005 to 2020. We use two analyst output measures as the dependent variables: #_ALTERNATIVE_FORECASTS and TIMELY_FORECAST. FEMALE is an indicator variable that takes the value of 1 if an analyst is a female, and 0 otherwise. Panel C examines the market perception of analyst skills using OLS regression with firm times year fixed effects. The sample consists of 1,587,729 firm-analyst-revision-year observations over the period of 2005 to 2020. We use two market price reaction measures as the dependent variables: 3-day cumulative stock return and 3-day cumulative market-adjusted abnormal stock return (CAR), centered on an analyst's annual EPS forecast revision date. Both returns are expressed in percentage points. Definitions of the variables are provided in the Appendix. Heteroscedasticity-consistent standard errors (in parentheses) are clustered at the firm times year level. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

	HIGH_IDV						LOW_IDV						
	Female		Male		Difference between Female and Male Analysts in		Female		Male		Difference between Female and Male Analysts in		DID Test
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13
Panel A. Difference-in-Differences Analysis of an Analyst's Brokerage Affiliation and Stock Portfolio When First Becoming an Analyst													
TOP10_BROKERAGE	0.419	0.000	0.280	0.000	0.139***	0.000***	0.210	0.000	0.144	0.000	0.066***	0.000***	0.073***
TOP20_BROKERAGE	0.492	0.000	0.376	0.000	0.116***	0.000***	0.278	0.000	0.215	0.000	0.063***	0.000***	0.054**
%TOP10_STOCK_ASSETS	0.189	0.000	0.198	0.000	−0.009	0.000	0.215	0.000	0.230	0.000	−0.015	0.000	0.006
%TOP20_STOCK_ASSETS	0.415	0.200	0.380	0.182	0.034**	0.018	0.402	0.226	0.411	0.231	−0.009	−0.004	0.043*
%TOP10_STOCK_MKT_CAP	0.240	0.000	0.225	0.000	0.015	0.000	0.253	0.000	0.260	0.000	−0.008	0.000	0.022
%TOP20_STOCK_MKT_CAP	0.479	0.333	0.426	0.286	0.053***	0.048**	0.462	0.333	0.460	0.333	0.002	0.000	0.051**

	#_ALTERNATIVE_FORECASTS	TIMELY_FORECAST
	1	2
Panel B. Cross-Country Gender Differences in Analysts' Other Output Under Competition		
FEMALE	−0.000	−0.066***
	(0.003)	(0.010)
FEMALE × HIGH_IDV	0.014***	0.046***
	(0.004)	(0.013)
HIGH_IDV	−0.238***	0.025**
	(0.003)	(0.010)
GGGI	−0.071	−0.237
	(0.049)	(0.154)

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TABLE 6 (continued)

Cross-Country Gender Differences in Analyst Skills

Panel B. Cross-Country Gender Differences in Analysts' Other Output Under Competition (continued)

	#_ALTERNATIVE_FORECASTS	TIMELY_FORECAST
	1	2
ln(GDP_PER_CAPITA)	0.052***	0.102***
	(0.003)	(0.008)
FOREIGN_ANALYST	−0.075***	−0.244***
	(0.003)	(0.008)
FORECAST_HORIZON	−0.033***	0.360***
	(0.000)	(0.001)
FORECAST_FREQUENCY	0.010***	0.119***
	(0.000)	(0.001)
#_FIRMS_FOLLOWED	−0.002***	0.002***
	(0.000)	(0.000)
#_INDUSTRIES_FOLLOWED	−0.009***	−0.012***
	(0.000)	(0.001)
FIRM_EXPERIENCE	−0.000	−0.001
	(0.000)	(0.001)
GENERAL_EXPERIENCE	0.006***	0.009***
	(0.000)	(0.001)
ln(BROKERAGE_SIZE)	0.088***	0.077***
	(0.001)	(0.002)
Firm × Year fixed effects	Yes	Yes
Intercept	Yes	Yes
Test if FEMALE + FEMALE × HIGH_IDV = 0		
F–value	24.55	5.05
p–Value	0.00	0.02
No. of obs.	610,847	610,847
Adj. R^2	0.374	0.419

Panel C. Market Perception of Analyst Skills

	THREE_DAY_CUMULATIVE_RETURN	THREE_DAY_CAR
	1	2
FEMALE × HIGH_IDV × FORECAST_REVISION	4.520*	3.721*
	(2.314)	(2.178)
FEMALE × HIGH_IDV	0.018	0.008
	(0.031)	(0.028)

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TABLE 6 (continued)

Cross-Country Gender Differences in Analyst Skills

Panel C. Market Perception of Analyst Skills (continued)

	THREE_DAY_CUMULATIVE_RETURN	THREE_DAY_CAR
	1	2
FEMALE × FORECAST_REVISION	−2.673**	−2.654**
	(1.217)	(1.144)
HIGH_IDV × FORECAST_REVISION	26.662***	26.998***
	(1.024)	(0.973)
FEMALE	−0.022	−0.014
	(0.026)	(0.023)
FORECAST_REVISION	20.058***	19.705***
	(0.595)	(0.555)
HIGH_IDV	0.071***	0.091***
	(0.023)	(0.020)
GGGI	0.693*	0.622*
	(0.379)	(0.331)
ln(GDP_PER_CAPITA)	−0.023	−0.029
	(0.023)	(0.020)
FOREIGN_ANALYST	−0.025	0.001
	(0.018)	(0.016)
FORECAST_HORIZON	0.000***	0.001***
	(0.000)	(0.000)
FORECAST_FREQUENCY	−0.004**	−0.005***
	(0.002)	(0.002)
#_FIRMS_FOLLOWED	−0.001	−0.001
	(0.001)	(0.001)
#_INDUSTRIES_FOLLOWED	−0.002	0.001
	(0.003)	(0.003)
FIRM_EXPERIENCE	0.001	0.000
	(0.002)	(0.002)
GENERAL_EXPERIENCE	−0.001	−0.001
	(0.001)	(0.001)
ln(BROKERAGE_SIZE)	−0.004	−0.006*
	(0.004)	(0.003)
Firm × Year fixed effects	Yes	Yes
Intercept	Yes	Yes
No. of obs.	1,587,729	1,587,729
Adj. R^2	0.132	0.142

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significantly larger than that in low IDV countries, suggesting that female analysts are more skilled (based on the prestige of brokerages) in high IDV countries compared to their peers in low IDV countries. Using an alternative measure of prestigious brokerages (i.e., the top 20 brokerages) does not change our main finding.

Panel A of Table 6 further shows, through our use of top stocks based on total assets in the top quintile to capture economically important stocks in an analyst's stock portfolio, that in high IDV countries, 42% of the stock portfolios of new female analysts are important stocks compared to 38% of the stock portfolios of new male analysts. In low IDV countries, 40% of the stock portfolios of new female analysts are important stocks compared to 41% of the stock portfolios of new male analysts. The DID test in column 13 shows that the gender gap in women's favor for covering more important stocks in high IDV countries is significantly larger than that in low IDV countries, suggesting that female analysts are more skilled (using the importance of stock portfolios) in high IDV countries compared to their peers in low IDV countries.[21]

Taken together, the results in Panel A of Table 6 provide support for our national culture-based explanation, that in individualistic countries, only women who are capable may choose to become equity analysts, resulting in no gender difference in performance.

B. Analyst Effort

Gervais et al. (2011) show that people who believe in themselves exert more effort than those without such beliefs. We employ two direct measures of effort: #_ALTERNATIVE_FORECASTS, defined as the number of other types of forecasts (excluding EPS), such as book value per share and dividend per share made by an analyst; and TIMELY_FORECAST, defined as the number of days between an analyst's forecast and last earnings announcement date times minus 1. Thus, the higher the value, the more timely a forecast is. We employ the same regression specification as equation (1)). Panel B of Table 6 presents the results.

We first show that in low IDV countries, there is a negative and significant association between the indicator variable FEMALE and TIMELY_FORECAST. Importantly, the coefficient on the interaction term FEMALE × HIGH_IDV is positive and significant in both columns, and the *F*-test rejects the null that the sum of the coefficients on FEMALE and FEMALE × HIGH_IDV is 0, that is, female analysts in high IDV countries exert the same effort as their male counterparts.

Taken together, the evidence is consistent with our conjecture that in high individualistic countries, female analysts exert significantly more effort than male analysts compared to their peers in low individualistic countries.

[21]Using top stocks based on total assets in the top decile to capture the economic significance of analysts' stock portfolios gives weaker but consistent results. Relatedly, using top stocks based on market capitalization gives similar findings.

C. The Market's Perception of Analyst Skills

To investigate the market's perception of analyst skills, we estimate a panel data regression similar to equation (1)) where the dependent variables are 3-day cumulative stock return and 3-day cumulative market-adjusted abnormal stock return, centered on an analyst' annual EPS forecast revision date. The independent variables include a triple interaction term FEMALE × HIGH_IDV × FORECAST_REVISION; three two-way interaction terms FEMALE × HIGH_IDV, FEMALE × FORECAST_REVISION, and HIGH_IDV × FORECAST_REVISION; and other controls similar to those in equation (1)). FORECAST_REVISION is the difference between an analyst's new annual EPS forecast and her last forecast normalized by the stock price at the prior fiscal year end. To calculate FORECAST_REVISION, we require that an analyst issue at least two annual EPS forecasts for the same firm and year. Firm and market returns are obtained from Refinitiv Datastream in local currency. The variable of interest is the coefficient on the triple interaction term. Panel C of Table 6 presents the results.

We find that the coefficient on the triple interaction term FEMALE × HIGH_IDV × FORECAST_REVISION is positive and significant in both specifications, suggesting that in high individualistic countries, the market reacts more strongly to forecast revisions made by female analysts than to those made by male analysts, compared to the market reaction to those made by their peers in low individualistic countries. In other words, the market perceives female analysts relative to male analysts in high individualistic countries to be more skilled compared to their peers in low individualistic countries.[22]

In summary, the results in Table 6 provide support for our national culture-based explanation that in individualistic countries, only women who are capable and willing to work hard may choose to become equity analysts, eliminating the gender performance gap under competition.

D. Analyst Turnover

In this section, we provide suggestive evidence on only capable females may self-selecting to stay in a competitive profession in high individualistic countries by examining the gender difference in analyst turnover rates conditional on bad performance between the high and low IDV country subsamples. The indicator variable, TURNOVER, for analyst j in year t takes the value of 1 if this is the year in which analyst j makes their last forecasts (i.e., there are no further forecasts after year t according to IBES).[23] The indicator variable, BAD_PERFORMANCE, takes

[22]It is worth noting that our main findings remain when using the global sample excluding analysts based in the United States only or excluding analysts based in both the United States and the United Kingdom.

[23]Our analysis assumes that if an analyst no longer produces forecasts, he or she has left the position. It is possible some of those analysts might have been promoted instead of fired. It is worth noting that our analysis focuses on the difference in turnover rates between genders conditional on an analyst's relatively poor performance among peers. As a result, our performance-based analysis is less subject to the concern that we do not know for certain if a given analyst has left the profession (relating to their poor performance). Due to data limitations, our analysis above does not differentiate between voluntary

TABLE 7

Cross-Country Gender Differences in Analyst Turnover

Table 7 presents DID analysis to help explain female analysts' performance. We compare the female and male differences in analyst turnover-to-performance sensitivity in the high (low) IDV country subsample. The indicator variable, TURNOVER, takes the value of 1 for the year when it is the last year that an analyst makes their last forecasts. The indicator variable, BAD_PERFORMANCE, takes the value of 1 if an analyst's average relative performance in years t and $t-1$ is in the bottom quartile, and 0 otherwise. For the sample of analysts (sorted by gender and their country's individualism score), we compute the turnover rate in year $t+1$ based on the information that she is no longer working as an analyst. We report the gender difference in turnover rates in column 5 for the high IDV subsample and that in column 10 for the low IDV subsample, and the DID test in column 11. Definitions of the variables are provided in the Appendix. Heteroscedasticity-consistent standard errors (in parentheses) are clustered at the analyst and year levels. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

	HIGH_IDV					LOW_IDV					
	Female		Male		Difference between Female and Male Analysts in	Female		Male		Difference between Female and Male Analysts in	DID Test
	1	2	3	4	5	6	7	8	9	10	11
	No. of Obs.	Mean	No. of Obs.	Mean	Mean	No. of Obs.	Mean	No. of Obs.	Mean	Mean	Mean
BAD_PERFORMANCE	1,077	0.101	10,299	0.071	0.030**	1,375	0.122	6,899	0.120	0.002	0.028**

the value of 1 if the average of an analyst's adjusted forecast accuracy in year t and $t-1$ is in the bottom quartile, and 0 otherwise.[24] Then, for the sample of analysts (sorted by gender and the individualism score of each analyst's country), we compute the turnover rate in year $t+1$ based on the information that a female analyst has left the profession. Table 7 presents the results.

We show that female analysts experience a significantly higher turnover rate when underperforming (as measured by their past 2-year performance being in the bottom quartile) relative to male analysts in high IDV countries (column 5): 10% of the underperforming female analysts are gone compared to 7% of the underperforming male analysts in high IDV countries. In contrast, female analysts experience a similar turnover rate when underperforming relative to male analysts in low IDV countries (column 10): 12% of the underperforming female analysts are gone compared to the same 12% of the underperforming male analysts in low IDV countries. The DID test in column 11 suggests that there is a significant gender gap in turnover rates conditional on bad performance between high and low IDV countries. Taken together, Table 7 provides evidence suggesting that less capable

turnover and forced turnover (i.e., firings). It is worth noting that even if some turnovers are forced, as long as they do not vary systematically in high and low IDV countries, the analysis in this section is still consistent with our national culture-based explanation: in individualistic countries, women are more likely to leave equity research if they experience bad performance and recognize their limitations as equity researchers, compared to women in collectivistic countries, thereby narrowing the gender performance gap in individualistic countries.

[24]Our choice of a 2-year performance window in the turnover analysis is based on the following considerations. First, Kumar (2010) finds that in his U.S. sample, the average brokerage tenure (i.e., the average number of years an analyst works at a brokerage firm) of female analysts is about 5 years, whereas the average brokerage tenure for male analysts is about 4 years. As a result, using a longer performance window will reduce the sample substantially for this analysis. Second, we do not use a 1-year window because it might be too short and subject to measurement errors.

females may self-select to drop out of a competitive profession in high individualistic countries.

We conclude that the evidence in Table 7 is consistent with our national culture-based explanation, that only capable women may self-select to stay in a competitive profession in high individualistic countries, eliminating the gender performance gap in those countries.

VII. Additional Investigation

We conduct a large number of robustness checks of our main findings.

A. Removing Analysts Based in the United States and the United Kingdom

Prior studies on gender differences in analyst performance are mainly based on U.S. data (Green et al. (2009), Kumar (2010), and Peng, Teoh, Wang, and Yan (2022)). In a recent study, Drake, Moon, Twedt, and Warren (2023) document a continuous decline in the number of sell-side equity analysts in the United States and a rise in the so-called social media analysts since the early 2000s due to changes in regulation such as Regulation Fair Disclosure, the Global Analyst Research Settlements, and the growth in passive investing. As a result, brokerages face heightened pressure to hire and retain the best talent. Consistent with this observation, we find no gender difference in analyst performance in the United States over the more recent period of 2005 to 2020.

To address the concern that our main findings are not specific to analysts based in the United States and the United Kingdom, which are the two countries with the highest individualism scores as well as the largest numbers of analysts in our international sample, we repeat our analysis in Panel C of Table 4, removing analysts based in these two countries. Table IA4 in the Supplementary Material presents the results.[25] We show that in two out of the four specifications, the *F*-test of the null that the sum of the coefficients on FEMALE and FEMALE × HIGH_IDV is 0 fails to reject the null, suggesting that female analysts in high IDV countries (outside the United States and the United Kingdom) perform the same as (or better than) their male counterparts.

B. Controlling Other National Cultural Values

Under the national cultural framework of Hofstede (1980), (2001), there are three other national cultural values in addition to individualism: masculinity (MAS), power distance (PDI), and uncertainty avoidance (UAI). Conceptually, as discussed in Section V.B, we expect that the value of individualism, as opposed to the other three values, encourages women to make career choices consistent with

[25]In untabulated analyses, we repeat the regressions of Panel C of Table 4, removing countries with five or fewer female analysts: Argentina, Denmark, Hungary, Israel, and New Zealand, resulting in a drop in sample size by 3,698 observations (representing 0.6% of the sample). To ensure our premise holds that equity analysts are in a competitive profession with high pay, we also repeat the regressions of Panel C of Table 4, removing the top five countries with the highest personal income tax rates: Austria, Belgium, Denmark, Israel, and the Netherlands, resulting in a drop in sample size by 10,123 observations (representing 1.7% of the sample). In both cases, our main findings remain.

their preferences (i.e., many women are averse to competition). As a result, only capable women may self-select into the equity research profession, eliminating the gender performance gap under competition in high individualistic countries. Arguably, these other national cultural values could nonetheless drive our main findings, since these values are positively correlated.

Table IA5 in the Supplementary Material presents the results when we repeat our analysis in Panel C of Table 4 by sequentially adding one out of each of the three other national cultural values of Hofstede (1980), (2001). In all cases, we do not see that the gender performance gap varies with any of these three other national cultural value variables in any meaningful way, suggesting that these values do not explain our main findings.

C. Controlling Country-Level Transparency

Bae, Tan, and Welker (2008) and Bradshaw et al. (2019) show that a country-level regulatory and institutional environment influences analysts' behaviors. To ensure our main findings are robust to controlling for the level of transparency in the country in which an analyst operates, we add a transparency measure following Bradshaw et al. (2019) in the specification of Panel C of Table 4. Table IA6 in the Supplementary Material presents the regression results. We show that our main findings remain.

D. Using a Different Cutoff to Define High IDV

Table IA7 in the Supplementary Material presents the regression results using the 30% cutoff to define the indicator variable HIGH_IDV. There are 12 countries with the indicator variable HIGH_IDV taking the value of 1: Australia, Belgium, Canada, Denmark, France, Hungary, Italy, the Netherlands, New Zealand, Sweden, the United Kingdom, and the United States. We show that our main findings remain.

E. Employing an Updated Version of Hofstede's Individualism Score

Hofstede's (1980), (2001) individualism score was constructed from answers to a survey of 117,000 IBM employees across the company's subsidiaries in 70 countries between 1967 and 1973 (see the Appendix for the list of survey questions). Although Hofstede's score is based on survey data from the late 1960s and early 1970s, Beugelsdijk, Maseland, and Van Hoorn (2015) find that cultural change is absolute rather than relative, that is, countries' scores on the Hofstede dimensions relative to the scores of other countries have changed little over time, which is important to our empirical analysis.

As a robustness check, following Griffin, Guedhami, Li, and Lu (2021), we employ an updated version of the individualism score derived from survey data from the World Values Survey (WVS) and its equivalent, the European Values Study (EVS), over the period of 1981 to 2002 (see the Appendix for detailed description). HIGH_IDV_WVS is an indicator variable that takes the value of 1 if a country is in the top quartile of updated individualism scores, and 0 otherwise. Table IA8 in the Supplementary Material replicates the analysis in Panel C of Table 4 using the updated individualism score.

We show that in low IDV countries, across all four forecast performance measures, female analysts significantly underperform their male counterparts. However, in high IDV countries, there is no significant difference in performance between genders.

F. Using Standard Errors Clustered at Different Levels

Our main regression specifications in Panel C of Table 4 employ standard errors clustered at the firm times year level to account for cross-firm and time-series dependence in the residuals of a given analyst's forecast errors (Petersen (2009)). One could argue that the residuals of analyst forecast errors may also be correlated across observations within a country-year, across observations within a brokerage-year, across observations by an individual analyst, or across observations by a firm. As robustness checks, we employ standard errors clustered at the analyst country times year, brokerage times year, analyst, or firm level to account for possible cross-sectional or temporal correlation at those levels. Table IA9 in the Supplementary Material presents the results. We show that our main findings remain.

G. Using Forecast-Level Observations and Including High-Dimensional Fixed Effects

As a robustness check, we include high-dimensional fixed effects using firm-forecast-analyst-year observations. We include firm times year times month fixed effects because of known gender differences that might result in female analysts' forecasts being later than those made by their male counterparts. Using more granular fixed effects allows us to compare forecasts made by the different genders within a short window (in this case monthly) to help control for forecast timing differences. Panel A of Table IA10 in the Supplementary Material presents the results. We show that our main findings remain unchanged when including different fixed effects and using more granular performance measures at the forecast level.

As a further robustness check, we add brokerage times year fixed effects to the specification in equation (1)) using firm-analyst-year observations to control for time-varying brokerage characteristics, including labor market pressure faced by analysts working for different brokers over time (Bradley, Gokkaya, and Liu (2017)). Panel B of Table IA10 in the Supplementary Material presents the results. We show that our main findings remain.

H. Removing Potentially Misclassified Analysts

Thus far in our analysis, we have determined an analyst's country of origin by the location of their office. It is possible that using an analyst's office location might potentially misclassify their country of origin; for example, an analyst from the United States (based on their name, a high IDV country) might be working in Japan (based on their place of work, a low IDV country), which would create noise in our analysis.

As a final robustness check, we turn to a proprietary database from OriginsInfo Ltd. incorporating sources such as the American Dictionary of Family Names and international telephone directories; this database allows us to identify the most likely ethnic origins of analysts in our sample. OriginsInfo's classification assigns

an ethnicity to each name based on the family name; when family names are inadequate for accurate identification (e.g., for family names such as Lee), the database uses a combination of an individual's family name and given name to identify ethnicity (Hegde and Tumlinson (2014)).

Our full sample consists of 18,269 equity analysts from 42 countries. We are able to determine ethnicity using names for 16,318 analysts. Among those, we keep 11,444 equity analysts from 42 countries for whom the individualism ranking of an analyst's country of origin as determined by their name is the same as that of their place of work.

Panel C of Table IA10 in the Supplementary Material presents the regression results. Consistent with our intuition, we show that our main findings become stronger when we employ a subsample of analysts with cross-validated information on their respective countries of origin.

We conclude that the national cultural value of individualism encourages women to make career choices more freely based on their preferences compared to women in collectivistic societies; only capable females may self-select into a competitive profession, resulting in no gender performance gap under competition in high individualistic countries.

VIII. Conclusions

This article, to the best of our knowledge, is the first in the literature to study whether and how gender differences in performance under competition vary across countries. Our measures of country-level differences capture cross-country differences in institutional/economic development: the GGGI, GDP per capita, and the individualism dimension in Hofstede's (1980), (2001) national cultural framework.

Using a hand-collected sample of 18,269 equity analysts from 42 countries over the period of 2004 to 2019, we first establish an intriguing negative association between a country's level of institutional/economic development and its female share of equity analysts. Using a panel data set of analyst forecast errors and firm times year fixed effects to account for time-varying unobservables that could potentially drive analysts' coverage decisions and performance, we next show that, in individualistic countries only, there is no gender gap in analyst forecast accuracy. We further show that female analysts are more skilled and more likely to drop out when underperforming in individualistic countries compared to peers in collectivistic countries. The evidence supports our hypothesis that the national cultural value of individualism encourages women to make career choices consistent with their general aversion to competition. As a result, only capable women may self-select to enter and/or stay in the equity research profession in high individualistic countries, resulting in no gender performance gap in those countries. Our findings will guide government policies and business practices promoting female representation in highly competitive professions.

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Appendix. Variable Definitions

All continuous variables are winsorized at the 1st and 99th percentiles. All values are reported in 2010 constant U.S. dollars (USD).

Variables	Definition	Source
Country–Level Variables		
INDIVIDUALISM	The index is a weighted sum of the following four statements: 1) Have sufficient time for your personal or family life 2) Have good physical working conditions (good ventilation and lighting, adequate work space, etc.) 3) Have security of employment 4) Have an element of variety and adventure in the job High individualism is indicated by ratings of "of very little or no importance" to items (2) and (3), and of "of utmost importance" to items (1) and (4). In individualistic cultures, the ties between individuals are loose: Everyone is expected to look after him/herself and his/her immediate family. In collectivistic cultures, people from birth onward are integrated into strong, cohesive in–groups, often extended families that continue protecting them in exchange for unquestioning loyalty, and oppose other in–groups (Hofstede (1980), (2001), (2011)). In a general review of his cultural dimensions, Hofstede (2011) provides 10 contrasts between individualism (IDV) and collectivism. Here are the first five contrasts, which are the most relevant to organizational/individual behaviors: *Individualism* / *Collectivism* "I" – consciousness / "We" – consciousness Right of privacy / Stress on belonging Speaking one's mind is healthy / Harmony should always be maintained Others classified as individuals / Others classified as in–group or out–group Personal opinion expected: one person, one vote / Opinions and votes predetermined by in–group	Hofstede Culture Dimension website
HIGH_IDV	Indicator equals 1 if a country is in the top quartile of individualism among sample countries, and 0 otherwise.	Hofstede Culture Dimension website
HIGH_IDV_WVS	Indicator equals 1 if a country is in the top quartile of updated individualism scores, and 0 otherwise. Prior work including Schwartz (1994), Triandis (1995), Beugelsdijk et al. (2015), and Griffin et al. (2021) associates the following questions in the WVS and EVS with individualism. Based on questions in the WVS, an individual is considered to be individualistic if he/she strongly agrees with: i) one of my main goals in life is to make my parents proud: 1. strongly agree… 4. strongly disagree; ii) private versus government ownership of business: 1. private ownership should be increased… 10. government ownership should be increased; 3) justifiability; homosexuality: 1. never justifiable… 10. always justifiable; and 4) justifiability; abortion: 1. never justifiable… 10. always justifiable. When coding these four items, the response to item 2 corresponding to a high individualism score is the lowest order option (i.e., option 1), whereas for all other three items, the responses are the highest order options (i.e., either option 4 or option 10). To obtain an updated version of the individualism score, we take the following steps. First, for each	World Values Survey (WVS); European Values Survey (EVS)

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(continued)

Variables	Definition	Source
	WVS variable listed above, we compute a country–mean of that variable over the period of 1981 to 2002. Second, we regress Hofstede's individualism score on the country means of the four survey responses to obtain the coefficients on those four countries means. Third, we multiply the estimated coefficients with the corresponding country–means of the same four survey questions over the period of 2003 to 2015 to obtain an updated score for individualism.	
HIGH_IDV_ALT	Indicator equals 1 if a country is in the top 30th percentile of individualism among sample countries, and 0 otherwise.	Hofstede Culture Dimension website
GLOBAL_GENDER_GAP_INDEX	The GGGI was first introduced by the World Economic Forum (WEF) in 2006 to benchmark progress toward gender parity and compare countries' gender gaps across four dimensions: economic opportunities, education, health, and political leadership (WEF (2020)). We fill the missing values before 2006 with applicable values in 2006.	World Economic Forum
HIGH_GGGI	Indicator equals 1 if a country is in the top quartile of global gender gap index among sample counties in a year, and 0 otherwise.	World Economic Forum
GDP_PER_CAPITA	GDP per capita (in thousands of dollars).	World Bank
ln(GDP_PER_CAPITA)	Natural logarithm of GDP per capita (in thousands of dollars).	World Bank
HIGH_GDP_PER_CAPITA	Indicator equals 1 if a country is in the top quartile of GDP per capita among sample counties in a year, and 0 otherwise.	World Bank
TRANSPARENCY	The first principal component of four country–level investor protection and legal enforcement variables: i) the aggregate annual index of legal system and property rights from the Economic Freedom Data Set by Fraser Institute; ii) the assessment of corruption in government by the country–risk rating agency International Country Risk (ICR); iii) the assessment of efficiency and integrity of the legal environment as it affects business, particularly foreign firms produced by the country–risk rating agency Business International Corporation; and iv) the rule of law indicator from the Worldwide Governance Indicators (WGI).	Bradshaw, Huang, and Tan (2019)
FEMALE_RATIO	Number of unique female analysts divided by the total number of unique analysts in a country–year. We determine whether an IBES analyst is a female or not based on hand–collected biographic information from Capital IQ, Bloomberg, and online search. Please see Appendix IA1 in the Supplementary Material for details.	IBES; Capital IQ; Bloomberg
Analyst–Level Variables		
AVERAGE_FORECAST_ERROR	Average of absolute forecast errors that an analyst makes during a year. Absolute forecast error is the absolute value of the difference between an analyst's annual EPS forecast and actual EPS normalized by the stock price at the prior fiscal year end, expressed as a percentage of the prior year's stock price following Hong and Kacperczyk (2010).	IBES
FIRST_FORECAST_ERROR	Absolute value of the forecast error made in an analyst's first forecast during a year.	IBES
LAST_FORECAST_ERROR	Absolute value of the forecast error made in an analyst's last forecast during a year.	IBES
SAME_WEEK_FORECAST_ERROR	Absolute value of the forecast error made in an analyst's forecast that is within 5 days after the prior fiscal year's annual earnings announcement.	IBES
BAD_PERFORMANCE	Indicator equals 1 if the average of an analyst's adjusted forecast accuracy in year t and $t-1$ is in the bottom quartile, and 0 otherwise. Adjusted forecast accuracy is the difference between an analyst's average forecast error and the mean of the same variable across analysts following the same firm in the same year.	IBES

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(continued)

Variables	Definition	Source
TOP10_BROKERAGE	Indicator equals 1 if a brokerage's size is in the global top decile in a year, and 0 otherwise.	IBES
TOP20_BROKERAGE	Indicator equals 1 if a brokerage's size is in the global top quintile in a year, and 0 otherwise.	IBES
%TOP10_STOCK_ASSETS	The share of prestigious stocks in an analyst' stock portfolio in a year. Prestigious stocks are those stocks in the top decile by total assets across firms covered by both Worldscope and IBES in a country–year.	IBES; Worldscope
%TOP20_STOCK_ASSETS	The share of prestigious stocks in an analyst's stock portfolio in a year. Prestigious stocks are those stocks in the top quintile by total assets across firms covered by both Worldscope and IBES in a country–year.	IBES; Worldscope
%TOP10_STOCK_MKT_CAP	The share of prestigious stocks in an analyst's stock portfolio in a year. Prestigious stocks are those stocks in the top decile by market capitalization across firms covered by both Worldscope and IBES in a country–year.	IBES; Worldscope
%TOP20_STOCK_MKT_CAP	The share of prestigious stocks in an analyst's stock portfolio in a year. Prestigious stocks are those stocks in the top quintile by market capitalization across firms covered by both Worldscope and IBES in a country–year.	IBES; Worldscope
#_ALTERNATIVE_FORECASTS	The natural logarithm of 1 plus the number of other types of forecasts, excluding EPS, such as book value per share (BPS), dividend per share (DPS), and capital expenditures (CAPX) issued by an analyst during the year.	IBES
TIMELY_FORECAST	The natural logarithm of 1 plus the number of days between analyst forecast date and last earnings announcement date. We put a negative sign to the variable so that the higher the value, the more timely a forecast is.	IBES
THREE_DAY_CUMULATIVE_RETURN	Three–day cumulative stock return, centered on an analyst's annual EPS forecast revision date, expressed in percentage points.	Refinitiv Datastream; IBES
THREE_DAY_CAR	Three–day cumulative market–adjusted abnormal stock return, centered on an analyst's annual EPS forecast revision date, expressed in percentage points.	Refinitiv Datastream; IBES
FORECAST_REVISION	The difference between an analyst's new annual EPS forecast and her last annual EPS forecast normalized by the stock price at the prior fiscal year end.	IBES
FEMALE	Indicator equals 1 if an analyst is a female, and 0 otherwise.	IBES; Capital IQ; Bloomberg
FOREIGN_ANALYST	Indicator equals 1 if an analyst's affiliated brokerage is in a country different from the country of primary listing of the firm she follows, and 0 otherwise.	Capital IQ; Worldscope
FORECAST_HORIZON	Average number of months between the forecast date of an analyst during a year to the date of the annual earnings announcement.	IBES
FORECAST_FREQUENCY	Number of annual EPS forecasts made by an analyst during a year.	IBES
#_FIRMS_FOLLOWED	Number of firms for which an analyst makes at least one forecast during a year.	IBES
#_INDUSTRIES_FOLLOWED	Number of 2–digit SIC industries for which an analyst makes at least one forecast during a year.	IBES
FIRM_EXPERIENCE	Number of years for which an analyst makes at least one forecast of the focal firm during a year.	IBES
GENERAL_EXPERIENCE	Number of years for which an analyst makes at least one forecast of any firm during a year.	IBES
BROKERAGE_SIZE	Number of analysts making at least one forecast at the focal brokerage during a year.	IBES
ln(BROKERAGE_SIZE)	Natural logarithm of the brokerage size in a brokerage–year.	IBES

Supplementary Material

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