Overreaction or Underreaction to Intra-Industry Earnings Information Transfer: A Cross-Country Analysis

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ABSTRACT: We apply the moderated confidence hypothesis (MCH) to investigate overreaction and underreaction in intra-industry earnings information transfers in an international setting. MCH predicts that late announcing firms' investors overreact (underreact) to early announcing industry peers' earnings news when early announcing peers' earnings news is imprecise (precise) signals of late announcing firms' earnings. Consistent with early announcing peers' earnings news being imprecise signals of late announcing firms' earnings in an international setting, we find that late announcing firms' investors overreact to early announcing peers' earnings news. The country-level information environment and culture shape the precision of peers' earnings as signals of each other's earnings and investor behaviors. Consistent with MCH, we find that late announcing firms' investors are more likely to underreact in countries with a richer information environment, are more likely to overreact in countries with higher individualism and are less likely to overreact in countries with higher uncertainty avoidance.

Keywords: Moderated confidence hypothesis; information transfer; information environment; culture

JEL Classification: M41; G41; G15

I. INTRODUCTION

Accounting researchers have studied intra-industry information transfer for more than four decades. Intra-industry information transfer occurs when the information disclosed by one firm affects the returns of its industry peers (Schipper 1990). Because reported earnings contain both industry-wide and firm-specific components (Brown and Ball 1967), peer firms' earnings convey useful information for investors to form their expectations of other firms' earnings. Prior studies provide evidence of intra-industry information transfer relating to earnings announcements in the U.S. capital markets (Foster 1981; Freeman and Tse 1992; Han, Wild, and Ramesh 1989; Ramnath 2002) and the international markets (Kim and Li 2010; Wang 2014). While intra-industry information transfer is well documented in the literature, findings are mixed with respect to whether the information transfer is proper and adequate. While most studies suggest that an underreaction occurs, Thomas and Zhang (2008) find an overreaction.[1] Thomas and Zhang's (2008) finding of an overreaction appears puzzling. They depict their finding as "an island of overreaction amidst a sea of underreaction" and call for further investigation into the phenomenon.

In parallel with research on intra-industry information transfer, research on the information transfer between suppliers and customers finds that underreaction prevails (Cohen and Frazzini 2008). The literature consisders this underreaction to be consistent with the view that investors do not fully incorporate news from economically linked firms due to limited

[1] Using U.S. data, they find that late announcing firms' stock returns around their own earnings announcements are negatively associated with their stock returns around their early announcing peers' earnings announcements. Their finding suggests that the stock market overreacts to the implications of early announcing firms' earnings for late announcing peers' earnings. They also show a positive association between late and early announcing peers' returns around their own earnings announcements, suggesting that the stock market also underreacts to the information contained in early announcing peers' stock price movements.

attention and thereby underreact. Interestingly, Cheng and Eshleman (2014) also document the presence of overreaction. Specifically, they find that suppliers' investors overreact to their customers' earnings announcements when customers' earnings news as a signal of suppliers' earnings are imprecise, which is consistent with the moderated confidence hypothesis (hereafter MCH) that predicts an overreaction to imprecise information.[2] When a firm has multiple industry peers, the earnings news of an individual peer is likely to be an imprecise signal.[3] According to the MCH, overreactions are more likely than underreactions in the context of intra-industry information transfers when firms have multiple industry peers.

The MCH is originated in the behavioral finance literature. It assumes that investors update their beliefs about a firm's value in a Bayesian fashion. The Bayesian decision-making theory prescribes that the weights that a rational investor places on signals are proportional to their precision/reliability.[4] The MCH predicts that investors systematically bias their estimate of signal precision towards the unconditional mean and, as a result, they tend to overreact to imprecise signals and underreact to precise signals.[5] Because industry peers' earnings are, on average, an imprecise signal of each other's earnings, the MCH predicts an overreaction to peer firms' earnings news. However, an underreaction to peer firms' earnings news is also likely if the precision of peer firms' earnings news is high. That is, some peer firms' earnings

[2] While the precision of industry peers' earnings news varies, we expect that on average, the earnings news of an individual industry peer is an imprecise signal of other firms' earnings.

[3] Thomas and Zhang (2008) find that overreaction is greater as more industry peers announce earnings, which the authors attribute to the overall positive correlation between industry peers' earnings news and the representativeness heuristic bias.

[4] Early studies offer supporting evidence for the MCH mainly using laboratory experiments (Bloomfield, Libby, and Nelson 2000; Kahneman and Tversky 1972; Tversky and Kahneman 1971). Ramalingegowda, Shu, and Yeung (2012) and Cheng and Eshleman (2014) are two of the early studies that use large-scale archival data to test the MCH.

[5] We use "precision" and "reliability" interchangeably in this paper with both referring to the inverse of the variance of a signal.

information is relatively precise and thereby leads to underreaction, whereas some other peer firms' earnings information is relatively imprecise and thereby leads to overreaction. In this study, we apply the MCH to investigate the efficiency of intra-industry information transfer using a large set of international firms. With the model used in Thomas and Zhang (2008), we can capture both overreaction and underreaction to peer firms' earnings news, depending on the precision of peer firms' earnings as signals of each other's earnings. The international context provides an ideal setting for applying the MCH to investigate intra-industry information transfer because there are wide variations in country-level institutions and national culture that shape the precision of early announcing firms' earnings as a signal of late announcing firms' earnings. Moreover, results obtained using international data help us to evaluate the generalizability of findings from the U.S. market.

Bloomfield, Libby, and Nelson (2000) argue that moderated confidence can be either rational or irrational depending on the reason for investor's uncertainty about signals' precision. Investors' uncertainty may stem from their innate inability to gauge the precision of the signals. Their uncertainty may also stem from their improper use of irrelevant cues and/or the undue influence of psychological factors on their assessment of the precision of the signals. The international setting allows us to investigate how both rational and irrational factors affect overreaction and underreaction because country-level institutions and national culture systematically determine the precision of earlier announcing firms' earnings as signals of late announcing firms' earnings. Specifically, we examine the effect of the country-level information environment and national culture on overreaction and underreaction through their effects on the precision of peers' earnings. In countries with richer information environments,

the precision of firms' information is expected to be higher, and investors are expected to pay less attention to peers' information. Accordingly, we predict a greater underreaction in countries with richer information environments. With regard to national culture, we focus on individualism and uncertainty avoidance. In countries with strong individualism, managers are more likely to manipulate financial reporting and investors are more likely to be overconfident and thereby assign higher weights to imprecise signals; in countries with high uncertainty avoidance, investors are less likely to assign higher weights to imprecise signals because they are uncomfortable with ambiguity and prefer to avoid unpredictable outcomes. Taking all this together, we predict a greater overreaction in countries with higher individualism or lower uncertainty avoidance.

We begin with firms that have data on quarterly earnings announcement dates. Firms are matched with their industry peers within a country using their four-digit SIC industry codes. We include only countries with more than 100 firm-quarter observations in the main analysis. We exclude U.S. observations to ensure that our results are not driven by U.S. firms.[6] Our final sample consists of 91,442 firm-quarter observations from Quarter 2 of 1995 through Quarter 4 of 2015 from 33 countries.

To examine the existence of overreaction and underreaction in an international setting, we follow the previous literature to construct three short-term return variables: late announcing firms' (firm *i*) three-day returns around early announcing firms' (firm *j*) earnings announcements ($iRET_{j\text{-}EA}$), early announcing firms' (firm *j*) three-day returns around their own

[6] We also report results obtained using only U.S. data and find results that are quite close to those reported in Thomas and Zhang (2008). These results are discussed in robustness tests.

earnings announcements ($jRET_{j\text{-}EA}$), and late announcing firms' (firm *i*) three-day returns around their own earnings announcements ($iRET_{i\text{-}EA}$).[7]

We find a reliable negative relationship between $iRET_{i\text{-}EA}$ and $iRET_{j\text{-}EA}$, suggesting that investors of late announcing firms overreact to early announcing firms' earnings, consistent with the prediction of the MCH since early announcing firms' earnings are imprecise signals of late announcing firms' earnings. Our finding continues to hold when we use different samples, control for firm, industry, and country fixed effects, and use standard errors clustered by country and year to compute test statistics. In sum, we find no evidence of underreaction, which we consider to be consistent with the notion that that early announcing firms' earnings are imprecise signals of late announcing firms' earnings in an international setting.[8]

Next, we conduct tests to examine how the country-level information environment affects overreaction and underreaction. The country-level information environment is measured in two dimensions: investor protection and transparency. The information environment is expected to be better for countries with higher investor protection because investors protection promotes disclosure and high-quality financial reporting and for countries with higher transparency because higher transparency indicates a richer information environment. We find greater underreaction for countries with richer information environments, which we consider to be consistent with our prediction that peers' earnings are more precise signals of each other's earnings in such countries.

[7] We discuss the empirical methodology in detail in Section III.

[8] We find an underreaction when we include U.S. firms in the analysis or use observations only from the U.S. This finding suggests that early announcing firms' earnings are relatively precise signals about late announcing firms' earnings in the U.S., which we consider to be consistent with the view that the U.S. capital market is more developed and efficient.

We next investigate how national culture affects overreaction and underreaction. We focus on two dimensions of national culture from Hofstede's cultural dimensions theory (Hofstede 2003): individualism and uncertainty avoidance. Consistent with our prediction, we find greater overreaction for countries with higher individualism or lower uncertainty avoidance.

Our study contributes to the literature in at least three ways. First, we use the moderated confidence hypothesis (MCH) to explain the overreaction and underreaction phenomenon documented in Thomas and Zhang (2008) in an international setting. We find that overreaction dominates underreaction in an international setting. This finding is consistent with the prediction of MCH, suggesting that in countries other than the U.S., industry peers' earnings are generally imprecise signals of each other's earnings.

Second, we show that the country-level information environment and national culture affect the extent of overreaction and underreaction to peer firms' information. We find greater underreaction in countries with a more transparent information environment; we find greater overreaction in countries with higher individualism and smaller overreaction in countries with higher uncertainty avoidance. These findings are in line with the arguments that country-level information environment and national culture influence the precision of peer firms' earnings as signals of each other's earnings and investor behaviors and thereby generate cross-country variations in investors' mis-reactions (Bloomfield, Libby, and Nelson 2000).

Third, our study is one of the few large-scale empirical studies that apply the MCH to under the intra-industry information transfer. Our study adds to the growing literature that applies behavioral theories to examine capital market phenomena. Prior studies generally use

the limited attention hypothesis to explain underreaction (DellaVigna and Polle 2009; Hirshleifer, Lim, and Teoh 2009; Hirshleifer, Lim, and Teoh 2011). Our study demonstrates that the MCH helps to understand both overreaction and underreaction, shedding further light on intra-industry information transfers.

The remainder of the paper is organized as follows. Section II reviews the literature and develops hypotheses. Section III describes research design. Section IV presents international evidence on overreaction and underreaction and Section V presents the results of cross-country tests. Section VI presents the results of robustness tests. Section VII concludes.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Overreaction and Underreaction to Information Transfers

Intra-industry information transfer occurs when information disclosed by one firm affects stock returns of its industry peers (Schipper 1990). Early studies examine information transfer between two firms in the same industry and shows that a firm's stock price reacts to its peer's earnings announcement, and that this reaction depends on the degree of co-movement between the two firms' earnings (Baginski 1987; Firth 1976; Freeman and Tse 1992; Han, Wild, and Ramesh 1989; Pandit, Wasley, and Zach 2011).[9]

While intra-industry information transfer is consistently documented in the literature, findings on whether the information transfer is adequate and proper are mixed. Ramnath (2002) shows that investors and analysts fail to fully incorporate the information from the earnings

[9] Later studies provide similar evidence by focusing on corporate information announcements that are unrelated to earnings announcements, such as voluntary management forecasts (Baginski 1987; Han, Wild, and Ramesh 1989; Kim, Lacina, and Park 2008), dividend announcements (Laux, Starks, and Yoon 1998), bankruptcy announcements (Benmelech and Bergman 2011; Lang and Stulz 1992), takeover threats (Servaes and Tamayo 2013), a peer firm's analyst revisions (Hope and Zhao 2016) and restatements (Beatty, Liao, and Yu 2013; Gleason, Jenkins, and Johnson 2008).

news of the first announcers in the industry into their revised earnings expectations for subsequent announcers, suggesting underreactions in intra-industry information transfer. Hui and Yeung (2013) find a large post-forecast revision drift associated with industry-wide earnings news, but no drift associated with firm-specific earnings news, which they attribute to investors' underreaction to industry-wide earnings news conveyed by analysts' forecast revisions. Kovacs (2016) shows that underreaction to industry-specific information contributes to analyst forecast-based post-earnings announcement drift. Cohen and Frazzini (2008) investigate information transfer between suppliers and customers and find that a supplier's stock price does not promptly incorporate news about customers, suggesting that investors underreact to news from a supplier's key customers.

Using an innovative research design, Thomas and Zhang (2008) capture both overreaction and underreaction of stock prices of late earnings announcing firms to early announcing firms' earnings news. Specifically, they calculate stock returns around both early and late announcing firms' earnings announcements and investigate the correlation between these stock returns. They find that late announcing firms' announcement returns are positively correlated with early announcing industry peers' announcement returns—which they interpret as evidence of underreaction—and negatively correlated with their own stock returns around early announcing industry peers' announcement dates—which they interpret as evidence of overreaction. Moreover, they find that all other pairs of non-contemporaneous returns are positively related. In sum, they find "an island of overreaction amidst a sea of underreaction", which the authors find hard to explain.[10] In a following study, Chung, Hrazdil, and Trottier

[10] According to Thomas and Zhang (2008, p.938), "while different theories can explain different aspects of our results, it is difficult to combine those theories in a meaningful way."

(2015) find that the overreaction in intra-industry information transfer for U.S. firms identified in Thomas and Zhang (2008) becomes weaker after U.S. markets experience rapid improvements in the efficiency of the underlying price formation processes.

Another line of research seeks to provide an explanation to the overreaction and underreaction phenomenon. Daniel, Hirshleifer, and Subrahmanyam (1998) argue that overconfidence induces investors to overreact to private information and underreact to public information; Zhang (2006) shows that investors underreact to information to a greater extent when information uncertainty is higher; Ramalingegowda, Shu, and Yeung (2012) find that the investors of a firm's blockholders underreact to the firm's earnings news, whereas the firm's investors overreact to its blockholders' earnings news, which the authors consider to be consistent with the MCH (described in detail in the next section).

In sum, U.S.-based studies provide ample evidence of intra-industry information transfer and overreaction and underreaction to peer firms' news. However, few studies have examined whether there is intra-industry information transfer in the international setting and whether such information transfer is timely and sufficient. Kim and Li (2010) and Wang (2014) are two recent related studies using the international context. Kim and Li (2010) examine the impact of mandatory IFRS adoption on intra-industry information transfer. They find that investors of IFRS firms react more strongly to earnings releases of other IFRS firms in the same industry after the widespread mandatory IFRS adoption in 2005. They interpret their findings as evidence that after switching to IFRS, investors are more likely to use earnings information of industry peers for valuation. Wang (2014) find that cross-country information

transfer is enhanced when financial statement comparability increases due to accounting standards harmonization.

Altogether, in the international setting, existing studies have not considered the underreaction and overreaction phenomena documented in Thomas and Zhang (2008), and it remains unknown whether late announcing firms react efficiently to early announcing firms' earnings news. In this study, we attempt to fill in this void.

The Moderated Confidence Hypothesis

The moderated confidence hypothesis (MCH) originates from the behavioral finance literature. It begins with the assumption that investors update their beliefs about a firm's value in a Bayesian fashion. Bayesian decision-making theory prescribes that the weights a rational investor places on signals are proportional to signals' precision/reliability. That is, Bayesian decision-making theory predicts that more precise, value-relevant signals are given larger weights and thereby cause greater price revisions. In contrast, the MCH suggests that the confidence interval of investors' estimates is generally less extreme than what would be appropriate; that is, investors tend to moderate information reliability to an average level. This moderated confidence causes investors to assign higher-than-justified weights to imprecise signals and lower-than-justified weights to precise signals. As a result, investors overreact to imprecise signals and underreact to precise signals. Moreover, as the precision of a signal increases from low to high, the weight that investors places on the signal first increases and then decreases after its precision crosses the threshold between imprecision and precision (Bloomfield, Libby, and Nelson 2000).

Existing research has accumulated ample laboratory evidence for the validity of the MCH. For instance, Tversky and Kahneman (1971) find that people tend to put too much weight on small-sample evidence that is conceivably unreliable; Kahneman and Tversky (1972) show that people pay no adequate attention to the size of the sample in forming their estimates of subjective sampling distributions and posterior probability judgments. Importantly, the validity of the MCH is manifested in Griffin and Tversky's (1992) finding that people tend to be overconfident when the extremeness is high and underconfident when the extremeness is low, which the authors attribute to the regularity that people focus on the extremeness of the available evidence with insufficient regard for its credence.

Bloomfield, Libby, and Nelson (2000) conduct another laboratory experiment whereby subjects bought and sold five hypothetical securities. All subjects were provided with the following information about the flipping outcomes of biased coins: the number of times for which they were flipped and the proportion of landings on heads. Subjects were asked to value and trade these securities. Bloomfield, Libby, and Nelson (2000) find that participants consistently overvalue those securities that are associated with strong signals (i.e., a high percentage of heads) and a small sample size (i.e., coins that were flipped for only a few times). Evidently, Bloomfield, Libby, and Nelson's (2000) finding is consistent with the prediction of the MCH.

Despite the ample laboratory evidence for the MCH, archival studies only sporadically apply the MCH to explain capital market phenomena. Nonetheless, two recent studies apply the MCH to guide their investigation of market responses to various information releases. Ramalingegowda, Shu, and Yeung (2012) find that stock prices of a firm's blockholders

underreact to the firm's earnings news, but stock price of the firm overreacts to its blockholders' earnings news. While the implication of a firm's earnings news for its blockholder's performance is precise because the blockholder's ownership is a publicly known constant, the blockholder's earnings news has only vague implication for the firm's performance because it is unclear to what extent the blockholder's earnings news is attributed to the firm's performance. In sum, the finding of Ramalingegowda, Shu, and Yeung (2012) is consistent with the prediction of the MCH. Cheng and Eshleman (2014) apply the MCH to explain market-wide overreactions to supply chain information transfers. Using the strength of the economic link between a customer and its supplier to measure the precision, they find that the stock market overreacts to the customer's earnings announcement and that the overreaction is stronger when the economic link between them is low. The findings in Cheng and Eshleman's (2014) are also consistent with the MCH: overreaction is stronger when the customer's earnings are a more imprecise signal about the supplier's earnings.

The MCH predicts that late announcing firms' investors overreact to early announcing peers' earnings news when early announcing peers' earnings news is an imprecise signal about late announcing firms' earnings and underreact when early announcing peers' earnings news is a precise signal. Although we expect a wide variation in the precision of early announcing peers' earnings news as signals for late announcing firms' earnings, early announcing peers' earnings news conceivably is an imprecise signal about later announcing firms' earnings on average. Therefore, we have the following hypothesis:

Hypothesis 1 (H1): On average, investors of late announcing firms overreact to early announcing peers' earnings news.

The Role of Information Environment in Overreaction and Underreaction

The moderated confidence can be rational or irrational depending on the reason for investors' uncertainty about the precision of signals (Bloomfield, Libby, and Nelson 2000). This uncertainty can stem from investor' innate inability to adequately gauge the precision of signals due to the poor information environment faced by them. Conceivably, the country-level information environment shapes the precision of early announcing firms' earnings as signals of later announcing firms' earnings, leading to systematic variations in underreaction and overreaction. The country-level information environment can affect overreaction and underreaction. A good country-level information environment helps to improve the quality of earnings, thereby increasing the precision of peers' earnings as signals of each other's earnings. According to the MCH, overreaction is less likely and underreaction is more likely when peers' earnings are more precise signals of each other's earnings. Therefore, we have the following hypothesis:

Hypothesis 2 (H2): Investors of late announcing firms are more likely to underreact to early announcing peers' earnings news in countries with a rich information environment.

The Role of National Culture in Overreaction and Underreaction

Uncertainty may stem from investors' use of irrelevant cues and from the undue influence of their behavioral characteristics on their assessment of information reliability. We investigate how national culture affects the overreaction and underreaction of investors of late announcing firms to early announcing peers' earnings releases, because national culture shapes firms' financial reporting and disclosure (Hooghiemstra, Hermes, and Emanuels 2015; Hope, 2003; Li, Griffin, Yue, and Zhao 2013). Following the literature, we focus on the following

two dimensions of national culture from Hofstede's cultural dimensions theory (Hofstede 2003): individualism and uncertainty avoidance.

Individualism is the social outlook that emphasizes the intrinsic worth of individuals, the exercise of one's goals and desires, independence, and self-reliance (Hofstede 2003). The contrast between individualism and collectivism captures the essential differences in how a society resolves the universal tension between the competing claims of individual self-fulfillment and social action (Shane and Venkataraman 1996). In a society with high individualism, individualist managers tend to be overconfident and take risks. This can lead to more heterogenous fundamentals among industry peers and thus cause peers' earnings to be less informative about each other's earnings. Moreover, in a society with high individualism their managers tend to pursue personal interests and maximize private benefits (Fidrmuc and Jacob 2010) and, therefore, they are more likely to take opportunistic actions including manipulating reported earnings (Han, Kang, Salter, and Yoo 2010; Kanagaretnam, Lim, and Lobo 2011). As a result, in a society with high individualism, industry peers' reported earnings are more imprecise about each other's earnings. Taking all this together, we have the following hypothesis:

Hypothesis 3 (H3): Investors of late announcing firms are more likely to overreact to early announcing peers' earnings news in countries with higher individualism.

The uncertainty avoidance dimension captures the amount of tolerance that members of a society have for ambiguity and unpredictability. Early announcing peers' earnings news is inherently imprecise as signals of later announcing firms' earnings. In countries with high uncertainty avoidance, investors have low tolerance for ambiguity and unpredictable outcomes

and hence are expected not to put much weight on imprecise information. Therefore, we have the following hypothesis:

Hypothesis 4 (H4): Investors of late announcing firms are less likely to overreact to early announcing firms' earnings news in countries with higher uncertainty avoidance.

III. RESEARCH DESIGN

Sample Selection

We obtain data on financial and accounting information and company profiles for publicly listed firms around the world from DataStream. We begin with data on quarterly earnings announcements made during Quarter 1 of 1984 through Quarter 4 of 2015. Following prior studies (e.g., Thomas and Zhang (2008)), we limit our sample to firms with a fiscal year-end of December 31 and quarterly earnings announcements made within 6 months after the fiscal quarter-end.[11] We keep only observations with values for required variables from countries with at least 100 firm-quarter observations.[12] We exclude U.S. firms and firms in the financial or utilities industries. Our final sample has 91,442 observations from Quarter 2 of 1995 through Quarter 4 of 2015 from 33 countries. We describe the sample selection procedure in Table 1. Table 2 describes our sample composition by year and country.[13]

[Insert Table 1 about here]

[Insert Table 2 about here]

Testing Methods

[11] We use 5,4, 3, or 2 months rather than 6 months to form our sample and find similar results.

[12] We use alternative sample filters and find similar results.

[13] Observations from China account for 36.72% of the sample. In a robustness test, we show that our results hold for both observations from China and observations from countries other than China.

Figure 1 illustrates the framework for testing intra-industry information transfer, underreaction, and overreaction with respect to earnings news.[14] In the figure, firm *j* is firm *i*'s industry peer with industries defined according to the four-digit SIC codes, assuming that firm *i* has *n* industry peers [*j(1)* to *j(n)*] in quarter *Q*. Firm *j* announces its earnings before firm *i*. $iRET_{i-EA}$ ($jRET_{j-EA}$) is firm *i*'s (firm *j*'s) short-window return around its own earnings announcement. $iRET_{j-EA}$ is firm *i*'s short-window return around firm *j*'s earnings announcement. In our study, we require that peer firm *j* announces its quarterly earnings at least 5 calendar days before firm *i*'s earnings announcement.

[Insert figure 1 about here]

A positive correlation between $iRET_{j-EA}$ and $jRET_{j-EA}$ indicates information transfer from firm *j* to firm *i*. The overreaction of firm *i*'s investors to firm *j*'s earnings news is captured in $iRET_{j-EA}$. Following prior studies (e.g., Jegadeesh and Titman (2001)), we use the magnitude of return reversal to gauge overreaction. Specifically, we take a negative association between $iRET_{j-EA}$ and $iRET_{i-EA}$ as evidence of overreaction.[15,16] We take a positive association between $iRET_{i-EA}$ and $jRET_{j-EA}$ as evidence of underreaction.

IV. EVIDENCE OF OVERREACTION AND UNDERREACTION

Descriptive Statistics

[14] Readers can refer to Figure 1 in Thomas and Zhang (2008) for more details.

[15] We cannot use the relationship between $jRET_{j-EA}$ and $iRET_{i-EA}$ to infer overreaction because overreaction is not captured in $jRET_{j-EA}$ but captured in $iRET_{j-EA}$.

[16] Ramnath (2002) takes a positive association between $iRET_{j-EA}$ and $iRET_{i-EA}$ as evidence of underreaction. However, the association between $iRET_{j-EA}$ and $iRET_{i-EA}$ is not necessarily positive when underreaction occurs. For example, if underreaction leads to no contemporaneous response, $iRET_{j-EA}$ is zero and unrelated to $iRET_{i-EA}$ and, as a result, there is no correlation between $iRET_{j-EA}$ and $iRET_{i-EA}$ at all.

We define the industry membership of observations according to their 4-digit SIC industry codes. Following Thomas and Zhang (2008), we require that firm *j*'s earnings announcement is made at least 5 calendar days before firm *i*'s earnings announcement to ensure that there is sufficient time for firm *i*'s investors to react to peer firm *j*'s earnings news. Table 3 reports descriptive statistics for the sample used in the main test. Panel A shows that the mean of $jRET_{j-EA}$ is 0.09% and the mean of $iRET_{i-EA}$ is -0.19%. That is, early announcing firms tend to have higher announcement returns than late announcing firms, which is consistent with the U.S.-based findings (Thomas and Zhang 2008). The distributions of *ACC*, *BM*, *RET6*, and *SIZE* are comparable to those reported in Thomas and Zhang (2008). Panel B reports Pearson and Spearman correlations. There is a significantly negative correlation between $iRET_{i-EA}$ and $iRET_{j-EA}$, which is consistent with the view that investors of late announcing firms overreact to the earnings announcements made by early announcing peer firms. The correlation between $iRET_{i-EA}$ and $jRET_{j-EA}$ is negative but not significant at the 5% level: -0.006 (Pearson) and -0.002 (Spearman).

[Insert Table 3 about here]

Baseline Results

We use Thomas and Zhang's (2008) model to test the overreaction and underreaction phenomenon, which is specified as follows,

$$\begin{aligned} iRET_{i-EA} = {} & \beta_0 + \beta_1 iRET_{j-EA} + \beta_2 jRET_{j-EA} + \beta_3 L1iRETi + \beta_4 L4iRETi + \beta_5 SIZE \\ & + \beta_6 BM + \beta_7 RET6 + \beta_8 ACC \\ & + Country\ \&\ Industry\ \&\ Year\_quarter\ Fixed\ Effects\ + \varepsilon_{it} \end{aligned} \quad (1)$$

Excess returns are calculated as raw returns minus the local market returns in the [-1, 1] window, where day 0 is the earnings announcement date. $iRET_{i-EA}$ is firm *i*'s excess return around its own earnings announcement; $iRET_{j-EA}$ is the average of firm *i*'s excess returns around its peers' earnings announcements that occur at least five calendar days before its own earnings announcement; $jRET_{j-EA}$ is the average of firm *j*'s early announcing peers' excess returns around their own earnings announcements. Specifically, for firm *i* that has *n* early announcing peers (j_1 to j_n),

$$iRET_{j-EA} = \frac{1}{n}\sum_{k=1}^{n} iRET_{j_k-EA} \tag{2}$$

$$jRET_{j-EA} = \frac{1}{n}\sum_{k=1}^{n} j_k RET_{j_k-EA} \tag{3}$$

As it is shown in Figure 1, β_1 captures the overreaction of late announcing firms' investors to early announcing peers' earnings news and β_2 captures underreaction. A significantly negative coefficient on $iRET_{j-EA}$ (β_1<0) indicates the presence of overreaction and a significantly positive coefficient on $jRET_{j-EA}$ ($\beta_2 > 0$) indicates the presence of underreaction. While overreaction and underreaction cannot occur simultaneously for the same firm, cross-sectional analyses based on the model can capture both overreaction and underreaction for different firms, which is crucial for testing the MCH.

We include several control variables that prior studies show to affect stock returns within a short window. Specifically, to control for the effect of the post-earnings announcement drift (Bernard and Thomas 1990), we include firm *i*'s stock return around the announcement of its last quarterly earnings (*L1iRETi*) and its stock return around the earnings announcement of the same quarter of last year (*L4iRETi*); we include the past 6-month buy-and-hold return

(*RET6*) to control for the momentum effect (Jegadeesh and Titman 1993); we control for three other known determinants of stock returns: size (*SIZE*) (Banz 1981), the book-to-market ratio *(BM)* (Lakonishok, Shleifer, and Vishny 1994), and total accruals *(ACC)* (Sloan 1996). We also control for country, industry, and year-quarter fixed effects. Coefficients are estimated using pooled OLS regressions and test statistics are computed using standard errors clustered by country. All variables are defined in Appendix A.

We present international evidence of overreaction and underreaction in Table 4.[17] As shown in Table 4, when only $iRET_{i-EA}$ is included, the coefficient on $iRET_{j-EA}$ is -0.0537 (t = -3.97), suggesting that on average, investors of late announcing firms overreact to early announcing firms' earnings information. When we test underreaction without including the control variables, the coefficient on $jRET_{j-EA}$ is -0.0075 (t = -1.30), suggesting the absence of underreaction in an international setting. When we include both $iRET_{i-EA}$ and $jRET_{j-EA}$ in the model specification, the coefficient on $iRET_{j-EA}$ remains essentially the same. The coefficient on $jRET_{j-EA}$ becomes positive, but still not statistically significant.

Overall, these results show that overreaction plays a dominant role in an international setting, which is consistent with the view that in an international setting, industry peers' earnings news are imprecise signals for each other's earnings. Consistent with the absence of underreaction in an international setting, the coefficients on $jRET_{j-EA}$ are never statistically significant. This finding seems to differ from the finding of Thomas and Zhang (2008) that there are both overreaction and underreaction in the U.S. setting. However, note that the information environment is better and earnings quality is higher in the U.S. than in the

[17] We present the international evidence of intra-industry information transfer in Appendix B.

international setting. According to the MCH, underreaction is more likely in U.S. than in the international setting.[18] Taken together, it becomes evident that the MCH is a useful framework for understanding the overreaction and underreaction relating to intra-industry information transfer. In sum, these results are consistent with H1.

Regarding the coefficients on control variables, the coefficients on *L1iRETi* and *L1iRETi* are significantly positive, which is consistent with the post-earnings announcement drift (Bernard and Thomas 1990); the coefficient on *SIZE* is expected to be negative (Fama and French 1992; Lakonishok, Shleifer, and Vishny 1994), but is not statistically significant: 0.0002 (t = 1.09);[19] the coefficient on *BM* has an expected positive sign but is not statistically significant (Fama and French 1992; Lakonishok, Shleifer, and Vishny 1994); consistent with the momentum effect (Jegadeesh and Titman 1993), the coefficient of *RET6* is positive, but not statistically significant; consistent with firms with higher accruals generating lower return (Sloan 1996), the coefficient on *ACC* has an expected negative sign, but not statistically significant.

[Insert Table 4 about here]

To generate the results reported in Table 4, we use firm-quarter average values of $iRET_{j-EA}$ and $jRET_{j-EA}$ across industry peers. We use firm-peer-quarter data to redo the analysis.[20] In untabulated results,[21] we find that our inferences remain the same, suggesting that our results are not driven by our use of firm-quarter average values.

[18] We estimate Equation (1) using U.S. firms and, consistent with Thomas and Zhang (2008), we find both overreaction and underreaction.

[19] The positive sign of the coefficient on *SIZE* appears to contradict the negative sign based on the U.S. data. However, as it is evident in the survey by van Dijk (2011), the international evidence on the relation between firm size and realized return is indeed inconclusive.

[20] Each pair of firms *i* and *j* in each quarter has one observation. By construction, the *ij*-level dataset has more observations than the *i*-level dataset:853,792 observations versus 91,442 observations.

[21] All untabulated results are available upon request.

V. CROSS-SECTIONAL VARIATION OF OVERREACTION AND UNDERREACTION

The Effect of Information Environment on Overreaction and Underreaction

Investor Protections

A firm's information environment can be improved by lowering information risk and improving disclosure rules (Bushman, Piotroski, and Smith 2004). Investor protections improve the information environment by lowering information risk (Hail, Tahoun, and Wang 2014). Specifically, a well-functioning legal system protects the rights of outside investors (La Porta, Lopez-De-Silance, Shleifer, and Vishny 1997). Prior studies show that corporate transparency is higher in countries with a common law legal origin and high judicial efficiency than in countries with a code law legal origin and low judicial efficiency (Bushman, Piotroski, and Smith 2004). Consistent with an effective legal system helping to mitigate information asymmetry, Hail and Leuz (2006) find that the cost of equity capital is lower in countries with more effective legal systems.

A country's legal system also shapes financial reporting quality (Ball, Kothari, and Robin 2000; Boulton, Smart, and Zutter 2017; Leuz, Nanda, and Wysocki 2003). Strong investor protections limit managers' incentives and ability to conceal the firm's real performance and hence reduce earnings management (Leuz, Nanda, and Wysocki 2003). Ball, Kothari, and Robin (2000) argue that firms in common law countries provide more public disclosures to mitigate information asymmetry, whereas firms in code law countries use more insider communications. Consistent with their argument, Ball, Kothari, and Robin (2000) show that firms in common law countries recognize loss in a timelier way and generate more conservative financial reporting. Similarly, Bushman and Piotroski (2006) show that the

legal/judicial system plays a significant role in creating incentives for timely loss recognition by shaping the behaviors of managers, investors, and regulators. Taken together, the information environment is better in countries with better investor protection.

Following the prior literature (Djankov, La Porta, Lopez-De-Silance, and Shleifer 2008), we use two country-level investor protection measures: the country's legal origin (*LAW*) and the antidirector rights index (*ANTIDIR*). We get data on a country's legal origin from La Porta, Lopez-De-Silance, Shleifer, and Vishny (1997) and the anti-director rights index from Djankov, La Porta, Lopez-De-Silance, and Shleifer (2008). Investor protection is higher in common law countries than in code law countries. *LAW* is an indicator variable that equals 1 for firms in common law countries and 0 for firms in code law countries. *ANTIDIR* is an indicator variable that equals 1 for firms in countries with the antidirector rights index above the median, and 0 otherwise.[22] These two measures are widely used in prior studies to measure country-level investor protections.

We refer to the interaction between the two country-level investor protection measures and $iRET_{j-EA}/jRET_{j-EA}$ to infer how country-level investor protections affect overreaction and underreaction of intra-industry information transfer. Table 5 presents the results. The coefficient on the investor protection measures is significantly positive, which is consistent with the notion that investor protections enhance the information content of reported earnings and, as a result, investors react more strongly to firms' earnings announcements. Importantly, the coefficients on the interaction terms involving $iRET_{j\text{-}EA}$ are not statistically significant, whereas the coefficients on the interaction terms involving $jRET_{j\text{-}EA}$ are significantly positive,

[22] The value of the antidirector rights index ranges from 0 to 6 with a higher value indicating greater investor protections.

which is consistent with the view that investors of late announcing firms underreact more to early announcing peers' earnings news in countries with higher investor protections. Overall, the results reported in Table 5 are consistent with H2.

[Insert Table 5 about here]

Transparency

Value-relevant and credible disclosures can mitigate the information asymmetry between firms and investors as well as between investors (Glosten and Milgrom 1985; Verrecchia 2001). Using an international setting, Hail and Leuz (2006) find that country-level disclosure rules affect the cost of capital through their effects on information asymmetry (see also Hope (2003)). Badertscher, Shroff, and White (2013) study the effect of the 2005 Securities Offering Reform in the U.S. and find that pre-offering disclosures are negatively correlated with information asymmetry and in turn reduce the cost of raising equity capital.

Following Manconi, Peyer and Vermaelen (2019) and Daske, Hail, Leuz, and Verdi (2008), we use two measures to gauge the country-level transparency (*TRANS*). The first is stock price impact (*LAMBDA*), which captures stock market illiquidity and is akin to the parameter λ in Kyle's (1985) informed trading model. Transparency—thus the information available to investors—is low in countries with low stock market liquidity and thus high *LAMBDA*. The second measure is *IFRS*, an indicator variable that equals 1 if the country adopted *IFRS* and 0 otherwise (Beuselinck, Joos, Khurana, and Meulen 2017; Chan, Hsieh, Lee, and Yueh 2015; Cheng, Huang, and Li 2020; Daske, Hail, Leuz, and Verdi 2008; Gunn,

Kawada, and Michas 2019). We set *TRANS* to 1 (0 otherwise) for firms with *LAMBDA* below the sample median when *LAMBDA* is used and *TRANS* to *IFRS* when *IFRS* is used.

We refer to the interaction between *TRANS* and $iRET_{j-EA}/jRET_{j-EA}$ to examine how transparency affects overreaction and underreaction of late announcing firms' investors to early announcing peers' earnings news. Table 6 presents the results. The coefficients on *TRANS* $*$ $iRET_{j\text{-}EA}$ are not statistically significant, while the coefficients on *TRANS* $*$ $jRET_{j\text{-}EA}$ are significantly positive, suggesting that late announcing firms' investors underreact to early announcing peers' earnings news. These results are consistent with our argument that because the precision of peers' earnings news as signals of each other's earnings is high in a rich information environment, late announcing firms' investors tend to underreact to early announcing firms' earnings news. Overall, the results in Tables 5 and 6 are consistent with H2 that investors tend to underreact to industry peers' earnings information in countries with a rich information environment.

[Insert Table 6 about here]

The Effect of National Culture on Overreaction and Underreaction

As one form of informal institutions, national culture shapes firms' financial reporting and disclosure and how investors digest information in capital markets (An, Chen, Li, and Xing 2018; Bova and Vance 2019; Chui, Titman, and Wei 2010; Hooghiemstra, Hermes, and Emanuels 2015; Hope 2003; Li, Griffin, Yue, and Zhao 2013). Following prior studies (e.g., Bjornsen, Do, and Omer 2019; Caban-Garcia, Figueroa, and Petruska 2017; Gois, Lima, Sousa, and Malacrida 2018), we focus on the individualism and uncertainty avoidance dimensions of national culture. We hypothesize that investors of late announcing firms are more likely to

overreact to early announcing firms' earnings news in countries in countries with higher individualism and are less likely in countries with higher uncertainty avoidance. We create two indicator variables to capture these two dimensions: *IDV* that equal 1 (0 otherwise) for countries with individualism above the median and *UAI* that equals 1 (0 otherwise) for countries with uncertainty avoidance above the median. We refer to the coefficient on the interaction between *IDV* / *UAI* and $iRET_{j-EA}$ / $jRET_{j-EA}$ to detect how national culture affects overreaction and underreaction.

Table 7 presents the results. Consistent with H3, the coefficient on $IDV * iRET_{j\text{-}EA}$ is significantly negative: -0.052 (*t* =-2.40), indicating that in countries with higher individualism, late announcing firms' investors are more likely to overreact to early announcing peers' earnings news. Consistent with H4, the coefficient on $UAI * iRET_{j\text{-}EA}$ is significantly positive, suggesting that in countries with higher uncertainty avoidance late announcing firms' investors are less likely to overreact to early announcing peers' earnings news. In sum, late announcing firms' investors are more likely to overreact to early announcing firms' earnings news in countries with higher individualism, whereas they are less likely in countries with higher uncertainty avoidance.

[Insert Table 7 about here]

VI. ROBUSTNESS TESTS

We conduct a battery of robustness tests. First, we include firm fixed effects in the model specification to control for unobservable time-invariant sources of firm-specific heterogeneity. The untabulated results continue to support our hypothesis. Second, we use

standard errors clustered by country and year to generate *t* statistics. In untabulated results, we find that our inferences remain the same.

Because observations from China account for 36.72%, to ensure that our results are not driven by only observations from China, we test the hypotheses separately using observation from China and from countries other than China. In untabulated results, we find that our hypotheses hold for both groups. Moreover, observations from China, Canada, and Taiwan together account for more than 60%. To ensure that our results are not driven by observations from only these three countries, we test the hypotheses separately using observation from these three countries and from countries other than these three countries. In untabulated results, we find that our hypotheses hold for both groups.

To generate the baseline results, we include only countries with more than 100 firm-quarter observations in the analysis. To ensure that the baseline results are not specific to our research design choice, we use all countries with available data and countries with at least 200 or 500 firm-quarter observations to test our hypotheses. We find that the untabulated results continue to support our hypotheses. Finally, we require that the quarterly earnings announcements are made within 5 or 4 or 3 or 2 months—rather than 6 months—after the end of a fiscal quarter and find that the untabulated results continue to support our hypotheses.

VII. CONCLUSION

Our study applies the moderated confidence hypothesis (MCH) to investigate the overreaction and underreaction to industry peers' earnings information in an international setting. The MCH predicts that late announcing firms' investors overreact (underreact) to early announcing industry peers' earnings news when early announcing peers' earnings news is imprecise (precise) signals of late announcing firms' earnings. Consistent with the view that

early announcing peers' earnings news is generally imprecise signals of late announcing firms' earnings in an international setting, we find that late announcing firms' investors overreact to early announcing peers' earnings news.

Our study also examines whether the misreaction of late announcing firms' investors to early announcing peers' earnings news varies with the country-level information environment and with national culture. Because industry peers' earnings as signals of each other's earnings are more precise—less imprecise—in a richer information environment, we find that consistent with the MCH, investors of late announcing firms are more likely to underreact to early announcing peers' earnings news in countries with a richer information environment. In countries with high individualism, managers tend to manipulate reported earnings, causing industry peers' reported earnings to be more imprecise signals of each other's earnings; in countries with high uncertainty avoidance, investors have low tolerance for ambiguity and are thus expected not to put much weight on imprecise information. Consistent with the MCH, we find that investors of late announcing firms are more likely to overreact to early announcing peers' earnings news in countries with higher individualism and are less likely to overreact in countries with higher uncertainty avoidance.

Our study contributes to the literature in at least three ways. First, we use the MCH to examine investors' misreaction in intra-industry information transfers documented in Thomas and Zhang (2008) in an international setting and show that overreaction dominates underreaction in an international setting. Second, we show that the country-level information environment and national culture affect investors' misreaction to peer firms' information in a way consistent with the MCH. Third, as one large-scale empirical study that applies the MCH to understand intra-industry information transfers, our study adds to the growing literature that applies behavioral theories to understand capital market phenomena by showing that the MCH helps to understand ivestors' misreaction in intra-industry information transfers.

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APPENDIX A
Variables Definitions and Data Sources

Variable	Definition	Source
Firm-level variables		
ACC	Accruals measured as net income (WC01551) less operating cash flows (WC04860) scaled by prior year's total assets (WC02999).	WorldScope
BM	Book-to-market ratio measured as the ratio of book value of equity (WC03501) to market value (MV) of equity at the end of prior fiscal year.	Datastream/WorldScope
$iRET_{i\text{-}EA}$	Firm *i*'s excess return (raw return – value-weighted market return) over the three-day [−1, 1] period, where day 0 is its earnings announcement date.	Datastream/WorldScope
$iRET_{j\text{-}EA}$	Firm *i*'s excess return (raw return – value-weighted market return) over the three-day [−1, 1] period around its peer firm *j*'s earnings announcement, where peer firm *j*'s earnings announcement is at least five days before firm *i*'s earnings announcement.	Datastream/WorldScope
$jRET_{j\text{-}EA}$	Peer firm *j*'s excess return (raw return – value-weighted market return) in the same quarter as firm *i*'s earnings, where peer firm *j*'s earnings announcement is at least five days before firm *i*'s earnings announcement.	Datastream/WorldScope
L1iRETi	Firm *i*'s three-day earnings announcement excess return around its last quarterly earnings announcement.	Datastream/WorldScope
L4iRETi	Firm *i*'s three-day earnings announcement excess return around the earnings announcement of the same quarter of last year.	Datastream/WorldScope
RET6	Buy-and-hold six-month stock return up to one week before firm *i*'s earnings announcement.	Datastream/WorldScope
SIZE	Natural logarithm of market value.	Datastream/WorldScope
Country-level variables		
Investor protection		
LAW	An indicator variable that equals 1 for common law countries and 0 for code law countries.	La Porta et al. (1998).
ANTIDIR	An indicator variable that equals 1 for countries with their anti-director rights indexes above the median and 0 otherwise.	Djankov et al. (2008).
Information environment		
LAMBDA	An indicator variable that equals 1 for countries with stock market liquidity above the median and 0 otherwise.	Retrieved from Fong, Holden, and Trzcinka (2017).

IFRS	An indicator variable that equals 1 for countries that already adopted IFRS, and 0 otherwise.	
National culture		
IDV	An indicator variable that equals 1 for countries with their individualism above the median, and 0 otherwise.	GEERT HOFSTEDE (2001)
UAI	An indicator variable that equals 1 for countries with their uncertainty avoidance above the median, and 0 otherwise.	GEERT HOFSTEDE (2001)

APPENDIX B
Intra-industry Information Transfer: The International Evidence

Dependent variable	$iRET_{j\text{-}EA}$	$iRET_{j\text{-}EA}$	$iRET_{j\text{-}EA}$
	Full sample with U.S.	**Full sample without U.S.**	**U.S. only**
	(1)	**(2)**	**(3)**
$jRET_{j\text{-}EA}$	0.1163***	0.1580***	0.0629***
	(3.84)	(6.69)	(11.40)
L1iRETi	-0.0010	0.0052	-0.0080***
	(-0.21)	(0.94)	(-2.93)
L4iRETi	0.0008	-0.0005	0.0018
	(0.55)	(-0.17)	(0.73)
SIZE	-0.0005***	-0.0003*	-0.0008***
	(-2.82)	(-1.74)	(-5.20)
BM	-0.0001	-0.0001	-0.0004
	(-1.09)	(-0.49)	(-1.26)
RET6	0.0100***	0.0096***	0.0111***
	(19.13)	(22.60)	(18.03)
ACC	-0.0007	0.0015	-0.0037**
	(-0.43)	(1.16)	(-2.14)
Intercept	-0.0045***	-0.0323***	-0.0063
	(-4.36)	(-20.44)	(-0.58)
Fixed effects	Country, year-quarter and industry	Country, year-quarter and industry	Year-quarter and industry
N	130,484	91,442	39,042
Adj. R^2	0.030	0.039	0.024

This table reports the intra-industry information transfer evidence in an international setting. The regression model is as follows,

$$iRET_{j-EA} = \beta_1 + \beta_2 jRET_{j-EA} + \beta_3 L1iRETi + \beta_4 L4iRETi + \beta_5 SIZE + \beta_6 BM + \beta_7 RET6 + \beta_8 ACC + \varepsilon_{it}$$

Coefficients are obtained by using pooled *OLS* regressions. Variables are defined in Appendix A. *t* statistics in parentheses are computed using standard errors clustered by country. *, **, and *** denotes significance at the 0.10, 0.05 and 0.01 levels, respectively.

FIGURE 1
Timeline and Framework for Testing the Intra-industry Information Transfer and Overreaction and Underreaction

This figure illustrates how we use the quarterly earnings announcement setting to test the intra-industry information transfer as well as overreaction and underreaction. In the figure, firm *j* is firm *i*'s industry peer. We define the industry membership of firms according to their four-digit SIC codes. Moreover, peer firm *j* announces its earnings earlier (at least by 5 calendar days) than firm *i*. We assume that firm *i* has *n* industry peers [*j(1)* to *j(n)*] *i* in quarter *Q*.

$$iRET_{j-EA} = \frac{1}{n}\sum_{k=1}^{n} iRET_{j_k-EA}$$

$$jRET_{j-EA} = \frac{1}{n}\sum_{k=1}^{n} j_k RET_{j_k-EA}$$

A positive association between $iRET_{j-EA}$ and $jRET_{j-EA}$ captures intra-industry information transfer; a negative association between $iRET_{i-EA}$ and $iRET_{j-EA}$ indicates that late announcing firm *i*"s investors overreact to early announcing peers' earnings news; a positive association between $iRET_{i-EA}$ and $jRET_{j-EA}$indicates that late announcing firm "s investors underreact to early announcing peers' earnings news.

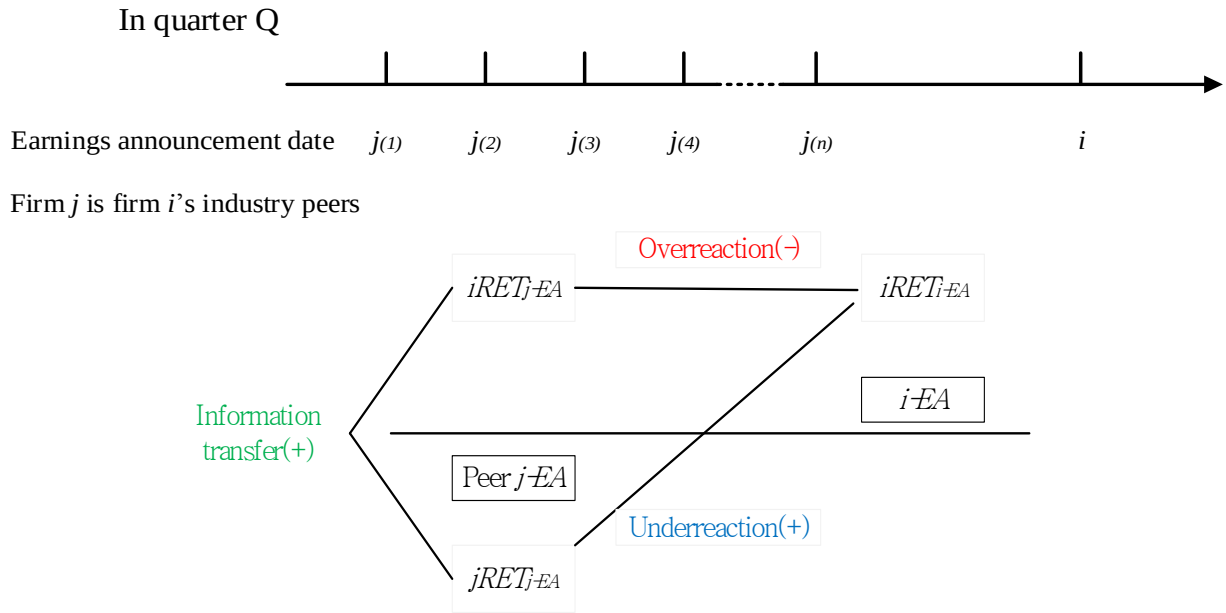

TABLE 1
Sample Selection Procedure

Step	Filters	Sample period	Sample size
1	Begins with data on quarterly earnings announcements.	Quarter 1, 1984 to quarter 4, 2015	1,919,474
2	Keep firms with fiscal year ended at December 31 and quarterly earnings announcements made within 6 months after the end of a fiscal quarter.	Quarter 1, 1986 to quarter 4, 2015	795,676
3	Using daily returns to calculate $iRET_{i\text{-}EA}$, $iRET_{j\text{-}EA}$, $jRET_{j\text{-}EA}$, requiring that peer firm *j*'s quarterly earnings announcement is at least five calendar days before firm *i*'s the quarterly earnings announcement.	Quarter 1, 1988 to quarter 4, 2015	380,536
4	Keep observations with no missing values for control variables, keep only countries with at least 100 observations, and exclude observations from U.S. and the financial and utility industries.	Quarter 2, 1995 to quarter 4, 2015	91,442

This table describes our sample selection procedure. The final sample consists of 91,442 observations from quarter 2, 1995 to quarter 4, 2015.

TABLE 2
Sample Composition

Year	Frequenc	Percen
1995	8	0.01
1996	10	0.01
1997	4	0.00
1998	16	0.02
1999	28	0.03
2000	58	0.06
2001	101	0.11
2002	555	0.61
2003	1,084	1.19
2004	2,938	3.21
2005	4,028	4.40
2006	4,532	4.96
2007	5,153	5.64
2008	5,779	6.32
2009	7,961	8.71
2010	8,190	8.96
2011	8,452	9.24
2012	9,533	10.43
2013	9,805	10.72
2014	12,560	13.74
2015	10,647	11.64
Tota	**91,442**	**100.00**

Country	Frequenc	Percen
CHINA	33,574	36.72
TAIWAN	12,404	13.56
CANADA	11,389	12.45
KOREA	6,217	6.80
MALAYSIA	4,867	5.32
THAILAND	3,861	4.22
SWEDEN	2,579	2.82
BRAZIL	1,828	2.00
SINGAPORE	1,597	1.75
INDONESIA	1,273	1.39
POLAND	1,265	1.38
NORWAY	1,234	1.35
JAPAN	1,145	1.25
TURKEY	1,097	1.20
GERMANY	986	1.08
ISRAEL	960	1.05
FRANCE	772	0.84

Country	Frequenc	Percen
GREECE	700	0.77
FINLAND	589	0.64
PHILIPPINES	515	0.56
ITALY	464	0.51
PERU	368	0.4
HONG KONG	300	0.33
DENMARK	227	0.25
KUWAIT	175	0.19
SPAIN	168	0.18
UNITED KINGDOM	160	0.17
MEXICO	150	0.16
INDIA	130	0.14
OMAN	126	0.14
EGYPT	113	0.12
UNITED ARAB	107	0.12
BULGARIA	102	0.11
Total	**91,442**	**100.00**

This table presents the sample composition. The sample consists of 91,442 observations from quarter 2, 1995 to quarter 4, 2015 from 33 countries.

TABLE 3
Descriptive Statistics

Panel A Summary Statistics

Variable	N	Mean	SD	Min	p25	p50	p75	Max
$iRET_{i\text{-}EA}$	91,442	-0.0019	0.0582	-0.1757	-0.0299	-0.0031	0.0226	0.2064
$iRET_{j\text{-}EA}$	91,442	-0.0003	0.0364	-0.1078	-0.0179	-0.0018	0.0147	0.1376
$jRET_{j\text{-}EA}$	91,442	0.0009	0.0350	-0.1059	-0.0161	-0.0001	0.0161	0.1291
L1iRETi	91,442	-0.0023	0.0584	-0.1762	-0.0304	-0.0035	0.0221	0.2086
L4iRETi	91,442	-0.0024	0.0567	-0.1721	-0.0298	-0.0034	0.0217	0.2027
ACC	91,442	-0.0371	0.1127	-0.4802	-0.0836	-0.0307	0.0160	0.3053
RET6	91,442	0.0943	0.4298	-0.6838	-0.1597	0.0130	0.2484	1.8860
BM	91,442	1.2041	2.0999	0.0535	0.3504	0.6406	1.2028	16.1478
SIZE	91,442	7.1689	2.5476	0.9708	5.5077	7.4280	8.6483	13.9077

Panel B Correlation Matrix

	$iRET_{i\text{-}EA}$	$iRET_{i\text{-}EA}$	$jRET_{i\text{-}EA}$	*L1iRETi*	*L4iRETi*	*ACC*	*RET6*	*BM*	*SIZE*
$iRET_{i\text{-}EA}$		-0.031	-0.006	0.034	0.021	0.008	0.005	-0.011	0.020
p		*<0.001*	*0.089*	*<0.001*	*<0.001*	*0.013*	*0.152*	*0.001*	*<0.001*
$iRET_{i\text{-}EA}$	-0.032		0.186	0.031	0.008	0.015	0.101	-0.017	0.014
p	*<0.001*		*<0.001*	*<0.001*	*0.018*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
$jRET_{i\text{-}EA}$	-0.002	0.162		0.007	0.005	0.016	0.029	0.001	0.014
p	*0.520*	*<0.001*		*0.048*	*0.151*	*<0.001*	*<0.001*	*0.843*	*<0.001*
L1iRETi	0.032	0.026	0.005		0.022	0.011	0.116	-0.009	0.016
p	*<0.001*	*<0.001*	*0.111*		*<0.001*	*0.001*	*<0.001*	*0.007*	*<0.001*
L4iRETi	0.013	0.002	0.004	0.014		0.025	0.004	-0.038	0.026
p	*<0.001*	*0.597*	*0.271*	*<0.001*		*<0.001*	*0.211*	*<0.001*	*<0.001*
ACC	0.002	0.008	0.010	0.008	0.031		-0.004	-0.051	0.138
p	*0.616*	*0.017*	*0.002*	*0.021*	*<0.001*		*0.179*	*<0.001*	*<0.001*
RET6	0.009	0.107	0.028	0.131	0.005	-0.002		0.052	0.042
p	*0.005*	*<0.001*	*<0.001*	*<0.001*	*0.150*	*0.490*		*<0.001*	*<0.001*
BM	0.001	0.002	0.003	0.002	-0.018	-0.022	0.025		-0.302
p	*0.708*	*0.587*	*0.380*	*0.551*	*<0.001*	*<0.001*	*<0.001*		*<0.001*
SIZE	0.010	-0.006	0.013	0.005	0.017	0.164	0.017	-0.294	
p	*0.002*	*0.098*	*<0.001*	*0.111*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	

This table presents descriptive statistics for the sample used in the main test. Panel A presents summary statistics. In Panel B, Pearson (Spearman) correlations are in the upper (lower) triangle. Variables are defined in Appendix A. The sample consists of 91,442 observations from quarter 2, 1992 to quarter 4, 2015. All continuous variables are winsorized at the top and the bottom one percent of their pooled distributions.

TABLE 4
Overreaction and Underreaction: The International Evidence

Dependent variable	$iRET_{i\text{-}EA}$ **(1)**	$iRET_{i\text{-}EA}$ **(2)**	$iRET_{i\text{-}EA}$ **(3)**	$iRET_{i\text{-}EA}$ **(4)**
$iRET_{j\text{-}EA}$	-0.0537***		-0.0539***	-0.0564***
	(-3.97)		(-3.90)	(-3.97)
$jRET_{j\text{-}EA}$		-0.0075	0.0015	0.0013
		(-1.30)	(0.25)	(0.22)
L1iRETi				0.0289***
				(4.42)
L4iRETi				0.0112**
				(2.33)
SIZE				0.0002
				(1.09)
BM				0.0000
				(0.34)
RET6				0.0011
				(1.51)
ACC				-0.0016
				(-0.49)
Intercept	0.1300***	0.1299***	0.1300***	0.1277***
	(8.82)	(8.77)	(8.83)	(8.67)
Country, year-quarter,	YES	YES	YES	YES
N	91,442	91,442	91,442	91,442
Adj. R^2	0.003	0.002	0.003	0.004

This table presents results from estimating Equation (1). Variables are defined in Appendix A. *t* statistics in parentheses are computed using standard errors clustered by country. *, **, and *** denotes significance at the 0.10, 0.05 and 0.01 levels, respectively.

TABLE 5
The Effect of Investor Protections on Overreaction and Underreaction

Dependent variable	$iRET_{i\text{-}EA}$	$iRET_{i\text{-}EA}$
INVPRO =	***LAW***	***ANTIDIR***
	(1)	**(2)**
$INVPRO * iRET_{j\text{-}EA}$	-0.0221	0.0063
	(-1.51)	(0.22)
$INVPRO * jRET_{j\text{-}EA}$	0.0325***	0.0215**
	(2.85)	(2.36)
$iRET_{j\text{-}EA}$	-0.0227**	-0.0588***
	(-2.38)	(-4.32)
$jRET_{j\text{-}EA}$	-0.0078	-0.0081
	(-0.81)	(-1.01)
INVPRO	0.0070***	0.0037***
	(7.64)	(4.03)
L1iRETi	0.0274***	0.0290***
	(9.91)	(4.40)
L4iRETi	0.0096	0.0114**
	(1.65)	(2.36)
SIZE	0.0004**	0.0002
	(2.13)	(1.14)
BM	0.0001	0.0000
	(1.43)	(0.27)
RET6	0.0011	0.0011
	(1.11)	(1.46)
ACC	-0.0027	-0.0016
	(-1.09)	(-0.49)
Intercept	0.0086***	0.0171***
	(6.93)	(12.93)
Country, year-quarter, industry fixed effects	YES	YES
N	56,093	91,034
Adj. R^2	0.006	0.004

This table reports results of the analysis that examines how investor protections affect overreaction and underreaction. *LAW* is an indicator variable that equals 1 for common law countries and 0 for civil law countries. *ANTIDIR* is an indicator variable that equals 1 for countries with their which is anti-director rights indexes above the median and 0 otherwise. Other variables are defined in Appendix A. *t* statistics in parentheses are computed using standard errors clustered by country. *, **, and *** denote significance at the 0.10, 0.05 and 0.01 levels, respectively.

TABLE 6
The Effect of Transparency on Overreaction and Underreaction

Dependent variable	$iRET_{i\text{-}EA}$	$iRET_{i\text{-}EA}$
TRANS =	***LAMBDA***	***IFRS***
	(1)	**(2)**
$TRANS * iRET_{j\text{-}EA}$	-0.0087	0.0082
	(-0.53)	(0.84)
$TRANS * jRET_{j\text{-}EA}$	0.0282***	0.0466**
	(3.58)	(2.08)
$iRET_{j\text{-}EA}$	-0.0397***	-0.0405***
	(-2.87)	(-3.32)
$jRET_{j\text{-}EA}$	-0.0087	-0.0268*
	(-1.60)	(-1.72)
INFENV	-0.0061***	-0.0029**
	(-13.44)	(-2.16)
L1iRETi	0.0227***	0.0262***
	(4.20)	(9.32)
L4iRETi	0.0111***	0.0112*
	(2.79)	(2.02)
SIZE	0.0005***	0.0004*
	(3.27)	(2.01)
BM	0.0000	0.0001
	(0.55)	(0.98)
RET6	0.0002	0.0012
	(0.26)	(1.13)
ACC	0.0001	-0.0027
	(0.05)	(-1.09)
Intercept	0.0151***	0.0196***
	(8.15)	(8.05)
Country, year-quarter, industry fixed effects	YES	YES
N	88,623	50,677
Adj. R^2	0.005	0.006

This table presents results of the analysis that examines how country-level transparency affects overreaction and underreaction. *LAMBDA* is an indicator variable that equals 1 for countries with country-level stock market liquidity above the median and 0 otherwise. *IFRS* is an indicator variable that equals 1 for countries that already adopted IFRS, and 0 otherwise. Other variables are defined in Appendix A. *t* statistics in parentheses are computed using standard errors clustered by country. *, **, and *** denote significance at the 0.10, 0.05 and 0.01 levels, respectively.

TABLE 7
The Effect of National Culture on Overreaction and Underreaction

Dependent variable	$iRET_{i\text{-}EA}$	$iRET_{i\text{-}EA}$
CULTURE =	***IDV***	***UAI***
	(1)	(2)
$CULTURE * iRET_{j\text{-}EA}$	-0.0520**	0.0641***
	(-2.40)	(3.84)
$CULTURE * jRET_{j\text{-}EA}$	-0.0004	-0.0135
	(-0.03)	(-1.09)
$iRET_{j\text{-}EA}$	-0.0398**	-0.0747***
	(-2.25)	(-7.29)
$jRET_{j\text{-}EA}$	0.0004	0.0052
	(0.08)	(0.73)
CULTURE	0.0036***	-0.0036***
	(3.75)	(-3.78)
L1iRETi	0.0289***	0.0288***
	(4.40)	(4.38)
L4iRETi	0.0115**	0.0116**
	(2.40)	(2.43)
SIZE	0.0002	0.0002
	(1.12)	(1.14)
BM	0.0000	0.0000
	(0.34)	(0.32)
RET6	0.0011	0.0011
	(1.48)	(1.52)
ACC	-0.0017	-0.0018
	(-0.51)	(-0.53)
Intercept	0.0170***	0.0203***
	(13.36)	(12.39)
Country, year-quarter, industry fixed effects	YES	YES
N	90,921	90,921
Adj. R^2	0.004	0.005

This table presents results of the analysis that examines how national culture affects overreaction and underreaction. *IDV* is an indicator variable that equals 1 for countries with individualism above the median, and 0 otherwise. *UAI* is an indicator variable that equals 1 for countries with uncertainty avoidance above the median, and 0 otherwise. Other variables are defined in Appendix A. *t* statistics in parentheses are computed using standard errors clustered by country. *, **, and *** denote significance at the 0.10, 0.05 and 0.01 levels, respectively.