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Another look at the holiday effect: evidence from sell-side analysts' forecasts

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ABSTRACT

This paper tests whether and how sell-side financial analysts in the United States react to the holidays of their countries of origin. Based on these holiday identifiers, we find that analysts' forecasts are less biased before these holidays, but shortly after these holidays, analysts' forecasts are more accurate, and recommendations are related to more market reactions. These results are robust to control for January/December, and Monday/Friday effect. The accuracy effect is also robust to alternative measurements. We further show that the relationship is more pronounced in the subsample of male analysts, analysts whose highest degree is a bachelor's, follower analysts, and analysts who do not graduate from the top ten universities. In addition, we show that the association mainly exists in large size firms and firms with stable operations. Lastly, we show that our results are robust to alternative cultural elements, including social trust, hierarchy, and individualism.

1. Introduction

Multiple studies have documented how managers' (including boards'), investors', auditors', and analysts' cultural background might affect their behaviors (such as Brochet et al., 2019, 2020; Giannetti and Zhao, 2019; Hughes et al., 2009; Merkley et al., 2020; Nguyen et al., 2018; Pursiainen, 2020).[1] These studies assume that the cultural backgrounds, like DNA, though mutable, stay the same from season to season for the same person. However, can the strength of cultural influence stay the same? When, within a certain year, do values related to a specific culture affect a person, i.e., a sell-side analyst, the strongest? This paper aims to test whether a sell-side analyst with multiple cultural backgrounds is affected by his or her culture more when the culture is celebrated than when it is not, and how he or she is affected.

We try to answer this question from the viewpoint of holidays. Holidays are windows, showcasing a community's collective beliefs, pivotal historical events, and unique traditions. They illuminate cultural characters (Etzioni and Bloom, 2004). In addition, Urry (1988) argues that culture and the holiday have parallel developments. Fig. 1 displays the number of unique countries that celebrate

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[1] For example, Merkley et al. (2020) document that sell-side analysts' cultural diversity is positively related to the quality of the consensus earnings forecast, and Hao (2019) compares individualistic analysts and collectivistic analysts in terms of their forecasting behaviour and more ethical analysts with less ethical analysts in terms of career outcome.

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holidays during each month. It shows that holidays are celebrated each month out of all the countries of origin of the final sample. If an analyst learns or re-learns his or her culture during celebration periods, then he or she might be strongly affected by the culture during the short period of celebration, thus affecting his or her forecasting behavior.

Existing studies on the holiday effect mainly concentrate on the stock markets, both in the U.S. (e.g., Lakonishok and Smidt, 1988; Kim and Park, 1994; Brockman and Michayluk, 1998) and the worldwide (e.g., Marrett and Worthington, 2009; Dodd and Gakhovich, 2011). The first aspect of the holiday effect is that stock returns exhibit consistent patterns around holidays, with systematically higher returns to days prior to major holidays. The dominating explanation for this phenomenon is investor psychology, meaning that investors tend to buy stocks before holidays because of holiday euphoria and high spirits (Brockman and Michayluk 1998; Kudryavtsev, 2018), which leads them to expect positive returns in the sequel. Another aspect of the holiday effect is that stock trading volumes before holidays tend to be lower than on regular days. The main explanation for this fact is the mood maintenance hypothesis (Isen, 2000; Kliger and Kudryavtsev, 2014), which suggests that people are highly motivated to maintain their positive mood states and tend to think less critically and to process information less systematically so as not to disturb their pleasant mood. Applying these arguments to the sell-side analysts, we could predict that when an analyst's country of origin celebrates a major holiday, she might be in higher spirits and a more positive mood than usual. If she wants to maintain a positive mood, she might be less willing to make complicated analyses, resulting in lower forecast accuracy and larger forecast bias.

On the other hand, since these analysts no longer live in their country of origin, the celebration of holidays might not impact analysts' forecasts. In addition, research on the cultural transmission among immigrants finds that even second and third-generation immigrants have strong identification with their culture of origin, primarily in preserving the language of origin (Mchitarjan and Reisenzein, 2013). Further, Ndione et al. (2018) find immigrants could find comfort when celebrating the holidays of country of origin. If this is the case, then analysts might make a more accurate forecast during the holiday period. Since both sides could happen, it is an empirical question to investigate how analysts' forecasts are during the holiday period.

To answer the research question, our focus is US-based sell-side analysts whose biological descriptions are available in FactSet Terminal. Based on this information, we search for the birth, marriage, education, and immigration records of each analyst from AncestryLibrary. Then, we use the analyst's last name to search in the Hanks (2003) and https://forebears.io/surnames to trace back his or her original countries or continents.[2] After classifying analysts into US-born without another cultural background, US-born with another potential cultural background, and non-US-born, we can test whether the latter two groups of analysts are affected by the other culture in terms of whether their forecast behavior changes when the other culture is celebrating holidays.[3]

We use a U.S. sample from 2000 to 2021 and find that analysts' forecasts are less biased shortly before these holidays. In addition, shortly after these holidays, analysts' forecasts are more accurate, and recommendations are related to more market reactions. Then, we show that these results do not disappear after deleting forecasts or recommendations issued on Monday/Friday, January/December, or on religion-specific holidays. In addition, when we use an alternative measurement of forecast accuracy, we still find that analysts' forecast accuracy increases shortly after the holidays. Furthermore, when we redefine the holiday period to be the period spanning from the three days before to the three days after the holiday, we still find that analysts make more accurate forecasts during this holiday period, providing robustness to the initial finding.

Further, we find that when analysts are male, earn a bachelor's degree, are followers in their forecasts, and graduate from universities that do not rank in the top ten, their forecasts during the holiday period are more significantly accurate. In terms of firms' characteristics, we find that our results sustain in firms of big size and stable operations.

Lastly, we control the country-level of trust, hierarchy and individualism. We find that our focal association sustains when controlling these cultural elements.

Our study might contribute to existing literature in the following ways. First, it contributes to current investigations on analysts' cultural backgrounds (Merkley et al., 2020; Cao et al., 2024). To be specific, instead of treating analysts' countries of origin as a status quo, we further investigate whether and how the analysts' countries of origin celebrate holidays might be associated with analysts' forecasts and recommendations. Contrary to predictions based on the existing same-country holiday effect, we find that analysts' forecasts, instead of being more biased during the holiday periods, are less biased. In addition, we document that analysts' forecasts are more accurate shortly after the holiday. We believe that our studies present an interesting phenomenon.

Second, we contribute to the studies on the holiday effect (Kim and Park, 1994; Gama and Vieira, 2013; Kudryavtsev, 2018). Existing studies mainly study the holiday effect from the viewpoint of investors and discuss how investors trade around major holidays and how these trading patterns result in changes in stock return (Kim and Park, 1994; Kudryavtsev, 2018). We contribute to the

[2] For example, Fig. 2 shows an example of Mr. Joseph Thomas Arsenio, whose birth index is available in AncestryLibrary, while the surname "Arsenio" is most populated in "Angola" based on Forebears. Since Mr. Joseph Thomas Arsenio was born in California, USA, though he might bear the imprint of culture from another country, we still assume that he is most affected by the U.S. culture and potentially affected by the Angolan culture. In Fig. 3, Mr. Eapen Chacko's name was found in Passenger and Crew Lists in the New York State (1917-1967), and at the same time, "Chacko" as the last name is most prevalent in "India". In this case, Mr. Eapen Chacko is more likely to be affected by both the U.S. culture and Indian culture.

[3] Continuing by using the example of Mr. Joseph Thomas Arsenio and Mr. Eapen Chacko, all three countries, the US, Angola, and India, will celebrate the New Year on January 1, 2018. However, January 15, 2018, is Martin Luther King Jr. Day in the US, January 26, 2018, is Republic Day in India, and February 5, 2018, is Day off for Liberation Movement Day in Angola. Both January 15 and February 5, 2018, will be the celebration dates for Mr. Joseph Thomas Arsenio, while January 26, 2018, will be the celebration date for Mr. Eapen Chacko. How will Mr. Eapen Chacko forecast differently from Mr. Joseph Thomas Arsenio on January 15 and February 5, 2018, and vice versa?

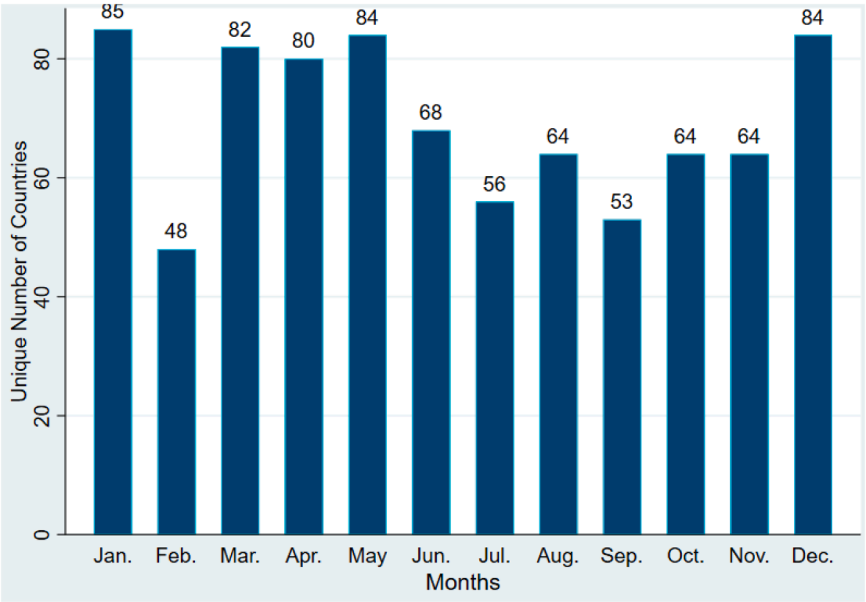

Fig. 1. Unique number of countries celebrating holidays on each month.
Source: https://www.timeanddate.com/holidays/. Only "Official holidays" are counted, whose type can be "Public Holiday", "Bank Holiday", "Bank and Government Holiday", "De facto Holiday", "Federal Holiday", "Federal Public Holiday", "National Day", "National Holiday", "National/Legal Holiday", "Official Holiday", or "Public Holiday".

holiday effect by studying the behavior of analysts. In addition, instead of focusing on the local holidays, we study the holidays of analysts' country of origin. In this way, we expand the realm of the holiday effect

The remainder of the paper is organized as follows. Section 2 reviews the related literature and develops our hypotheses. Section 3 discusses the sample, variables, and empirical model. Section 4 reports the main results and robustness tests. Section 5 reports the heterogeneity analysis. Section 6 concludes the paper

2. Literature review and hypothesis development

2.1. Holiday effect

The holiday effect was first found by practitioners. Merrill (1966) states an erroneous market myth, namely, "traders sell off before a holiday, since they like to be free of worries on holiday, however, market rallies before holiday" and finds disproportionate advances of the Dow Jones Industrial Average (DJIA) on the trading day before holidays for the period from 1897 to 1965 (Page 15). Fosback (1993) reports significantly high pre-holiday returns in the S&P 500 index, especially for the two days before holidays.

Academically, the evidence of high abnormal returns on pre-holidays has been widely documented in the US market, namely in what concerns the organized stock markets (Lakonishok and Smidt, 1988; Pettengill, 1989; Ariel, 1990), over-the-counter stock markets (Liano et al. 1992), the futures market (Fabozzi et al., 1994; Brockman and Michayluk, 1998). Ariel (1990) finds that the high mean return accruing to the CRSP equally- and value-weighted indexes on the trading day before holidays is statistically significant and attributes the findings to the possibility that some clienteles preferentially buy or avoid selling on pre-holidays. Brockman and Michayluk (1998) document an extraordinarily robust and persistent holiday effect. Results show that pre-holiday returns are significantly higher than non-holiday returns from 1963 to 1993, in all size and price categories, and in both types of market (i.e., auction and dealer).

The pre-holiday effect has also been evidenced outside the U.S. market, namely in Italy (Barone 1990), Japan (Ziemba 2020), and the U.K. (Mills and Andrew Coutts, 1995; Arsad and Andrew Coutts, 1997), India (Arumugam, 1999), Greece (Coutts et al., 2000), Spain (Meneu and Pardo, 2004), Hong Kong (McGuinness, 2005), New Zealand (Cao et al., 2009), Australia (Marrett and Worthington, 2009), Israel (Kaplanski and Levy, 2012), China (Bao et al., 2023; Casalin, 2018; Ju and Tanizaki, 2024), and other Asian countries or districts such as India, Malaysia, Singapore, Thailand (Chan et al., 1996). Further, holiday effects in the U.K. and Japanese markets, even after controlling for the U.S. linkage, are documented, suggesting that the holiday effect exists in these markets independently of the U.S. market (Kim and Park, 1994). Although previous studies use index data or aggregate portfolio data, Meneu and Pardo (2004) investigated the existence of a pre-holiday effect in individual Spanish stock exchange stocks that are also traded on both the Frankfurt Stock Exchange and the NYSE. Analyzing the period from 1990 to 2000, the authors find evidence of high abnormal returns on the trading day before holidays which were not related to any calendar anomaly, suggesting that the pre-holiday effect might be based on the reluctance of small investors to buy on pre-holidays. In addition to testing pre-holiday returns, Dodd and Gakhovich (2011) focus

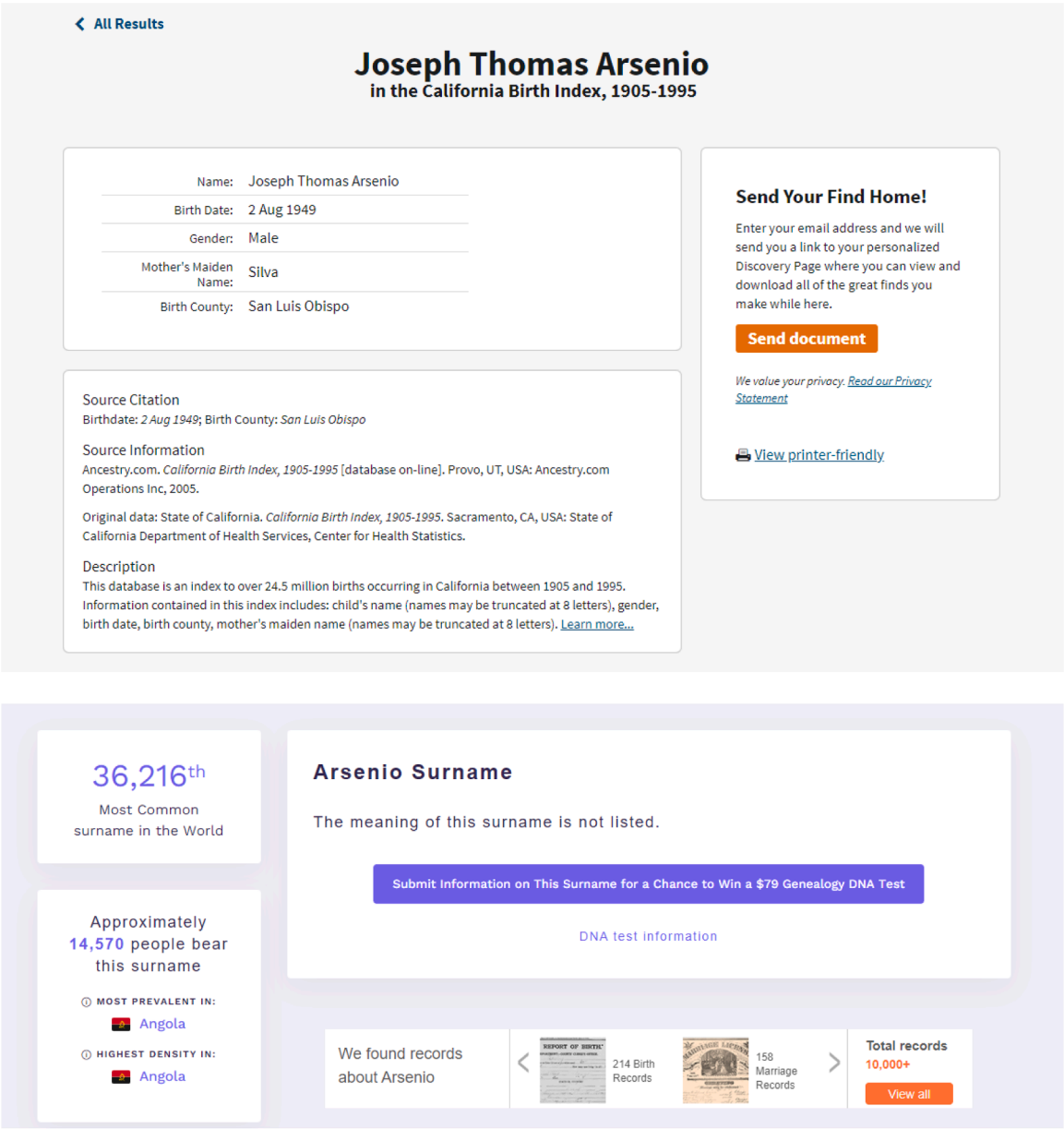

Fig. 2. An example – Mr. Joseph Thomas Arsenio.
Source: https://search.ancestrylibrary.com/cgi-bin/sse.dll?indiv=1&dbid=5247&h=4130504&tid=&pid=&queryId=7a7dedd88bb384f3bbc23cb70d887544&usePUB=true&_phsrc=KtA1&_phstart=successSource (subscription is required to open the link) and https://forebears.io/surnames/arsenio (subscription is not required).

on analyzing trading volumes and find that 80 % of the analyzed firms have lower volumes a day before holidays in the emerging Central and Eastern European markets.

Several reasons have been attempted to explain the pre-holiday effect. Some argue that this effect is related to other calendar anomalies, such as the day-of-the-week and the monthly effects (Ariel, 1990; Liano et al., 1992). Others consider that these abnormal pre-holiday returns result from a closing effect (Pettengill, 1989). This effect is relevant for the day before a weekend, meaning the pre-holiday effect is due to the market closing. Another explanation is suggested by Ariel (1990), who argues that this effect occurs due to the preference of some clientele who prefer to buy on pre-holidays, avoiding selling.

The dominant explanation for the existence of the holiday effect arises from investor psychology (Brockman and Michayluk, 1998; Fleming et al., 2024; Kumar et al., 2025), suggesting that investors tend to buy stocks before holidays because of holiday euphoria and high spirits (Frieder and Subrahmanyam, 2004; Autore et al., 2015), which causes them to expect positive future stock returns. The above-average positive mood of investors before the holiday also leads investors to trade less. Jacobs and Levy (1988) suggest that

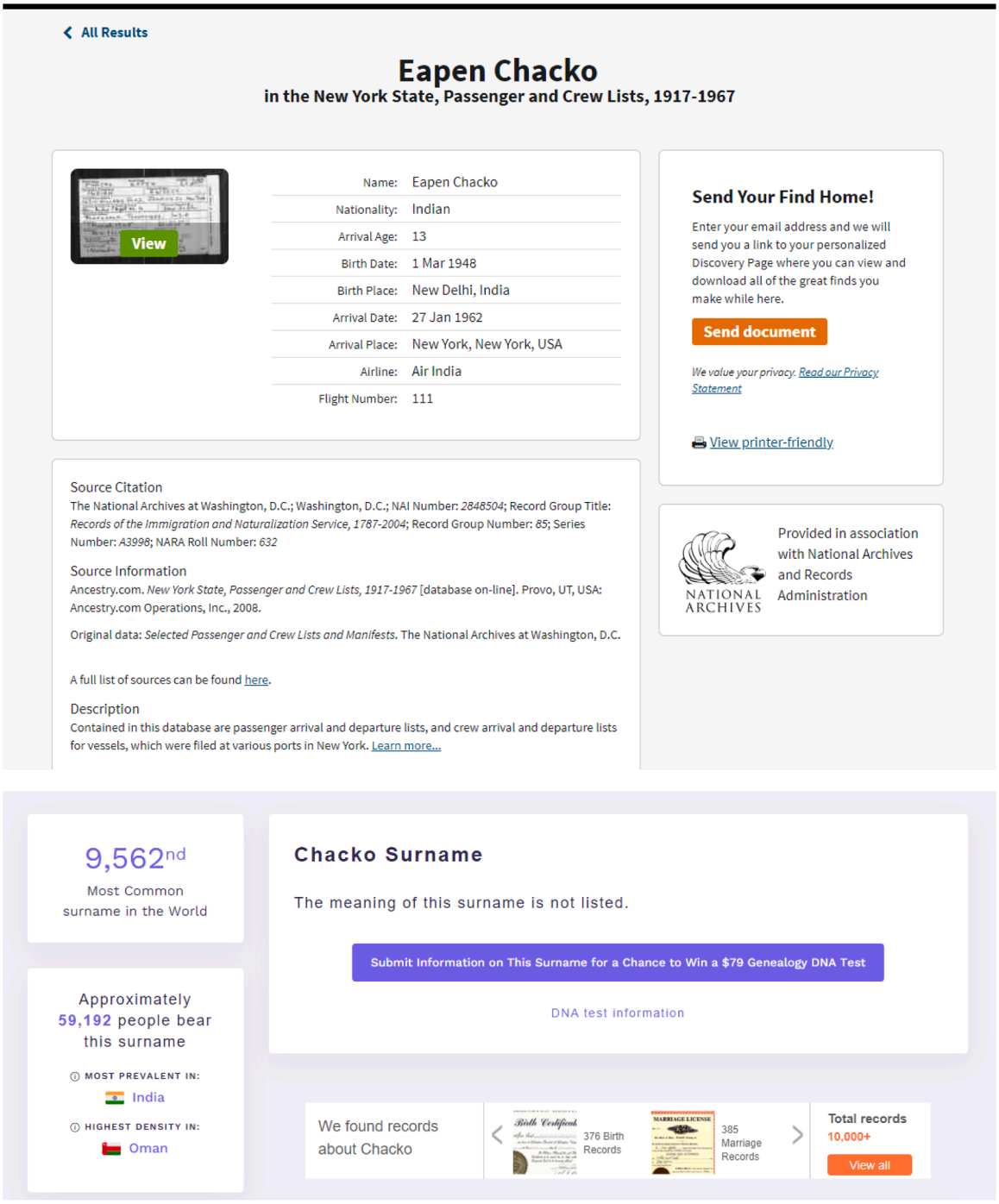

Fig. 3. An example – Mr. Eapen Chacko.
Source: https://search.ancestrylibrary.com/cgi-bin/sse.dll?indiv=1&dbid=1277&h=12842942&tid=&pid=&queryId=7feac604f14b191dbc49be2f0c8466ad&usePUB=true&_phsrc=EpA1210&_phstart=successSource (Subscription is required to open the link) and https://forebears.io/surnames/chacko (subscription is not required).

holiday euphoria leads to short-covering and general buying pressure. Fabozzi et al. (1994) propose a generally favorable mood around holidays. Marrett and Worthington (2009) document that one of the main explanations for the holiday effect lies in investor psychology. Because of the holiday euphoria, investors tend to buy more stocks before the holidays.

Gama and Vieira (2013) use a natural setting where a public holiday is not accompanied by a stock market break in the Portuguese stock market to revisit the holiday effect. In their setting, public holidays are different from stock market holidays, where stock markets

are closed. Then, they find a statistically significant positive price effect during Portuguese-specific national holidays relative to a typical trading day. They also find that there is no difference in volume, volatility, or returns in non-holiday and pre-holiday periods. They attribute their findings to the mood effect, by which, on the onset of a nonstock-market-related professional occupation, optimism drives investor trading preferences.

Lahav et al. (2016) send surveys to students before and after Passover vacation to investigate how holiday periods influence students' time preferences. They document a pre-holiday effect on time preference, indicating that holiday euphoria induces impulsive behavior, making people more present-oriented (having a higher subjective discount rate) before the holiday, and that holiday euphoria affects people's immediate mood (feeling down in the present).

2.2. Holiday effect and analyst's research

Research in analysts' psychological bias has found evidence of how non-economic factors such as natural disasters (i.e. earthquake (Kong et al., 2021), hurricanes (Bourveau and Law, 2021)), climate change (i.e., air pollution (Dong et al., 2019), unpleasant weather (DeHaan et al., 2017)), health-related problems (i.e., flu (Dong and Heo, 2014), climatic disasters (Han et al., 2020)), time-related factors (i.e., seasonal affective disorder (Dolvin et al., 2009; Kucheev and Sorensson, 2019; Lo and Wu, 2018), holiday effects (Chang and Hsu, 2018)), and terrorist attacks and mass shootings (Cuculiza et al., 2021) affect analyst forecast behavior. The dominating theories in these studies are limited attention theory, risk aversion theory, and related theory. Specifically, Kong et al. (2021) and Dong et al. (2019) test their theories based on Chinese data. Other studies are mostly based on U.S. datasets.

Kong et al. (2021) classify analyst-firms' locations into earthquake disaster zones, neighborhood areas, and other places. They find that analysts are less optimistic in their forecasts for firms in neighborhood areas. They further attribute their findings to heuristics in making forecasts, especially, the less optimistic analysts' forecasts come from neighborhood areas with high media attention.

Using the arrival of hurricanes from 1996 to 2009 at analysts' office locations across the United States as a plausibly exogenous shock, Bourveau and Law (2021) test how analysts' experience of disruptive life events might affect their forecasts. They find that affected analysts are less optimistic in their forecasts than non-affected analysts for non-affected firms, especially for those first-time affected analysts.

In addition, Dolvin et al. (2009) examine the potential effect of seasonal affective disorder (SAD), the psychological condition that produces heightened pessimism and risk aversion during the fall and winter months, on equity analysts' annual earnings forecasts. They find that analysts are less optimistic in their annual forecasts during SAD months than in other months, especially for analysts in northern states. Lo and Wu (2018) correct mistakes in Dolvin et al. (2009) and conduct more comprehensive research on how SAD contributes to predictable seasonal changes in forecast characteristics. They find that revisions issued in fall are on average more pessimistic than those issued in the rest of the year, that the pessimism trend in analysts' fall forecasts is reversed in the spring, that there is a deterioration in the precision of both public and private information in fall, and that the boldness of favorable fall forecast is asymmetric.

Chang and Hsu (2018) find that holiday-related mood is related to more optimistic forecasts and larger errors, and that disaster with significant fatalities is related to more pessimistic forecasts and smaller errors. However, Jannati et al. (2020) find that mild depression is related to an increase in forecast accuracy. Kudryavtsev (2018) documents that, compared to regular recommendation revisions, pre-holiday recommendation revisions are followed by significantly weaker event-day stock price reactions, and significantly more pronounced post-event price drifts, whose magnitude increases over more extended post-event periods (up to six months).

2.3. Hypothesis development

The celebration of holidays in individual analysts' countries of origin might be related to their forecast behaviors in several ways.

The first is through the mood maintenance hypothesis (Kliger and Kudryavtsev 2014), which refers to people's tendency to maintain positive mood states, implying that positive mood is associated with less critical thinking and reduced information processing. This mood maintenance hypothesis will further yield three behavioral effects. The first one is out of the blue effect, meaning stronger adverse reactions to bad news during good mood periods; the second one is sunray on a cloudy day effect, meaning stronger positive reactions to good news during bad mood periods; the third one is shallow thinking, meaning stronger reactions to all kinds of news during good mood periods.

Based on Merrill (1966)'s observation that except Washington's birthday and Thanksgiving, the day preceding a holiday is usually a good (positive mood) day, we expect that during the pre-holiday periods, the two behavior effects, i.e., out of the blue effect and shallow thinking, will have affected analysts' forecast optimism and forecast accuracy differently. As for the out of blue effect, analysts whose country of origin is celebrating holiday in the day that they make earnings forecast is expected to react stronger to all kinds of news during the pre-holiday periods, meaning that they might be more positive than they normally do or than other analysts whose country of origin is not celebrating any holiday. As for the shallow thinking effect, if pre-holidays are related to a positive mood, analysts, who strive to maintain their positive mood, may be less willing to process significant market, industry, and company information, thus issuing less accurate forecasts.

Based on these arguments, we make the following hypothesis.

H1a: Analysts whose country of origin is celebrating holidays issue less accurate forecasts.

However, since these analysts no longer live in their country of origin, the celebration of holidays might not impact analysts' forecasts. In addition, research on the cultural transmission among immigrants finds that even second and third-generation immigrants have strong identification with their culture of origin, primarily in preserving the language of origin (Mchitarjan and Reisenzein,

2013). Further, Ndione et al. (2018) find immigrants could find comfort when celebrating the holidays of country of origin. If this is the case, then analysts might make a more accurate forecast during the holiday period. Based on these arguments, we make the following alternative hypothesis.

H1b: Analysts whose country of origin is celebrating holidays issue more accurate forecasts.

3. Sample data and research design

3.1. Sample data

We identify national holidays between 2000 and 2021 by using the Holidays and Observances Around the World (HOAW).[4] HOAW collects public holidays and other special days for >200 countries and regions. Since our focus is on public holidays, when collecting the dataset, we restrict the sample to Official Holidays for all countries. Different countries have different names of types when the filter is Official Holidays. For example, the name of the type is Federal Holiday for the U.S., but it becomes Bank Holiday for the U.K.

First, we need to deal with the overlapping and differences between the Official Holidays identified in HOAW and those used in prior studies (Ariel, 1990; Cadsby and Ratner, 1992; Meneu and Pardo, 2004; Dodd and Gakhovich, 2011; Coutts and Sheikh, 2002; Cao et al., 2009; McGuinness, 2005; Alagidede, 2013; Kaplanski and Levy, 2012; Tangjitprom, 2010; Dumitriu et al., 2011). The selection of Official Holidays overlaps with the selections of prior studies, but each has a unique set of holidays that the others do not have. For example, Ariel (1990) considers the following holidays that provoke stock market closings: New Year's Day, Presidents' Day (formerly Washington's Birthday), Good Friday, Memorial Day, July Fourth, Labor Day, Thanksgiving, and Christmas. But in this paper, we include not only the holidays that Ariel (1990) has considered, but also Martin Luther King Jr. Day, Inauguration Day, Juneteenth, Columbus Day, and Veterans Day.[5]

Second, we need to deal with the situation where some holidays fall on a weekday and therefore are accompanied by an extra stock market closing. In contrast, other holidays may fall on weekends and thus will not always induce an extra market closing. Even though this might pose a problem for stock market reaction research, such as Brockman and Michayluk (1998), in which the daily close-to-close returns occurring on the day immediately prior to a trading holiday when the market is closed, the same situation might not pose a problem to our study. The reason is that we are not focusing on holidays for U.S. investors. Instead, we are focusing on holidays in other countries that happen to be the analysts' country of origin.

We then match the holidays of each country with the analysts' country of origin. We use multiple ways to identify the analysts' country of origin. The first way is based on the birth record, ship record, high school yearbook, marriage record, or city directory in Ancestry Library. Since analysts born outside of the U.S. are harder to identify, we use the combination of all these sources to identify the time that the analysts arrived in the United States and the country of origin of the analysts. In this way, we could only identify a tiny sample of analysts who are foreigners.

To compensate for the lack of observation and lack of variance, we tap into prior studies on cultural diversity, such as Merkley et al. (2020), Pacelli (2018) and Pursiainen (2020). Specifically, following Merkley et al. (2020), we obtain analysts' surnames from I/B/E/S. We cross-check with name dictionaries, including the Oxford Dictionary of American Family Names and the Ancestry Library, to identify each surname's probable country of origin. In the case of multiple origins, which is often the case with the Dictionary of American Family Names, we map surnames to the most likely country on the relative frequency of the name and country combinations.

Instead of then mapping the country of origin to a cultural cluster, as Merkley et al. (2020) and House et al. (2002) do in their study, we match each country with its Official Holidays to investigate analysts' forecasting behaviors on these days in relation to their behaviors on other days. To control the cultural cluster effect, we follow Gupta et al. (2002)'s method to locate each cultural cluster.[6]

We obtain analysts' surnames from the I/B/E/S detailed analyst recommendation file. We then combine the I/B/E/S detailed analyst recommendation file with the earnings forecast file. Since I/B/E/S no longer provides the translation table and analysts in I/B/E/S can choose to conceal their real names, our focus is on analysts whose names are not concealed as of the beginning of 2018. We merge the revealing-name version of the analysts' recommendation file with the concealed-name version to find the real names and the concealing numbers of the analysts. Then, we append the concealing analysts' post-2018 recommendations to the pre-2018 recommendations. In this way, we delete those analysts who enter I/B/E/S database after 2018. This treatment has the advantage of focusing on a stable sample of analysts but the disadvantage of not including the newly-added analysts, which might potentially have the left censoring problem mentioned in Clement (1999).

[4] https://www.timeanddate.com/holidays/.

[5] Similarly, for Portugal, instead of considering the Portuguese-specific holidays including Carnival (moving), Freedom Day (April 25), God's Day (moving), Portugal's Day (June 10), Our Lady's Day (August 8), Republic Implantation Day (October 5), All Saints Day (November 1), Independence Day (December 1), and Immaculate Conception Day (December 8) in Gama and Vieira (2013), I only focus those national holidays which do not include Carnival Day, Our Lady's Day, but include holidays like Easter Sunday (April 4) and Labor Day (May 1). I acknowledge these treatments are arbitrary. In the robustness check, I use the holidays identified for each country used in prior studies, if there are, to test whether the findings are robust.

[6] A list of the cultural clusters is available at https://globeproject.com/results?page_id=country#cluster.

3.2. Research design

Our first test is to see whether analysts behave differently around holidays. We first use the following regression model (1) to address this question.

$$ACCURACY_{i,j,t}\left(BIAS_{i,j,t}\right) = \beta_0 + \beta_1 HOLIDAY\_DUMMY_{j,t} + \sum \gamma_i Firm\_Controls + \sum \delta_j Analyst\_Controls + Analyst\_Fixed\_Effect + Industry \Big/ Firm\_Fixed\_Effect + Year\_Fixed\_Effect \quad (1)$$

Where i indexes firm, j indexes analyst, and t indexes quarter or year. $ACCURACY_{i,j,t}$ and $BIAS_{i,j,t}$ are measured based on Clement and Tse (2003). $ACCURACY_{i,j,t}$ ($BIAS_{i,j,t}$) is the difference between the maximum absolute (signed) forecast error and analyst j's absolute (signed) forecast error for firm i in quarter t, divided by the difference between the maximum absolute (signed) forecast error and the minimum absolute (signed) forecast error. $HOLIDAY\_DUMMY_{j,t}$ is an indicator that equals one if the forecast issuance date is one to three days before (in or after) the holiday that is going to be celebrated in analyst j's country of origin. Firm-level control variables include the number of analysts covering the firm ($NumAnalysts_{i,t}$), the natural log of the equity market value of the firm ($SIZE_{i,t}$), the natural log of the ratio of market value of equity to book value of equity ($LnBM_{i,t}$), the ratio of income before extraordinary items to total assets ($ROA_{i,t}$), the standard deviation of ROA over the last five years, the standard deviation of daily stock returns in the previous 12 months ($STD\_ROA_{i,t}$), the average monthly return over the last 12 months ($RET_{i,t}$), and an indicator for whether the firm reports foreign sales activity ($ForeignSales_{i,t}$). Analyst-level control variables include the natural logarithm of the number of analysts employed by the broker firm in the calendar year ($BROKERSIZE_{j,t}$), the number of years an analyst has been providing forecasts in I/B/E/S database ($GENERALEXP_{j,t}$), and the number of years that an analyst has been providing forecasts for firm i based on I/B/E/S database ($FIRMEXP_{j,t}$). Control variables are lagged to be calculated based on the prior fiscal year relative to the period for which analysts are forecasting. To control the intra-cultural-cluster effect, we further test the effects by evaluating each culture cluster individually (Gupta et al. 2002). We have employed various fixed effects models. We control for analyst-level fixed effects for all fixed effect models to control for the invariant factors related to an analyst. Then, we vary the combination of firm, industry, and year fixed effects. In some models, we additionally control for industry-fixed effect, industry-year-fixed effect, and industry times year fixed effect; in other models, we replace industry with firm and control firm-fixed effect, firm-year-fixed effect, and firm times year fixed effect. In all models, we cluster the standard errors at the firm level. Appendix 1 lists details on these variables and data sources.

In addition to testing whether analysts' forecast accuracy and bias changes around holidays, we further test analysts' recommendation informativeness around their home-country holidays, by following model (2).

$$CAR_{i,t} = \beta_0 + \beta_1 HOLIDAY\_DUMMY_{j,t} + \sum \gamma_i Firm\_Controls + \sum \delta_j Analyst\_Controls + Analyst\_Fixed\_Effect + Industry \Big/ Firm\_Fixed\_Effect + Year\_Fixed\_Effect \quad (2)$$

Where i indexes firm, j indexes analyst, and t indexes quarter or year. $CAR_{i,t}$ is a two-day, three-day, or fourteen-day cumulated weighted abnormal return around the recommendation issuance date. $HOLIDAY\_DUMMY_{j,t}$ is an indicator that equals one if the forecast issuance date is one to three days before (in or after) the holiday that is going to be celebrated in analyst j's country of origin. Control variables and fixed effects are the same as in model (1). In all models, we cluster the standard errors at the firm level. Appendix 1 lists details on these variables and data sources.

4. Empirical results

4.1. Summary statistics

Table 1 presents the summary statistics of the main variables. Panel A reports those of model (1) and panel B reports those of model (2). Panel A shows that around 7.7 % of analysts' forecasts are issued one to three days before these analysts' countries of origin have a holiday (*Pre_Holiday*), around 5.3 % are issued one to three days after the holiday date (*Post_Holiday*), and around 1.4 % are issued on the holiday date (*In_Holiday*). These statistics are similar for the analyst recommendation dataset in panel B. Other statistics are similar to existing studies (such as Merkley et al. (2020)).

4.2. Results on forecast accuracy/bias

Table 2 reports the results related to forecast accuracy and forecast bias. Panel A presents the results related to forecast accuracy, and Panel B presents those related to forecast bias. In both panels, column (1) to (8) report results where HOLIDAY_DUMMY is defined as one when forecasts are announced one to three days after the holiday, i.e., Post_Holiday, while column (9) to (16) report results where HOLIDAY_DUMMY is defined as one when forecasts are announced one to three days before the holiday, i.e., Pre_Holiday. Given that one forecast that is issued after a holiday could not be the same forecast that is issued before a holiday, and that different fixed effects will have various requirements, the regression sample varies slightly from column to column.

Panel A, columns (1) to (8) primarily show that after the home-country of the analyst has just celebrated holidays, even though the analyst works and lives in the United States, his or her forecast accuracy increases significantly after the holiday, no matter whether a

Table 1
Summary statistics.

Panel A: Analysts' Forecast Accuracy and Bias					
	N	Mean	Min	Median	Max
ACCURACY	122,973	0.025	−17.000	0.050	1.000
BIAS	122,973	0.490	0.000	0.500	1.000
Pre_Holiday	122,973	0.077	0.000	0.000	1.000
Post_Holiday	122,973	0.053	0.000	0.000	1.000
In_Holiday	122,973	0.014	0.000	0.000	1.000
SIZE	122,973	8.727	4.446	8.637	12.510
LnBM	122,973	0.886	−1.004	0.770	4.667
ROA	122,973	0.042	−0.682	0.045	0.265
STD_ROA	122,973	0.037	0.001	0.021	0.538
RETVOL	122,973	0.022	0.008	0.019	0.070
RET	122,973	0.011	−0.078	0.012	0.093
NumAnalysts	122,973	15.618	3.000	15.000	36.000
ForeignSales	122,973	0.670	0.000	1.000	1.000
BROKERSIZE	122,973	3.408	0.693	3.497	4.787
FIRMEXP	122,973	5.237	1.000	4.000	18.000
GENERALEXP	122,973	10.398	1.000	9.000	30.000
Panel B: Market Reactions to Analysts' Recommendations					
	N	Mean	Min	Median	Max
CAR(−3, −1)	65,241	−0.001	−1.197	0	1.475
CAR(0, +1)	65,241	−0.002	−1.278	0	1.977
CAR(−1, +1)	65,241	−0.002	−1.36	0	1.919
CAR(+2, +15)	65,241	0.004	−1.52	.003	1.893
Pre_Holiday	65,241	0.094	0.000	0.000	1.000
Post_Holiday	65,241	0.058	0.000	0.000	1.000
In_Holiday	65,241	0.014	0.000	0.000	1.000
SIZE	65,241	8.661	4.065	8.582	12.613
LnBM	65,241	0.774	−1.422	0.647	5.196
ROA	65,241	0.041	−0.749	0.042	0.270
STDROA	65,241	0.041	0.001	0.023	0.584
RETVOL	65,241	0.025	0.008	0.021	0.087
RET	65,241	0.002	−0.158	0.001	0.163
NumAnalysts	65,241	17.242	1.000	16.000	48.000
ForeignSales	65,241	0.611	0.000	1.000	1.000
BROKERSIZE	65,241	3.273	0.000	3.367	5.004
FIRMEXP	65,241	3.848	1.000	3.000	16.000
GENERALEXP	65,241	8.270	1.000	6.000	25.000

The table presents results the summary statistics of the main variables.

fixed effect model is used or not, or what kind of fixed effects are controlled. For example, in column (5), when analyst fixed effect and the industry times year fixed effect are controlled, the coefficient on HOLIDAY_DUMMY is 0.028 (p-value < 0.05), meaning that within the post three days of the home-country holiday period, analysts who work in the U.S. and thus do not officially celebrate the holidays issue forecast that are 2.8 % more accurate than forecast that they issue in other periods.

Panel A, columns (9) to (16), however, consistently show that in the one to three days before the home-country holidays (i.e., the pre-holiday period), the analysts' forecast accuracy is not significantly different from the forecast accuracy in other periods. None of the coefficients on HOLIDAY_DUMMY are significantly different from zero.

Panel A of Table 2 presents very interesting evidence. Different from what the theories have suggested, i.e., analysts overhyped or lack attention, resulting in lower forecast accuracy, the results in Panel A of Table 2 seem to imply that analysts are doing a fair amount of work before the home country holidays. What's more interesting is that even though analysts are neither more nor less accurate in the one-to-three-day period before the holiday, they are more accurate in the one-to-three-day period after the holiday.

As for forecast bias, Panel B, columns (1) to (8) show that in the one to three days after the home-country holidays (i.e., the post-holiday period), analysts' forecast bias is not significantly different from the forecast bias in other periods. Most of the coefficients on HOLIDAY_DUMMY are not significantly different from zero.

However, Panel B, columns (9) to (16) consistently show that in the one to three days before the home-county holidays (i.e., the pre-holiday period), the analysts' forecast is significantly less biased than in other periods. For example, the coefficient of HOLIDAY_DUMMY in column (13) is −0.015 (p-value < 0.05), meaning that within the pre-three days of the home-country holiday period, analysts who work in the U.S. and thus do not officially celebrate the holidays issue forecast that are 1.5 % less bias than forecast that they issue in other periods.

If we combine the four parts of results from both panels, it seems that analysts forecast, to some extent, differently within the six-day period around their home-country holiday. Their forecast bias decreases prior to the holiday, and their forecast accuracy increases after the holiday. Our results provide supporting evidence to H1b. Specifically, we find that analysts are less biased (prior to the

Table 2
Results on forecast accuracy/bias.

Panel A: Analyst cultural origin country's holiday and forecast accuracy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	HOLIDAY_DUMMY is one to three days before forecast announcement dates								HOLIDAY_DUMMY is one to three days after forecast announcement dates							
DV = ACCURACY	No Fixed Effect	Fixed Effect							No Fixed Effect	Fixed Effect						
	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t
HOLIDAY_DUMMY	0.025**	0.026**	0.027**	0.026**	0.029***	0.022*	0.021*	0.023*	0.012	0.009	0.009	0.009	0.010	0.006	0.007	−0.000
	(2.24)	(2.28)	(2.38)	(2.28)	(2.59)	(1.93)	(1.81)	(1.92)	(0.90)	(0.67)	(0.65)	(0.68)	(0.74)	(0.44)	(0.50)	(−0.01)
SIZE	−0.009***	−0.004	−0.006*	−0.006*	−0.004	0.005	0.012	−0.007	−0.009***	−0.004	−0.006*	−0.006*	−0.004	0.005	0.012	−0.008
	(−2.96)	(−1.27)	(−1.71)	(−1.70)	(−1.23)	(0.61)	(1.50)	(−0.32)	(−2.93)	(−1.25)	(−1.69)	(−1.68)	(−1.21)	(0.61)	(1.50)	(−0.35)
LnBM	0.005	0.004	0.006	0.005	0.005	−0.008	−0.015*	0.043**	0.005	0.004	0.006	0.005	0.004	−0.008	−0.015*	0.043**
	(1.30)	(0.94)	(1.42)	(1.21)	(1.13)	(−0.99)	(−1.86)	(2.33)	(1.27)	(0.93)	(1.41)	(1.20)	(1.12)	(−1.00)	(−1.88)	(2.33)
ROA	0.084**	0.023	0.010	−0.001	−0.019	0.067	0.050	0.413	0.084**	0.023	0.010	−0.001	−0.019	0.067	0.051	0.421
	(1.99)	(0.58)	(0.24)	(−0.02)	(−0.46)	(1.26)	(0.92)	(1.06)	(1.99)	(0.57)	(0.24)	(−0.03)	(−0.46)	(1.26)	(0.93)	(1.08)
STD_ROA	−0.173**	−0.103	−0.130	−0.112	−0.138	−0.146	−0.099	0.192	−0.173**	−0.103	−0.130	−0.112	−0.139	−0.146	−0.099	0.191
	(−2.02)	(−1.22)	(−1.48)	(−1.26)	(−1.52)	(−1.25)	(−0.84)	(0.23)	(−2.02)	(−1.22)	(−1.48)	(−1.26)	(−1.53)	(−1.24)	(−0.84)	(0.22)
RETVOL	1.209***	1.054***	1.046***	0.940**	1.117***	1.146***	0.969**	1.225*	1.212***	1.054***	1.045***	0.941**	1.122***	1.148***	0.972**	1.234*
	(3.97)	(3.33)	(3.23)	(2.47)	(2.82)	(3.21)	(2.28)	(1.69)	(3.98)	(3.34)	(3.23)	(2.48)	(2.83)	(3.21)	(2.28)	(1.70)
RET	−0.264**	−0.217*	−0.226*	−0.244**	−0.202	−0.118	−0.107	0.346	−0.268**	−0.220*	−0.229*	−0.247**	−0.204	−0.121	−0.110	0.343
	(−2.32)	(−1.88)	(−1.92)	(−1.99)	(−1.56)	(−0.93)	(−0.81)	(1.42)	(−2.34)	(−1.91)	(−1.95)	(−2.02)	(−1.58)	(−0.96)	(−0.83)	(1.41)
NumAnalysts	0.002**	0.001	0.001	0.001*	0.001	0.003***	0.004***	0.007***	0.002**	0.001	0.001	0.001*	0.001	0.003***	0.004***	0.007***
	(2.43)	(1.30)	(1.63)	(1.66)	(1.52)	(2.82)	(3.37)	(3.65)	(2.45)	(1.32)	(1.64)	(1.67)	(1.54)	(2.85)	(3.40)	(3.68)
ForeignSales	−0.017**	−0.014*	−0.013	−0.013	−0.016*	−0.006	−0.003	−0.059	−0.017**	−0.014*	−0.013	−0.013	−0.016*	−0.006	−0.003	−0.058
	(−2.26)	(−1.69)	(−1.46)	(−1.43)	(−1.71)	(−0.32)	(−0.19)	(−0.42)	(−2.31)	(−1.70)	(−1.47)	(−1.44)	(−1.72)	(−0.32)	(−0.19)	(−0.42)
BROKERSIZE	0.013***	0.006	0.006	−0.001	−0.002	0.004	−0.004	−0.005	0.013***	0.006	0.006	−0.001	−0.002	0.004	−0.004	−0.005
	(3.15)	(0.85)	(0.78)	(−0.07)	(−0.30)	(0.54)	(−0.47)	(−0.55)	(3.16)	(0.86)	(0.78)	(−0.07)	(−0.29)	(0.55)	(−0.46)	(−0.54)
FIRMEXP	0.004***	0.003***	0.003***	0.003***	0.003***	0.003**	0.003***	0.003**	0.004***	0.003***	0.003***	0.003***	0.003***	0.003**	0.003***	0.003**
	(3.81)	(2.83)	(2.83)	(2.90)	(2.71)	(2.56)	(2.88)	(2.47)	(3.81)	(2.85)	(2.84)	(2.92)	(2.73)	(2.57)	(2.89)	(2.49)
GENERALEXP	−0.002***	−0.006***	−0.006***	−0.001	−0.001	−0.007***	−0.000	0.000	−0.002***	−0.006***	−0.006***	−0.001	−0.001	−0.007***	0.000	0.000
	(−3.24)	(−6.00)	(−5.95)	(−0.61)	(−0.62)	(−5.25)	(−0.02)	(0.10)	(−3.23)	(−5.99)	(−5.93)	(−0.58)	(−0.57)	(−5.23)	(0.01)	(0.11)
CONSTANT	0.020	0.065*	0.076**	0.047	0.041	−0.041	−0.150**	−0.076	0.020	0.065*	0.076**	0.046	0.040	−0.040	−0.150**	−0.072
	(0.71)	(1.76)	(2.03)	(1.12)	(0.92)	(−0.61)	(−2.08)	(−0.35)	(0.72)	(1.77)	(2.04)	(1.11)	(0.91)	(−0.59)	(−2.08)	(−0.33)
ANALYS		Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
INDUSTRY			Yes	Yes							Yes	Yes				
YEAR				Yes			Yes					Yes			Yes	
INDUSTRY X YEAR					Yes								Yes			
FIRM						Yes	Yes							Yes	Yes	
FIRM X YEAR								Yes						No		Yes
N	122,973	122,827	121,095	121,095	121,093	122,821	122,821	122,792	122,973	122,827	121,095	121,095	121,093	122,821	122,821	122,792
Adjusted R Square	0.00169	0.0422	0.0432	0.0439	0.0486	0.0553	0.0563	0.111	0.00169	0.0422	0.0432	0.0439	0.0486	0.0553	0.0563	0.111
F	6.055	5.977	5.995	2.726	2.788	4.463	3.256	2.664	6.055	5.977	5.995	2.726	2.788	4.463	3.256	2.664

Panel B: Analyst cultural origin country's holiday and forecast bias

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	HOLIDAY_DUMMY is one to three days before forecast announcement dates								HOLIDAY_DUMMY is one to three days after forecast announcement dates							
DV = BIAS	No Fixed Effect	Fixed Effect							No Fixed Effect	Fixed Effect						
	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t
HOLIDAY_DUMMY	0.004	0.009	0.009	0.009	0.008	0.009	0.009	0.008	−0.013*	−0.014**	−0.016**	−0.015**	−0.015**	−0.016**	−0.016**	−0.008
	(0.77)	(1.47)	(1.55)	(1.56)	(1.44)	(1.56)	(1.58)	(1.43)	(−1.77)	(−2.00)	(−2.15)	(−2.07)	(−2.09)	(−2.28)	(−2.24)	(−1.06)
SIZE	0.000	−0.001	−0.001	−0.001	−0.001	0.003	0.002	−0.016	0.000	−0.001	−0.001	−0.001	−0.001	0.003	0.002	−0.016
	(0.10)	(−0.25)	(−0.49)	(−0.54)	(−0.39)	(0.73)	(0.42)	(−1.14)	(0.10)	(−0.25)	(−0.50)	(−0.54)	(−0.39)	(0.72)	(0.42)	(−1.15)
LnBM	−0.006***	−0.006**	−0.006**	−0.005*	−0.004*	−0.011**	−0.009**	−0.004	−0.006***	−0.006**	−0.006**	−0.005*	−0.004*	−0.011**	−0.009**	−0.004
	(−3.10)	(−2.39)	(−2.24)	(−1.94)	(−1.73)	(−2.50)	(−2.10)	(−0.32)	(−3.12)	(−2.40)	(−2.25)	(−1.95)	(−1.74)	(−2.51)	(−2.11)	(−0.31)
ROA	−0.035	−0.043	−0.047	−0.050*	−0.071**	−0.030	−0.031	0.121	−0.035	−0.043	−0.047	−0.050*	−0.071**	−0.029	−0.030	0.126
	(−1.35)	(−1.54)	(−1.65)	(−1.73)	(−2.36)	(−0.86)	(−0.88)	(0.57)	(−1.35)	(−1.53)	(−1.63)	(−1.72)	(−2.35)	(−0.84)	(−0.86)	(0.59)
STD_ROA	0.006	0.012	0.015	0.012	−0.010	0.020	0.012	0.065	0.006	0.012	0.014	0.011	−0.011	0.020	0.012	0.067
	(0.14)	(0.28)	(0.32)	(0.27)	(−0.22)	(0.34)	(0.21)	(0.19)	(0.14)	(0.26)	(0.30)	(0.25)	(−0.24)	(0.34)	(0.20)	(0.20)
RETVOL	−0.318	−0.201	−0.228	−0.321	−0.262	−0.351	−0.495	−0.756*	−0.315	−0.198	−0.226	−0.316	−0.254	−0.347	−0.487	−0.749*
	(−1.60)	(−0.99)	(−1.10)	(−1.21)	(−0.99)	(−1.52)	(−1.61)	(−1.75)	(−1.59)	(−0.97)	(−1.08)	(−1.19)	(−0.97)	(−1.51)	(−1.59)	(−1.74)
RET	−0.074	−0.067	−0.076	−0.026	−0.014	−0.119	−0.087	−0.341**	−0.074	−0.067	−0.076	−0.027	−0.014	−0.119	−0.087	−0.342**
	(−1.00)	(−0.89)	(−1.00)	(−0.34)	(−0.17)	(−1.44)	(−1.04)	(−2.27)	(−1.00)	(−0.90)	(−1.00)	(−0.35)	(−0.17)	(−1.44)	(−1.04)	(−2.27)
NumAnalysts	−0.000	−0.001***	−0.001***	−0.001***	−0.001***	−0.003***	−0.003***	−0.004***	−0.000	−0.001***	−0.001***	−0.001***	−0.001***	−0.003***	−0.003***	−0.004***
	(−0.72)	(−3.29)	(−3.03)	(−3.27)	(−3.33)	(−3.64)	(−4.01)	(−3.42)	(−0.74)	(−3.31)	(−3.06)	(−3.29)	(−3.36)	(−3.65)	(−4.03)	(−3.41)
ForeignSales	−0.006	−0.001	−0.001	−0.002	−0.003	−0.001	−0.002	0.033	−0.006	−0.001	−0.001	−0.002	−0.003	−0.001	−0.001	0.033
	(−1.46)	(−0.23)	(−0.30)	(−0.34)	(−0.65)	(−0.15)	(−0.19)	(0.63)	(−1.44)	(−0.23)	(−0.28)	(−0.32)	(−0.63)	(−0.13)	(−0.18)	(0.64)
BROKERSIZE	−0.007***	−0.001	−0.000	0.003	0.005	−0.001	0.001	0.002	−0.007***	−0.001	−0.000	0.003	0.005	−0.001	0.001	0.002
	(−3.80)	(−0.17)	(−0.00)	(0.73)	(1.26)	(−0.24)	(0.35)	(0.40)	(−3.81)	(−0.18)	(−0.01)	(0.73)	(1.25)	(−0.25)	(0.34)	(0.40)
FIRMEXP	0.000	−0.000	−0.000	−0.000	−0.000	−0.001	−0.001	−0.000	0.000	−0.000	−0.000	−0.000	−0.000	−0.001	−0.001	−0.000
	(0.79)	(−0.31)	(−0.21)	(−0.24)	(−0.23)	(−1.22)	(−1.19)	(−0.67)	(0.78)	(−0.30)	(−0.21)	(−0.24)	(−0.22)	(−1.21)	(−1.18)	(−0.66)
GENERALEXP	−0.000	0.001**	0.001**	0.001	0.000	0.002***	0.001	0.001	−0.000	0.001**	0.001**	0.001	0.000	0.002***	0.001	0.001
	(−1.38)	(2.50)	(2.34)	(0.74)	(0.36)	(2.67)	(1.15)	(1.10)	(−1.38)	(2.50)	(2.34)	(0.72)	(0.35)	(2.67)	(1.14)	(1.11)
CONSTANT	0.537***	0.515***	0.518***	0.518***	0.514***	0.512***	0.526***	0.671***	0.539***	0.517***	0.520***	0.520***	0.516***	0.513***	0.527***	0.673***
	(32.43)	(23.44)	(23.13)	(21.16)	(20.85)	(14.96)	(13.63)	(5.59)	(32.47)	(23.55)	(23.26)	(21.31)	(20.98)	(15.00)	(13.68)	(5.60)
ANALYS		Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
INDUSTRY			Yes	Yes							Yes	Yes				
YEAR				Yes			Yes					Yes			Yes	
INDUSTRY X YEAR					Yes								Yes			
FIRM						Yes	Yes							Yes	Yes	
FIRM X YEAR								Yes						No		Yes
N	122,973	122,827	121,095	121,095	121,093	122,821	122,821	122,792	122,973	122,827	121,095	121,095	121,093	122,821	122,821	122,792
Adjusted R Square	0.00106	0.0484	0.0500	0.0511	0.0659	0.0786	0.0794	0.213	0.00113	0.0485	0.0501	0.0511	0.0659	0.0786	0.0794	0.213
F	3.373	3.806	3.657	3.535	3.634	2.617	2.605	1.883	3.708	3.946	3.797	3.583	3.745	2.734	2.688	1.825

The table presents results from estimating regressions of forecast accuracy on the indicator of analysts' country of origin holiday (HOLIDAY_DUMMY), control variables, and analyst, industry, firm, year fixed effects. Standard errors are clustered by firms. Control variables include and natural logarithm of market capitalization (SIZE), natural logarithm of market capitalization and book value (lnBM), return on assets (ROA), the standard deviation of ROA over the past five years (STD_ROA), stock volatility calculated by using the past 13- trading days return (RETVOL), the average monthly returns of the past 12 months (RET), number of firms covered by the analyst (NumAnalysts), indicator of foreign sales (ForeignSales), broker size (BROKERSIZE), analyst's firm experience (FIRMEXP), analyst's total experience (GENERALEXP). All p-values are two-tailed. *, **, and *** indicate statistical significance at 10 %, 5 %, and 1 % level, respectively. Sample starts in the fiscal year of 2000 and ends in the fiscal year of 2020.

holiday) and more accurate (shortly after the holiday).

4.3. Robustness tests

After finding the preliminary results that analysts are more accurate in their forecasts in the one to three days after their home-country holidays and they are less optimistic bias in their forecasts in the one to three days before their home-country holidays, it's natural to attribute the evidence to the Monday/Friday effect, January/December effect, or US holiday effect.

To rule out these alternative explanations, we focus on the subsamples where analysts announce their forecasts on non-US holidays, Tuesday-to-Thursday only, and in February-to-November only. Table 3 reports the results.

Panel A of Table 3 reports the results in the subsample where there are no major U.S. holidays in one to three days to come for the earnings forecasts. Column (1) of Panel A shows that the coefficient on HOLIDAY_DUMMY, which is a post-holiday indicator, is 0.034 (p-value < 0.01), indicating that analysts are more accurate in their forecast even for the days where there are no significant holidays celebrated in the U.S. However, columns (2) to (4) of panel A fail to report any significant coefficient on HOLIDAY_DUMMY. The insignificant coefficient of HOLIDAY_DUMMY in columns (4) might suggest that the results in Table 2 in terms of less optimistic forecasts before the holiday come from the U.S. holiday instead of the home-country holiday.

Panel B of Table 3 reports the results in the subsample where earnings forecasts are not issued on Monday or Friday. Column (1) of panel B shows that the coefficient on HOLIDAY_DUMMY, which is a post-holiday indicator, is 0.040 (p-value < 0.01), indicating that analysts are more accurate in their forecast even for days other than Monday and Friday. Similar to the results in panel A, the coefficient of HOLIDAY_DUMMY in column (4) is not significant.

Lastly, panel C of Table 3 reports the results in the subsample where earnings forecasts are issued from February to November. In this subsample, the more accurate after home-country holidays and the less bias before home-country holidays are sustained, as the coefficient of HOLIDAY_DUMMY is 0.037 (p-value < 0.05) in column (1) and -0.017 (p-value < 0.05) in column (4).

Overall, the consistently positive and significant coefficient on HOLIDAY_DUMMY in column (1) from Panel A to Panel C shows that analysts' being more accurate in the three-day periods after the home-country holidays found in Table 2, might not come from the previously documented US Holiday effect, nor Monday/Friday effect, nor January/December effect. However, the evidence related to forecast bias only maintains in the subsample where January/December months' forecasts are deleted.

4.4. Alternative measurements

In the prior section, we measure the forecast accuracy based on Clement and Tse (2003) and the prior three days before the holiday as our holiday indicator. In this section, we use alternative measurements for both the forecast accuracy and the holiday measurements. Specifically, we follow Bae et al. (2008) and measure the forecast accuracy as the ratio of the difference between the absolute forecast error by analyst j for firm i at quarter t and the mean absolute forecast error for all the forecasts for firm i for quarter t, to the mean absolute forecast error (ACCURACY_ALT). We then measure the holiday measurement as the three days after the holiday (including the holiday) (HOLIDAY_ALT1), and as the seven-day period spanning from the three days before to the three days after the holiday (HOLIDAY_ALT2). We then replace model (1) with alternative measurements and report the results in Table 6.

Table 4 shows that analyst forecasts are more accurate shortly after the holiday (columns (1) and (2)), and that analyst forecasts are more accurate during the holiday period (columns (3) to (6)). These results suggest that our findings are robust to alternative measurements.

4.5. Results on recommendation informativeness

In addition to testing analysts' forecasts around home-country holidays, we continue to test analysts' recommendations for informativeness and report the results in Table 5.

Table 5 reports the estimation results of model (2). The interpretation of Table 5 is tricky based on my definition of HOLIDAY_DUMMY. In panel A, columns (1) to (8), the HOLIDAY_DUMMY is a post-holiday indicator as the recommendations are issued after the holidays. Since the recommendations are post-holiday and are within three-day period of the holidays, columns (1) to (8) are measuring the stock market reaction to the analyst's home-country holidays after which the analyst issues a recommendation shortly. Results from columns (1) to (8) seem to show that investors value recommendations more when (shortly after) the recommending analyst is celebrating his or her holidays in the country of origin. For instance, in column (5), the coefficient on HOLIDAY_DUMMY is 0.002 (p-value < 0.10), implying that investors earn an average of 2 base points in the two days before a recommendation when the recommendation is issued after the issuing analyst's home country celebrates a holiday. This evidence validates the result of forecast accuracy found in Table 2, Panel A.

In Panel A, columns (9) to (16), the HOLIDAY_DUMMY is defined as one to three days after the country of origin's holiday. In this case, the market reaction to recommendation is a stricter version of market reaction. Unfortunately, the market fails to react to recommendations that are issued on dates after the country of origin's holiday of the recommending analyst, with or without fixed effects, indicating that for the investors in the market do not regard these recommendations that are issued before incoming holidays as important.

In Panel B, columns (1) to (16) fail to show any market reaction to recommendations no matter whether the HOLIDAY_DUMMY is defined as one to three dates before recommendation dates or after recommendation dates.

In Panel C, columns (1) to (8) show that when investors optimistically react to analysts' recommendations in dates when analysts'

Table 3
Robustness tests on forecast accuracy/bias.

Panel A: Excluding US Public Holidays

	(1)	(2)	(3)	(4)
	HOLIDAY_DUMMY is one to three days before forecast announcement dates		HOLIDAY_DUMMY is one to three days after forecast announcement dates	
	ACCURACY b/t	BIAS b/t	ACCURACY b/t	BIAS b/t
HOLIDAY_DUMMY	0.033***	0.008	0.020	−0.013
	(2.80)	(1.30)	(1.07)	(−1.36)
CONTROLS	Yes	Yes	Yes	Yes
ANALYST	Yes	Yes	Yes	Yes
INDUSTRY X YEAR	Yes	Yes	Yes	Yes
N	116,543	116,543	116,543	116,543
Adjusted R Square	0.0503	0.0670	0.0502	0.0670
F	3.065	3.203	2.652	3.228

Panel B: Redefining HOLIDAY_DUMMY by excluding Mondays and Fridays.

	(1)	(2)	(3)	(4)
	HOLIDAY_NONMONDAY _NONFRIDAY_DUMMY is one to three days before forecast announcement dates		HOLIDAY_NONMONDAY _NONFRIDAY_DUMMY is one to three days after forecast announcement dates	
	ACCURACY	BIAS	ACCURACY	BIAS
HOLIDAY_NONMONDAY _NONFRIDAY_DUMMY	0.039***	0.007	0.010	0.001
	(3.07)	(1.16)	(0.54)	(0.06)
CONTROLS	Yes	Yes	Yes	Yes
ANALYST	Yes	Yes	Yes	Yes
INDUSTRY X YEAR	Yes	Yes	Yes	Yes
N	80,378	80,091	80,378	80,091
Adjusted R Square	0.0594	0.0786	0.0592	0.0786
F	2.317	2.770	1.446	2.710

Panel C: Redefining HOLIDAY_DUMMY by excluding holidays in January and December.

	(1)	(2)	(3)	(4)
	HOLIDAY_NONJANUARY _NONDECEMBER_DUMMY is one to three days before forecast announcement dates		HOLIDAY_NONJANUARY _NONDECEMBER_DUMMY is one to three days after forecast announcement dates	
	ACCURACY	BIAS	ACCURACY	BIAS
HOLIDAY_NONJANUARY _NONDECEMBER_DUMMY	0.036***	0.002	0.018	−0.017**
	(2.82)	(0.34)	(1.29)	(−2.27)
CONTROLS	Yes	Yes	Yes	Yes
ANALYST	Yes	Yes	Yes	Yes
INDUSTRY X YEAR	Yes	Yes	Yes	Yes
N	105,165	104,780	105,165	104,780
Adjusted R Square	0.0536	0.0687	0.0534	0.0689
F	2.103	2.538	1.687	2.946

Panel D: Redefining HOLIDAY_DUMMY by excluding any religious related Holidays

	(1)	(2)	(3)	(4)
	HOLIDAY_NONRELIGION_DUMMY is one to three days before forecast announcement dates		HOLIDAY_NONRELIGION_DUMMY is one to three days after forecast announcement dates	
	ACCURACY	BIAS	ACCURACY	BIAS
HOLIDAY_NONRELIGION_DUMMY	0.029***	0.009	0.011	−0.016**
	(2.59)	(1.54)	(0.83)	(−2.25)
CONTROLS	Yes	Yes	Yes	Yes
ANALYST	Yes	Yes	Yes	Yes
INDUSTRY X YEAR	Yes	Yes	Yes	Yes
N	120,544	120,138	120,544	120,138
Adjusted R Square	0.0483	0.0655	0.0482	0.0655
F	2.882	3.453	2.492	3.580

The table presents results from estimating regressions of forecast accuracy on the indicator of analysts' country of origin holiday (HOLIDAY_-DUMMY), control variables, and analyst, industry, firm, year fixed effects. Standard errors are clustered by firms. Control variables include and natural logarithm of market capitalization (SIZE), natural logarithm of market capitalization and book value (lnBM), return on assets (ROA), the

standard deviation of ROA over the past five years (STD_ROA), stock volatility calculated by using the past 13- trading days return (RETVOL), the average monthly returns of the past 12 months (RET), number of firms covered by the analyst (NumAnalysts), indicator of foreign sales (ForeignSales), broker size (BROKERSIZE), analyst's firm experience (FIRMEXP), analyst's total experience (GENERALEXP). All p-values are two-tailed. *, **, and *** indicate statistical significance at 10 %, 5 %, and 1 % level, respectively. Sample starts in the fiscal year of 2000 and ends in the fiscal year of 2020. Major religions considered include Christian, Orthodox, Jewish, Islamic, Hindu, Sikh, and Jain, the source data is available at https://www.infoplease.com/culture-entertainment/holidays.

Table 4
Alternative measurements.

	(1) ACCURACY_ALT	(2)	(3) ACCURAY	(4)	(5)	(6)
	b/t	b/t	b/t	b/t	b/t	b/t
HOLIDAY_DUMMY	0.012*	0.011*				
	(1.96)	(1.76)				
HOLIDAY_ALT1			0.030***	0.029**		
			(2.62)	(2.56)		
HOLIDAY_ALT2					0.030***	0.029***
					(3.19)	(3.13)
SIZE		−0.002		−0.004		−0.004
		(−0.82)		(−1.22)		(−1.20)
LnBM		0.002		0.005		0.004
		(0.98)		(1.13)		(1.12)
ROA		−0.040		−0.019		−0.019
		(−1.44)		(−0.46)		(−0.46)
STD_ROA		−0.096**		−0.137		−0.136
		(−2.31)		(−1.51)		(−1.50)
RETVOL		0.379		1.117***		1.108***
		(1.52)		(2.82)		(2.80)
RET		−0.320***		−0.202		−0.202
		(−4.12)		(−1.56)		(−1.56)
NumAnalysts		0.004***		0.001		0.001
		(8.52)		(1.52)		(1.55)
ForeignSales		−0.006		−0.016*		−0.016*
		(−1.09)		(−1.71)		(−1.73)
BROKERSIZE		−0.003		−0.002		−0.002
		(−0.86)		(−0.30)		(−0.29)
FIRMEXP		0.001*		0.003***		0.003***
		(1.90)		(2.72)		(2.73)
GENERALEXP		0.001		−0.001		−0.001
		(0.83)		(−0.62)		(−0.58)
CONSTANT	0.584***	0.536***	0.022***	0.040	0.021***	0.037
	(299.12)	(23.05)	(7.84)	(0.91)	(7.13)	(0.84)
ANALYS	Yes	Yes	Yes	Yes	Yes	Yes
INDUSTRY X YEAR	Yes	Yes	Yes	Yes	Yes	Yes
N	121,093	121,093	121,093	121,093	121,093	121,093
r2_a	0.0628	0.0667	0.0483	0.0488	0.0484	0.0488
F	3.842	12.66	6.853	3.121	10.17	3.425
p	0.0501	3.78e-25	0.00893	0.000211	0.00145	0.0000544

The table presents results from estimating regressions of forecast accuracy on the indicator of analysts' country of origin holiday, control variables, and analyst, industry, firm, year fixed effects, by using alternative measurements of forecast accuracy and holiday indicators. Standard errors are clustered by firms. Control variables include and natural logarithm of market capitalization (SIZE), natural logarithm of market capitalization and book value (lnBM), return on assets (ROA), the standard deviation of ROA over the past five years (STD_ROA), stock volatility calculated by using the past 13- trading days return (RETVOL), the average monthly returns of the past 12 months (RET), number of firms covered by the analyst (NumAnalysts), indicator of foreign sales (ForeignSales), broker size (BROKERSIZE), analyst's firm experience (FIRMEXP), analyst's total experience (GENERALEXP). All p-values are two-tailed. *, **, and *** indicate statistical significance at 10 %, 5 %, and 1 % level, respectively. Sample starts in the fiscal year of 2000 and ends in the fiscal year of 2020.

country of origin just celebrates a holiday one to three days ago, investors will downward their reactions in the following fourteen days. In column (5), the coefficient on HOLIDAY_DUMMY is 0.003 (p-value < 0.05), implying that investors earn an average of 3 base points in the fourteen-day period after a recommendation when the recommendation is issued after the issuing analyst's home country celebrates a holiday. In combination with the results in column (5) of Panel A, it seems that for the sixteen days around the recommendation, the market on average reacts negatively by one base point to the recommendation. Columns (9) to (16) fail to show any significant results.

Similar as the forecast accuracy/bias test, the results might be attributed to the Monday/Friday effect, January/December effect, or US holiday effect.

To test whether these alternative dates are the reasons underlying in Table 6, we focus on the subsamples where analysts announce

Table 5
Results on recommendation informativeness.

Panel A: Two-day Market Reaction Prior to Recommendations																
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	HOLIDAY_DUMMY is one to three days before forecast announcement dates								HOLIDAY_DUMMY is one to three days after forecast announcement dates							
DV = CAR (−3, −1)	No Fixed Effect	Fixed Effect							No Fixed Effect	Fixed Effect						
	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t
HOLIDAY_DUMMY	0.002*	0.002*	0.001	0.001	0.002*	0.002**	0.002**	0.002*	−0.002	−0.001	−0.000	−0.000	−0.000	−0.001	−0.001	−0.001
	(1.83)	(1.84)	(1.50)	(1.36)	(1.74)	(2.36)	(2.21)	(1.95)	(−1.05)	(−0.36)	(−0.25)	(−0.21)	(−0.26)	(−0.62)	(−0.58)	(−0.72)
SIZE	−0.001***	−0.001**	−0.001***	−0.001***	−0.001***	−0.004***	−0.004***	0.001	−0.001***	−0.001**	−0.001***	−0.001***	−0.001***	−0.004***	−0.004***	0.001
	(−2.73)	(−2.45)	(−2.74)	(−2.73)	(−2.66)	(−6.32)	(−6.31)	(0.45)	(−2.75)	(−2.46)	(−2.74)	(−2.73)	(−2.66)	(−6.30)	(−6.29)	(0.48)
LnBM	−0.001	−0.001	−0.001	−0.001	−0.001	0.000	0.001	−0.000	−0.001	−0.001	−0.001	−0.001	−0.001	0.000	0.001	−0.000
	(−1.29)	(−1.47)	(−1.45)	(−1.08)	(−1.07)	(0.68)	(1.36)	(−0.10)	(−1.28)	(−1.47)	(−1.44)	(−1.08)	(−1.07)	(0.67)	(1.36)	(−0.12)
ROA	−0.010	−0.015**	−0.020***	−0.019***	−0.018***	−0.024***	−0.021***	−0.114	−0.010	−0.015**	−0.020***	−0.019***	−0.018***	−0.024***	−0.021***	−0.115
	(−1.54)	(−2.52)	(−3.67)	(−3.53)	(−3.50)	(−3.72)	(−3.35)	(−1.62)	(−1.55)	(−2.52)	(−3.68)	(−3.53)	(−3.49)	(−3.73)	(−3.35)	(−1.62)
STD_ROA	−0.006	−0.006	−0.007	−0.006	−0.006	−0.004	−0.005	−0.102	−0.006	−0.006	−0.007	−0.006	−0.006	−0.004	−0.006	−0.101
	(−0.58)	(−0.79)	(−0.82)	(−0.82)	(−0.82)	(−0.36)	(−0.54)	(−1.25)	(−0.58)	(−0.79)	(−0.81)	(−0.82)	(−0.81)	(−0.38)	(−0.56)	(−1.24)
RETVOL	−0.218***	−0.213***	−0.252***	−0.299***	−0.293***	−0.222***	−0.235***	−0.093	−0.219***	−0.214***	−0.252***	−0.300***	−0.293***	−0.223***	−0.235***	−0.093
	(−4.46)	(−3.90)	(−4.77)	(−4.62)	(−4.23)	(−3.70)	(−3.11)	(−0.94)	(−4.46)	(−3.91)	(−4.78)	(−4.62)	(−4.23)	(−3.72)	(−3.12)	(−0.93)
RET	−0.020**	−0.021**	−0.019**	−0.019**	−0.023**	−0.029***	−0.029***	−0.075***	−0.020**	−0.021**	−0.019**	−0.019**	−0.023**	−0.029***	−0.029***	−0.075***
	(−2.17)	(−2.26)	(−2.01)	(−2.01)	(−2.48)	(−3.00)	(−3.04)	(−5.57)	(−2.17)	(−2.26)	(−2.01)	(−2.01)	(−2.48)	(−2.99)	(−3.03)	(−5.57)
NumAnalysts	−0.000***	−0.000	−0.000	−0.000	−0.000	−0.000	0.000	0.000	−0.000***	−0.000	−0.000	−0.000	−0.000	−0.000	0.000	0.000
	(−2.76)	(−0.57)	(−1.25)	(−0.42)	(−0.06)	(−0.20)	(0.60)	(1.03)	(−2.75)	(−0.58)	(−1.27)	(−0.43)	(−0.08)	(−0.21)	(0.59)	(1.00)
ForeignSales	−0.000	−0.002***	0.000	−0.000	−0.000	−0.003**	−0.003**	−0.001	−0.000	−0.002***	0.000	−0.000	−0.000	−0.003**	−0.004**	−0.001
	(−0.66)	(−2.70)	(0.01)	(−0.32)	(−0.48)	(−2.01)	(−2.26)	(−0.30)	(−0.64)	(−2.70)	(0.02)	(−0.32)	(−0.47)	(−2.02)	(−2.26)	(−0.31)
BROKERSIZE	−0.000	−0.001**	−0.001	−0.000	−0.001	−0.001*	−0.000	−0.000	0.000	−0.001**	−0.001	−0.000	−0.001	−0.001*	−0.000	−0.000
	(−0.00)	(−2.13)	(−1.43)	(−0.61)	(−0.84)	(−1.77)	(−0.63)	(−0.06)	(0.00)	(−2.15)	(−1.45)	(−0.63)	(−0.86)	(−1.79)	(−0.66)	(−0.10)
FIRMEXP	−0.000	0.000	−0.000	0.000	0.000	0.000	0.000	0.000	−0.000	0.000	−0.000	0.000	0.000	0.000	0.000	0.000
	(−0.86)	(0.14)	(−0.08)	(0.17)	(0.02)	(0.79)	(0.92)	(1.57)	(−0.85)	(0.14)	(−0.08)	(0.17)	(0.01)	(0.78)	(0.92)	(1.55)
GENERALEXP	0.000	0.000	0.000	0.000	0.000	0.000**	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000**	0.000	0.000
	(0.48)	(0.57)	(0.14)	(0.91)	(1.35)	(2.22)	(1.06)	(0.01)	(0.47)	(0.60)	(0.17)	(0.93)	(1.37)	(2.27)	(1.09)	(0.04)
CONSTANT	0.013***	0.017***	0.017***	0.014***	0.014***	0.042***	0.044***	−0.002	0.014***	0.017***	0.017***	0.015***	0.014***	0.042***	0.044***	−0.002
	(4.77)	(4.52)	(4.63)	(3.59)	(3.31)	(7.26)	(6.62)	(−0.08)	(4.88)	(4.59)	(4.68)	(3.62)	(3.35)	(7.30)	(6.65)	(−0.09)
ANALYS		Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
INDUSTRY			Yes	Yes							Yes	Yes				
YEAR				Yes			Yes					Yes			Yes	

(*continued on next page*)

Table 5 (*continued*)

Panel A: Two-day Market Reaction Prior to Recommendations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	HOLIDAY_DUMMY is one to three days before forecast announcement dates								HOLIDAY_DUMMY is one to three days after forecast announcement dates							
DV = CAR (−3, −1)	No Fixed Effect	Fixed Effect							No Fixed Effect	Fixed Effect						
	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t
INDUSTRY X YEAR					Yes								Yes			
FIRM						Yes	Yes							Yes	Yes	
FIRM X YEAR								Yes								Yes
N	65,241	64,901	63,548	63,548	63,533	64,563	64,563	59,301	65,241	64,901	63,548	63,548	63,533	64,563	64,563	59,301
Adjusted R Square	0.00300	0.0286	0.0290	0.0311	0.0404	0.0572	0.0589	0.106	0.00297	0.0285	0.0290	0.0310	0.0404	0.0571	0.0588	0.106
F	5.457	4.782	5.537	4.531	4.413	9.120	7.755	4.448	5.325	4.622	5.473	4.436	4.202	8.606	7.359	4.096

Panel B: Two-day Market Reaction After Recommendations

DV = CAR (0,+1)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t
HOLIDAY_DUMMY	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.002
	(0.22)	(0.47)	(0.31)	(0.33)	(0.06)	(0.41)	(0.38)	(0.77)	(0.91)	(0.66)	(0.93)	(0.94)	(0.85)	(0.57)	(0.57)	(1.12)
Control and Fixed Effect	Same as Panel A	Same as Panel A														

Panel C: Fourteen-day Market Reaction After Recommendations

DV = CAR (+2, +15)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t
HOLIDAY_DUMMY	−0.005***	−0.003**	−0.003*	−0.003**	−0.003**	−0.002	−0.002*	−0.002	−0.002	−0.002	−0.002	−0.002	−0.002	−0.002	−0.002	−0.004*
	(−3.22)	(−2.15)	(−1.91)	(−2.20)	(−2.14)	(−1.39)	(−1.70)	(−1.29)	(−1.08)	(−0.92)	(−1.06)	(−1.10)	(−1.14)	(−1.14)	(−1.21)	(−1.73)
Control and Fixed Effect	Same as Panel A	Same as Panel A														

The table presents results from estimating regressions of recommendation informativeness on the indicator of analysts' country of origin holiday (HOLIDAY_DUMMY), control variables, and analyst, industry or year fixed effects. Standard errors are clustered by firms. Control variables include and natural logarithm of market capitalization (SIZE), natural logarithm of market capitalization and book value (lnBM), return on assets (ROA), the standard deviation of ROA over the past five years (STD_ROA), stock volatility calculated by using the past 13- trading days return (RETVOL), the average monthly returns of the past 12 months (RET), number of firms covered by the analyst (NumAnalysts), indicator of foreign sales (ForeignSales), broker size (BROKERSIZE), analyst's firm experience (FIRMEXP), analyst's total experience (GENERALEXP). All p-values are two-tailed. *, **, and *** indicate statistical significance at 10 %, 5 %, and 1 % level, respectively. Sample starts in the fiscal year of 2000 and ends in the fiscal year of 2020.

Table 6
Robustness tests on recommendation informativeness.

Panel A: Excluding US Public Holidays

	(1)	(2)	(3)	(4)	(5)	(6)
	HOLIDAY_DUMMY is one to three days before forecast announcement dates			HOLIDAY_DUMMY is one to three days after forecast announcement dates		
	CAR (−3,−1)	CAR (0,+1)	CAR (+2,+15)	CAR (−3,−1)	CAR (0,+1)	CAR (+2,+15)
	b/t	b/t	b/t			
HOLIDAY_DUMMY	0.002*	−0.000	−0.003**	−0.003	0.002	−0.001
	(1.77)	(−0.00)	(−2.15)	(−1.13)	(0.75)	(−0.27)
CONTROLS	Yes	Yes	Yes	Yes	Yes	Yes
ANALYST	Yes	Yes	Yes	Yes	Yes	Yes
INDUSTRY X YEAR	Yes	Yes	Yes	Yes	Yes	Yes
N	60,126	60,126	60,126	60,126	60,126	60,126
Adjusted R Square	0.0423	0.0406	0.0593	0.0422	0.0407	0.0592
F	4.144	7.422	17.26	4.043	7.460	17.37

Panel B: Redefining HOLIDAY_DUMMY by excluding Mondays and Fridays.

	(1)	(2)	(3)	(4)	(5)	(6)
	HOLIDAY_NONMONDAY _NONFRIDAY_DUMMY is one to three days before forecast announcement dates			HOLIDAY_NONMONDAY _NONFRIDAY_DUMMY is one to three days after forecast announcement dates		
	CAR (−3,−1)	CAR (0,+1)	CAR (+2,+15)	CAR (−3,−1)	CAR (0,+1)	CAR (+2,+15)
HOLIDAY_NONMONDAY _NONFRIDAY_DUMMY	0.002**	−0.000	−0.002	0.000	0.000	−0.002
	(2.26)	(−0.20)	(−1.03)	(0.01)	(0.13)	(−0.76)
CONTROLS	Yes	Yes	Yes	Yes	Yes	Yes
ANALYST	Yes	Yes	Yes	Yes	Yes	Yes
INDUSTRY X YEAR	Yes	Yes	Yes	Yes	Yes	Yes
N	63,533	63,533	63,533	63,533	63,533	63,533
Adjusted R Square	0.0405	0.0402	0.0580	0.0404	0.0402	0.0580
F	4.457	8.022	17.43	4.198	8.015	17.52

Panel C: Redefining HOLIDAY_DUMMY by excluding holidays in January and December.

	(1)	(2)	(3)	(4)	(5)	(6)
	HOLIDAY_NONJANUARY _NONDECEMBER_DUMMY is one to three days before forecast announcement dates			HOLIDAY_NONJANUARY _NONDECEMBER_DUMMY is one to three days after forecast announcement dates		
	CAR (−3,−1)	CAR (0,+1)	CAR (+2,+15)	CAR (−3,−1)	CAR (0,+1)	CAR (+2,+15)
HOLIDAY_NONJANUARY _NONDECEMBER_DUMMY	0.000	0.001	−0.005***	−0.002	−0.001	−0.003
	(0.30)	(0.62)	(−2.84)	(−1.09)	(−0.59)	(−1.18)
CONTROLS	Yes	Yes	Yes	Yes	Yes	Yes
ANALYST	Yes	Yes	Yes	Yes	Yes	Yes
INDUSTRY X YEAR	Yes	Yes	Yes	Yes	Yes	Yes
N	63,533	63,533	63,533	63,533	63,533	63,533
Adjusted R Square	0.0404	0.0402	0.0581	0.0404	0.0402	0.0580
F	4.204	8.030	17.68	4.233	8.030	17.81

Panel D: Redefining HOLIDAY_DUMMY by excluding any religious related Holidays

	(1)	(2)	(3)	(4)	(5)	(6)
	HOLIDAY_NONRELIGION_DUMMY is one to three days before forecast announcement dates			HOLIDAY_NONRELIGION_DUMMY is one to three days after forecast announcement dates		
	CAR (−3,−1)	CAR (0,+1)	CAR (+2,+15)	CAR (−3,−1)	CAR (0,+1)	CAR (+2,+15)
HOLIDAY_NONRELIGION_DUMMY	0.001	0.000	−0.004**	−0.000	0.001	−0.002
	(1.48)	(0.26)	(−2.36)	(−0.29)	(0.83)	(−1.16)
CONTROLS	Yes	Yes	Yes	Yes	Yes	Yes
ANALYST	Yes	Yes	Yes	Yes	Yes	Yes
INDUSTRY X YEAR	Yes	Yes	Yes	Yes	Yes	Yes
N	63,209	63,209	63,209	63,209	63,209	63,209
Adjusted R Square	0.0405	0.0401	0.0579	0.0405	0.0402	0.0578
F	4.284	7.951	17.25	4.137	8.016	17.56

The table presents results from estimating regressions of recommendation informativeness on the indicator of analysts' country of origin holiday (HOLIDAY_DUMMY), control variables, and analyst, industry or year fixed effects. Standard errors are clustered by firms. Control variables include and natural logarithm of market capitalization (SIZE), natural logarithm of market capitalization and book value (lnBM), return on assets (ROA), the standard deviation of ROA over the past five years (STD_ROA), stock volatility calculated by using the past 13- trading days return (RETVOL), the average monthly returns of the past 12 months (RET), number of firms covered by the analyst (NumAnalysts), indicator of foreign sales (Foreign-Sales), broker size (BROKERSIZE), analyst's firm experience (FIRMEXP), analyst's total experience (GENERALEXP). All p-values are two-tailed. *, **, and *** indicate statistical significance at 10 %, 5 %, and 1 % level, respectively. Sample starts in the fiscal year of 2000 and ends in the fiscal year of 2020. Major religions considered include Christian, Orthodox, Jewish, Islamic, Hindu, Sikh, and Jain, the source data is available at https://www.infoplease.com/culture-entertainment/holidays.

their forecasts on non-US holidays, on Tuesday-to-Thursday only, and in February-to-November only. Table 6 reports the results.

Panel A of Table 6 reports the results based on the subsample where the U.S. holidays are excluded. In this subsample, only the holidays outside of the U.S. Columns (1) and (3) show very similar results as column (5) in Table 5, indicating that the positive market reaction around the recommendation and later negative market reaction do not disappear for the subsample where only the non-U.S. holidays are considered.

Panel B of Table 6 shows the results based on the subsample where the recommendations are not issued on Mondays nor on Fridays, and Panel C is based on months from February to November. Neither of the results from these two panels fully imply that the results in column (5) of Table 5 are not affected by Mondays/Fridays or January/December. For example, in column (1) in Panel B, the coefficient of HOLIDAY_DUMMY is 0.002 (p-value < 0.05), indicating a positive market reaction in the short period around the holidays of the issuing analyst's country of holiday; however, the coefficient of HOLIDAY_DUMMY is not significant in column (3), implying no post-recommendation adjustment. Similarly, in panel C, while the coefficient of HOLIDAY_DUMMY in column (1) is not significant, the coefficient of HOLIDAY_DUMMY is -0.005 (p-value < 0.01), implying a null reaction around the recommendation but a significantly negative reaction in the post recommendation period.

In general, results from Tables 5 and 6 show that when the recommendation is issued on the date before the recommending analyst's country of origin has a holiday, the market neither reacts significantly to the recommendation immediately nor in the post-fourteen-day period. However, when the recommendation is issued after a holiday in the recommending analyst's country of origin, the market reacts positively immediately, and the reaction is reversed in the post-fourteen-day period.

5. Additional analyses

5.1. Cultural clusters

The previous tests do not consider the effect of cultural clusters. Existing studies find that due to the various understanding of concepts from country to country, clustering multiple countries into a cultural cluster is more meaningful (Van Vlimmeren et al., 2017). To test how cultural clusters might moderate the evidence found in prior tables, we divide the whole sample into different cultural clusters based on Gupta et al. (2002). We then report results in Table 7.

Panels A and B report the results relating to forecast accuracy and forecast bias,[7] and Panel C reports the results when the dependent variables are the abnormal returns around the recommendations.[8]

Panel A shows that when analysts' countries of origin are countries that belong to the cultural clusters of Latin Europe and Anglo, right after their country of origin celebrates a holiday, the analysts' forecasts are more accurate than they are in other periods, and than forecasts of analysts who do not celebrate the holidays. In addition, when analysts' country of origin belongs to Eastern Europe, right after their country of origin celebrates a holiday, analysts' forecast is more optimistic bias, than they are in other periods, and than forecast of analysts who do not celebrate the holidays. One interesting finding is that when the analysts' country of origin is in Germanic Europe and right after the country celebrates a holiday, the analysts' earnings forecasts are less accurate.

Panel B shows that before analysts' countries of origin celebrate holidays, analysts from countries that belong to the Middle East cultural cluster issue more accurate earnings forecasts than analysts from other places or the same analysts in different periods. In addition, right before analysts' countries of origin celebrate holidays, analysts from countries that belong to the Nordic Europe and Latin Europe cultural clusters issue less optimistically biased earnings forecasts than analysts from other places or the same analysts in different periods.

As for the stock market reaction, Panel C of Table 7 reports that for post-holiday recommendations, analysts from Southern Asian countries will trigger a positive market reaction when the countries just celebrate holiday before the analysts issue a recommendation. However, this positive reaction does not reverse in the period after the recommendation. In addition, for post-holiday recommendations, in the fourteen-day period after the recommendations are issued, the market will go downward when the recommendations are issued right after the issuing analysts whose country of origin is either Easter Europe or Confucian Asian, without an initial market reaction right after the holiday celebration.

[7] Panels A and B only reports the results of subsamples where the coefficients of HOLIDAY_DUMMY are significant.

[8] In panels A and B, we use a subsample analysis, but in panel C, we use dummy variables to denote each cultural cluster and interact the cultural cluster variables with holiday dummy variable. Results are qualitative similar for panels A and B if interactions with cultural cluster variables are used and for panel C if subsample analyses are used.

Table 7
Cross-sectional Analyses: Cultural Clusters.

Panel A: HOLIDAY_DUMMY is one to three days before the forecast announcement dates

	(1)	(2)	(3)	(4)
	DV = ACCURACY			DV = BIAS
	Latin Europe	Anglo	Germanic Europe	Eastern Europe
	b/t	b/t	b/t	b/t
HOLIDAY_DUMMY	0.069**	0.047***	−0.082*	0.058**
	(2.10)	(3.37)	(−1.94)	(2.25)
SIZE	−0.004	−0.003	−0.021	−0.017
	(−0.31)	(−0.71)	(−1.55)	(−1.32)
LnBM	0.025	0.005	0.004	0.001
	(1.55)	(0.95)	(0.28)	(0.06)
ROA	−0.376**	−0.040	−0.005	−0.129
	(−2.27)	(−0.77)	(−0.03)	(−0.93)
STD_ROA	−0.177	−0.241**	−0.033	0.297
	(−0.65)	(−2.36)	(−0.11)	(1.18)
RETVOL	0.706	0.932**	−0.011	0.993
	(0.37)	(2.00)	(−0.01)	(0.65)
RET	0.711	−0.090	−1.444***	−0.013
	(1.21)	(−0.57)	(−3.04)	(−0.04)
NumAnalysts	0.000	0.001	−0.000	0.003
	(0.13)	(1.20)	(−0.05)	(1.14)
ForeignSales	−0.018	−0.009	−0.043	0.052**
	(−0.42)	(−0.78)	(−1.18)	(2.07)
BROKERSIZE	0.070	−0.002	0.076*	−0.028
	(1.57)	(−0.29)	(1.74)	(−1.21)
FIRMEXP	0.009***	0.003**	0.001	0.001
	(2.70)	(2.17)	(0.32)	(0.17)
GENERALEXP	−0.011	−0.002	0.004	0.013
	(−1.31)	(−0.79)	(0.47)	(0.33)
CONSTANT	−0.090	0.040	−0.078	0.468
	(−0.56)	(0.77)	(−0.36)	(1.10)
ANALYS	Yes	Yes	Yes	Yes
INDUSTRY X YEAR	Yes	Yes	Yes	Yes
N	8040	82,764	9017	3993
Adjusted R Square	0.0680	0.0493	0.112	0.189
F	1.701	2.739	1.890	2.132

Panel B: HOLIDAY_DUMMY is one to three days after the forecast announcement dates

	DV = ACCURACY	DV = BIAS	
	Middle East	Nordic Europe	Latin Europe
	b/t	b/t	b/t
HOLIDAY_DUMMY	0.270***	−0.107**	−0.069**
	(3.34)	(−2.35)	(−2.58)
SIZE	0.112**	0.021	−0.012
	(2.12)	(1.46)	(−1.44)
LnBM	−0.117*	0.004	−0.017*
	(−1.98)	(0.19)	(−1.67)
ROA	0.970	−0.259*	−0.079
	(1.02)	(−1.82)	(−0.83)
STD_ROA	6.063***	−0.437*	−0.158
	(5.58)	(−1.97)	(−1.25)
RETVOL	−6.232	0.812	−0.867
	(−1.13)	(0.46)	(−1.03)
RET	−0.462	0.325	−0.561**
	(−0.24)	(0.66)	(−2.14)
NumAnalysts	−0.014	−0.002	−0.002*
	(−0.96)	(−0.81)	(−1.66)
ForeignSales	−0.011	0.001	0.049***
	(−0.06)	(0.04)	(3.04)
BROKERSIZE	−0.242	−0.026	0.067***
	(−0.79)	(−0.22)	(3.61)
FIRMEXP	−0.020	−0.000	−0.002
	(−0.89)	(−0.03)	(−0.78)
GENERALEXP	−0.231**	0.024	−0.006
	(−2.54)	(0.81)	(−1.31)

(*continued on next page*)

Table 7 (*continued*)

Panel B: HOLIDAY_DUMMY is one to three days after the forecast announcement dates

	DV = ACCURACY	DV = BIAS	
	Middle East	Nordic Europe	Latin Europe
	b/t	b/t	b/t
CONSTANT	3.827**	0.172	0.523***
	(2.04)	(0.32)	(6.07)
ANALYS	Yes	Yes	Yes
INDUSTRY X YEAR	Yes	Yes	Yes
N	438	1226	8040
Adjusted R Square	0.236	0.234	0.142
F	7.379	1.353	3.406

Panel C: Recommendation Informativeness

	(1)	(2)	(3)	(4)	(5)	(6)
	HOLIDAY_DUMMY is one to three days before forecast announcement dates			HOLIDAY_DUMMY is one to three days after forecast announcement dates		
	CAR (−3,−1)	CAR (0,+1)	CAR (+2,+15)	CAR (−3,−1)	CAR (0,+1)	CAR (+2,+15)
	b/t	b/t	b/t			
HOLIDAY_DUMMY X Eastern Europe	−0.007	0.005	−0.026***	−0.010	0.008	−0.006
	(−0.49)	(0.89)	(−3.27)	(−1.14)	(1.04)	(−0.42)
HOLIDAY_DUMMY X Confucian Asia	−0.000	−0.010	−0.029**	−0.004	0.011**	−0.013
	(−0.04)	(−1.31)	(−2.35)	(−0.87)	(2.28)	(−1.19)
HOLIDAY_DUMMY X Sub-Saharan Africa	−0.005	0.003	0.002	−0.006	−0.001	−0.022
	(−0.62)	(0.31)	(0.20)	(−0.97)	(−0.09)	(−1.26)
HOLIDAY_DUMMY X Middle East	0.004	0.001	−0.003	−0.003	−0.000	0.002
	(0.91)	(0.18)	(−0.61)	(−0.81)	(−0.13)	(0.31)
HOLIDAY_DUMMY X Latin America	0.007	0.004	0.000	−0.001	−0.000	−0.014*
	(1.61)	(1.37)	(0.07)	(−0.25)	(−0.01)	(−1.80)
HOLIDAY_DUMMY X Nordic Europe	0.001	0.001	−0.003	0.001	0.000	−0.000
	(0.90)	(0.49)	(−1.61)	(0.39)	(0.07)	(−0.07)
HOLIDAY_DUMMY X Southern Asia	0.010**	−0.009*	0.003	0.005	0.004	−0.010
	(2.53)	(−1.92)	(0.43)	(0.88)	(0.89)	(−1.35)
HOLIDAY_DUMMY X Latin Europe	0.005	−0.000	0.002	−0.007	0.014	0.012
	(0.67)	(−0.09)	(0.20)	(−0.92)	(0.89)	(1.02)
HOLIDAY_DUMMY X Anglo	0.011	0.004	0.027*	0.019	0.009	0.012
	(0.68)	(0.55)	(1.92)	(0.65)	(0.72)	(1.03)
HOLIDAY_DUMMY X Germanic Europe	−0.004	−0.001	0.004	−0.001	0.006	0.007
	(−0.70)	(−0.04)	(0.35)	(−0.09)	(0.49)	(0.43)
CONTROLS	Yes	Yes	Yes	Yes	Yes	Yes
ANALYST	Yes	Yes	Yes	Yes	Yes	Yes
INDUSTRY X YEAR	Yes	Yes	Yes	Yes	Yes	Yes
N	60,113	60,113	60,113	60,113	60,113	60,113
Adjusted R Square	0.0387	0.0402	0.0582	0.0386	0.0403	0.0581
F	2.896	4.961	10.80	2.679	4.819	11.34

The table presents results from estimating regressions of forecast accuracy on the indicator of analysts' country of origin holiday (HOLIDAY_DUMMY), control variables, and analyst, industry, firm, year fixed effects, **for different subsample of culture clusters**. To save space, only significant results are reported. Standard errors are clustered by firms. Control variables include and natural logarithm of market capitalization (SIZE), natural logarithm of market capitalization and book value (lnBM), return on assets (ROA), the standard deviation of ROA over the past five years (STD_ROA), stock volatility calculated by using the past 13- trading days return (RETVOL), the average monthly returns of the past 12 months (RET), number of firms covered by the analyst (NumAnalysts), indicator of foreign sales (ForeignSales), broker size (BROKERSIZE), analyst's firm experience (FIRMEXP), analyst's total experience (GENERALEXP). All p-values are two-tailed. *, **, and *** indicate statistical significance at 10 %, 5 %, and 1 % level, respectively. Sample starts in the fiscal year of 2000 and ends in the fiscal year of 2020.

Similar as what is reported in Table 5, when HOLIDAY_DUMMY is defined as a dummy variable to indicate the one to three days before the holiday, no significant immediate market reaction or post-announcement drift are observed.[9]

5.2. Analyst's characteristics

5.2.1. Demographic characteristics

Numerous studies have documented that analysts' personal characteristics will moderate their forecast outcomes (Clement 1999). To test how analysts' personal characteristics might moderate their reaction to the holidays of their country of origin, we use FactSet Analysts' personal characteristics dataset, which includes gender, age, and educational background.

To test how analysts' gender might moderate their forecast accuracy and bias around the short period of their country of origin's holiday, we separate the sample into male analysts' subsamples and female analysts' subsamples. Results of analysts' forecast accuracy and bias are reported in Table 8, columns (1), (2), (5) and (6).

To test how analysts' educational background moderates the results found in Table 2, we create a dummy variable which equals to one when analysts at least have an undergraduate degree. Then we interact the dummy variable with HOLIDAY_DUMMY to test the moderating effect of education. Results are reported in Table 8, columns (3) and (7).

To test how analysts' age moderates the results found in Table 2, I create several dummy variables to denote whether analysts are born before 1960s, from 1960s to 1970s, from 1970s to 1980s, and after 1980s. Then we interact the dummy variables with HOLIDAY_DUMMY to test the moderating effect of age. Results are reported in Table 8, column (4) and (8).

Same as before, in Panel A, HOLIDAY_DUMMY is the dummy variable to denote one to three days after the holidays of issuing analysts' country of origin, while in Panel B, HOLIDAY_DUMMY is the dummy variable to denote one to three days before the holidays of issuing analysts' country of origin. Since for the same forecast, it can only be before or after the holiday, the samples of Panel A and Panel B are not the same.

Columns (1) and (2) in panel A of Table 8 show that male analysts issue more accurate forecasts shortly after their country of origin celebrates a holiday but that female analysts do not enjoy the increasing in forecasting accuracy effect. Column (5) and (6) of Panel A does not show any difference or any significance relating to forecast bias. This piece of evidence seems to indicate what Table 2 has documented is mainly constraint to the male analysts.

Column (3) of Panel A shows that when an analyst's highest degree of education is undergraduate, his or her forecasts are more accurate shortly after his or her country of origin celebrates a holiday. Column (7) of Panel A does not report any educational-related effect to the forecast bias. Neither column (4) of panel A nor column (8) of panel A shows any effect relating to when analysts were born.

Unlike in Panel A, where HOLIDAY_DUMMY denotes one to three days after the issuing analysts' country of origin celebrates a holiday, in Panel B, HOLIDAY_DUMMY denotes one to three days before the issuing analysts' country of origin.

Columns (1) and (2) of Panel B show no significant effect or difference between male and female analysts when they issue earnings forecasts shortly before their country of origin celebrates a holiday. In columns (5) and (6) of panel B, male analysts' forecasts are significantly less biased in one to three days before their country of origin celebrates a holiday, implying that the negative coefficient of HOLIDAY_DUMMY in panel B of Table 2 is mainly due to male analysts.

Column (3) of Panel B shows that when an analyst's highest degree of education is undergraduate, his or her forecast accuracy is not significantly accurate in the short period before his or her country of origin is going to celebrate a holiday. Column (7) of panel B, in contrast, shows that when analyst's highest degree of education is undergraduate, his or her forecast bias is significantly less during the short period before a holiday of his or her country of origin.

Column (4) of Panel B shows that for analysts who are born before 1960s, shortly before their country of origin celebrates a holiday, their forecast accuracy increased by 0.189 (p-value < 0.01), which is the greatest increase among analysts of different age groups. It also shows that for the same period, analysts who are born after 1980s issue forecast that is increased the second among all age groups, by 0.095 (p-value < 0.10); that analysts who are born between 1960s and 1970s issue forecast that is increased the third among all age groups, by 0.055 (p-value < 0.10); and that analysts who are born between 1970s and 1980s issue forecasts that are not significantly more accurate.

Column (8) of Panel B shows that analysts of different ages issue forecasts whose bias might be associated with whether the analysts' home country of origin will celebrate a holiday. It seems that analysts from 1970s and 1980s issue less biased forecasts in the short period before their country of origin celebrates a holiday.

In terms of recommendation informativeness, untabulated results show none of the above personal characteristics, i.e., gender, age, and educational backgrounds, moderate what is found in Table 5.

5.2.2. Analyst's skills

In addition to analysts' demographic characteristics such as gender and age, we further test whether analysts' professional skills might moderate the results. We measure analysts' skills by whether analysts are leaders in issuing the forecasts and whether analysts

[9] We also separately create an indicator variable to measure major religion related holidays, untabulated results show that the coefficient on that indicator is not significant.

Table 8
Analysts demographic characteristics.

Panel A: HOLIDAY_DUMMY is one to three days before forecast announcement dates

	(1) DV = ACCURACY	(2)	(3)	(4)	(5) DV = BIAS	(6)	(7)	(8)
	Male Analyst b/t	Female Analyst b/t	Analyst Education b/t	Analyst Age b/t	Male Analyst b/t	Female Analyst b/t	Analyst Education b/t	Analyst Age b/t
HOLIDAY_DUMMY	0.032***	−0.002			0.007	0.020		
	(2.68)	(−0.06)			(1.10)	(1.11)		
HOLIDAY_DUMMY X Undergraduate			0.029**				0.005	
			(2.49)				(0.82)	
HOLIDAY_DUMMY X Undergraduate & Born before 1960s				0.041				−0.007
				(0.81)				(−0.30)
HOLIDAY_DUMMY X Undergraduate & Born before 1970s				0.046				0.010
				(1.61)				(0.72)
HOLIDAY_DUMMY X Undergraduate & Born before 1980s				−0.000				0.001
				(−0.02)				(0.11)
HOLIDAY_DUMMY X Undergraduate & Born after 1980s				0.009				−0.025
				(0.17)				(−1.22)
SIZE	−0.004	−0.015	−0.002	−0.004	−0.000	−0.008	−0.001	0.002
	(−1.07)	(−1.06)	(−0.48)	(−0.72)	(−0.19)	(−1.33)	(−0.41)	(0.69)
LnBM	0.006	−0.007	0.002	0.003	−0.005*	0.006	−0.005*	−0.005
	(1.37)	(−0.48)	(0.42)	(0.42)	(−1.92)	(0.74)	(−1.91)	(−1.53)
ROA	0.013	−0.434**	0.002	−0.081	−0.069**	−0.224**	−0.076**	−0.156***
	(0.30)	(−2.42)	(0.05)	(−1.22)	(−2.19)	(−2.18)	(−2.40)	(−3.65)
STD_ROA	−0.122	−0.823**	−0.130	−0.156	−0.014	−0.175	−0.009	−0.077
	(−1.24)	(−2.44)	(−1.38)	(−0.99)	(−0.29)	(−1.07)	(−0.19)	(−1.22)
RETVOL	1.011**	2.071	1.371***	0.782	−0.253	−0.525	−0.239	−0.392
	(2.49)	(1.16)	(3.32)	(1.19)	(−0.92)	(−0.67)	(−0.88)	(−1.08)
RET	−0.186	−0.303	−0.119	0.154	−0.075	0.603**	−0.031	−0.021
	(−1.38)	(−0.65)	(−0.85)	(0.72)	(−0.93)	(2.28)	(−0.37)	(−0.19)
NumAnalysts	0.001	0.007**	0.001	0.001	−0.001***	−0.001	−0.001***	−0.002***
	(1.14)	(2.24)	(0.95)	(0.52)	(−3.15)	(−1.08)	(−3.30)	(−3.83)
ForeignSales	−0.015	−0.010	−0.020**	−0.012	−0.002	−0.008	−0.004	−0.001
	(−1.60)	(−0.26)	(−1.99)	(−0.84)	(−0.45)	(−0.49)	(−0.87)	(−0.09)
BROKERSIZE	−0.004	0.066**	−0.003	−0.014	0.003	0.025	0.006	0.003
	(−0.51)	(2.33)	(−0.39)	(−1.38)	(0.76)	(1.36)	(1.43)	(0.55)
FIRMEXP	0.003***	0.004	0.003**	0.004*	−0.000	0.003	−0.000	0.000
	(2.63)	(0.82)	(2.37)	(1.92)	(−0.58)	(1.25)	(−0.44)	(0.29)
GENERALEXP	−0.001	−0.006	−0.002	−0.004	0.001	−0.001	−0.000	−0.001
	(−0.36)	(−0.72)	(−0.73)	(−1.11)	(0.72)	(−0.33)	(−0.07)	(−0.78)
CONSTANT	0.038	−0.105	0.028	0.111*	0.514***	0.503***	0.518***	0.527***
	(0.84)	(−0.57)	(0.61)	(1.77)	(20.40)	(5.08)	(20.48)	(16.34)
ANALYS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
INDUSTRY X YEAR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	110,578	10,199	108,203	50,218	110,578	10,199	108,203	50,218
Adjusted R Square	0.0491	0.0914	0.0489	0.0578	0.0663	0.128	0.0659	0.0743
F	2.715	2.368	2.854	1.010	3.037	2.386	3.813	3.072

Panel B: HOLIDAY_DUMMY is one to three days after forecast announcement dates

	(1) DV = ACCURACY	(2)	(3)	(4)	(5) DV = BIAS	(6)	(7)	(8)
	Male Analyst b/t	Female Analyst b/t	Analyst Education b/t	Analyst Age b/t	Male Analyst b/t	Female Analyst b/t	Analyst Education b/t	Analyst Age b/t
HOLIDAY_DUMMY	0.005	0.028			−0.018**	−0.000		
	(0.36)	(0.56)			(−2.46)	(−0.00)		
HOLIDAY_DUMMY X Undergraduate			0.009				−0.017**	

(*continued on next page*)

Table 8 (*continued*)

Panel B: HOLIDAY_DUMMY is one to three days after forecast announcement dates

	(1) DV = ACCURACY	(2)	(3)	(4)	(5) DV = BIAS	(6)	(7)	(8)
	Male Analyst b/t	Female Analyst b/t	Analyst Education b/t	Analyst Age b/t	Male Analyst b/t	Female Analyst b/t	Analyst Education b/t	Analyst Age b/t
			(0.60)				(−2.30)	
HOLIDAY_DUMMY X Undergraduate & Born before 1960s				0.189***				−0.038
				(3.05)				(−1.06)
HOLIDAY_DUMMY X Undergraduate & Born before 1970s				0.056*				−0.031*
				(1.81)				(−1.96)
HOLIDAY_DUMMY X Undergraduate & Born before 1980s				−0.059				−0.025*
				(−1.56)				(−1.88)
HOLIDAY_DUMMY X Undergraduate & Born after 1980s				0.095*				−0.018
				(1.67)				(−0.72)
SIZE	−0.004	−0.015	−0.002	−0.004	−0.000	−0.008	−0.001	0.002
	(−1.05)	(−1.07)	(−0.47)	(−0.68)	(−0.20)	(−1.33)	(−0.42)	(0.67)
LnBM	0.006	−0.007	0.002	0.003	−0.005*	0.006	−0.005*	−0.005
	(1.36)	(−0.48)	(0.42)	(0.38)	(−1.93)	(0.74)	(−1.91)	(−1.53)
ROA	0.013	−0.428**	0.002	−0.078	−0.068**	−0.224**	−0.076**	−0.156***
	(0.30)	(−2.38)	(0.05)	(−1.18)	(−2.17)	(−2.18)	(−2.40)	(−3.64)
STD_ROA	−0.123	−0.820**	−0.131	−0.151	−0.015	−0.175	−0.011	−0.078
	(−1.25)	(−2.43)	(−1.39)	(−0.95)	(−0.31)	(−1.07)	(−0.21)	(−1.23)
RETVOL	1.020**	2.032	1.378***	0.774	−0.246	−0.518	−0.232	−0.380
	(2.51)	(1.14)	(3.33)	(1.18)	(−0.90)	(−0.65)	(−0.86)	(−1.05)
RET	−0.188	−0.301	−0.122	0.162	−0.075	0.601**	−0.031	−0.021
	(−1.39)	(−0.65)	(−0.87)	(0.75)	(−0.93)	(2.28)	(−0.37)	(−0.19)
NumAnalysts	0.001	0.007**	0.001	0.001	−0.001***	−0.001	−0.001***	−0.002***
	(1.16)	(2.25)	(0.98)	(0.52)	(−3.19)	(−1.05)	(−3.33)	(−3.88)
ForeignSales	−0.015	−0.010	−0.020**	−0.012	−0.002	−0.009	−0.004	−0.001
	(−1.59)	(−0.25)	(−1.98)	(−0.83)	(−0.42)	(−0.51)	(−0.85)	(−0.07)
BROKERSIZE	−0.004	0.067**	−0.003	−0.014	0.003	0.024	0.006	0.003
	(−0.49)	(2.33)	(−0.39)	(−1.34)	(0.77)	(1.33)	(1.44)	(0.55)
FIRMEXP	0.003***	0.004	0.003**	0.004*	−0.000	0.003	−0.000	0.000
	(2.65)	(0.83)	(2.39)	(1.90)	(−0.57)	(1.27)	(−0.43)	(0.30)
GENERALEXP	−0.001	−0.005	−0.002	−0.004	0.001	−0.001	−0.000	−0.001
	(−0.32)	(−0.70)	(−0.69)	(−1.08)	(0.70)	(−0.31)	(−0.10)	(−0.84)
CONSTANT	0.038	−0.112	0.027	0.106*	0.516***	0.507***	0.520***	0.530***
	(0.84)	(−0.61)	(0.60)	(1.69)	(20.52)	(5.16)	(20.60)	(16.42)
ANALYS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
INDUSTRY X YEAR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	110,578	10,199	108,203	50,218	110,578	10,199	108,203	50,218
Adjusted R Square	0.0490	0.0915	0.0488	0.0584	0.0664	0.127	0.0660	0.0745
F	2.166	2.406	2.380	2.094	3.351	2.178	4.120	3.363

The table presents results from estimating regressions of forecast accuracy on the indicator of analysts' country of origin holiday (HOLIDAY_DUMMY), control variables, and analyst, industry, firm, year fixed effects, for different subsample of analysts' demographic characteristics. Standard errors are clustered by firms. Control variables include and natural logarithm of market capitalization (SIZE), natural logarithm of market capitalization and book value (lnBM), return on assets (ROA), the standard deviation of ROA over the past five years (STD_ROA), stock volatility calculated by using the past 13- trading days return (RETVOL), the average monthly returns of the past 12 months (RET), number of firms covered by the analyst (NumAnalysts), indicator of foreign sales (ForeignSales), broker size (BROKERSIZE), analyst's firm experience (FIRMEXP), analyst's total experience (GENERALEXP). All p-values are two-tailed. *, **, and *** indicate statistical significance at 10 %, 5 %, and 1 % level, respectively. Sample starts in the fiscal year of 2000 and ends in the fiscal year of 2020.

Table 9
Analysts' skills.

Panel A: HOLIDAY_DUMMY is one to three days before forecast announcement dates				
DV = ACCURACY	(1) LEADERS b/t	(2) FOLLOWERS b/t	(3) TOP TEN UNIVERSITIES b/t	(4) OTHER UNIVERSITIES b/t
HOLIDAY_DUMMY	0.002	0.043***	0.017	0.032***
	(0.15)	(2.81)	(0.43)	(2.64)
SIZE	−0.002	−0.007	0.006	−0.003
	(−0.52)	(−1.33)	(0.53)	(−0.62)
LnBM	0.009*	−0.000	0.002	0.001
	(1.67)	(−0.05)	(0.11)	(0.13)
ROA	0.001	−0.033	−0.074	0.005
	(0.02)	(−0.56)	(−0.46)	(0.11)
STD_ROA	0.055	−0.237**	−0.015	−0.132
	(0.43)	(−2.40)	(−0.07)	(−1.30)
RETVOL	1.012*	1.043*	2.596	1.187***
	(1.69)	(1.74)	(1.55)	(2.82)
RET	0.038	−0.424**	0.155	−0.179
	(0.22)	(−2.17)	(0.36)	(−1.23)
NumAnalysts	−0.003***	0.004***	0.003	0.001
	(−2.80)	(3.28)	(1.24)	(0.68)
ForeignSales	−0.011	−0.014	−0.071**	−0.017*
	(−0.80)	(−1.25)	(−2.04)	(−1.75)
BROKERSIZE	−0.018*	0.001	−0.022	−0.003
	(−1.65)	(0.07)	(−0.85)	(−0.35)
FIRMEXP	0.003**	0.002	0.002	0.003**
	(2.08)	(1.36)	(0.49)	(2.44)
GENERALEXP	−0.001	0.000	0.005	−0.001
	(−0.33)	(0.10)	(0.72)	(−0.26)
CONSTANT	0.074	0.052	−0.043	0.025
	(1.20)	(0.83)	(−0.30)	(0.50)
ANALYS	Yes	Yes	Yes	Yes
INDUSTRY X YEAR	Yes	Yes	Yes	Yes
N	58,465	62,365	10,652	98,367
Adjusted R Square	0.0738	0.0648	0.0866	0.0508
F	2.303	3.259	0.916	2.548
Panel B: HOLIDAY_DUMMY is one to three days before forecast announcement dates				
DV=BIAS	(1) LEADERS b/t	(2) FOLLOWERS b/t	(3) TOP TEN UNIVERSITIES b/t	(4) OTHER UNIVERSITIES b/t
HOLIDAY_DUMMY	−0.013	−0.017*	−0.019	−0.017**
	(−1.28)	(−1.80)	(−0.93)	(−2.29)
SIZE	−0.007***	0.005*	−0.008	−0.000
	(−2.81)	(1.69)	(−1.42)	(−0.18)
LnBM	−0.002	−0.006**	0.000	−0.006**
	(−0.75)	(−2.04)	(0.04)	(−1.98)
ROA	−0.044	−0.100**	−0.119	−0.078**
	(−1.20)	(−2.35)	(−1.59)	(−2.37)
STD_ROA	0.016	−0.052	0.205	−0.040
	(0.23)	(−0.84)	(1.64)	(−0.81)
RETVOL	−0.334	−0.210	−2.834***	−0.017
	(−0.96)	(−0.65)	(−3.32)	(−0.07)
RET	−0.330***	0.233**	−0.161	−0.029
	(−3.52)	(2.05)	(−0.61)	(−0.35)
NumAnalysts	−0.000	−0.002***	0.001	−0.002***
	(−0.65)	(−3.71)	(0.74)	(−3.69)
ForeignSales	−0.001	−0.004	−0.007	−0.004
	(−0.10)	(−0.55)	(−0.51)	(−0.68)
BROKERSIZE	0.003	0.001	0.013	0.005
	(0.59)	(0.23)	(0.85)	(1.13)
FIRMEXP	−0.000	0.000	−0.003	−0.000
	(−0.60)	(0.10)	(−1.38)	(−0.25)
GENERALEXP	0.001	0.001	−0.000	−0.000
	(0.50)	(0.72)	(−0.14)	(−0.33)
CONSTANT	0.563***	0.481***	0.598***	0.519***
	(17.27)	(15.15)	(7.28)	(19.28)
ANALYS	Yes	Yes	Yes	Yes
INDUSTRY X YEAR	Yes	Yes	Yes	Yes

(*continued on next page*)

Table 9 (*continued*)

Panel B: HOLIDAY_DUMMY is one to three days before forecast announcement dates				
DV=BIAS	(1) LEADERS b/t	(2) FOLLOWERS b/t	(3) TOP TEN UNIVERSITIES b/t	(4) OTHER UNIVERSITIES b/t
N	58,465	62,365	10,652	98,367
Adjusted R Square	0.0889	0.0881	0.135	0.0656
F	3.185	3.166	1.784	4.249

The table presents results from estimating regressions of forecast accuracy on the indicator of analysts' country of origin holiday (HOLIDAY_DUMMY), control variables, and analyst, industry, firm, year fixed effects, for different subsamples of analysts' skills. Standard errors are clustered by firms. Control variables include and natural logarithm of market capitalization (SIZE), natural logarithm of market capitalization and book value (lnBM), return on assets (ROA), the standard deviation of ROA over the past five years (STD_ROA), stock volatility calculated by using the past 13-trading days return (RETVOL), the average monthly returns of the past 12 months (RET), number of firms covered by the analyst (NumAnalysts), indicator of foreign sales (ForeignSales), broker size (BROKERSIZE), analyst's firm experience (FIRMEXP), analyst's total experience (GENERALEXP). All p-values are two-tailed. *, **, and *** indicate statistical significance at 10 %, 5 %, and 1 % level, respectively. Sample starts in the fiscal year of 2000 and ends in the fiscal year of 2020.

graduate from the top ten universities in the U.S.A., based on prior studies (such as Cooper et al.).[10] We then present the subsample analyses in Table 9.

Results show that the increased forecast accuracy shortly before the holiday and the decreased forecast bias shortly after the holiday mainly exists in the subsamples where the sell-side analysts are followers or do not graduate from universities that rank top ten in the U.S. News.

5.3. Firms' characteristics

Firms' characteristics might moderate how following analysts react to the holidays of their country of origin. To investigate this, we focus on the firm's size and its operational stability. The larger the size, and the more stable the firm operates, the easier it will be for analysts to make an earnings forecast. Thus, when the analysts face the holiday, they might be able to make more accurate forecasts for these firms (i.e., firms of big size and stable operation). We report the subsample analysis in Table 10. Results provide supporting evidence for our expectation.

5.4. Alternative explanations

In the prior tables, we test how analysts react to the holidays of their country of origin, in terms of whether their forecasts are made shortly (one to three days) before these holidays or shortly (one to three days) after these holidays. In un-tabulated tables, we also test how analysts' forecasts or the stock market's reaction to analysts' recommendations if these forecasts or recommendations are made during these holidays. To our surprise, none of results are significant, i.e., analysts are not significantly accurate in their forecasts, not more biased in their forecasts, or issuing important recommendations if their country of origin is celebrating holidays at the same time.

Pevzner et al. (2015), along with other scholars (such as Guisoet al. (2006), (2008)), when investigating the cultural effects, believe that culture is related to both the country of origin and the religion. For instance, Becker (1996) writes: "individuals have less control over their culture than over other social capital. They cannot alter their ethnicity, race, or family history, and only with difficulty can they change their country or religion." Guisoet al. (2006) even use religion and ethnicity as instrumental variables for culture. Since holidays, religions, and social trust are part of individual's cultural composites. In Tables 3 and 6, we try to rule out of the effect of religion. In Pevzner et al. (2015), the authors test a variety of country-level cultural, rule of law, disclosure, education and etc. factors. Given that the rule of law index, disclosure requirement index, and average education level are country level cross-sectional dataset. We further test societal trust, hierarchy, and individualism based on the time-series cross-national world value survey dataset.[11]

First, we test whether the holiday effect comes from the country's ex ante social trust. To test the potential effect of social trust, we measure societal trust based on the following question from the World Values Survey (WVS):

"Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people."

We recode the response to this question to one if a survey participant reports that most people can be trusted and zero otherwise and then calculate the mean of the response in each country year as my measure of societal trust (*trust_country*). Then, based on analysts' country of origin and the forecast year, we merge the societal trust to individual analyst.

Then, we test whether hierarchy and individualism might also explain the holiday effect. For national attitudes toward hierarchy versus egalitarianism, we use the following question from the WVS:

"People have different ideas about following instructions at work. Some say that one should follow one's superior's instructions even when one does not fully agree with them. Others say that one should follow one's superior's instructions only when one is convinced that they are right.

[10] We use the top ten universities from the U.S. News, the list is available at https://www.usnews.com/best-colleges/rankings/national-universities?_sort=rank&_sortDirection=asc.

[11] The time-series WVS dataset (1981-2020) is available at https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp.

Table 10
Firms' characteristics.

Panel A: HOLIDAY_DUMMY is one to three days before forecast announcement dates				
DV = ACCURACY	(1) BIG FIRMS b/t	(2) SMALL FIRMS b/t	(3) MORE STABLE FIRMS b/t	(4) LESS STABLE FIRMS b/t
HOLIDAY_DUMMY	0.044***	0.005	0.055***	0.002
	(2.75)	(0.32)	(3.73)	(0.13)
SIZE	−0.010	0.001	−0.002	−0.010**
	(−1.52)	(0.23)	(−0.42)	(−2.01)
LnBM	0.004	0.002	−0.006	0.014**
	(0.70)	(0.24)	(−0.98)	(2.57)
ROA	−0.102	0.034	−0.125	−0.008
	(−1.37)	(0.63)	(−1.41)	(−0.16)
STD_ROA	−0.175	−0.089	0.273	−0.233**
	(−1.08)	(−0.86)	(1.46)	(−2.24)
RETVOL	1.321*	0.959*	1.869	0.476
	(1.81)	(1.90)	(1.34)	(0.88)
RET	−0.120	−0.204	−0.176	−0.224
	(−0.51)	(−1.29)	(−0.68)	(−1.46)
NumAnalysts	0.002	0.001	0.001	0.002*
	(1.30)	(1.26)	(1.08)	(1.83)
ForeignSales	−0.012	−0.013	−0.028**	0.000
	(−0.81)	(−1.11)	(−2.12)	(0.03)
BROKERSIZE	0.003	−0.001	−0.004	−0.001
	(0.29)	(−0.09)	(−0.47)	(−0.07)
FIRMEXP	0.004**	0.002	0.003*	0.002
	(2.46)	(1.13)	(1.89)	(1.31)
GENERALEXP	−0.001	−0.001	−0.001	−0.000
	(−0.30)	(−0.36)	(−0.41)	(−0.09)
CONSTANT	0.048	−0.003	0.024	0.073
	(0.65)	(−0.05)	(0.37)	(1.17)
ANALYS	Yes	Yes	Yes	Yes
INDUSTRY X YEAR	Yes	Yes	Yes	Yes
N	60,713	60,223	60,745	60,148
Adjusted R Square	0.0697	0.0611	0.0698	0.0635
F	2.436	1.027	3.259	1.355
Panel B: HOLIDAY_DUMMY is one to three days before forecast announcement dates				
DV = BIAS	(1) BIG FIRMS b/t	(2) SMALL FIRMS b/t	(3) MORE STABLE FIRMS b/t	(4) LESS STABLE FIRMS b/t
HOLIDAY_DUMMY	−0.015	−0.013	−0.020**	−0.010
	(−1.44)	(−1.40)	(−1.97)	(−1.03)
SIZE	−0.002	−0.001	0.003	−0.003
	(−0.59)	(−0.35)	(0.96)	(−0.96)
LnBM	−0.006*	−0.006	−0.008**	−0.000
	(−1.65)	(−1.52)	(−2.00)	(−0.14)
ROA	−0.133***	−0.046	−0.039	−0.057
	(−3.35)	(−1.20)	(−0.71)	(−1.54)
STD_ROA	−0.038	−0.050	−0.044	−0.015
	(−0.52)	(−0.87)	(−0.45)	(−0.25)
RETVOL	−0.576	−0.136	−0.806	−0.161
	(−1.32)	(−0.42)	(−0.81)	(−0.45)
RET	−0.200	0.047	−0.026	0.029
	(−1.30)	(0.48)	(−0.16)	(0.31)
NumAnalysts	−0.002***	−0.001*	−0.003***	−0.001
	(−3.10)	(−1.73)	(−4.20)	(−0.94)
ForeignSales	−0.013*	0.003	−0.002	0.003
	(−1.66)	(0.46)	(−0.27)	(0.39)
BROKERSIZE	0.009*	0.002	0.012**	−0.003
	(1.95)	(0.31)	(2.58)	(−0.53)
FIRMEXP	0.000	−0.001	−0.000	−0.001
	(0.11)	(−0.97)	(−0.33)	(−1.18)
GENERALEXP	0.002	−0.002	0.001	0.001
	(1.40)	(−1.36)	(0.32)	(0.64)
CONSTANT	0.526***	0.544***	0.486***	0.533***
	(11.40)	(14.27)	(12.80)	(16.70)
ANALYS	Yes	Yes	Yes	Yes
INDUSTRY X YEAR	Yes	Yes	Yes	Yes

(*continued on next page*)

Table 10 (*continued*)

Panel B: HOLIDAY_DUMMY is one to three days before forecast announcement dates				
DV = BIAS	(1) BIG FIRMS b/t	(2) SMALL FIRMS b/t	(3) MORE STABLE FIRMS b/t	(4) LESS STABLE FIRMS b/t
N	60,713	60,223	60,745	60,148
Adjusted R Square	0.0948	0.0879	0.0930	0.0910
F	3.805	1.334	3.557	1.051

The table presents results from estimating regressions of forecast accuracy on the indicator of analysts' country of origin holiday (HOLIDAY_DUMMY), control variables, and analyst, industry, firm, year fixed effects, for different subsamples of firms' characteristics. Standard errors are clustered by firms. Control variables include and natural logarithm of market capitalization (SIZE), natural logarithm of market capitalization and book value (lnBM), return on assets (ROA), the standard deviation of ROA over the past five years (STD_ROA), stock volatility calculated by using the past 13- trading days return (RETVOL), the average monthly returns of the past 12 months (RET), number of firms covered by the analyst (NumAnalysts), indicator of foreign sales (ForeignSales), broker size (BROKERSIZE), analyst's firm experience (FIRMEXP), analyst's total experience (GENERALEXP). All p-values are two-tailed. *, **, and *** indicate statistical significance at 10 %, 5 %, and 1 % level, respectively. Sample starts in the fiscal year of 2000 and ends in the fiscal year of 2020.

With which of these two opinions do you agree? 1. Should follow instructions. 2. Must be convinced first."

Countries where people are more likely to follow instructions without question are considered hierarchical. we recode the response to the question to one if a survey participant agrees with the first opinion and zero otherwise. Then we use the average response of survey participants in each country year to measure the degree of hierarchy in a society (*hierarchy_country*).

To measure individualism, we use the following question from the WVS.

"How would you place your views on this scale? 1 means you completely agree with statement (1); 10 means you agree completely with statement (2); and if your views fall somewhere in between, you can choose any number in between. (1) Incomes should be made more equal. (2) We need larger income differences as incentives for individual effort."

Countries that are more individualistic place greater weight on individual effort than on ensuring everyone's benefit. we rescale the response of each survey participant to this question to be between zero and one, with zero representing completely agreeing with the first statement and one representing completely agreeing with the second statement. The average of the rescaled response in each country year is the measurement of individualism (*individualism_country*).

Given that the WVS dataset contains the results from seven waves, i.e., 1981–1983, 1990–1992, 1995–1998, 2000–2004, 2005–2009, 2010–2014, 2017–2020, we match the WVS dataset with individual financial analyst forecast dataset by finding the most recent World Value Survey year for any forecast. For example, if the forecast is made on November 18, 2011, and the nearest available WVS dataset is from 2002, then we match the WVS's data of 2002 to the 2011′s forecast. In this way, we can make sure that the value measure is not affected by the forecast variable.

Results of adding the societal trust, hierarchy, and individualism respectively are reported in Table 11. Panels A and B report results related to forecast accuracy and forecast bias, while panels C and D report results related to the short-term stock market reaction. When comparing results in panel A of Table 11 with those in panel A of Table 2, the significance of the HOLIDAY_DUMMY is almost the same in both tables, implying the post-holiday boost in forecast accuracy is not decreased by the country of origin's ex-ante societal trust, level of hierarchy, or level of individualism. When comparing results in panel B of Table 11 with those in panel B of Table 2, it seems that when HOLIDAY_DUMMY means one to three days before a holiday in issuing analysts' country of origin, analysts are less biased in the pre-holiday period, but not when controlling for the country's level of hierarchy. Results in panel C and panel D of Table 11 almost mimic those in panel A and panel C of Table 11.

Overall, these results show that the three country-level cultural measurements could not replace the effect of the holiday.

6. Conclusion

This paper tests whether and how sell-side financial analysts in the United States react to the holidays of their country of origin. To track the analyst's country of origin, we use the analyst's last name and search in which country the last name is most prevalent or has the highest density. Then, we search the national holidays of each of these countries to identify the forecasts or recommendations that are issued one to three days before each holiday or one to three days after each holiday. Based on these holiday identifiers, we find that before these holidays, analysts' forecasts are less biased, but shortly after these holidays, analysts' forecasts are more accurate, and recommendations are related to more market reactions. These results show that analysts perform better shortly after the holidays, even though they do not celebrate these holidays in the United States. We further rule out the potential effects of January/December, Monday/Friday, Religion-related holidays, other social factors (such as social trust, the level of hierarchy, and the level of individualism). These results seem to show that holidays are a unique factor.

CRediT authorship contribution statement

Zheng Liu: Methodology. **Yingfei Liu:** Writing – review & editing, Writing – original draft, Conceptualization. **Qiankun Gu:** Investigation. **Huiqiang Wang:** Data curation.

Table 11
Alternative explanations.

Panel A: HOLIDAY_DUMMY is one to three days before forecast announcement dates						
	(1) ACCURACY	(2)	(3)	(4) BIAS	(5)	(6)
	b/t	b/t	b/t	b/t	b/t	b/t
HOLIDAY_DUMMY	0.026**	0.026**	0.026**	0.007	0.005	0.007
	(2.38)	(2.17)	(2.37)	(1.24)	(0.82)	(1.24)
trust_country	0.205			−0.024		
	(1.59)			(−0.37)		
hierarchy_country		−0.555			0.447	
		(−0.66)			(1.09)	
individualism_country			−0.005			−0.034
			(−0.04)			(−0.65)
CONTROLS	Yes	Yes	Yes	Yes	Yes	Yes
ANALYS	Yes	Yes	Yes	Yes	Yes	Yes
INDUSTRY#fyearq	Yes	Yes	Yes	Yes	Yes	Yes
N	115,441	103,281	115,441	115,441	103,281	115,441
Adjusted R Square	0.0488	0.0469	0.0487	0.0652	0.0652	0.0652
F	3.112	2.737	2.875	3.383	3.638	3.395
Panel B: HOLIDAY_DUMMY is one to three days after forecast announcement dates						
	(1) ACCURACY	(2)	(3)	(4) BIAS	(5)	(6)
	b/t	b/t	b/t	b/t	b/t	b/t
HOLIDAY_DUMMY	0.008	0.006	0.008	−0.013*	−0.010	−0.013*
	(0.59)	(0.37)	(0.60)	(−1.79)	(−1.29)	(−1.79)
trust_country	0.202			−0.024		
	(1.57)			(−0.36)		
hierarchy_country		−0.554			0.449	
		(−0.66)			(1.09)	
individualism_country			−0.004			−0.034
			(−0.04)			(−0.64)
CONTROLS	Yes	Yes	Yes	Yes	Yes	Yes
ANALYS	Yes	Yes	Yes	Yes	Yes	Yes
INDUSTRY#fyearq	Yes	Yes	Yes	Yes	Yes	Yes
N	115,441	103,281	115,441	115,441	103,281	115,441
Adjusted R Square	0.0487	0.0468	0.0486	0.0652	0.0652	0.0652
F	2.754	2.509	2.508	3.467	3.706	3.472
Panel C: HOLIDAY_DUMMY is one to three days before forecast announcement dates						
	(1) CAR (−3, −1)	(2)	(3)	(4) CAR (+2, +15)	(5)	(6)
	b/t	b/t	b/t	b/t	b/t	b/t
HOLIDAY_DUMMY	0.002	0.002*	0.002	−0.003**	−0.003**	−0.003**
	(1.61)	(1.87)	(1.63)	(−2.32)	(−1.96)	(−2.31)
trust_country	0.013			0.015		
	(0.99)			(0.91)		
hierarchy_country		0.095			0.080	
		(0.77)			(0.45)	
individualism_country			−0.004			−0.005
			(−0.36)			(−0.29)
CONTROLS	Yes	Yes	Yes	Yes	Yes	Yes
ANALYS	Yes	Yes	Yes	Yes	Yes	Yes
INDUSTRY#fyearq	Yes	Yes	Yes	Yes	Yes	Yes
N	60,192	54,179	60,192	60,192	54,179	60,192
Adjusted R Square	0.0416	0.0389	0.0415	0.0582	0.0580	0.0582
F	4.259	3.785	4.104	16.37	16.38	16.20
Panel D: HOLIDAY_DUMMY is one to three days after forecast announcement dates						
	(1) CAR (−3, −1)	(2)	(3)	(4) CAR (+2, +15)	(5)	(6)
	b/t	b/t	b/t	b/t	b/t	b/t
HOLIDAY_DUMMY	0.000	0.000	0.000	−0.003	−0.002	−0.003
	(0.05)	(0.27)	(0.06)	(−1.30)	(−0.74)	(−1.29)
trust_country	0.013			0.015		
	(1.01)			(0.89)		

(*continued on next page*)

Table 11 (*continued*)

Panel D: HOLIDAY_DUMMY is one to three days after forecast announcement dates						
	(1)	(2)	(3)	(4)	(5)	(6)
	CAR (−3, −1)			CAR (+2, +15)		
	b/t	b/t	b/t	b/t	b/t	b/t
hierarchy_country		0.094			0.081	
		(0.77)			(0.45)	
individualism_country			−0.004			−0.005
			(−0.37)			(−0.27)
CONTROLS	Yes	Yes	Yes	Yes	Yes	Yes
ANALYS	Yes	Yes	Yes	Yes	Yes	Yes
INDUSTRY#fyearq	Yes	Yes	Yes	Yes	Yes	Yes
N	60,192	54,179	60,192	60,192	54,179	60,192
Adjusted R Square	0.0415	0.0388	0.0415	0.0581	0.0580	0.0581
F	4.100	3.657	3.924	16.62	16.45	16.43

The table presents results from estimating regressions of forecast accuracy (bias) on the indicator of analysts' country of origin holiday (HOLIDAY_DUMMY), societal trust (trust_country), the degree of hierarchy in a society (hierarchy_country), individualism (individualism_country), control variables, and analyst, industry or year fixed effects. Standard errors are clustered by firms. Control variables include and natural logarithm of market capitalization (SIZE), natural logarithm of market capitalization and book value (lnBM), return on assets (ROA), the standard deviation of ROA over the past five years (STD_ROA), stock volatility calculated by using the past 13- trading days return (RETVOL), the average monthly returns of the past 12 months (RET), number of firms covered by the analyst (NumAnalysts), indicator of foreign sales (ForeignSales), broker size (BROKERSIZE), analyst's firm experience (FIRMEXP), analyst's total experience (GENERALEXP). Standard errors are reported in parentheses. All p-values are two-tailed. *, **, and *** indicate statistical significance at 10 %, 5 %, and 1 % level, respectively. Sample starts in the fiscal year of 2000 and ends in the fiscal year of 2020.

Appendix 1 Variable Definitions

Variable	Definition
Dependent Variables	
$ACCURACY_{i,j,t}$	The difference between the maximum absolute forecast error for firm i in quarter t and analyst j's absolute forecast error for firm i in quarter t, divided by the difference between the maximum absolute forecast error for firm i in quarter t and the minimum absolute forecast error for firm i in quarter t. (Data source: I/B/E/S)
$ACCURACY\_ALT_{i,j,t}$	The difference between the absolute forecast error by analyst j for firm i at quarter t and the mean absolute forecast error of all the forecasts for firm i at quarter t, divided by the mean absolute error.
$BIAS_{i,j,t}$	The difference between the maximum signed forecast error for firm i in quarter t and analyst j's signed forecast error for firm i in quarter t, divided by the difference between the maximum signed forecast error for firm i in quarter t and the minimum signed forecast error for firm i in quarter t. (Data source: I/B/E/S)
$CAR(-3, -1)_{i,j,t}$	The two-day cumulative abnormal returns starting from three days before and ending one days before analyst j's recommendation for firm i. (Data source: I/B/E/S and CRSP)
$CAR(0, +1)_{i,j,t}$	The two-day cumulative abnormal returns starting from the date and ending one day after analyst j's recommendation for firm i. (Data source: I/B/E/S and CRSP)
$CAR(+2, +15)_{i,j,t}$	The fourteen-day cumulative abnormal returns starting from two days after and ending fifteen days after analyst j's recommendation for firm i. (Data source: I/B/E/S and CRSP)
Holiday Measurement	
$HOLIDAY\_DUMMY_{j,t}$ ($Pre\_Holiday_{j,t}$, $In\_Holiday_{j,t}$, $Post\_Holiday_{j,t}$)	An indicator variable which is equal to one if the forecast or the recommendation issuance date is one to three days before (after or in) the holiday that is going to be celebrated in analyst j's country of origin. (Data source: I/B/E/S, https://www.timeanddate.com/holidays/, and FactSet) Note: for a specific forecast or recommendation, since the date of issuance is certain, the forecast or recommendation can only belong to one of the three period, a pre-holiday period, a in-holiday period, or a post-holiday period.
$HOLIDAY\_ALT1_{j,t}$	An indicator variable which is equal to one if the forecast or the recommendation issuance date is on the day and one to three days after the holiday that is going to be celebrated in analyst j's country of origin.
$HOLIDAY\_ALT2_{j,t}$	An indicator variable which is equal to one if the forecast or the recommendation issuance date is the seven-day period (three days before to three days after) around the holiday that is going to be celebrated in analyst j's country of origin.
$HOLIDAY\_NONMONDAY\_NONFRIDAY\_DUMMY_{j,t}$	An indicator variable which is equal to one if the forecast or the recommendation issuance date is one to three days before (after or in) the holiday that is going to be celebrated in analyst j's country of origin, but not on Mondays or Fridays.
$HOLIDAY\_NONJANUARY\_NONDECEMBER\_DUMMY_{j,t}$	An indicator variable which is equal to one if the forecast or the recommendation issuance date is one to three days before (after or in) the holiday that is going to be celebrated in analyst j's country of origin, but not in January or in December.
$HOLIDAY\_NONRELIGION\_DUMMY_{j,t}$	An indicator variable which is equal to one if the forecast or the recommendation issuance date is one to three days before (after or in) the holiday that is going to be celebrated in analyst j's country of origin, but not religious holidays.
Control Variables	
$NumAnalysts_{i,t}$	The number of analysts that cover the firm i in quarter t. (Data source: I/B/E/S)

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(*continued*)

Variable	Definition
$SIZE_{i,t}$	The natural log of the equity market value of the firm i in quarter t. (Data source: Compustat)
$LnBM_{i,t}$	The natural log of the ratio of market value of equity of firm i to book value of equity of firm i in quarter t. (Data source: Compustat)
$ROA_{i,t}$	The ratio of firm i's income before extraordinary items in quarter t to total assets in quarter t. (Data source: Compustat)
$STD\_ROA_{i,t}$	The standard deviation of firm i's ROA over the last five years by the end of quarter t. (Data source: Compustat)
$RETVOL_{i,t}$	The standard deviation of firm i's daily stock returns over the last 12 months by the end of quarter t. (Data source: CRSP)
$RET_{i,t}$	The average monthly return of firm i over the last 12 months by the end of quarter t. (Data source: CRSP)
$ForeignSales_{i,t}$	An indicator variable set to one if the firm i reports non-missing and non-zero values of any of the following by the end of quarter t: foreign sales from the Compustat Segment file; foreign pretax income; foreign taxes; or foreign currency translation. (Data source: Compustat)
$BROKERSIZE_{j,t}$	The natural logarithm of the number of analysts employed by the broker firm in quarter t. (Data source: I/B/E/S)
$GENERALEXP_{j,t}$	The number of years of an analyst j has been providing forecasts in I/B/E/S database by the end of quarter t. (Data source: I/B/E/S)
$FIRMEXP_{i,j,t}$	The number of years that an analyst j has been providing forecasts for firm i based on I/B/E/S database by the end of quarter t. (Data source: I/B/E/S)
Other Variables	
$COUNTRY\_CLUSTER_{j}$	An ordinal variable to denote whether the analyst j's country of origin belongs to one of the nine country clusters identified in Anglo GLOBAL Project, where 1 for countries or regions in Eastern Europe (Albania, Georgia, Greece, Hungary, Kazakhstan, Poland, Russia, Slovenia), 2 for countries or regions in Confucian Asia (China, Hong Kong, Japan, Singapore, South Korea, Taiwan), 3 for countries or regions in Sub-Saharan (Africa, Namibia, Nigeria, South Africa, Zambia, Zimbabwe), 4 for countries or regions in Middle East (Egypt, Kuwait, Morocco, Qatar, Turkey), 5 for countries or regions in Latin America (Argentina, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Mexico, Venezuela), 6 for countries or regions in Nordic Europe (Denmark, Finland, Sweden), 7 for countries or regions in Southern Asia (India, Indonesia, Iran, Malaysia, Philippines, Thailand), 8 for countries or regions in Latin Europe (France, Israel, Italy, Portugal, Spain, Switzerland), and 9 for countries or regions in Anglo (Australia, Canada, England, Ireland, New Zealand, South Africa, United States), and 10 for countries or regions in Germanic Europe (Austria, Germany, Netherlands, Switzerland). (Data Source: https://globeproject.com/results/clusters/anglo?menu=list#list)
$Undergraduate_{J}$	An indicator variable set to one if analyst j's highest academic degree is bachelor's degree. (Data source: I/B/E/S and FactSet)
Undergraduate & Born before 1960_{J}	An indicator variable set to one if analyst j's highest academic degree is bachelor's degree and was born before 1960. (Data source: I/B/E/S and FactSet)
Undergraduate & Born before 1970_{J}	An indicator variable set to one if analyst j's highest academic degree is bachelor's degree and was born after 1961 but before 1970. (Data source: I/B/E/S and FactSet)
Undergraduate & Born before 1980_{J}	An indicator variable set to one if analyst j's highest academic degree is bachelor's degree and was born after 1971 but before 1980. (Data source: I/B/E/S and FactSet)
Undergraduate & Born after 1980_{J}	An indicator variable set to one if analyst j's highest academic degree is bachelor's degree and was born after 1981. (Data source: I/B/E/S and FactSet)
$Religious\_Dummy_{i,j,t}$	An indicator variable set to one if analyst j's forecast or recommendation for firm i is issued on a Holiday that is related to one of the seven religions, i.e., Christian, Orthodox, Jewish, Islamic, Hindu, Sikh, and Jain. (Data source: I/B/E/S and https://www.infoplease.com/culture-entertainment/holidays)
$Trust\_country_{j,t}$	The average of the response the following question in World Values Survey (1981–2020) in each year, where country is the analyst j's country of origin. "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" (1 if a survey participant reports that most people can be trusted and 0 otherwise) (Data source: https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp)
$Hierarchy\_country_{j,t}$	The average of the response the following question in World Values Survey (1981–2020) in each country year, where country is the analyst j's country of origin. "People have different ideas about following instructions at work. Some say that one should follow one's superior's instructions even when one does not fully agree with them. Others say that one should follow one's superior's instructions only when one is convinced that they are right, with which of these two opinions do you agree? 1 should follow instructions; 2 must be convinced first." (1 if a survey participant agrees with the 1st opinion and 0 otherwise) (Data source: https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp)
$Individualism\_country_{j,t}$	The average of the response the following question in World Values Survey (1981–2020) in each country year, where country is the analyst j's country of origin. "How would you place your views on this scale? 1 means you completely agree with statement (1); 10 means you agree completely with statement (2); and if your views fall somewhere in between, you can choose any number in between. (1) incomes should be made more equal; (2) we need larger income differences as incentives for individual effort." (1 represents completely agreeing with the second statement, 0 represents completely agreeing with the first statement) (Data source: https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp)

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