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Corporate social responsibility assurance and reporting quality: Evidence from restatements[☆]Brian Ballou, Po-Chang Chen^{*}, Jonathan H. Grenier, Dan L. Heitger

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ABSTRACT

Previous research has shown that obtaining independent assurance of corporate social responsibility (CSR) reporting has capital market benefits and that these benefits are amplified when accountants provide the assurance. Yet, little is known about whether and the manner in which CSR assurance improves the quality of CSR reporting, and whether accounting providers improve reporting quality to a greater extent than non-accounting providers. This study uses the unique setting of CSR restatements to examine these issues. We present theoretical and empirical evidence supporting a competitive advantage of using accounting firms as assurance providers as they not only identify inaccuracies in previous reports earlier than non-accounting providers, but also prevent future reporting inaccuracies. CSR assurance, from either type of provider, also leads to improved reporting definitions, scopes, and methodologies that require restatements for comparability. Results also indicate that CSR reporting frameworks (e.g., GRI) are not a substitute for obtaining CSR assurance as the latter has incremental benefits over GRI usage in terms of identifying errors and reporting improvements. These results have implications for public policy makers considering the merits of mandating CSR assurance and for organizations assessing the relative benefits and costs of preparing GRI-based CSR reports, obtaining CSR assurance, and choosing between accounting vs. non-accounting CSR assurance providers.

1. Introduction

Independent assurance of corporate social responsibility (CSR) reports has become a standard business practice with nearly two-thirds of the largest 250 global companies having their CSR reports independently assured (KPMG, 2015). This demand for CSR assurance is driven by a need to convince stakeholders that the firm is appropriately managing its environmental and social risks (Simmnett et al., 2009). CSR assurance appears to be effective in this respect as it reduces firms' cost of capital and reduces analyst forecast errors and dispersion, especially when accounting firms provide the assurance (Casey and Grenier, 2015). Yet, there is only scant empirical evidence on how CSR assurance achieves these capital market benefits. Do capital market participants simply have more confidence in firms' reported CSR performance due to the CSR assurance report or is the reporting also of higher quality? Further, if the reporting is of higher quality, what are the competitive advantages of accountants in improving reporting quality? This study uses the unique setting of restatements of CSR reports to shed light on these important questions.

KPMG (2011) reports that approximately one-third of the largest 250 global companies and approximately one-fifth of 3400

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companies across 34 countries have restated previously-issued CSR reports.¹ A CSR report is deemed to be “restated” when a subsequent CSR report indicates that the previous report had an error or omission (i.e., errors) or was otherwise updated to improve or enhance definitions, scopes, and/or estimation/calculation methodologies (i.e., non-errors), necessitating previously-issued metrics to be restated for comparability (KPMG, 2011). See Appendix A for examples of both types of restatements. Consistent with KPMG (2011), we consider CSR restatements as “good,” and a positive step forward for improving CSR quality and effectiveness (i.e., part of the maturation process of CSR reporting). That is, in contrast to the mature financial reporting setting where restatements can be indicative of management incompetence (or in some cases fraud), CSR reporting is still in its relative infancy where errors are somewhat expected and where definitions, scopes and methodologies should be significantly improving over time.²

Leveraging and extending previous literature on the internal and external benefits of obtaining CSR assurance (e.g., Chua, 2006; Casey and Grenier, 2015), we predict that obtaining CSR assurance is positively associated with both error and non-error CSR restatements, and having an accounting firm provide the assurance amplifies this association. As CSR assurance is a verification exercise, identified inaccuracies in current reporting lead to error restatements to fix similar inaccuracies in prior periods. CSR assurance providers also recommend improvements to CSR reporting (O’Dwyer and Owen, 2005, 2007) resulting in non-error CSR restatements where previous reports have to be restated for comparability. We expect accountants to be more likely (than non-accounting providers) to identify each type of restatement due to their superior assurance expertise (cf. Power, 1997; Gray, 2000; Wallace, 2000; Pflugrath et al., 2011). We also pose a research question to examine whether accounting providers are not only more likely to identify CSR restatements, but also do so in a timelier manner. Importantly, we expect to find these associations after controlling for use of CSR reporting frameworks such as GRI’s (2013) *G4 Sustainability Reporting Standards*, indicating that reporting frameworks are not a substitute for obtaining CSR assurance in terms of improving reporting quality, let alone in terms of increasing user confidence in the reporting.

However, it also possible that CSR assurance does not improve reporting quality, and the capital market benefits are solely attributable to increased, but perhaps misplaced, confidence in CSR reporting. This possibility is consistent with the extensive criticism of CSR assurance (cf. Gray, 2000). Critics argue that CSR assurance (1) is often unduly influenced by management and hence fails to challenge reporting completeness or relevance (Ball et al., 2000; O’Dwyer and Owen, 2007; Smith et al., 2011), (2) often fails to engage stakeholders in identifying concerns (Adams and Evans, 2004; O’Dwyer and Owen, 2005, 2007), and (3) exhibits high variation in scope, independence of provider, use of external criteria (Kamp-Roelands, 2002; Deegan et al., 2006; Manetti and Becatti, 2009). Further, most CSR assurance engagements provide limited assurance (O’Dwyer and Owen, 2005, 2007), a lower level than the reasonable level of assurance provided on financial statement audits that may not be sufficient to improve reporting quality. Finding a significant association of CSR assurance and restatements would help refute such criticisms by suggesting that CSR assurance is serving its primary role of improving the relevance and reliability of CSR reporting.

Our sample includes 2339 of the 7540 firms surveyed by KPMG in their 2011 and 2013 surveys. Within the sample, 36.3 percent obtained CSR assurance and 20.2 percent restated a previously issued CSR report. To address self-selection and endogeneity, we utilize Heckman’s two-stage estimation approach in our empirical models. In the first stage, CSR assurance is the dependent variable in a probit regression using the determinants of CSR assurance decisions from prior research (Simmnett et al., 2009; Casey and Grenier, 2015) as independent variables. We use a probit regression in the second stage with CSR restatements serving as the dependent variable (error and non-error restatements separately estimated) and CSR assurance, provider type (accounting vs. non-accounting) and several control variables for other factors that may be associated with CSR restatements as independent variables. The most notable control variable is the use of GRI reporting standards to examine whether CSR assurance has an incremental effect over use of reporting frameworks.

Results support our predictions as CSR assurance and use of accounting providers are both significantly positively associated with both types of CSR restatements (errors and non-errors). Importantly, these results are obtained when controlling for use of GRI reporting standards, indicating that such frameworks are not a substitute for independent assurance. In fact, GRI standards are only significantly associated with non-error restatements (i.e., definitions, scopes, and/or methodologies); whereas, CSR assurance is significantly associated with both error and non-error restatements. Supplemental analyses examining the time series dynamics of CSR assurance/provider elucidate one of the argued competitive advantages of accounting providers insofar as they are able to detect errors relatively better than non-accounting providers and prevent future errors during early engagement periods; whereas, non-accounting providers detect errors more gradually across engagement periods. CSR assurance has a constant effect on non-error CSR restatements, however, illustrating the importance of repeated CSR engagements in improving CSR reporting quality.

This study makes several contributions to the literature. First, we extend previous archival and experimental research that documents capital market benefits of CSR assurance (Pflugrath et al., 2011; Casey and Grenier, 2015; Cheng et al., 2015) by providing empirical evidence on whether and the manner in which CSR assurance improves the quality of CSR reporting, and whether

¹ Although KPMG (2011) describes its report as a survey and it technically meets the definition, its research procedures are different from typical academic conceptions of surveys. Rather than sending questionnaires to the companies, KPMG professionals complete a questionnaire based on the publicly available CSR reports (or lack thereof) of the top 250 companies listed on the Fortune Global 500 for 2010 and the 100 largest firms by revenue in each of 34 countries. As such, our study examines standalone CSR reporting, and does not examine CSR-related disclosures in annual reports or through other channels such as the CSRwire newswire service (cf. Griffin and Sun, 2013). See De Villiers and Van Staden (2011) for a discussion of factors that affect the choice of CSR disclosure medium.

² The notion that CSR restatements are a positive step forward for improving CSR quality and effectiveness distinguishes CSR restatements from earnings restatements that are usually treated as indicators of reduced credibility and quality of financial reporting. Nevertheless, the implications of CSR restatements could change over time, as KPMG (2011, 27) notes that, “In the long-run however, restatements, errors and omissions in CR reporting will begin to erode investor confidence in not only the data presented, but potentially also the quality of the wider governance structure and internal controls with the organization.”

accounting providers improve reporting quality to a greater extent than non-accounting providers. Before our study, the existing evidence on the CSR assurance process was primarily qualitative in nature, most notably interviews with CSR assurance providers (O'Dwyer et al., 2011) and surveys of corporate responsibility officers about their CSR assurance decisions (Ballou et al., 2012). Using the unique setting of CSR restatements, we find that CSR assurance, especially when provided by accounting firms, improves the quality of CSR reporting by identifying inaccuracies in prior reports and improvements to definitions, scopes, and methodologies that require restatements for comparability. As such, we show that the capital market benefits of CSR assurance are not solely due to increased user confidence, but also to improved reporting quality. Further, the superior capital market benefits of using accountants (Pflugrath et al., 2011; Casey and Grenier, 2015) appear justified as accountants not only improve the numerical accuracy of CSR reporting to a greater extent and on a timelier basis than non-accounting providers, but also prevent errors in future reporting.

Our study also contributes to the nascent literature on CSR restatements. In a concurrent study, Pinnuck et al. (2017) apply an exploratory approach using a relatively smaller sample than the one used in our study to examine the nature and determinants of CSR restatements. Focusing solely on error restatements, they find some evidence supporting firms' reporting bias in CSR disclosures—e.g., overstatements of CSR performance. In comparison, our paper builds on prior studies on CSR assurance and employs CSR restatements, both error and non-error, as a unique setting to further investigate the impact of CSR assurance and type of assurance provider on CSR reporting quality. By documenting that assurance is associated with both types of CSR restatements and that obtaining assurance from accounting professionals has an incremental quality effect, we provide comprehensive evidence on the relationship between CSR assurance and CSR reporting quality.³

Finally, our study has important implications for public policy as regulators across the globe consider the merits of whether or not to mandate CSR assurance. Although the regulation of CSR reporting and assurance is complex, we provide critical evidence on the manner in which CSR assurance improves CSR reporting quality, and the related competitive advantages of accountants in the provision of CSR assurance. Regulators should also consider our results that CSR reporting frameworks (e.g., GRI) do have value in terms of constant identification of reporting improvements, but are not a substitute for CSR assurance in terms of improving reporting quality. This result is important as several high-profile companies (e.g., Shell, Proctor & Gamble, American Electric Power) use GRI, but do not obtain independent assurance but potentially would benefit from doing so.

2. Hypothesis development

2.1. CSR assurance and restatements

Stakeholders often are skeptical of CSR reports, especially when they contain an imbalance of positive CSR performance—considering such reports to be public-relation ploys (i.e., greenwashing; Lyon and Maxwell, 2011). To address this concern, firms enhance the credibility of their CSR reports by having them independently assured (Simnett et al., 2009; Pflugrath et al., 2011; Casey and Grenier, 2015). For example, Pflugrath et al. (2011) find that analysts perceive CSR reports to be more credible when externally assured. This enhanced credibility also has capital market benefits as Casey and Grenier (2015) find that assuring CSR reports leads to a lower cost of equity capital, along with lower analyst forecast errors and dispersion. Furthermore, Cheng et al. (2015) find that CSR assurance increases non-professional investors' willingness to invest, especially when the reporting is of high relevance to company strategy.

We expect that obtaining independent assurance on CSR reports would lead to both error and non-error CSR restatements. With respect to error restatements, assurance involves verifying the numerical accuracy of reported CSR metrics. Any discovered inaccuracies in the current reporting period will prompt an error CSR restatement if a similar inaccuracy was present in prior reporting periods. Although this does imply that for *repeat* CSR assurance engagement that the “misstatement” was missed by the CSR assurance provider in the original reporting period, we expect that error CSR restatements will not only be associated with first-time CSR assurance for two primary reasons. First, for many organizations, CSR reporting is still in its infancy and numerical inaccuracies may be difficult to detect especially when the metrics are highly subjective and/or the source documentation is imperfect. Second, the majority of CSR assurance engagements are limited assurance engagements (O'Dwyer and Owen, 2005, 2007) which involves a much lower level of assurance than a reasonable assurance engagement (e.g., a financial statement audit). In other words, the metrics are not under the same level of scrutiny as they would be on a reasonable assurance engagement.⁴

In addition to discovering inaccuracies or inconsistencies in CSR reports, assurance providers also identify weaknesses and associated suggestions for improvement in information systems and internal control (Owen et al., 2000; Corbett et al., 2005; Darnall et al., 2009; Edgley et al., 2010; O'Dwyer et al., 2011). Consequently, when assurance providers identify and prompt firms to implement suggested improvements, restatements may be necessary to ensure comparability with past CSR reports.

We expect CSR assurance to lead to error and non-error CSR restatements even when firms utilize CSR reporting standards. First,

³ Another difference between our study and Pinnuck et al. (2017) is that we do not view misstatements as indicative of a systematic bias in CSR reporting, as it is difficult to see why managers who opportunistically misstate CSR performance would voluntarily seek independent assurance which may increase the likelihood of detection of those misstatements. Of course, we believe that public policy makers should remain cognizant of potential opportunistic CSR reporting and consider *mandatory* independent assurance as a potential solution. We encourage future research to examine the effects of mandatory versus voluntary CSR assurance on CSR reporting quality, since our study examines the status quo of voluntary CSR assurance.

⁴ That said, we do expect that higher quality assurance engagement will detect inaccuracies quicker than lower quality assurance engagement (see development of RQ1). Also, this possibility of missing the “misstatement” does not necessarily indicate that CSR assurance did not have an overall positive effect on the quality of CSR reporting if CSR assurance detected other CSR restatements in the misstatement period, and/or if they reduced the number of future restatements.

assurance involves a verification process for reported metrics (not involved when simply applying reporting standards) that result in an increased likelihood of uncovering inaccuracies and opportunities for improved definitions, scopes, and methodologies. Second, assurance providers are likely to counsel or require firms to restate inaccuracies or to leverage opportunities for improvement; whereas, a firm may be less likely to restate on its own accord. Although the Global Reporting Initiative's (2013) G4 reporting standards emphasize the importance of maintaining comparability by restating current disclosures alongside historical data (or vice versa), firms that identify errors or opportunities for improvement may or may not go as far as to issue a CSR restatement without the urging of an assurance provider.⁵ Accordingly, we propose the following hypotheses.

H1a: CSR assurance has a positive association with error CSR restatements.

H1b: CSR assurance has a positive association with non-error CSR restatements.

2.2. Accounting CSR assurance providers and restatements

We also expect both error and non-error CSR restatements to be more likely when assurance providers are accounting firms as opposed to non-accounting firms (e.g., environmental consulting firms, expert panels, etc.). Accountants' competitive advantage resides in their assurance expertise from superior understanding of evidence, professional skepticism, information systems, coordination of specialists, and independence issues (Power, 1997; Gray, 2000; Wallage, 2000; Pflugrath et al., 2011). At least two previous studies provide evidence consistent with accountants providing higher quality assurance than non-accountants. Pflugrath et al. (2011) find that analysts believe that assurance increases the credibility of CSR reports to a larger extent when provided by an accounting firm. Casey and Grenier (2015) find that the reduction in firms' cost of capital and analyst forecast dispersion are larger when the assurance provider is an accounting firm.

Not only are accounting providers perceived as providing higher quality assurance, but also the focus of their assurance differs from non-accounting providers in a manner that could lead to superior prompting of both error and non-error restatements. Specifically, the assurance provided by accounting firms primarily focuses on the material accuracy of the reported information, whereas, non-accountants provide more qualitative assurance focusing on recommendations for improvement, etc. (O'Dwyer and Owen, 2005, 2007). The benefits of this accuracy focus in terms of identification of error restatements is self-evident as accountants bringing their financial statement audit expertise to CSR assurance engagements should lead to superior detection of inaccuracies in reported metrics.

Further, the benefits of this accuracy focus should also extend to non-error restatements. When there are updates to definitions, scopes, and methodologies (either identified by the reporting firm or the assurance provider), accountants should be more likely than non-accountants to identify that a restatement is necessary due to their experience and understanding of accounting standards (that also occur in GRI standards) to ensure comparability in financial (and nonfinancial) reports. In other words, an accountant may be more likely to realize that an updated definition, scope, or methodology related to a CSR metric *requires* restatement of prior period metrics for comparability. Taken together, we propose the following hypotheses.

H2a: CSR assurance from accounting firm providers has a stronger positive association with error CSR restatements than CSR assurance from non-accounting firm providers.

H2b: CSR assurance from accounting firm providers has a stronger positive association with non-error CSR restatements than CSR assurance from non-accounting firm providers.

2.3. Time series dynamics of CSR assurance and restatements

In addition to our hypotheses, we pose a series of research questions on the time series dynamics of CSR assurance restatements. Conceptually, CSR assurance could prompt both types of restatements immediately (i.e., in early assurance periods), gradually (i.e., in late assurance periods), or constantly (i.e., in all assurance periods). For error restatements, immediate identification is ideal as gradual or constant identification entail missing misstatements in previous assurance periods. Also, immediate identification would imply that assurance is preventing future inaccurate reporting. For non-error restatements, constant identification would be ideal as it implies continual improvement in CSR reporting, at least until CSR reporting has reached a state of maturity.

We expect that CSR assurance will lead to the detection of error restatements (H1a) and non-error restatements (H1b), but our theory is not sufficient to indicate whether the effects will be immediate, gradual, or constant. The limited level of assurance provided on most CSR assurance engagements (O'Dwyer and Owen, 2005, 2007) could lead to restatements not being identified immediately. On the other hand, assurance providers will want to demonstrate the value they are providing in terms of enhancing reporting quality, especially in early assurance periods. For error restatements, we feel that constant identification is unlikely as it would imply the assurance providers constantly miss errors (and correcting them in subsequent periods). For non-error restatements, we feel that gradual identification is unlikely as opportunities for improved reporting should be evident in early assurance periods, especially since assurance providers will be looking to demonstrate value. The main question is whether assurance providers can continue to

⁵ The GRI Framework provides standardized, international sustainability reporting standards firms can rely on in their CSR reporting. GRI standards are developed for use by all types of companies, and thus, are not industry-specific (although the GRI does produce certain sector supplements). In the U.S., the Sustainability Accounting Standards Board (SASB) is currently developing industry-specific CSR reporting standards for publicly-traded companies.

identify reporting improvements in later assurance periods.

RQ1a: Is the association between CSR assurance and error restatements immediate or gradual?

RQ1b: Is the association between CSR assurance and non-error restatements immediate or constant?

We expect that accounting assurance providers will be more likely to prompt companies to issue both types of restatements (H2a and H2b). However, it is unclear whether they will do so in a timelier manner than non-accountants. In other words, are the advantages of accounting assurers in prompting error corrections and non-error improvements constant across time periods? If not, are accounting assurers more likely to prompt restatements in earlier periods and less likely to do so in later periods? The latter would be consistent with accounting providers preventing future errors, or having CSR reporting quality reach maturity leading to less non-error restatements in future periods.

RQ2: Do accounting providers prompt error and non-error restatements in a timelier manner than non-accounting providers?

3. Empirical design

3.1. Sample description

Our initial sample of firms restating their CSR reports originates from the proprietary survey data collected by KPMG for its International Survey of Corporate Responsibility Reporting 2011 (KPMG, 2011) and The KPMG Survey of Corporate Responsibility Reporting 2013 (KPMG, 2013). In the 2011 survey, KPMG professionals hand-collected data based on the publicly available CSR reports (or lack thereof) of the top 250 companies listed on the Fortune Global 500 and the 100 largest companies by revenue from 34 countries around the globe (KPMG, 2011). In the 2013 survey, KPMG professionals hand-collected data of the 100 largest companies, also by revenue, from 41 countries. The initial data from the two surveys contain 7540 firm year observations, of which 3440 observations come from the 2011 survey and 4100 observations from the 2013 survey. Out of these observations, 5124 firm years include CSR reporting.

The KPMG data set includes information on whether the CSR report contains changes in a previously issued CSR report(s) for one of the following reasons: (1) restatements due to error or omission (i.e., error), (2) restatements due to updated/improved estimation/calculation methodology (i.e., non-error), (3) update of definitions applied (i.e., non-error), (4) update of scope (i.e., non-error), and (5) unspecified (i.e., non-error).⁶ The data set also includes information on whether the CSR report is assured and, if it is assured, the identity of the assurance provider.

We hand-matched the surveyed firms to the Compustat Global – Fundamentals Annual database using company names and country information. We were able to match 2631 out of the 5124 firm year observations. After excluding observations that were missing variables required for our empirical tests, our final sample contains 2339 firm-year observations (i.e., CSR reports). Table 1, Panel A reports the sample selection process.

In Table 1, Panel B, we report the distribution of CSR restatements. Out of the 2339 reports, 472 contain a CSR restatement. Out of the 472 CSR restatements, 118 of them involve correction of errors (i.e., error restatements) and 354 restatements pertain to non-error reasons only (i.e., see Panel C of Table 1 for more detail).⁷ Since firms could report more than one reason for each restatement, the total number of reasons (599) exceeds the total number of CSR restatements (472). Method update is the most common reason of firms restating their sustainability reports (37.7 percent), and scope update is second (26.7 percent). Correction of errors, ranked third, is identified by 19.7 percent of CSR restating firms as the reason (or one of the reasons) for the restatement. Finally, definition update and unspecified reasons are identified in 11.7 percent and 4.2 percent of the CSR restatements, respectively.

Next, the distribution of CSR reports/restatement by Fama-French 17 industry is presented in Table 1, Panel D. The top three industries of CSR restatements are Mining and Minerals (32.4 percent), Utilities (26.2 percent), and Chemicals (22.5 percent). Finally, Table 1, Panel E reports the distribution of CSR reports/restatements by country. Half of the top ten CSR restating countries are in Europe (Portugal, Spain, Germany, Sweden, and Italy), with an average restatement percentage of 38.7 percent for those five countries. Overall, 20.2 percent of firms have restated information disclosed in prior CSR reports.

3.2. CSR assurance and providers

Out of the 2339 firm year observations of CSR reports in our final sample, 848 of them (36.3 percent) are independently assured.

⁶ As CSR reporting is voluntary and unregulated in most jurisdictions, CSR restatements also are typically voluntary and unregulated. It is important to note that all of the restatements in the KPMG surveys were disclosed in the subsequent CSR report (see footnote 1), rather than through a formal press release at the time of restatement.

⁷ When analyzing CSR restatements by type, we code a CSR restatement as an *error* restatement (*ERROR*) if error is one of the reasons for the restatement (i.e., there are error corrections in all instances, but they also might include one or more non-error reasons). All non-error only restatements are coded as *non-error* restatements (*NON-ERROR*). Therefore, the sum of *ERROR* (118) and *NON-ERROR* (354) CSR restatements is equal to the total number of CSR restatements (472). In our multivariate tests, we also analyze cases where errors are the sole reason for restatement (i.e., no mention of non-error reasons). Accordingly, we use the variable, *PURE_ERROR*, in place of *ERROR* in the regression model to analyze error-only reasons. Out of the 118 *ERROR* CSR restatements, 58 them involve error corrections only (*PURE_ERROR*) and 60 involve both error corrections and non-error reasons. See the subsection of “Empirical Models” and Section 4 for details.

Table 1
Sample selection and CSR restatements.

Panel A: Sample Selection		No. of Observations
KPMG Survey		7540
Less: firms not reporting on corporate social responsibility		(2416)
Less: firms without identified GVKEY		(2494)
Less: incomplete observations for required financial variables		(291)
Final Sample		2339

Panel B: Distribution of CSR Restatements		
	Frequency	% of Sample
No restatements	1867	79.8%
Non-Error restatements	354	15.1%
Error restatements	118	5.1%
Total	2339	100.0%

Panel C: Reasons of CSR Restatements		
Reason	Frequency	% of Restatements
Error	118	25.0%
Method Update	226	47.9%
Definition Update	70	14.8%
Scope Update	160	33.9%
Unspecified	25	5.3%
Total	599	> 100%

Panel D: CSR Reports and Restatements by Industry			
Fama-French 17 Industry	CSR Freq	Restatements (Non-Error/Error)	% Restated
Food	178	33 (28/5)	18.5%
Mining and Minerals	68	22 (11/11)	32.4%
Oil and Petroleum Products	132	27 (19/8)	20.5%
Textiles, Apparel & Foot ware	15	0 (0/0)	0.0%
Consumer Durables	37	7 (7/0)	18.9%
Chemicals	89	20 (15/5)	22.5%
Drugs, Soap, Perfumes, Tobacco	99	21 (16/5)	21.2%
Construction and Construction Materials	182	34 (26/8)	18.7%
Steel Works	87	17 (10/7)	19.5%
Fabricated Products	9	1 (1/0)	11.1%
Machinery and Business Equipment	162	28 (21/7)	17.3%
Automobiles	78	16 (11/5)	20.5%
Transportation	146	29 (22/7)	19.9%
Utilities	122	32 (23/9)	26.2%
Retail Stores	134	22 (16/6)	16.4%
Financial Institutions	383	74 (58/16)	19.3%
Other	418	89 (70/19)	21.3%
Total	2339	472	20.2%

Panel E: CSR Reports and Restatements by Country			
Country	CSR Frequency	Restatements (Non-Error/Error)	% Restated
Australia	80	23 (13/10)	28.8%
Belgium	19	3 (2/1)	15.8%
Brazil	51	18 (13/5)	35.3%
Canada	76	28 (14/14)	36.8%
Chile	40	4 (3/1)	10.0%
China	70	4 (4/0)	5.7%
Colombia	21	8 (7/1)	38.1%
Denmark	45	6 (5/1)	13.3%
Finland	77	15 (10/5)	19.5%
France	106	20 (16/4)	18.9%
Germany	63	24 (15/9)	38.1%

(continued on next page)

Table 1 (continued)

Panel D: CSR Reports and Restatements by Industry			
Fama-French 17 Industry	CSR Freq	Restatements (Non-Error/Error)	% Restated
Greece	20	5 (3/2)	25.0%
India	75	12 (6/6)	16.0%
Indonesia	81	5 (4/1)	6.2%
Israel	13	1 (1/0)	7.7%
Italy	50	16 (13/3)	32.0%
Japan	178	26 (21/5)	14.6%
Malaysia	84	11 (11/0)	13.1%
Mexico	75	13 (11/2)	17.3%
Netherlands	65	20 (12/8)	30.8%
New Zealand	14	6 (5/1)	42.9%
Nigeria	63	7 (7/0)	11.1%
Norway	29	2 (1/1)	6.9%
Poland	22	1 (1/0)	4.5%
Portugal	21	9 (7/2)	42.9%
Russia	43	4 (4/0)	9.3%
Singapore	88	1 (1/0)	1.1%
South Africa	165	36 (31/5)	21.8%
South Korea	73	26 (19/7)	35.6%
Spain	45	19 (15/4)	42.2%
Sweden	63	24 (22/2)	38.1%
Switzerland	75	12 (11/1)	16.0%
Taiwan	56	2 (2/0)	3.6%
United Kingdom	126	39 (27/12)	31.0%
United States	135	19 (15/4)	14.1%
Other	32	3 (2/1)	9.4%
Total	2339	472	20.2%

A CSR restatement is classified as an Error restatement if error is the reason (or one of the reasons) for the restatement. Out of the 118 Error restatements, 58 are due to error corrections only and 60 contain both error corrections and non-error reasons. Non-Error restatements are due to non-error reasons only.

A CSR restatement could involve more than one reason. Therefore, the sum of restatement frequency by reason is larger than 472, the total number of CSR restatements, and the sum of percentage exceeds 100%.

Other (countries) include Bulgaria, Hungary, Luxembourg, Romania, Slovakia, Thailand, and Ukraine, all of which have 10 or less observations.

Table 2, Panel A presents the distribution of CSR assurance by country. Notably, five of the top ten CSR assurance countries (South Korea, Spain, Italy, Portugal, and Columbia), based on CSR assurance percentage, are also among the top ten CSR-restating countries in Table 1, Panel E. This is consistent with the notion that there is a positive association between CSR assurance and CSR restatements. Table 2, Panel B breaks down the CSR assurance providers into accounting profession and non-accounting profession, and 62.5 percent of the CSR assurance engagements are conducted by the Big 4 (PwC, KPMG, EY, and Deloitte) and other accounting firms with non-accounting CSR assurance providers (DNV, Bureau Veritas, Lloyd's Register, etc.) accounting for the remaining 37.5 percent.

3.3. Empirical models

3.3.1. Determinants of CSR assurance decision

Our main tests examine the association between CSR assurance and the occurrence of error and non-error CSR restatements. As discussed before, CSR restatements are voluntary reporting choices subject to a self-selection process. For example, CSR reporting firms might choose to restate previously disclosed information to improve perceived information quality, which could be the same reason underlying the decision on getting their CSR reports assured. To address this self-selection, we employ the endogenous treatment regression model, also known as the Heckman's two-stage estimation approach.⁸ In the first stage, we estimate the determinants of CSR assurance decisions using a probit regression. The second-stage model then estimates the treatment effect (i.e., having CSR assurance) on the outcome (i.e., having a CSR restatement).

For the first stage estimation, we adapt the models of CSR assurance demand used in prior studies of assurance demand (e.g., Simnett et al., 2009, Casey and Grenier, 2015) and run the following probit regression to estimate the likelihood that a firm obtains CSR assurance in year t :

⁸ This empirical estimation process is similar to that used in Dhaliwal et al. (2014), where they control for self-selection when examining the association between CSR disclosure and the implied cost of equity capital. The endogenous treatment-regression model is also referred to as an endogenous binary-variable model or an endogenous dummy-variable model (StataCorp, 2014).

Table 2
CSR Assurance and Providers.

Panel A: CSR Assurance by Country			
Country	CSR Frequency	CSR Assured	% Assured
Australia	80	39	48.8%
Belgium	19	6	31.6%
Brazil	51	22	43.1%
Canada	76	23	30.3%
Chile	40	9	22.5%
China	70	27	38.6%
Colombia	21	10	47.6%
Denmark	45	16	35.6%
Finland	77	21	27.3%
France	106	76	71.7%
Germany	63	29	46.0%
Greece	20	10	50.0%
India	75	30	40.0%
Indonesia	81	6	7.4%
Israel	13	2	15.4%
Italy	50	30	60.0%
Japan	178	47	26.4%
Malaysia	84	11	13.1%
Mexico	75	16	21.3%
Netherlands	65	32	49.2%
New Zealand	14	3	21.4%
Nigeria	63	3	4.8%
Norway	29	8	27.6%
Poland	22	3	13.6%
Portugal	21	12	57.1%
Russia	43	13	30.2%
Singapore	88	7	8.0%
South Africa	165	60	36.4%
South Korea	73	63	86.3%
Spain	45	37	82.2%
Sweden	63	21	33.3%
Switzerland	75	26	34.7%
Taiwan	56	22	39.3%
United Kingdom	126	76	60.3%
United States	135	26	19.3%
Other	32	6	18.8%
Total	2339	848	36.3%

Panel B: CSR Assurance Providers		
<i>Accounting Profession</i>	Frequency	Percentage
PwC	148	17.5%
KPMG	141	16.6%
Ernst & Young	134	15.8%
Deloitte	103	12.1%
Other	4	0.5%
Subtotal	530	62.5%
<i>Non-Accounting Profession</i>	Frequency	Percentage
DNV	43	5.1%
Bureau Veritas	40	4.7%
SGS	20	2.4%
Environmental Resources Management (ERM)	16	1.9%
Lloyd's Register	15	1.8%
Corporate Citizenship	9	1.1%
Other	175	20.6%
Subtotal	318	37.5%
Total	848	100.0%

$$\begin{aligned} Prob(ASSURED = 1)_{i,t} = & \Phi(\gamma_0 + \gamma_1 SIZE_{i,t} + \gamma_2 ROA_{i,t} + \gamma_3 LEVERAGE_{i,t} + \gamma_4 MB_{i,t} + \gamma_5 HHI_{i,t} + \gamma_6 FIN_{i,t} + \gamma_7 UTILITY_{i,t} \\ & + \gamma_8 MINING_{i,t} + \gamma_9 PRODUCTION_{i,t} + \gamma_{10} FINANCE_{i,t} + \gamma_{11} STAKEHOLDER_{i,t} + \Sigma YEAR_{i,t}) + \varepsilon_{i,t} \end{aligned} \quad (1)$$

in which Φ is the cumulative distribution function of the standard normal distribution. The dependent variable, *ASSURED*, is an indicator variable set to 1 for those firms that obtain CSR assurance. On the right-hand side of the equation, we include natural logarithm of total assets (*SIZE*), return of assets (*ROA*), and leverage of the firm measured by the ratio of long-term debt divided by total assets (*LEVERAGE*) following prior literature (Simnett et al., 2009). Based on insights from Casey and Grenier (2015), we also control for three additional firm-level factors that potentially influence assurance demand: growth measured by the market-to-book equity ratio (*MB*), industry competition measured by the Herfindahl-Hirschman Index (*HHI*), and financing activities measured by the equity and debt raised during the year divided by beginning of year total assets (*FIN*).^{9,10}

Further, we include indicator variables for the four industries that Simnett et al. (2009) predicted to have a strong need for credibility enhancement in CSR reporting because of exposure to social and environmental risks: *UTILITY*, *MINING*, *PRODUCTION*, and *FINANCE*. Finally, we include an indicator variable to capture the shareholder-oriented versus stakeholder-oriented governance model (*STAKEHOLDER*) in different countries, as companies in stakeholder-oriented countries have been shown to be more likely to have their CSR reports assured (Simnett et al., 2009).¹¹

3.3.2. CSR assurance on Error/Non-Error CSR restatements

In the second stage, we rely on our theoretical discussions presented in Section 2 to develop, and estimate, the following probit model to determine the association between CSR assurance and the occurrence of error and non-error CSR restatements in year *t*:

$$\begin{aligned} Prob(ERROR/NON-ERROR = 1)_{i,t} = & \Phi(\beta_0 + \beta_1 ASSURED_{i,t} + \beta_2 ACC_{i,t} + \beta_3 GRI_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 ROA_{i,t} + \beta_6 ASDI_{i,t} + \beta_7 GOV_{i,t} \\ & + \beta_8 PFREE_{i,t} + \beta_9 EPI_{i,t} + \Sigma YEAR_{i,t} + \Sigma INDUSTRY_{i,t} + \Sigma COUNTRY_{i,t}) + \varepsilon_{i,t} \end{aligned} \quad (2)$$

where the dependent variable, *ERROR (NON-ERROR)*, is an indicator set to 1 if the CSR report issued for year *t* contains revisions of the previous CSR disclosures due to error corrections (non-error reasons), and 0 otherwise. Further, to isolate CSR restatements that arise from error corrections only from those involving both error corrections and other non-error reasons, we also estimate Eq. (2) using *PURE_ERROR*, an indicator variable equal to 1 if a CSR restatement is due to error corrections only and 0 otherwise.^{12,13} On the right-hand side, we include *ASSURED*, defined in Eq. (1), as our variable of interest for testing our first set of hypotheses that there is a positive association between obtaining CSR assurance and issuing an error or non-error CSR restatement. Next, we include *ACC*, an indicator variable set to 1 for CSR assurance providers in the accounting profession and 0 for non-accounting assurance providers for testing our second set of hypotheses that assurance from an accounting firm has an incremental effect on issuing an error or non-error CSR restatement.¹⁴

To control for other factors that could potentially affect the occurrence of a CSR restatement, we first include *GRI*, an indicator variable assigned to 1 if the firm adopts the CSR reporting framework produced by the Global Reporting Initiative (*GRI*), and 0 otherwise (see discussion in Section 2).¹⁵ For other firm-level factors, we control for firm size (*SIZE*) and profitability (*ROA*) considering that these two factors have been consistently shown in prior literature to be significantly associated with CSR reporting decisions including the likelihood of CSR disclosure (e.g., Dhaliwal et al., 2011, 2014) and the acquisition of CSR assurance as previously discussed.

Further, we follow prior studies and control for several country-level variables that could be associated with the level of firms' CSR disclosure (e.g., Cahan et al., 2016; De Villiers and Marques, 2016) and potentially the likelihood of a CSR restatement. First, we control for the level of legal protection of minority shareholders against corporate insiders' expropriation by using the anti-self-

⁹ Following Casey and Grenier (2015), we use contemporaneous variables in our CSR assurance model. Like Casey and Grenier (2015), the effect of those determinants on firms' CSR assurance decisions remains qualitatively unchanged when lagged variables are used. We examine the time series dynamics of CSR assurance in supplemental analysis.

¹⁰ Discussions with KPMG professionals indicate that the year of the report is not always consistent across companies. For example, some companies may have released their 2011 report in early 2011 whereas other companies may have issued their 2011 report in early 2012 (i.e., similar to their annual report). Furthermore, the actual release dates are often not publicly available. These timing issues add noise to our data set and bias us against finding significant results.

¹¹ Consistent with Simnett et al. (2009), firms are shareholder-oriented when they operate in a common law country where shareholders are dealt with at arm's length; whereas, other firms operate in code law countries with more insider ownership (e.g., banks) and are thus considered stakeholder-oriented.

¹² We thank the anonymous reviewer for making this suggestion, which allows us to further examine whether the results, and thus the inferences, may differ between error-only restatements and error restatements that also involve non-error reasons.

¹³ To retain consistency, we also estimate the first stage model, i.e., Eq. (1), using pure error restatements and excluding error restatements that involve non-error reasons. See the related discussions in Section 4 for details.

¹⁴ We recognize that the decision on selecting a CSR assurance provider is also a voluntary choice and therefore is also subject to endogeneity. We made the research choice to model the CSR assurance decision, rather than the assurance provider decision, in the first stage estimation because (1) we want to examine the *incremental effect* of assurance provider choice on the occurrence of a CSR restatement and (2) the assurance provider decision is a sequential choice that comes after the CSR assurance decision.

¹⁵ We do not include a measure of CSR performance for two primary reasons. First and most importantly, the most widely used measure of CSR performance is the MSCI ESG KLD STATS (formerly KLD) dataset, which is only for firms listed in the United States. Second, the relationship between CSR performance and reporting is controversial. Numerous studies support a negative relationship with weaker-performing firms being more likely to report their positive CSR efforts (Patten, 2002; Cho and Patten, 2007). Other studies find a positive relationship consistent with firms being more likely to report good news (Al-Tuwaijri et al., 2004; Clarkson et al., 2008). The relationship of CSR performance and restatements is also unclear. Firms with strong CSR performance are probably less likely to report inaccurate information. However, these same firms may also be more likely to take efforts to improve the quality of their CSR reporting, leading to restatements.

dealing index (*ASDI*) developed by Djankov et al. (2008).¹⁶ Second, we control for country-level governance (*GOV*) by using the average of four Worldwide Governance Indicators (*WGI*), namely voice and accountability, government effectiveness, regulatory quality, and rule of law, as our governance variable.¹⁷ All four measures of the governance indicators have values ranging from -2.5 (weak) to 2.5 (strong) governance performance; therefore, *GOV*, by construction, has the same range. Third, we control for the level of press freedom in each country using the Press Freedom Index published by Reporters Without Borders. The Press Freedom Index reflects the degree of freedom of the media in more than 170 countries and has values ranging from 0 to 112.5, with lower values indicating higher freedom of the press. In constructing our variable, *PFREE*, we multiply the index by -1 such that higher values indicate greater freedom of the press in a country. Fourth, since environmental issues are frequently a focus of CSR reporting, we also include the Environmental Performance Index, *EPI*, as another country-level control variable.¹⁸ This index covers more than 150 countries and is released biannually. The values range between 0 and 100 with higher values indicating countries that strongly pursue environmental policy goals (De Villiers and Marques, 2016). Finally, we include year, industry, and country indicators to control for any mean differences in the likelihood of a CSR restatement across time, industries, and countries.

4. Results

In this section, we first present two sets of main results from analyzing whether CSR assurance, as well as the type of assurance provider, is associated with the likelihood of error CSR restatements (H1a and H2a) and non-error CSR restatements (H1b and H2b) respectively. We then present an additional analysis on the time series dynamics of CSR assurance/assurance provider in relation to both error and non-error CSR restatements (RQ1a, RQ1b, and RQ2). Finally, we present robustness tests for our analyses.

4.1. CSR assurance and error CSR restatements

4.1.1. Descriptive statistics and univariate comparisons

Table 3, Panel A provides descriptive statistics of the variables used in both the first-stage and second-stage estimations of our testing of error CSR restatements. For this sample, approximately 32 percent of the firms have their CSR reports assured (mean *ASSURED* = 0.32). The dependent variable, *ERROR*, has a mean of 0.06 indicating that 6 percent of the sample firms have restated their CSR information due to correction of errors reported in a prior period. Public accounting firms provide assurance service for 19 percent of CSR reports (mean *ACC* = 0.19; 59 percent market share = 0.19 divided by 0.32), and less than half of the firms adopt GRI standards for their CSR reporting (mean *GRI* = 0.45).

Table 3, Panel B reports univariate comparisons of the second-stage variables between the error-restatement (*ERROR* = 1) and non-restatement (*ERROR* = 0) groups. Consistent with H1a, firms having error CSR restatements have a significantly higher percentage of CSR assurance as compared to non-restating firms (*ASSURED* = 0.68 for *ERROR* = 1; *ASSURED* = 0.29 for *ERROR* = 0; *t*-value = 8.86, *p*-value < 0.01). Further, error restating firms, compared to non-restating firms, have a higher percentage of CSR reports assured by a public accounting firm (*ACC* = 0.50 for *ERROR* = 1; *ACC* = 0.17 for *ERROR* = 0; *t*-value = 8.88, *p*-value < 0.01) suggesting that CSR assurance provided by the accounting profession is positively correlated with the incidence of an error CSR restatement. With respect to control variables, restating firms have a higher percentage of GRI standard adoption, a larger firm size, a higher composite governance score, more press freedom, and a higher Environmental Performance Index.

4.1.2. Multivariate regression analysis

4.1.2.1. First-stage: CSR assurance model. Table 3, Panel C presents the results from estimating the first-stage model, i.e., Eq. (1), for error CSR restatements using a probit regression. As discussed in Section 3, we employ two classifications of error CSR restatements—i.e., error restatements arising from error corrections with or without non-error reasons (*ERROR*) and error restatements due to error corrections only (*PURE_ERROR*), in the two-stage analysis to examine whether the effect of CSR assurance/assurance provider on the likelihood of an error CSR restatement varies between pure errors and errors coupled with non-error restatements.

Columns 1 and 2 of Panel C report the estimation results for the *ERROR* sample and the *PURE_ERROR* sample, respectively. As presented, the estimated coefficients on *SIZE* are positive and significant in both columns, suggesting that larger firms are more likely to obtain CSR assurance, consistent with Simnett et al. (2009) and Casey and Grenier (2015). We also find that more profitable firms are more likely to have their CSR reports assured, consistent with the notion that more profitable firms are subject to more scrutiny, thus elevating the demand for CSR assurance (Casey and Grenier, 2015). Next, the coefficients on *LEVERAGE* and *MB* are negative but

¹⁶ Djankov et al. (2008) create an index of *ex ante* private control of self-dealing by investors based on approval requirements on corporate transactions and mandated immediate disclosures and an index of *ex post* private control of self-dealing by investors based on ex post disclosure requirements and the ease of proving wrongdoing. The *anti-self-dealing index* is the average of the indices of *ex ante* and *ex post* private control of self-dealing. The estimated *ASDI* assigned to each country ranges from 0 to 1, with higher values indicating a stronger anti-self-dealing environment.

¹⁷ The World Governance Indicators (*WGI*) includes six broad dimensions of governance for 215 countries over the period 1996–2014, based on over 30 underlying data sources. These data sources are rescaled and combined to create the six aggregate indicators using an unobserved components model. We exclude two dimensions (political stability and absence of violence and control of corruption) since they are not as applicable to CSR reporting. We include the average of the remaining four indicators instead of individual measures because of the high statistical correlations among these measures (all ρ greater than 0.70).

¹⁸ The *EPI* indices, covering 178 countries in 2014, are created by Yale Center for Environmental Law and Policy and Center for International Earth Science Information Network (CIESIN), Columbia University, in collaboration with the World Economic Forum. The data can be accessed through the Socioeconomic Data and Applications Center (SEDAC).

Table 3
CSR Assurance and Error CSR Restatements.

Panel A: Descriptive Statistics							
Variable	N	Mean	Std. Dev.	p25	p50	p75	
<i>First-Stage CSR Assurance Model</i>							
ASSURED	1985	0.32	0.47	0	0	1	
SIZE	1985	8.93	1.64	7.75	8.96	10.32	
ROA	1985	0.08	0.09	0.03	0.07	0.12	
LEVERAGE	1985	0.17	0.13	0.06	0.16	0.25	
MB	1985	2.67	5.12	0.80	1.40	2.58	
HHI	1985	0.30	0.28	0.08	0.22	0.45	
FIN	1985	0.01	0.05	0.000	0.000	0.001	
UTILITY	1985	0.05	0.22	0	0	0	
MINING	1985	0.05	0.23	0	0	0	
FINANCE	1985	0.16	0.37	0	0	0	
PRODUCTION	1985	0.19	0.39	0	0	0	
STAKEHOLDER	1985	0.60	0.49	0	1	1	
<i>Second-Stage CSR Restatement Model</i>							
ERROR	1985	0.06	0.24	0	0	0	
ASSURED	1985	0.32	0.47	0	0	1	
ACC	1985	0.19	0.39	0	0	1	
GRI	1985	0.45	0.50	0	0	0	
ASDI	1985	0.57	0.23	0.42	0.54	0.76	
GOV	1985	0.92	0.79	0.34	1.24	1.53	
PFREE	1985	-22.13	30.25	-46.00	-9.75	-2.00	
EPI	1985	57.51	10.92	52.29	60.04	64.44	

Panel B: Univariate Comparisons

	ERROR = 1(n = 118)	ERROR = 0(n = 1867)	t-statistic (difference)
ASSURED	0.68	0.29	8.86 ^{***}
ACC	0.50	0.17	8.88 ^{***}
GRI	0.63	0.43	4.11 ^{***}
SIZE	9.75	8.88	5.66 ^{***}
ROA	0.08	0.08	0.23
ASDI	0.54	0.57	-1.41
GOV	1.21	0.90	4.17 ^{***}
PFREE	-9.24	-22.94	4.80 ^{***}
EPI	59.83	57.37	2.39 ^{**}

Panel C: First-Stage CSR Assurance Model

First-Stage Model:

$$\text{Prob}(\text{ASSURED} = 1)_{i,t} = \Phi(\gamma_0 + \gamma_1 \text{SIZE}_{i,t} + \gamma_2 \text{ROA}_{i,t} + \gamma_3 \text{LEVERAGE}_{i,t} + \gamma_4 \text{MB}_{i,t} + \gamma_5 \text{HHI}_{i,t} + \gamma_6 \text{FIN}_{i,t} + \gamma_7 \text{UTILITY}_{i,t} + \gamma_8 \text{MINING}_{i,t} + \gamma_9 \text{PRODUCTION}_{i,t} + \gamma_{10} \text{FINANCE}_{i,t} + \gamma_{11} \text{STAKEHOLDER}_{i,t} + \Sigma \text{YEAR}_{i,t}) + \varepsilon_{i,t}$$

Depvar = ASSURED	Second-Stage: ERROR	Second-Stage: PURE_ERROR
SIZE	0.316 ^{***} (13.499)	0.305 ^{***} (12.805)
ROA	1.125 ^{***} (2.687)	1.001 ^{**} (2.354)
LEVERAGE	-0.276 (-1.069)	-0.301 (-1.145)
MB	-0.010 (-1.366)	-0.009 (-1.216)
HHI	0.655 ^{***} (5.449)	0.632 ^{***} (5.151)
FIN	1.047 (1.602)	1.077 (1.617)
UTILITY	0.398 ^{***} (2.778)	0.436 ^{***} (3.004)
MINING	0.388 ^{***} (2.863)	0.429 ^{***} (3.081)
FINANCE	-0.067 (-0.683)	-0.045 (-0.452)
PRODUCTION	0.321 ^{***} (3.911)	0.316 ^{***} (3.765)

(continued on next page)

Table 3 (continued)

Panel C: First-Stage CSR Assurance Model		
First-Stage Model:		
$\text{Prob}(\text{ASSURED} = 1)_{i,t} = \Phi(\gamma_0 + \gamma_1 \text{SIZE}_{i,t} + \gamma_2 \text{ROA}_{i,t} + \gamma_3 \text{LEVERAGE}_{i,t} + \gamma_4 \text{MB}_{i,t} + \gamma_5 \text{HHI}_{i,t} + \gamma_6 \text{FIN}_{i,t} + \gamma_7 \text{UTILITY}_{i,t} + \gamma_8 \text{MINING}_{i,t} + \gamma_9 \text{PRODUCTION}_{i,t} + \gamma_{10} \text{FINANCE}_{i,t} + \gamma_{11} \text{STAKEHOLDER}_{i,t} + \Sigma \text{YEAR}_{i,t}) + \varepsilon_{i,t}$		
Depvar = ASSURED	Second-Stage: ERROR	Second-Stage: PURE_ERROR
STAKEHOLDER	0.252*** (3.711)	0.256*** (3.713)
Constant	-3.843*** (-15.936)	-3.760*** (-15.370)
Observations	1985	1925
Log likelihood	-1102.05	-1056.27
LR Chi-squared	275.13	251.85
Pseudo R-squared	0.111	0.107
Panel D: Second-Stage CSR Restatement Model		
Second-Stage Model:		
$\text{Prob}(\text{ERROR}/\text{NON-ERROR} = 1)_{i,t} = \Phi(\beta_0 + \beta_1 \text{ASSURED}_{i,t} + \beta_2 \text{ACC}_{i,t} + \beta_3 \text{GRI}_{i,t} + \beta_4 \text{SIZE}_{i,t} + \beta_5 \text{ROA}_{i,t} + \beta_6 \text{ASDI}_{i,t} + \beta_7 \text{GOV}_{i,t} + \beta_8 \text{PFREE}_{i,t} + \beta_9 \text{EPI}_{i,t} + \Sigma \text{YEAR}_{i,t} + \Sigma \text{INDUSTRY}_{i,t} + \Sigma \text{COUNTRY}_{i,t}) + \varepsilon_{i,t}$		
	Depvar = ERROR	Depvar = PURE_ERROR
ASSURED	0.058** (1.979)	0.009 (0.415)
ACC	0.062*** (3.278)	0.042*** (2.898)
GRI	0.006 (0.502)	0.001 (0.091)
SIZE	0.007 [†] (1.836)	0.004 (1.500)
ROA	0.015 (0.250)	0.020 (0.440)
ASDI	-0.003 (-0.120)	0.013 (0.629)
GOV	0.014 (0.963)	0.006 (0.571)
PFREE	0.000 (1.302)	0.000 (1.200)
EPI	-0.001 (-1.328)	-0.000 (-0.447)
Constant	0.460*** (2.687)	-0.013 (-0.331)
Observations	1985	1925
Log likelihood	-995.49	-362.29
Wald Chi-squared	82.57	33.66

***p < 0.01, **p < 0.05, *p < 0.1. Significant levels are based on two-tailed z-tests. Year fixed effects are included. This panel presents estimation results from the first-stage CSR assurance model. See Appendix B for variable definitions.

***p < 0.01, **p < 0.05, *p < 0.1. Significant levels are based on two-tailed z-tests. Year, industry, and country fixed effects are included. This panel presents estimation results from the second-stage CSR restatement model. See Appendix B for variable definitions.

insignificant in both columns. In addition, we find industry competition (*HHI*) to be positively associated with a firm's decision to obtain CSR assurance, suggesting that firms in less competitive industries have greater incentive to have their CSR reports assured. Finally, the estimated coefficients on external financing activities (*FIN*) are positive yet insignificant. For industry effects, *UTILITY*, *MINING*, and *PRODUCTION* all have positive and significant coefficients. We also find that firms in stakeholder-oriented countries (*STAKEHOLDER*) have a significantly higher likelihood of assuring their CSR reports. These findings are consistent with those of Simnett et al. (2009) suggesting that firms in certain industries and firms in stakeholder-oriented countries are more likely to obtain CSR assurance.

4.1.2.2. Second-stage: error CSR restatement model. For the second-stage analysis of the error CSR restatement model, we report the estimation results in Table 3, Panel D.¹⁹ Similar to Panel C, the results for the *ERROR* (*PURE_ERROR*) sample are presented in Column

¹⁹ We use the *etregress* command in Stata for the two-stage estimation. The reported results are from estimation by full maximum likelihood. We got similar results from estimation by a two-step consistent estimator.

1 (Column 2). For the *ERROR* sample, the estimated coefficient on *ASSURED*, our variable of interest for H1a, is positive and significant based on a *t*-test (coef. = 0.058; *z*-value = 1.98; *p*-value < 0.05, two-tailed). Thus, obtaining CSR assurance increases the likelihood of a CSR restatement involving correction of errors, which is consistent with H1a. Next, the estimated coefficient of *ACC* is positive and significant (coef. = 0.062; *z*-value = 3.28; *p*-value < 0.01), suggesting that CSR assurance service provided by a public accounting firm has an incremental positive effect on the likelihood of issuing an error CSR restatement. Therefore, H2a is supported using the *ERROR* sample. For the second-stage analysis using pure error restatements (i.e., *PURE_ERROR*), we find the coefficient on *ASSURED*, while still positive, becomes insignificantly different from zero (coef. = 0.009; *z*-value = 0.42; *p*-value greater than 0.10). On the other hand, the estimated coefficient on *ACC* remains positive and significant (coef. = 0.042; *z*-value = 2.90; *p*-value < 0.01). Taken together, our findings reveal that obtaining CSR assurance, while positively associated with the occurrence of a CSR restatement involving error corrections with/without other non-error reasons, does not appear to increase the likelihood of a pure error CSR restatement as only accounting providers are associated with the detection of pure errors (see below). As such, H1a is only partially supported by the empirical results.

In contrast, results from both error samples provide evidence supporting H2a that CSR assurance from accounting firms has a stronger positive relationship with error CSR restatements than CSR assurance from non-accounting firm providers. As such, the lack of effect of CSR assurance on pure errors (i.e., the partial support of H1a) is attributable to non-accounting assurance providers, consistent with our theory that non-accounting assurance providers are less focused on the numerical accuracy of CSR reporting (i.e., our H2 development). Lastly, *GRI* has a positive but insignificant coefficient in both columns of Panel D, suggesting that the adoption of *GRI* reporting standards is not associated with error CSR restatements. For control variables, only firm size (*SIZE*) has a positive and marginally significant effect on error CSR restatements for the *ERROR* sample.

4.2. CSR assurance and non-error CSR restatements

4.2.1. Descriptive statistics and univariate comparisons

Table 4, Panel A provides descriptive statistics of the variables used in both the first-stage and second-stage estimations for our test sample employed to examine the relationship between CSR assurance and the occurrence of non-error CSR restatements. As reported, approximately 35 percent of the firms have their CSR reports assured. Approximately 16 percent of the sample firms have their CSR reports restated due to an update of methodology, definition, and scope or other non-error reasons. Public accounting firms serve as the assurance provider for 21 percent of all CSR reports (assured and unassured) representing a 60 percent market share (21 percent divided by 35 percent), and 48 percent of the CSR firms adopt *GRI* standards for their sustainability reporting.

Table 4, Panel B reports univariate comparisons of the second-stage variables between the non-error restatement (*NON-ERROR* = 1) and no-restatement (*NON-ERROR* = 0) groups. Consistent with H1b, firms having other CSR restatements have a significantly higher percentage of CSR assurance as compared to non-restating firms (*ASSURED* = 0.62 for *NON-ERROR* = 1; *ASSURED* = 0.29 for *NON-ERROR* = 0; *t*-value = 12.15, *p*-value < 0.01). In addition, restating firms, relative to non-restating firms, have a higher percentage of CSR reports assured by a public accounting firm (*ACC* = 0.42 for *NON-ERROR* = 1; *ACC* = 0.17 for *NON-ERROR* = 0; *t*-value = 10.44, *p*-value < 0.01), which supports H2b that CSR assurance provided by the accounting profession is positively correlated with the occurrence of a CSR restatement. With respect to the control variables, restating firms have a higher percentage of *GRI* standard adoption, a larger firm size, a higher composite governance score, more press freedom, and a higher Environmental Performance Index, and a lower anti-self-dealing score than non-restating firms.

4.2.2. Multivariate regression analysis

4.2.2.1. *First-stage: CSR assurance model.* Table 4, Panel C presents the results from estimating the first-stage model for non-error CSR restatements using a probit regression as discussed in Section 3. All of the estimated coefficients have signs consistent with those reported in Table 3, Panel C, and thus lending further support to the validity of the CSR assurance model.²⁰

4.2.2.2. *Second-stage: non-error CSR restatement model.* The results from the second-stage estimation of the CSR restatement model using Eq. (2) are reported in Table 4, Panel D. The estimated coefficient on *ASSURED*, our variable of interest for H1b, is positive and significant based on a *t*-test (coef. = 0.092; *z*-value = 1.83; *p*-value < 0.10, two-tailed). This result suggests that obtaining CSR assurance increases the likelihood of issuing a CSR restatement related to updates of methodology/definition/scope or other non-error reasons, thus supporting H1b. Next, the estimated coefficient of *ACC* is positive and significant (coef. = 0.063; *z*-value = 2.38; *p*-value < 0.05), supporting H2b, which states that having the CSR report assured by a public accounting firm has an incremental positive effect on the likelihood of issuing a non-error CSR restatement. In addition, *GRI* has a positive and significant coefficient (coef. = 0.086; *z*-value = 4.84), suggesting that adopting *GRI* reporting standards also increases the likelihood of a non-error CSR restatement. For the control variables, both *SIZE* and *ROA* have positive yet insignificant coefficients. Finally, among the four country-level control variables, *PFREE* has a positive and significant coefficient (coef. = 0.001; *z*-value = 2.30) and *GOV* has a negative coefficient (coef. = -0.035; *z*-value = -1.67).

4.2.2.3. *Robustness test.* To further validate our main results, we conduct a robustness test in which we employ a one-stage analysis,

²⁰ Admittedly, the two test samples have the same no-restatement observations. Nevertheless, observing similar results from the first-stage estimation still provides meaningful support to the reasonableness of our model specification.

Table 4
CSR Assurance and Non-Error CSR Restatements.

Panel A: Descriptive Statistics							
Variable	N	Mean	Std. Dev.	p25	p50	p75	
<i>First-Stage CSR Assurance Model</i>							
ASSURED	2221	0.35	0.48	0	0	1	
SIZE	2221	8.96	1.63	7.80	9.03	10.35	
ROA	2221	0.09	0.09	0.03	0.07	0.12	
LEVERAGE	2221	0.17	0.13	0.06	0.16	0.25	
MB	2221	2.69	5.13	0.80	1.40	2.59	
HHI	2221	0.30	0.28	0.08	0.22	0.45	
FIN	2221	0.01	0.05	0.000	0.000	0.001	
UTILITY	2221	0.05	0.22	0	0	0	
MINING	2221	0.05	0.23	0	0	0	
FINANCE	2221	0.17	0.37	0	0	0	
PRODUCTION	2221	0.19	0.39	0	0	0	
STAKEHOLDER	2221	0.61	0.49	0	1	1	
<i>Second-Stage CSR Restatement Model</i>							
NON-ERROR	2221	0.16	0.37	0	0	0	
ASSURED	2221	0.35	0.48	0	0	1	
ACC	2221	0.21	0.41	0	0	1	
GRI	2221	0.48	0.50	0	0	0	
ASDI	2221	0.56	0.23	0.38	0.50	0.76	
GOV	2221	0.92	0.78	0.34	1.24	1.53	
PFREE	2221	-21.63	29.69	-45.00	-9.75	-2.00	
EPI	2221	57.67	11.00	52.29	60.31	65.65	
Panel B: Univariate Comparisons							
	NON-ERROR = 1(n = 354)	NON-ERROR = 0(n = 1867)	t-statistic (difference)				
ASSURED	0.62	0.29	12.15***				
ACC	0.42	0.17	10.44***				
GRI	0.69	0.43	9.18***				
SIZE	9.41	8.88	5.59***				
ROA	0.09	0.08	0.57				
ASDI	0.53	0.57	-2.68***				
GOV	1.03	0.90	2.90***				
PFREE	-14.73	-22.94	4.79***				
EPI	59.28	57.37	3.00***				
Panel C: First-Stage CSR Assurance Model							
First-Stage Model:							
$\text{Prob}(\text{ASSURED} = 1)_{i,t} = \Phi(\gamma_0 + \gamma_1 \text{SIZE}_{i,t} + \gamma_2 \text{ROA}_{i,t} + \gamma_3 \text{LEVERAGE}_{i,t} + \gamma_4 \text{MB}_{i,t} + \gamma_5 \text{HHI}_{i,t} + \gamma_6 \text{FIN}_{i,t} + \gamma_7 \text{UTILITY}_{i,t} + \gamma_8 \text{MINING}_{i,t} + \gamma_9 \text{PRODUCTION}_{i,t} + \gamma_{10} \text{FINANCE}_{i,t} + \gamma_{11} \text{STAKEHOLDER}_{i,t} + \Sigma \text{YEAR}_{i,t}) + \varepsilon_{i,t}$							
Depvar = ASSURED							
SIZE	0.313*** (14.471)						
ROA	1.038*** (2.657)						
LEVERAGE	-0.100 (-0.425)						
MB	-0.003 (-0.498)						
HHI	0.593*** (5.342)						
FIN	0.913 (1.418)						
UTILITY	0.514*** (3.864)						
MINING	0.397*** (3.094)						
FINANCE	-0.072 (-0.774)						
PRODUCTION	0.310*** (4.055)						

(continued on next page)

Table 4 (continued)

Panel C: First-Stage CSR Assurance Model	
First-Stage Model:	
$\text{Prob}(\text{ASSURED} = 1)_{i,t} = \Phi(\gamma_0 + \gamma_1 \text{SIZE}_{i,t} + \gamma_2 \text{ROA}_{i,t} + \gamma_3 \text{LEVERAGE}_{i,t} + \gamma_4 \text{MB}_{i,t} + \gamma_5 \text{HHI}_{i,t} + \gamma_6 \text{FIN}_{i,t} + \gamma_7 \text{UTILITY}_{i,t} + \gamma_8 \text{MINING}_{i,t} + \gamma_9 \text{PRODUCTION}_{i,t} + \gamma_{10} \text{FINANCE}_{i,t} + \gamma_{11} \text{STAKEHOLDER}_{i,t} + \Sigma \text{YEAR}_{i,t}) + \varepsilon_{i,t}$	
Depvar = ASSURED	
STAKEHOLDER	0.235*** (3.722)
Constant	-3.753*** (-16.902)
Observations	2221
Log likelihood	-1273.70
LR Chi-squared	316.81
Pseudo R-squared	0.1106
Panel D: Second-Stage CSR Restatement Model	
Second-Stage Model:	
$\text{Prob}(\text{ERROR/NON-ERROR} = 1)_{i,t} = \Phi(\beta_0 + \beta_1 \text{ASSURED}_{i,t} + \beta_2 \text{ACC}_{i,t} + \beta_3 \text{GRI}_{i,t} + \beta_4 \text{SIZE}_{i,t} + \beta_5 \text{ROA}_{i,t} + \beta_6 \text{ASDI}_{i,t} + \beta_7 \text{GOV}_{i,t} + \beta_8 \text{PFREE}_{i,t} + \beta_9 \text{EPI}_{i,t} + \Sigma \text{YEAR}_{i,t} + \Sigma \text{INDUSTRY}_{i,t} + \Sigma \text{COUNTRY}_{i,t}) + \varepsilon_{i,t}$	
Depvar = NON-ERROR	
ASSURED	0.092* (1.831)
ACC	0.063** (2.380)
GRI	0.086*** (4.843)
SIZE	0.008 (1.213)
ROA	0.106 (1.180)
ASDI	0.009 (0.224)
GOV	-0.035* (-1.673)
PFREE	0.001** (2.301)
EPI	0.001 (1.294)
Constant	-0.118 (-0.328)
Observations	2221
Log likelihood	-2096.74
Wald Chi-squared	98.25

*** p < 0.01, ** p < 0.05, * p < 0.1. Significant levels are based on two-tailed z-tests. Year fixed effects are included. This panel presents estimation results from the first-stage CSR assurance model. See Appendix B for variable definitions.

*** p < 0.01, ** p < 0.05, * p < 0.1. Significant levels are based on two-tailed z-tests. Year, industry, and country fixed effects are included. This panel presents estimation results from the second-stage CSR restatement model. See Appendix B for variable definitions.

i.e., estimating only Eq. (2) using a logistic model, instead of the two-stage estimation process as discussed above. Our results (not tabulated) and inferences remain qualitatively unchanged, lending further support to the empirical evidence on the quality effect of CSR assurance and accounting assurance providers for both error and non-error restatements.

4.3. Time series dynamics of CSR assurance/assurance provider

Our main results show that the existence of CSR assurance and the type of CSR assurance provider are associated with the occurrence of CSR restatements due to error corrections and/or non-error reasons. However, those findings do not address whether the impact of CSR assurance, and the use of public accounting firms as assurance providers on CSR restatements, is due to an *immediate* effect (i.e., the likelihood of a CSR restatement is higher in the *first* period of obtaining CSR assurance), a *gradual* effect (i.e., the likelihood of a CSR restatement is higher in a *recurring* period of obtaining CSR assurance), or a *constant* effect (i.e., the likelihood of a restatement is the same across assurance periods).

In order to better understand the time series dynamics of CSR assurance/assurance provider, we utilize the cross-period structure

of our data to study the temporal effect of firms' use of CSR assurance and accounting assurer on the likelihood of having CSR restatements.²¹ Specifically, we classify firms' adoption of CSR assurance and accounting assurer (when applicable) identified in the 2013 KPMG survey, as either their first or recurring adoption based on whether those firms have CSR assurance and accounting assurer (when applicable) according to the 2011 survey.²² We then estimate the following second-stage equations, based on a two-stage analysis described in our main tests, for the first-adoption sample and the recurring-adoption sample, respectively.²³

$$\begin{aligned} \text{Prob}(RES = 1)_{i,t} = & \Phi(\alpha_0 + \alpha_1 \text{ASSURED_FIRST}_{i,t} + \alpha_2 \text{ACC_FIRST}_{i,t} + \alpha_3 \text{GRI_FIRST}_{i,t} + \alpha_4 \text{SIZE}_{i,t} + \alpha_5 \text{ROA}_{i,t} + \alpha_6 \text{ASDI}_{i,t} + \alpha_7 \text{GOV}_{i,t} \\ & + \alpha_8 \text{PFREE}_{i,t} + \alpha_9 \text{EPI}_{i,t} + \Sigma \text{YEAR}_{i,t} + \Sigma \text{INDUSTRY}_{i,t} + \Sigma \text{COUNTRY}_{i,t}) + \varepsilon_{i,t} \end{aligned} \quad (3)$$

$$\begin{aligned} \text{Prob}(RES = 1)_{i,t} = & \Phi(\delta_0 + \delta_1 \text{ASSURED_REPEAT}_{i,t} + \delta_2 \text{ACC_REPEAT}_{i,t} + \delta_3 \text{GRI_REPEAT}_{i,t} + \delta_4 \text{SIZE}_{i,t} + \delta_5 \text{ROA}_{i,t} + \delta_6 \text{ASDI}_{i,t} \\ & + \delta_7 \text{GOV}_{i,t} + \delta_8 \text{PFREE}_{i,t} + \delta_9 \text{EPI}_{i,t} + \Sigma \text{YEAR}_{i,t} + \Sigma \text{INDUSTRY}_{i,t} + \Sigma \text{COUNTRY}_{i,t}) + \varepsilon_{i,t} \end{aligned} \quad (4)$$

RES refers to one of the three CSR restatement variables (*ERROR*, *PURE_ERROR*, and *NON-ERROR*) as previously defined. On the right-hand side of Eq. (3) (Eq. (4)), *ASSURED_FIRST* (*ASSURED_REPEAT*) is our first variable of interest capturing the effect of a first (recurring) adoption of CSR assurance on the likelihood of a particular type of CSR restatement. As our second variable of interest, *ACC_FIRST* (*ACC_REPEAT*) are included to examine whether the first (recurring) assurance service provided by a public accounting firm has any incremental effect on the occurrence of a CSR restatement. In addition, we also add *GRI_FIRST* and *GRI_REPEAT* to the two models, respectively, to examine the incremental effect of CSR assurance and using an accounting assurance provider over use of GRI reporting standards. All other variables are the same as defined in Eq. (2).

If obtaining CSR assurance (and from an accounting assurer) *immediately* increases the likelihood of a CSR restatement, we would expect to observe a positive coefficient on *ASSURANCE_FIRST* (*ACC_FIRST*). On the other hand, observing an insignificant or negative coefficient on *ASSURANCE_FIRST* (*ACC_FIRST*) and a positive coefficient on *ASSURED_REPEAT* (*ACC_REPEAT*) would indicate a *gradual* effect of CSR assurance (and from accounting assurer) on the occurrence of CSR restatements. Similarly, a significant and positive coefficient on *GRI_FIRST* (*GRI_REPEAT*) would indicate an immediate (gradual) effect of GRI adoption on the likelihood of a CSR restatement.

Table 5 reports the empirical results from estimating Eqs. (3) and (4). Panel A presents the results for all error CSR restatements (pure errors plus errors coupled with non-error restatements) whereas Panel B reports only pure errors, and Panel C reports the results for the non-error CSR restatements. In each panel, Columns 1 and 2 show the findings for first adoption and recurring adoption, respectively. First, the estimated coefficients on *ASSURED_FIRST* in both Panel A (coef. = 0.008; z-value = 0.24) and Panel B (coef. = -0.002; z-value = -0.08) are insignificant, but the coefficients on *ASSURED_REPEAT* are positive and significant in both panels (Panel A: coef. = 0.148, z-value = 3.46, p-value < 0.01; Panel B: coef. = 0.059, z-value = 1.88, p-value < 0.10). This finding suggests that obtaining CSR assurance does not immediately but gradually increases the likelihood of error restatements, which is not entirely surprising given the limited level of assurance typically provided.

However, the estimated coefficients on *ACC_FIRST* are positive and significant in both Panel A (coef. = 0.089, z-value = 3.45, p-value < 0.01) and Panel B (coef. = 0.099, z-value = 4.43, p-value < 0.01), indicating that firms' use of a public accounting firm as the CSR assurance provider helps detect and correct errors immediately—i.e., during the first adoption period. Further, the negative and significant coefficients on *ACC_REPEAT* in both panels (Panel A: coef. = -0.143, z-value = -3.59, p-value < 0.01; Panel B: coef. = -0.069, z-value = -2.44, p-value < 0.05) suggest that the use of accounting assurers prevents errors from happening in a subsequent period. For GRI adoptions, the results collectively suggest that they have some gradual effect on the likelihood of a broadly-defined error CSR restatement but not a pure error restatement. A possible explanation of this finding is that recurring GRI firms could have been cleaning up their CSR reporting in anticipation of GRI's G4 standards that were released in 2013, leading to the identification of error restatements (and non-error restatements).

Table 5, Panel C, reports the results from estimating Eqs. (3) and (4) for the non-error CSR restatement sample. As presented, both of the coefficients on *ASSURED_FIRST* (coef. = 0.105, z-value = 3.02, p-value < 0.01) and *ASSURED_REPEAT* (coef. = 0.259, z-value = 4.96, p-value < 0.01) are positive and significant. These results suggest that the use of CSR assurance, whether for the first time or repeatedly, has a positive, constant effect on the likelihood of a non-error restatement. This finding is consistent with CSR assurance prompting firms to constantly update the scope, methodology, or definition of CSR reporting as firms' CSR reporting matures and evolves.

On the other hand, as shown by the insignificant coefficients on *ACC_FIRST* and *ACC_REPEAT* in Panel C, an accounting assurer does not appear to have any incremental effect on the occurrence of a non-error CSR restatement. Thus, we interpret our previous H2b support with caution as it is not robust to alternative model specifications and/or sub-samples of the dataset. Collectively, our results demonstrate that accountants' competitive advantage over non-accounting CSR assurance providers in enhancing CSR

²¹ The cross-period structure refers to the data from the 2011 and 2013 KPMG surveys. Although it would be ideal to have two consecutive years for this analysis, hand collecting the KPMG data for 2012 would be a daunting and difficult exercise due to language barriers, etc., and the comparability of the results would be questionable without access to their survey methodology. It is important to note that some firms issue CSR reports bi-annually, and in the financial statement audit context, first-year audits are generally of lower quality due to substantial start-up costs (Myers et al., 2003).

²² We label the use of CSR assurance as a recurring (first) adoption if a firm obtained CSR assurance in both 2013 and 2011 (starting in 2013). The recurring (first) adoptions of accounting assurance providers are identified in a similar fashion.

²³ Note that our base case in both equations refers to *no use* of CSR assurance and accounting assurer (when applicable) in both 2011 and 2013. For example, *ASSURED_FIRST* is set to 1 if a firm obtained CSR assurance in 2013 but not in 2011, and set to 0 if the firm had no CSR assurance in both 2011 and 2013. This construction, as suggested by the reviewer, allows a clear identification of the first-adoption effect.

Table 5
Time Series Dynamics of CSR Assurance/Assurance Provider.

Panel A: Error Restatements – Second-Stage Analysis		
<i>First Adoption Model:</i>		
$\text{Prob}(\text{ERROR} = 1)_{i,t} = \Phi(\alpha_0 + \alpha_1 \text{ASSURED_FIRST}_{i,t} + \alpha_2 \text{ACC_FIRST}_{i,t} + \alpha_3 \text{GRI_FIRST}_{i,t} + \alpha_4 \text{SIZE}_{i,t} + \alpha_5 \text{ROA}_{i,t} + \alpha_6 \text{ASDI}_{i,t} + \alpha_7 \text{GOV}_{i,t} + \alpha_8 \text{PFREE}_{i,t} + \alpha_9 \text{EPI}_{i,t} + \Sigma \text{YEAR}_{i,t} + \Sigma \text{INDUSTRY}_{i,t} + \Sigma \text{COUNTRY}_{i,t}) + \varepsilon_{i,t}$		
<i>Recurring Adoption Model:</i>		
$\text{Prob}(\text{ERROR} = 1)_{i,t} = \Phi(\delta_0 + \delta_1 \text{ASSURED_REPEAT}_{i,t} + \delta_2 \text{ACC_REPEAT}_{i,t} + \delta_3 \text{GRI_REPEAT}_{i,t} + \delta_4 \text{SIZE}_{i,t} + \delta_5 \text{ROA}_{i,t} + \delta_6 \text{ASDI}_{i,t} + \delta_7 \text{GOV}_{i,t} + \delta_8 \text{PFREE}_{i,t} + \delta_9 \text{EPI}_{i,t} + \Sigma \text{YEAR}_{i,t} + \Sigma \text{INDUSTRY}_{i,t} + \Sigma \text{COUNTRY}_{i,t}) + \varepsilon_{i,t}$		
Depvar = ERROR	First Adoption	Recurring Adoption
ASSURED_FIRST	0.008 (0.242)	
ACC_FIRST	0.089 ^{***} (3.449)	
GRI_FIRST	0.015 (1.207)	
ASSURED_REPEAT		0.148 ^{***} (3.464)
ACC_REPEAT		-0.143 ^{***} (-3.586)
GRI_REPEAT		0.091 ^{***} (3.983)
SIZE	0.006 (1.493)	0.008 (1.566)
ROA	-0.045 (-0.655)	0.115 (1.291)
ASDI	0.008 (0.281)	0.043 (1.152)
GOV	0.001 (0.098)	-0.001 (-0.040)
PFREE	0.000 (1.088)	0.001 (1.231)
EPI	-0.001 (-1.219)	-0.001 (-0.633)
Constant	0.025 (0.428)	-0.044 (-0.605)
Observations	932	653
Log likelihood	-83.53	18.19
Wald Chi-squared	35.01	78.02
Panel B: Pure Error Restatements – Second-Stage Analysis		
<i>First Adoption Model:</i>		
$\text{Prob}(\text{PURE_ERROR} = 1)_{i,t} = \Phi(\alpha_0 + \alpha_1 \text{ASSURED_FIRST}_{i,t} + \alpha_2 \text{ACC_FIRST}_{i,t} + \alpha_3 \text{GRI_FIRST}_{i,t} + \alpha_4 \text{SIZE}_{i,t} + \alpha_5 \text{ROA}_{i,t} + \alpha_6 \text{ASDI}_{i,t} + \alpha_7 \text{GOV}_{i,t} + \alpha_8 \text{PFREE}_{i,t} + \alpha_9 \text{EPI}_{i,t} + \Sigma \text{YEAR}_{i,t} + \Sigma \text{INDUSTRY}_{i,t} + \Sigma \text{COUNTRY}_{i,t}) + \varepsilon_{i,t}$		
<i>Recurring Adoption Model:</i>		
$\text{Prob}(\text{PURE_ERROR} = 1)_{i,t} = \Phi(\delta_0 + \delta_1 \text{ASSURED_REPEAT}_{i,t} + \delta_2 \text{ACC_REPEAT}_{i,t} + \delta_3 \text{GRI_REPEAT}_{i,t} + \delta_4 \text{SIZE}_{i,t} + \delta_5 \text{ROA}_{i,t} + \delta_6 \text{ASDI}_{i,t} + \delta_7 \text{GOV}_{i,t} + \delta_8 \text{PFREE}_{i,t} + \delta_9 \text{EPI}_{i,t} + \Sigma \text{YEAR}_{i,t} + \Sigma \text{INDUSTRY}_{i,t} + \Sigma \text{COUNTRY}_{i,t}) + \varepsilon_{i,t}$		
Depvar = PURE_ERROR	First Adoption	Recurring Adoption
ASSURED_FIRST	-0.002 (-0.084)	
ACC_FIRST	0.099 ^{***} (4.428)	
GRI_FIRST	0.007 (0.668)	
ASSURED_REPEAT		0.059 [*] (1.888)
ACC_REPEAT		-0.069 ^{**} (-2.440)
GRI_REPEAT		0.016 (1.052)
SIZE	0.003 (0.848)	0.005 (1.590)
ROA	-0.053 (-0.888)	0.067 (1.133)
ASDI	0.015	0.031

(continued on next page)

Table 5 (continued)

Panel A: Error Restatements – Second-Stage Analysis		
<i>First Adoption Model:</i>		
$Prob(ERROR = 1)_{i,t} = \Phi(\alpha_0 + \alpha_1 ASSURED_FIRST_{i,t} + \alpha_2 ACC_FIRST_{i,t} + \alpha_3 GRI_FIRST_{i,t} + \alpha_4 SIZE_{i,t} + \alpha_5 ROA_{i,t} + \alpha_6 ASDI_{i,t} + \alpha_7 GOV_{i,t} + \alpha_8 PFREE_{i,t} + \alpha_9 EPI_{i,t} + \Sigma YEAR_{i,t} + \Sigma INDUSTRY_{i,t} + \Sigma COUNTRY_{i,t}) + \varepsilon_{i,t}$		
<i>Recurring Adoption Model:</i>		
$Prob(ERROR = 1)_{i,t} = \Phi(\delta_0 + \delta_1 ASSURED_REPEAT_{i,t} + \delta_2 ACC_REPEAT_{i,t} + \delta_3 GRI_REPEAT_{i,t} + \delta_4 SIZE_{i,t} + \delta_5 ROA_{i,t} + \delta_6 ASDI_{i,t} + \delta_7 GOV_{i,t} + \delta_8 PFREE_{i,t} + \delta_9 EPI_{i,t} + \Sigma YEAR_{i,t} + \Sigma INDUSTRY_{i,t} + \Sigma COUNTRY_{i,t}) + \varepsilon_{i,t}$		
Depvar = ERROR	First Adoption	Recurring Adoption
	(0.605)	(1.252)
GOV	-0.007 (-0.589)	-0.003 (-0.261)
PFREE	0.000 (1.122)	0.000 (1.473)
EPI	-0.000 (-0.257)	-0.000 (-0.299)
Constant	0.004 (0.084)	-0.035 (-0.728)
Observations	924	638
Log likelihood	61.16	296.51
Wald Chi-squared	35.84	21.97
Panel C: Non-Error Restatements – Second-Stage Analysis		
<i>First Adoption Model:</i>		
$Prob(NON-ERROR = 1)_{i,t} = \Phi(\alpha_0 + \alpha_1 ASSURED_FIRST_{i,t} + \alpha_2 ACC_FIRST_{i,t} + \alpha_3 GRI_FIRST_{i,t} + \alpha_4 SIZE_{i,t} + \alpha_5 ROA_{i,t} + \alpha_6 ASDI_{i,t} + \alpha_7 GOV_{i,t} + \alpha_8 PFREE_{i,t} + \alpha_9 EPI_{i,t} + \Sigma YEAR_{i,t} + \Sigma INDUSTRY_{i,t} + \Sigma COUNTRY_{i,t}) + \varepsilon_{i,t}$		
<i>Recurring Adoption Model:</i>		
$Prob(NON-ERROR = 1)_{i,t} = \Phi(\delta_0 + \delta_1 ASSURED_REPEAT_{i,t} + \delta_2 ACC_REPEAT_{i,t} + \delta_3 GRI_REPEAT_{i,t} + \delta_4 SIZE_{i,t} + \delta_5 ROA_{i,t} + \delta_6 ASDI_{i,t} + \delta_7 GOV_{i,t} + \delta_8 PFREE_{i,t} + \delta_9 EPI_{i,t} + \Sigma YEAR_{i,t} + \Sigma INDUSTRY_{i,t} + \Sigma COUNTRY_{i,t}) + \varepsilon_{i,t}$		
Depvar = NON-ERROR	First Adoption	Recurring Adoption
ASSURED_FIRST	0.105 ^{***} (3.024)	
ACC_FIRST	-0.025 (-0.375)	
GRI_FIRST	0.113 ^{***} (5.216)	
ASSURED_REPEAT		0.259 ^{***} (4.955)
ACC_REPEAT		-0.097 (-1.391)
GRI_REPEAT		0.173 ^{***} (4.961)
SIZE	0.002 (0.356)	-0.009 (-1.130)
ROA	-0.051 (-0.426)	0.222 (1.622)
ASDI	0.060 (1.192)	-0.031 (-0.555)
GOV	-0.079 ^{***} (-3.226)	0.009 (0.348)
PFREE	0.001 ^{**} (2.457)	-0.000 (-0.031)
EPI	0.002 [*] (1.836)	0.000 (0.236)
Constant	-0.050 (-0.498)	0.082 (0.724)
Observations	1017	709
Log likelihood	-564.11	-291.01
Wald Chi-squared	75.46	144.80

*** p < 0.01, ** p < 0.05, * p < 0.1. Significant levels are based on two-tailed z-tests. Year, industry, and country fixed effects are included. See Appendix B for variable definitions.

assurance quality primarily resides in identifying numerical inaccuracies. And while accounting assurance providers' advantage over non-accountants in identifying enhancements to definitions, scopes, and methodologies is less empirically clear, our findings show that accountants are at least as competent as non-accounting providers in this regard.

Finally, *GRI_FIRST* and *GRI_REPEAT* both have positive and significant coefficients indicating an increased likelihood of a non-error CSR restatement associated with either the first-time or a recurring adoption of GRI reporting standards. The immediate effect was expected as there are likely pervasive updates of definitions, scopes, and methodologies when GRI reporting standards are first adopted. As discussed above, the gradual effect could be attributable to GRI firms cleaning up their CSR reporting in preparation for GRI's (2013) G4 standards.

5. Conclusion

In this paper, we use the unique setting of CSR restatements to provide evidence on (1) whether CSR assurance improves CSR reporting quality, and if so, in what manner and (2) whether accounting providers improve CSR reporting quality to a greater extent than non-accounting providers. Results indicate that CSR assurance improves CSR reporting quality by identifying inaccuracies in prior reports and improvements to definitions, scopes, and methodologies that require restatements for comparability. As predicted, such quality improvements are increased when provided by accounting firms. In fact, results suggest that accounting providers are not only more likely to identify reporting inaccuracies, but do so in a timelier manner and prevent future inaccuracies. Results also indicate that CSR reporting frameworks (e.g., GRI) are not a substitute for obtaining CSR assurance in terms of improving reporting quality. More specifically, this finding suggests that while adopting GRI reporting standards helps enhance CSR reporting quality through prompting non-error CSR restatements, it does not appear to have the same impact on error discovery and correction as assurance-related activities. These results extend previous research documenting capital market benefits of CSR assurance (Pflugrath et al., 2011; Casey and Grenier, 2015; Cheng et al., 2015) and are inconsistent with previous extreme criticisms of CSR assurance (see Section 1).

These results have implications for companies, regulators, assurance providers, and other stakeholders. Our results indicate that companies interested in improving the quality of their CSR reporting should strongly consider obtaining external assurance, in particular by accounting firm providers (and using GRI reporting standards). Additionally, from a public policy standpoint, our results provide helpful insights for regulators as they consider mandating the use of CSR reporting standards (developed by organizations such as GRI), as well as CSR assurance, including whether assurance needs to be performed by an accounting firm. However, creating effective public policies for CSR reporting and assurance is complex and requires a thorough understanding of the stakeholders and industries.²⁴ For example, one study involving four countries that mandate CSR reporting finds some evidence that disclosure regulations provide positive economic benefits to shareholders that vary across reporting environments (Ioannou and Serrafeim, 2017). Further, the International Auditing and Assurance Standards Board issued ISAE 3410, Assurance Engagements on Greenhouse Gas Statements, in 2012 to regulate assurance for these specialized CSR reports (IAASB (2012)). Accordingly, we suggest that additional research building on our results and other relevant studies are warranted and could lead to improved public policy.

Our results also should assist CSR assurance providers in marketing their assurance services (i.e., making the “business case” to cost-conscious CSR reporting organizations), as we find that they improve the quality of CSR reporting by identifying inaccuracies and updates to scopes, definitions, and methodologies to a greater extent than non-accounting providers. Furthermore, accounting firms identify errors on a timelier basis than non-accounting firms and appear to prevent the occurrence of errors in later periods. Thus, our results may help accounting firm CSR assurance providers communicate the value of their relatively higher fees as compared to non-accounting CSR assurance providers. In addition, the Global Reporting Initiative (and other standard setters) should take comfort in the fact that implementation of their standards appears to improve the quality of CSR reporting, particularly when coupled with assurance (GRI uses a “+” to indicate that a GRI report is coupled with assurance).

Our study is subject to a number of limitations. First, beyond CSR assurance provider, we do not examine other differences in the nature of CSR assurance engagements. This is important as previous research finds high variation in scope, independence of provider, and use of external criteria (Kamp-Roelands, 2002; Deegan et al., 2006; Manetti and Becatti, 2009). Second, we do not assess the severity (i.e., materiality) of restatements involving quantitative information (e.g., correction of errors). Thus, some of the restatements may be insignificant in terms of improved reporting quality. Unfortunately, due to the non-financial nature of much of the restated information (e.g., definitions or methodological improvements) and the lack of an accepted measure of materiality for CSR information, analyzing the restatements based on materiality likely is not possible in a way that would enable credible empirical analysis.²⁵ Third, we do not examine other ways that CSR assurance improves reporting quality that are not captured by CSR restatements. For instance, CSR assurance, in addition to helping discover mistakes and prompt updates, may also improve the presentation, format, and readability of CSR reports. We encourage future researchers to examine these issues to more fully understand the effect of CSR assurance on CSR reporting quality.

²⁴ It is important to note that mandating CSR-related disclosures is not always effective as firms may not comply especially when the disclosures are involved in judicial proceeding (Peters and Romi, 2013).

²⁵ Materiality in a CSR context often refers to the relevance of reported information to key stakeholders crossed with the impact of the information in question on the organization's strategy (ISEA, 2008).

Appendix A. Examples of CSR Restatements

A.1. CSR restatements due to errors

Publicis Groupe SA, Page 46

“It is important to note that the 2009 Carbon Footprint contained **an error due to overweighting the energy factor**, attributable to an error by the calculation tool use for gas consumption. The technical error was detected during the 2010 mid-year audit by the Bureau Veritas. This point was therefore corrected for the 2010 Carbon Footprint calculation, the results of which should be compared with the restated 2009 calculation (erratum figuring in the 2009 CSR Report).”

United Parcel Service, Page 83

“UPS restated the 2009 Scope 3 inventory, due to **an error detected in the source document** used to calculate ocean GHG emissions, which resulted in an over- statement of Scope 3 emissions by approximately 917,000 tonnes of CO₂e. This restatement stems directly from the ongoing work to increase the comprehensiveness and accuracy of our reporting.”

Enbridge, Page 52

“...adjusted down from the 93 spills reported in Enbridge’s 2009 CSR Report because one Enbridge Gas Distribution planned and permitted release of water in 2008 was **incorrectly counted** as a spill.”

Reckitt Benckiser, Page 33

“The hazardous waste volume for 2009 in this Report is 6.4% lower than stated in our Sustainability Report 2009. During the preparation of the report we identified **a data quality issue** with one element of waste reporting at our Johannesburg site in South Africa. We have removed all waste data from this site from 2010 and all prior years. We hope to resolve the data issue and restate the numbers in the future.”

A.2. CSR restatements due to method update, definition update, scope update, or other reasons

SACYR Vallehermoso, Page 181

“...data for 2009 has been revised in accordance with the **more rigorous calculation method** introduced in 2010.”

Siemens, Page 81

“LTIFR – Lost time injury frequency rate: number of lost time injuries (LTI) × 100,000/work hours performed. In the Siemens Sustainability Report 2009, calculations were still based on 200,000 work hours performed. These figures were **adjusted to reflect the methods used in fiscal 2010**.”

SAS, Page 124

“Information for 2008 and 2009 have been adjusted due to **changes of method** regarding density for jet fuel, NO_x calculation, noise level contours and passenger kilometers.”

Asml Holding, Page 8

“2009 numbers have been corrected due to **change in scope definition** (was # Non-product related classroom training hours divided by # training attendees. Changed from participants to total # payroll FTE).”

Tech Resources, Page 73

“Reclamation data for the period 2006 to 2010 reported in the 2008, 2009 and this current report have been restated to include data for operating mines only, **per the scope defined by GRI and as used by our industry peers**, i.e., reclamation data for sites in active closure are no longer included.”

Chevron, Page 41

“Chevron’s 2007–2009 emissions have been restated, primarily due to a **data revision** by one business unit, resulting in an annual emissions reduction of nearly 0.3 million metric tons.”

Fiat, Page 118

“(1) The figure for 2009 has been restated and, therefore, differs from that published in the 2009 Sustainability Report. (2) The figures for 2008 and 2009, initially 5.50 and 5.15, have been adjusted to take account of **changes in the scope of activities** in 2010.”

Appendix B. Variable Definitions

CSR Restatement Variables

<i>ERROR</i>	Indicator variable equal to 1 if the CSR report is restated due to error corrections (and non-error reasons), and 0 if the CSR report contains no restatements
<i>PURE_ERROR</i>	Indicator variable equal to 1 if the CSR report is restated due to error corrections only, and 0 if the CSR report contains no restatements
<i>NON-ERROR</i>	Indicator variable equal to 1 if the CSR report is restated due to non-error reasons, and 0 if the CSR report contains no restatements

Variables in the First-Stage CSR Assurance Model

Dependent Variable

ASSURED	Indicator variable equal to 1 if the CSR report is assured, and 0 otherwise
<i>Independent Variables</i>	
SIZE	Firm size, measured as the natural logarithm of sales
ROA	Return on assets, measured as earnings before extraordinary items scaled by lagged total assets
LEVERAGE	The leverage ratio, measured as total debt divided by total assets
MB	Market-to-book ratio measured as market capitalization divided by book value of common equity
HHI	The Herfindahl-Hirschman Index calculated as the sum of the squared fractions of sales of the firms in a two-digit SIC industry
FIN	The level of financing, measured as the sale of common and preferred shares minus the purchase of common and preferred shares plus the long-term debt issuance minus the long-term debt reduction
UTILITY	Indicator variable equal to 1 if the firm is in the Utility industry, and 0 otherwise
MINING	Indicator variable equal to 1 if the firm is in the Mining industry, and 0 otherwise
PRODUCTION	Indicator variable equal to 1 if the firm is in the Production industry, and 0 otherwise
FINANCE	Indicator variable equal to 1 if the firm is in the Finance industry, and 0 otherwise
STAKEHOLDER	Indicator variable equal to 1 if the firm is in a stakeholder-oriented country, and 0 if in a shareholder-oriented country

Variables in the Second-Stage CSR Restatement Model

Dependent Variables

ERROR	Indicator variable equal to 1 if the CSR report is restated due to error corrections (and non-error reasons), and 0 if the CSR report contains no restatements
PURE_ERROR	Indicator variable equal to 1 if the CSR report is restated due to error corrections only, and 0 if the CSR report contains no restatements
NON-ERROR	Indicator variable equal to 1 if the CSR report is restated due to non-error reasons, and 0 if the CSR report contains no restatements

Independent Variables

ASSURED	Indicator variable equal to 1 if the CSR report is assured, and 0 otherwise
ACC	Indicator variable equal to 1 if the assurance provider is a public accounting firm, and 0 otherwise
GRI	Indicator variable equal to 1 if the firm adopts the GRI standards for its sustainability reporting, and 0 otherwise
ASDI	The Anti-Self Dealing Index from Djankov et al. (2008). Data available at http://scholar.harvard.edu/shleifer/publications
GOV	The average of four Worldwide Governance Indicators (WGI): voice and accountability, government effectiveness, regulatory quality, and rule of law from the World Bank. Data available at http://info.worldbank.org/governance/wgi/index.aspx#home
EPI	The Environmental Performance Index from Socioeconomic Data and Applications Center (SEDAC). Data available at http://sedac.ciesin.columbia.edu/data/collection/epi
PFREE	The Press Freedom Index from Reporters Without Borders, multiplied by – 1. Data available at http://en.rsf.org

Additional Variables in the Time Series Dynamics Model

ASSURED_FIRST	Indicator variable equal to 1 if the CSR report is assured in the current period but not in an earlier period, and 0 otherwise
ACC_FIRST	Indicator variable equal to 1 if the assurance provider is a public accounting firm in the current period but not in an earlier period, and 0 otherwise
GRI_FIRST	Indicator variable equal to 1 if the firm adopts the GRI standards for its sustainability reporting in the current period but not in an earlier period, and 0 otherwise
ASSURED_REPEAT	Indicator variable equal to 1 if the CSR report is assured in both the current period and an earlier period, and 0 otherwise
ACC_REPEAT	Indicator variable equal to 1 if the assurance provider is a public accounting firm in both the current period and an earlier period, and 0 otherwise
GRI_REPEAT	Indicator variable equal to 1 if the firm adopts the GRI standards for its sustainability reporting in both the current period and an earlier period, and 0 otherwise

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