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Assurance Provider Rotation and Sustainability Assurance Quality

Isabel-María García-Sánchez[1] | Paolo Perego[2] | Nicola Raimo[3] | Filippo Vitolla[3]

[1]University of Salamanca, Salamanca, Spain | [2]Free University of Bozen-Bolzano, Bolzano, Italy | [3]LUM University, Casamassima, Italy

Correspondence: Paolo Perego (paolo.perego@unibz.it)

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ABSTRACT

This study examines the relationship between assurance provider rotation and sustainability assurance quality using an international sample of 604 companies over the period 2011–2017. We find that provider rotation is positively associated with both breadth and depth of assurance statements, suggesting that switching assurers is linked to higher overall sustainability assurance quality. However, when companies switch from nonaccounting to accounting providers, assurance quality decreases, particularly in statement breadth and to a lesser extent in depth. Additional analyses indicate that these rotation effects reflect structural heterogeneity between provider types rather than dynamic improvements following a switch, with quality benefits emerging gradually as new assurers establish their engagement approaches. The findings advance understanding of how market structure and provider characteristics shape sustainability assurance quality and provide timely insights for standard setters and regulators developing new frameworks for sustainability reporting and assurance.

JEL Classification: M420, M40, M14

1 | Introduction

Assurance on stand-alone or integrated corporate social responsibility (CSR), environmental social and governance (ESG), and sustainability reports represents a growing market of nonfinancial audit services. Unlike the mature financial auditing market, however, sustainability assurance operates in a fragmented ecosystem characterised by substantial provider heterogeneity, diverse professional standards and varying stakeholder expectations (e.g., Simnett et al. 2009; Kolk and Perego 2010; Cohen and Simnett 2015; Moroney and Trotman 2016; Velte and Stawinoga 2017; Farooq and de Villiers 2020; Hummel et al. 2019; Dalla Via and Perego 2020; Venter and van Eck 2021; García-Sánchez et al. 2022; Venter and Krasodomska 2024). These characteristics raise fundamental questions about how market dynamics and institutional features affect sustainability assurance quality, particularly when companies decide to rotate assurance providers.

Audit rotation has received extensive attention in financial auditing research, where decades of research have revealed complex trade-offs between competence and independence (e.g., Stefaniak et al. 2009; Ye 2023). Financial auditing theory identifies competing mechanisms that operate over auditor tenure: 'auditor learning' effects, where longer relationships enhance client-specific knowledge and audit effectiveness, versus 'auditor closeness' effects, where extended tenure may compromise independence through familiarity threats (e.g., Myers et al. 2003; Ghosh and Moon 2005; Bamber and Iyer 2007; Jenkins and Vermeer 2013; DeFond and Zhang 2014; Deng et al. 2023). These opposing forces create theoretical ambiguity about whether rotation enhances or impairs audit quality, with empirical evidence reflecting this complexity through mixed and contextually dependent findings.

Translating these insights to sustainability assurance is not straightforward and requires careful consideration of the

distinctive features that may amplify, alter or neutralise assurance provider rotation effects. For example, the greater provider diversity means that rotation may involve transitions between fundamentally different competency profiles—from accounting firms emphasising procedural rigour and standardisation to specialised consultants offering technical sustainability expertise and stakeholder engagement approaches (e.g., Hummel et al. 2019; Channuntapipat et al. 2020). The dynamics of assurer rotation in sustainability assurance may therefore differ markedly from those observed in financial auditing. Although recent commentaries emphasise the potential importance of rotation (Farooq and de Villiers 2020; Venter and van Eck 2021; Simnett et al. 2022), systematic empirical evidence remains lacking due to data constraints and the market's relative novelty. As sustainability assurance becomes increasingly institutionalised through emerging standards (such as the newly approved ISSA 5000 *General Requirements for Sustainability Assurance Engagements* by IAASB), clarifying the relationship between assurer rotation and assurance quality constitutes both a research priority and a policy concern for regulators and standard setters.

To address this gap, this paper examines the association between assurance provider rotation and sustainability assurance quality using an international sample of 604 large companies across 50 countries. We measure assurance quality through two complementary dimensions that capture different aspects of assurance effectiveness: breadth, measuring the comprehensiveness of assurance statement disclosures and transparency about procedures performed, and depth, capturing the extent and rigor of verification activities undertaken (Hummel et al. 2019). This dual operationalisation acknowledges that sustainability assurance quality encompasses both process transparency and verification intensity—dimensions that may respond differently to rotation effects.

Our analysis yields nuanced findings that illuminate the complex dynamics governing provider rotation in sustainability assurance markets. We document a positive association between provider rotation and both assurance breadth and depth, suggesting that provider changes can enhance assurance quality. However, this general finding masks important heterogeneity across rotation types. Specifically, when companies switch from nonaccounting to accounting providers, assurance quality decreases, particularly in statement breadth and to a lesser extent in depth. This pattern aligns with prior evidence indicating that accounting firms, while emphasising procedural rigour, tend to provide narrower disclosures and fewer recommendations compared to nonaccounting providers who often adopt more comprehensive stakeholder-oriented approaches. Importantly, our change analyses reveal that these rotation effects represent structural differences between provider types rather than dynamic improvements, with quality benefits accruing gradually as new assurers establish their approaches rather than through immediate postswitch enhancements.

These findings contribute to both literature and practice in two ways. First, we extend sustainability assurance research by providing—to the best of our knowledge—the first empirical analysis of how assurer rotation is associated with assurance quality. Our focus on rotation reveals how the trade-offs inherent in assurer switches manifest differently across provider transition types. We thereby bridge sustainability assurance and financial auditing literature by testing whether established theoretical frameworks from mandatory financial audit rotation apply in the more heterogeneous and less regulated sustainability assurance market. Our results demonstrate both similarities and differences in how competence-independence trade-offs operate across these contexts, providing insights into the generalisability of auditing theory beyond traditional financial statement auditing.

Second, this study offers timely implications for standard setters and policymakers, such as the IAASB and AUASB, who are respectively developing standards like ISSA 5000 or regulatory frameworks for sustainability assurance. Understanding how provider rotation influences assurance quality can inform ongoing debates about whether rotation should be encouraged, mandated or left to market forces. Our evidence of differential effects across provider types suggests that policy interventions may need to consider the heterogeneous nature of the sustainability assurance market rather than simply adopting one-size-fits-all approaches derived from financial auditing practice. These considerations are particularly insightful for the AUASB's phased implementation of sustainability assurance under ISSA 5000 and ASSA 5010 in Australia. In the early period of limited assurance (2025–2029), a proportionate approach prioritising partner-level rotation—as prescribed in APES 110 (2025) similarly to financial audit engagements—can safeguard independence without disrupting a still-maturing market. Firm-level rotation could then be reconsidered from 2030 onward, when reasonable assurance becomes the norm and the market is better positioned to absorb stricter independence requirements. Our study also highlights the need for AUASB to establish quality benchmarks beyond independence, particularly given accounting assurance providers' tendency to constrain assurance scope and stakeholder-relevant disclosures.

The remainder of the paper is structured as follows. In the next section, we discuss the literature and outline the paper's theoretical framing. Section 3 describes the sample selection and research design. Section 4 presents our empirical results, followed by robustness tests and additional analyses. The final section concludes our study, discusses implications and limitations and provides ideas for further research in this area.

2 | Literature Review and Hypothesis Development

2.1 | Sustainability Assurance: Background and Prior Studies

The sustainability assurance market has experienced rapid expansion as stakeholders increasingly demand credible verification of corporate ESG disclosures. According to IFAC (2023), 64% of large companies globally obtained assurance over sustainability information in 2021, rising from 51% in 2019. This growth reflects heightened investor, regulatory and societal expectations for reliable sustainability reporting amid mounting concerns about greenwashing and sustainability claims lacking substantive evidence.

Unlike traditional financial auditing, which operates within well-established regulatory frameworks and standardised practices, sustainability assurance exists in a more fragmented and evolving ecosystem (Simnett 2014; Cohen and Simnett 2015). This fragmentation manifests in three critical dimensions that directly impact assurance quality considerations. First, the sustainability assurance market encompasses a heterogeneous mix of service providers, including Big4 accounting firms, smaller accounting practices, environmental consultancies, engineering firms and specialised certification bodies (O'Dwyer and Owen 2005; Perego and Kolk 2012). Each provider type brings distinct competencies: accounting firms offer procedural rigour and attestation expertise, while nonaccounting providers contribute technical sustainability knowledge and sector-specific insights (Dalla Via and Perego 2020; Hummel et al. 2019). Currently, accounting practitioners hold approximately 60% of market share in the EU and Australia, while nonaccounting providers dominate in the US and UK (IFAC 2023). This diversity creates quality differentials, as assurer switching may involve transitions between fundamentally different competency profiles rather than merely changing providers within homogeneous service categories.

Second, sustainability assurance operates across multiple standards frameworks, with ISO 14064-3 favoured by nonaccounting practitioners, AA1000 standards maintaining popularity, and ISAE 3000 used in approximately 40% of engagements (Ge et al. 2024). Unlike financial auditing's standardised scope and materiality thresholds, sustainability assurance engagements exhibit significant variation in scope, coverage and assurance levels (limited vs. reasonable assurance). This variability means that assurer rotation may involve not just changing providers but potentially altering assurance engagement procedures and standards applications—factors that could mask or amplify rotation effects on assurance quality.

Third, sustainability assurance serves multiple stakeholders with varying information needs, from investors seeking ESG risk assessments to regulators monitoring compliance and NGOs evaluating corporate accountability (Channuntapipat et al. 2020; Lu et al. 2023). The voluntary nature of most sustainability assurance creates market dynamics where credibility becomes a key differentiator. In contrast to financial auditing, where regulatory mandates drive demand, companies increasingly seek sustainability assurance in response to stakeholder pressure and corporate legitimacy concerns, making assurance quality and provider reputation particularly crucial for market positioning.

This voluntary, market-driven context creates distinct relationship dynamics that influence assurance quality outcomes. Early foundational studies established initial evidence of provider type differences. Perego and Kolk (2012) showed that accounting firms are more likely than nonaccounting providers to disclose a full set of assurance statement elements, suggesting greater expertise in formal procedures. Zorio et al. (2013) confirmed this pattern in the Spanish context, finding that accounting firms were associated with higher assurance quality, particularly in terms of report credibility. More recently, research has taken a more nuanced view. Martínez-Ferrero et al. (2018) highlighted that provider expertise and experience play a critical role in shaping assurance quality, stressing that both accounting and nonaccounting firms can deliver high-quality engagements depending on their accumulated knowledge and market reputation. Hummel et al. (2019) examined the joint effects of sustainability performance and provider type, showing that firms with weaker sustainability performance tend to seek deeper assurance processes, while affiliation with the accounting profession was negatively associated with breadth of assurance statements, suggesting a more standardised but narrower disclosure approach. Ruiz-Barbadillo and Martínez-Ferrero (2020) focused on financial auditors entering the sustainability domain, documenting a tendency towards limited scope and cautious reporting, reflecting professional norms carried over from financial auditing. Extending these findings, García-Sánchez et al. (2022) showed that assurance provider characteristics—such as independence, expertise and professional affiliation—are directly linked to corporate reputation effects, emphasising the market relevance of perceived assurance quality.

Taken together, these studies suggest that provider type and expertise matter, but the evidence remains fragmented and sometimes contradictory. What remains underexplored is how assurer rotation—a central mechanism in financial auditing—affects sustainability assurance quality. Recent commentaries (Farooq and de Villiers 2020; Venter and van Eck 2021; Simnett et al. 2022) highlight the potential importance of provider switching in this emerging market, yet empirical research on this issue is lacking due to the relative novelty of sustainability assurance, the diversity of providers and standards and limited data availability. Our study addresses this gap by examining whether and how assurer rotation is associated with the quality of sustainability assurance.

2.2 | Insights From Audit Rotation in Financial Auditing

Although sustainability assurance differs in important respects, the financial auditing literature provides a useful comparative framework and empirical evidence. Decades of research have debated whether long-term auditor relationships improve or impair audit quality (Stefaniak et al. 2009; Ye 2023). Audit tenure, defined as the length of a continuous relationship between an audit firm and a client, captures two competing forces. In the early years, auditors engage in a learning phase, during which they accumulate client-specific knowledge and reduce information asymmetries by gaining an enhanced understanding over time of the client's business operations, internal control structures, corporate governance and organisational culture (Johnson et al. 2002; Daugherty et al. 2012; Jenkins and Vermeer 2013; Deng et al. 2023). As auditors become more knowledgeable about the audit client's procedures and systems, audit quality is expected to improve, since the learning curve effect enables auditors to effectively apply an increased ability over repeated audit engagements, promptly detecting questionable accounting practices and misrepresentations by managers, including fraud or other forms of aggressive reporting.

Over time, however, the auditor-client relationship may enter a phase labelled as 'auditor closeness', potentially associated with

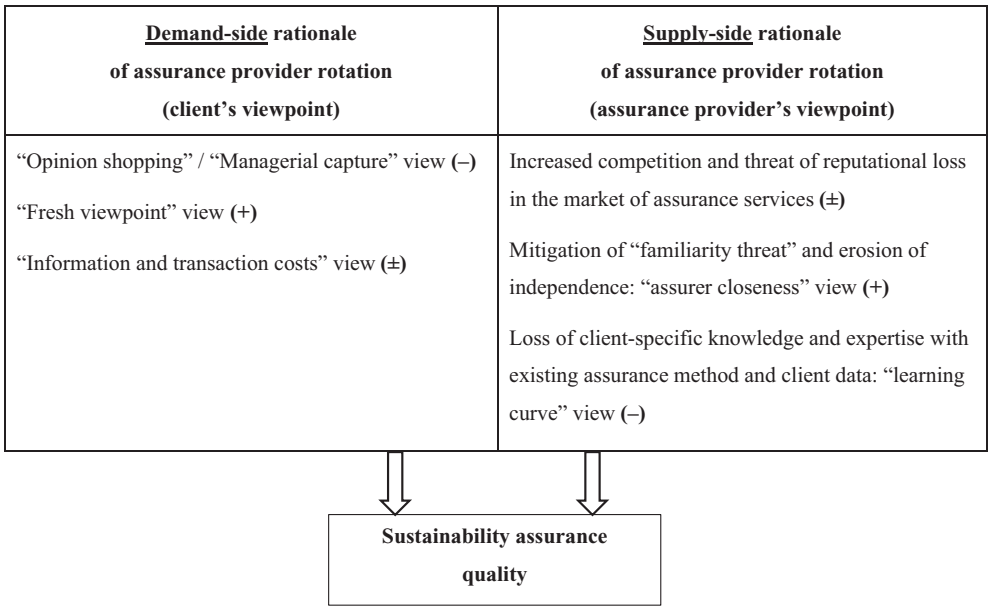

FIGURE 1 | Demand- and supply-side arguments linking assurer's rotation with sustainability assurance quality. In brackets the potential impact on assurance quality, either positive (+) or negative (–), or both positive and negative (±).

detrimental effects on audit quality (Jenkins and Vermeer 2013). First, as auditors work closely with client personnel to complete audited financial statements on time, they may become acquiescent and more lenient towards the audited client (Ball et al. 2015). Second, as auditor tenure increases, economic considerations could influence auditor's behaviour, such as the desire to keep clients long enough to recover initial engagement start-up costs, potentially making them more reluctant to update audit procedures. As a combined result of these inextricably linked arguments, it can be expected that in later years of an audit tenure, the bonding effect might impair audit quality, since the auditor presumably faces a greater challenge to remain objective and independent (Gietzmann and Sen 2002; Ghosh and Siriviriyakul 2018).

Reflecting the opposing arguments of the 'auditor learning' and 'auditor closeness' views, empirical evidence reflects this tension. Some studies document that longer tenure is associated with a decrease in the use of accounting accruals, higher earnings quality, and lower audit fees, thus leaning towards the hypothesis that audit tenure allows accumulation of client-specific and industry knowledge, enhances auditor's learning and expertise and ultimately improves audit quality (Johnson et al. 2002). On the contrary, a lengthy tenure may also deteriorate auditor independence and impair audit quality, thus validating the 'auditor closeness' rationale, which suggests a deteriorating capacity for critical appraisal over repeated audit engagements. Davis et al. (2009), for instance, document that extended tenure and the development of personal relationships increase the likelihood of an over-familiarity threat, reducing auditor vigilance and independence and resulting in higher earnings management as a proxy of eroded audit quality. Some studies propose a nonlinear relationship, where quality increases initially but declines after a threshold (Chi and Huang 2005; Hohenfels 2016). This 'inverted U-shape' reconciles mixed findings and suggests that both learning and closeness dynamics operate across the tenure lifecycle (Brooks 2011).

In the wake of scandals such as Enron and WorldCom, regulatory responses have varied with some jurisdictions introducing mandatory firm rotation and/or partner rotation (Lennox and Wu 2017). Evidence on their effects remains inconclusive (Carey and Simnett 2006; Chen et al. 2008; Chi et al. 2009; Kwon et al. 2014; Florio 2024). The persistence of 'opinion shopping', defined as seeking auditors willing to endorse favourable treatments, underscores that independence cannot be fully safeguarded by tenure limits alone.

Overall, the financial auditing literature illustrates that auditor rotation involves a trade-off: it can restore independence and provide a 'fresh perspective', but it may also undermine competence by disrupting accumulated knowledge. These insights are highly relevant for sustainability assurance, but must be adapted to its distinct institutional and market context.

2.3 | Hypothesis Development

Drawing from sustainability assurance literature and frameworks adapted from financial auditing (Stefaniak et al. 2009; DeFond and Zhang 2014), we outline the key demand- and supply-side dynamics that emerge around the decision to change sustainability assurance providers and subsequently shape assurance quality (see Figure 1).

From the client (demand-side) perspective, sustainability assurance provider rotation may be motivated by multiple considerations beyond those typical in financial auditing. Legitimacy-seeking behaviour represents a primary driver, where companies switch providers to enhance assurance credibility amid growing stakeholder scrutiny of sustainability claims. This may involve upgrading to more reputable providers or switching to specialists with stronger technical credentials in specific sustainability domains. Scope optimisation represents another key motivation, as companies may rotate providers to

align assurance capabilities with evolving reporting needs. For instance, companies expanding into new sustainability areas (e.g., climate change, biodiversity, human rights) may switch to providers with relevant technical expertise, while those seeking integrated reporting may prefer providers offering coordinated financial and sustainability assurance services. However, rotation may also reflect assurance shopping behaviours analogous to 'opinion shopping' in financial auditing (Deng et al. 2023), where companies seek providers willing to offer limited-scope engagements or favourable conclusions. The voluntary nature of most sustainability assurance and the variety of available standards create opportunities for such 'managerial capture' behaviour identified by Farooq and de Villiers (2020), potentially undermining assurance quality.

From the assurance provider (supply-side) perspective, providers face pressure to demonstrate both technical competency and credible independence to attract and retain clients in this expanding market. The emerging nature of sustainability assurance creates uncertainty about optimal quality standards and stakeholder expectations. New providers entering client relationships may adopt conservative approaches to limit liability exposure, potentially constraining the scope of assurance engagements. Alternatively, competitive pressures may encourage providers to differentiate through enhanced service quality and broader engagement scope.

Based on these sustainability-specific considerations, we propose that provider rotation effects in sustainability assurance reflect the complex interaction of multiple theoretical mechanisms that operate differently than in traditional financial auditing contexts. Central to understanding these effects is the importance of competency alignment between provider capabilities and evolving client needs. As demonstrated by Martínez-Ferrero et al. (2018) and Hummel et al. (2019), the effectiveness of different provider types varies significantly based on client sustainability maturity and performance levels. Companies in early stages of sustainability reporting may benefit from accounting providers' procedural expertise, while more advanced organisations may require the specialised technical knowledge that nonaccounting providers offer. This dynamic suggests that rotation effects will depend fundamentally on whether provider changes enhance or diminish the alignment between assurance capabilities and client requirements, with optimal timing potentially coinciding with shifts in organisational sustainability sophistication.

The rapidly evolving nature of sustainability reporting standards further complicates rotation dynamics in ways absent from financial auditing. Unlike the relatively stable IFRS or Generally Accepted Accounting Principles, sustainability reporting operates across multiple evolving frameworks (CSRD/ESRS in the EU and ISSB standards globally) with continuously emerging requirements and stakeholder expectations. As noted by Ge et al. (2024), different provider types demonstrate varying expertise with different standards, creating scenarios where rotation may be beneficial for incorporating new methodological approaches or compliance requirements. This dynamic about standards evolution suggests that periodic provider renewal could enhance assurance quality by bringing fresh perspectives on emerging reporting challenges, contrasting with financial auditing where continuity typically benefits from stable regulatory frameworks.

Independence considerations in sustainability assurance also differ markedly from financial auditing due to the multistakeholder accountability environment. While Farooq and de Villiers (2020) identify risks of 'professional capture' similar to financial auditing familiarity threats, the broader stakeholder scrutiny in sustainability contexts—including NGO monitoring, investor ESG screening and regulatory attention—creates countervailing independence pressures. García-Sánchez et al. (2022) show that provider reputation effects vary significantly based on stakeholder activism levels, suggesting that the independence benefits of rotation may be moderated by external accountability pressures that exceed those typically present in financial auditing relationships.

Finally, the learning curve dynamics in sustainability assurance exhibit greater complexity than in financial auditing due to the dual competency requirements identified in our empirical review. As documented by Ruiz-Barbadillo and Martínez-Ferrero (2020), even experienced financial auditors require substantial sustainability-specific knowledge development to deliver quality assurance, while Perego and Kolk (2012) provide evidence that procedural expertise alone is insufficient for comprehensive sustainability assurance. This dual learning requirement—encompassing both assurance methodology and sustainability technical knowledge—suggests that the disruption period following provider rotation may be more prolonged than in financial auditing, potentially extending the timeframe during which rotation negatively affects quality outcomes before learning benefits are realised.

Given the competing theoretical arguments and the limited empirical evidence in sustainability assurance contexts, we propose our main research hypothesis in null form:

H1. *There is no association between assurance provider rotation and assurance quality in sustainability assurance engagements.*

This null hypothesis reflects the theoretical ambiguity surrounding rotation effects and allows for empirical testing of both positive and negative assurance quality associations while acknowledging the unique characteristics of sustainability assurance markets.

3 | Research Methodology

3.1 | Sample Selection

To empirically contrast the opposing rationales discussed in the previous sections, we selected large, listed firms as our target population, sourced from the Thomson Reuters/Refinitiv ASSET4/EIKON database. We focus on large companies (i.e., those with 500 or more employees) as they are the most active in CSR/ESG performance measurement, disclosure, and independent verification of nonfinancial information, due to the significant impact these business-related aspects have on capital markets and stakeholders. We applied several data quality filters to ensure sample reliability (detailed sample selection procedures are reported in Table A1a in

the Appendix A). After eliminating companies lacking the necessary information, the panel data consisted of 1564 companies, of which 708 obtained assurances for their ESG/sustainability or integrated reports from an independent assurance provider. Due to challenges in retrieving assurance statements from company websites, our final sample comprises 3508 firm-year observations from 604 unique multinational corporations, each with information available for at least four consecutive years during the period 2011–2017 (see Table A1b for the temporal distribution of observations). This time horizon captures the period during which the two main international sustainability assurance standards (AA1000 and ISAE 3000) were introduced and began to diffuse in their initial versions, with ISAE 3000 undergoing a minor revision in 2013. By focusing on the early stages of sustainability assurance adoption among large firms, we aim to identify trends that may later extend to smaller firms. The sampled companies are headquartered in 50 different countries and operate across 10 different sectors.

3.2 | Empirical Models and Variable Measurement

Because sustainability assurance quality is not directly observable, we follow the methodology of prior studies in this area (O'Dwyer and Owen 2005; Perego and Kolk 2012; Fuhrmann et al. 2017; Hummel et al. 2019; Dalla Via and Perego 2020; García-Sánchez 2020; García-Sánchez et al. 2022) and proxy assurance quality by conducting a content analysis of publicly available assurance statements issued by third-party assurance providers that accompany a firm's stand-alone sustainability or integrated report. Since assurance standards typically specify the minimum information that an assurance statement should contain, content analysis of sustainability assurance statements enables us to evaluate the nature and rigour of the assurance engagement performed, thereby indirectly inferring the level of assurance quality.

Following Hummel et al. (2019), we adopt a definition of sustainability assurance quality derived from audit quality frameworks applied to financial statements (cf. DeAngelo 1981), which considers the joint probability that the assurer will discover and report problematic issues in the client's sustainability performance measurement and reporting system. To encompass these two aspects of assurance quality—discovering and reporting—we examine the depth of the assurance engagement process and the breadth of the assurance statement. Our content analysis methodology relies on the coding framework originally developed by O'Dwyer and Owen (2005) and subsequently adopted by Hummel et al. (2019), among others. Assurance *depth* (*AssuDepth*) measures the intensity of the assurance process, capturing the discovery of problematic issues through content analysis of six items: the scope of the assurance, the extent to which key sustainability-related performance indicators are covered in the assurance engagement, the level of assurance, the variety of the applied audit methods, whether the materiality of the report is assured, and whether recommendations are provided. The score of *AssuDepth* theoretically ranges from 0 to 6 points (Hummel et al. 2019), as outlined in Table A2a of the Appendix A. Assurance statement *breadth* (*AssuBreadth*), conversely, refers to the reporting of problematic issues. A broader, more comprehensive assurance statement enables a better assessment of the assurance process and its results. As exhibited in Table A2b of the Appendix A, the score of *AssuBreadth* theoretically ranges from 0 to 13 points (Hummel et al. 2019), capturing the presence of general information (addressee, assurance standard and miscellaneous data), provider information (competence, independence and area of responsibility), process information (scope, methods and level) and conclusions (veracity, materiality, limitations and recommendations) from publicly available assurance statements.

It is worth noting that Hummel et al.'s (2019) approach considers materiality as both a component of the breadth of the assurance statement and as a measure of the depth of the process. This dual inclusion is methodologically justified because materiality serves distinct functions across these dimensions: in assurance depth, it captures whether assurers apply materiality thresholds during the evidence-gathering and evaluation process, while in assurance breadth, it measures whether materiality considerations are transparently disclosed to stakeholders in the final assurance statement. This distinction aligns with sustainability assurance standards (AA1000AS and ISAE 3000), which require assurers both to integrate materiality assessments throughout the engagement process and to communicate these assessments in their public reports. The dual treatment thus reflects the fundamental principle that assurers must consider materiality at all stages of the process, since it defines the threshold beyond which omissions or errors in sustainability information are considered significant enough to influence stakeholders' decisions—both during the assurance work itself and in reporting the results of that work to users.

The coding rules used in the content analysis are outlined in Table A3 of the Appendix A. Given the inherently principles-based nature of the coding rules, we ensure the reliability and validity of the sustainability assurance breadth and depth scores through a complete double-coding process. Two members of the research team first independently conducted the content analysis and then engaged in iterative rounds of comparisons and discussions until all disagreements on item scores were resolved.

With regards to our model specifications, we examine the association between assurance rotation and sustainability assurance breadth and assurance depth through three empirical models set out below:

$$\begin{aligned}\text{AssuBreadth/AssuDepth}_{it} = {} & \omega_0 + \omega_1 \text{AssuBreadth/AssuDepth}_{i,t-1} + \omega_2 \text{AssuRotation}_{i,t} \\ & + \omega_3 \text{AssuRotConsbyAud}_{i,t} + \omega_4 \text{AssuRotAudbyCons}_{i,t} + \omega_5 \text{Accountant}_{i,t} + \omega_6 \text{AssuSpe}_{i,t} + \omega_7 \text{GRI}_{i,t} \\ & + \omega_8 \text{CSR} + \omega_9 \text{Size}_{i,t} + \omega_{10} \text{GroOpp}_{i,t} + \omega_{11} \text{ROA}_{i,t} + \omega_{12} \text{Leverage}_{i,t} + \omega_{13} \text{Accruals}_{i,t} + \omega_{14} \text{Audit\_Big4}_{i,t} \\ & + \omega_{15} \text{N\_Ana} + \omega_{16} \%\text{Indep}_{i,t} + \omega_{17} \text{CEOduality}_{i,t} + \omega_{18} \text{CSR\_Comm}_{i,t} + \omega_{19} \%\text{Female}_{i,t} + \omega_{20} \text{EU}_{i,t} \\ & + \omega_{21} \text{NCSRPI}_{i,t} + \omega_{22} \text{ICSRPI}_{i,t} + \omega_{23} \text{Country}_i + \omega_{24} \text{Industry}_i + \omega_{25} \text{Year}_t + \varepsilon_{it} + \eta_i \end{aligned} \quad (1)$$

$$\begin{aligned}\text{AssuBreadth/AssuDepth}_{it} = {} & \omega_0 + \omega_1 \text{AssuBreadth/AssuDepth}_{i,t-1} + \omega_2 \text{AssuRotation}_{i,t} \\ & + \omega_3 \text{AssuRotConsbyAud}_{i,t} + \omega_4 \text{AssuRotAudbyCons}_{i,t} + \omega_5 \text{TenAssuRotation}_{i,t} \\ & + \omega_6 \text{TenAssuRotConsbyAud}_{i,t} + \omega_7 \text{TenAssuRotAudbyCons}_{i,t} + \omega_8 \text{Accountant}_{i,t} \\ & + \omega_9 \text{AssuSpe}_{i,t} + \omega_{10} \text{GRI}_{i,t} + \omega_{11} \text{CSR} + \omega_{12} \text{Size}_{i,t} + \omega_{13} \text{GroOpp}_{i,t} + \omega_{14} \text{ROA}_{i,t} \\ & + \omega_{15} \text{Leverage}_{i,t} + \omega_{16} \text{Accruals}_{i,t} + \omega_{17} \text{Audit\_Big4}_{i,t} + \omega_{18} \text{N\_Ana} + \omega_{19} \%\text{Indep}_{i,t} \\ & + \omega_{20} \text{CEOduality}_{i,t} + \omega_{21} \text{CSR\_Comm}_{i,t} + \omega_{22} \%\text{Female}_{i,t} + \omega_{23} \text{EU}_{i,t} + \omega_{24} \text{NCSRPI}_{i,t} \\ & + \omega_{25} \text{ICSRPI}_{i,t} + \omega_{26} \text{Country}_i + \omega_{27} \text{Industry}_i + \omega_{28} \text{Year}_t + \varepsilon_{it} + \eta_i \end{aligned} \tag{2}$$

$$\begin{aligned}\text{AssuBreadth/AssuDepth}_{it} = {} & \omega_0 + \omega_1 \text{AssuBreadth/AssuDepth}_{i,t-1} + \omega_2 \text{AssuRotation}_{i,t} \\ & + \omega_3 \text{AssuRotConsbyAud}_{i,t} + \omega_4 \text{AssuRotAudbyCons}_{i,t} + \omega_5 \text{Ten} < 4\text{AssuRotation}_{i,t} \\ & + \omega_6 \text{Ten} < 4\text{AssuRotConsbyAud}_{i,t} + \omega_7 \text{Ten} < 4\text{AssuRotAudbyCons}_{i,t} + \omega_8 \text{Accountant}_{i,t} \\ & + \omega_9 \text{AssuSpe}_{i,t} + \omega_{10} \text{GRI}_{i,t} + \omega_{11} \text{CSR} + \omega_{12} \text{Size}_{i,t} + \omega_{13} \text{GroOpp}_{i,t} + \omega_{14} \text{ROA}_{i,t} + \omega_{15} \text{Leverage}_{i,t} \\ & + \omega_{16} \text{Accruals}_{i,t} + \omega_{17} \text{Audit\_Big4}_{i,t} + \omega_{18} \text{N\_Ana} + \omega_{19} \%\text{Indep}_{i,t} + \omega_{20} \text{CEOduality}_{i,t} \\ & + \omega_{21} \text{CSR\_Comm}_{i,t} + \omega_{22} \%\text{Female}_{i,t} + \omega_{23} \text{EU}_{i,t} + \omega_{24} \text{NCSRPI}_{i,t} + \omega_{25} \text{ICSRPI}_{i,t} \\ & + \omega_{26} \text{Country}_i + \omega_{27} \text{Industry}_i + \omega_{28} \text{Year}_t + \varepsilon_{it} + \eta_i \end{aligned} \tag{3}$$

Given the ordinal nature of the dependent variables, Models (1–3) are estimated using ordinal regressions for panel data. To address potential endogeneity concerns, we use lagged values of the explanatory variables. Additionally, all models incorporate a lagged dependent variable to account for changes in assurance commitment levels compared to the previous year.

Model 1 includes variables representing assurer rotation and its peculiarities: *AssuRotation*, *AssuRotConsbyAud* and *AssuRotAudbyCons*. All of them take a value of 1 in the year when a change of assurer occurs, and 0 otherwise. They respectively identify assurer switching regardless of provider type, a change of assurer from consultant/engineer/other to an accounting auditor and a change of assurer from accounting auditor to a consultant/engineer/other assurance provider. Model 2 additionally includes three variables that capture the number of years of the contractual relationship at contract termination for all rotations (*TenAssuRotation*) and, specifically, for the rotation from one type of assurance provider to another (*TenAssuRotConsbyAud* and *TenAssuRotAudbyCons*). These variables represent the previous assurer's tenure to identify whether duration of the relationship influences assurance quality. Experience and familiarity with the client's systems and procedures can enhance monitoring and assessment practices, which can improve assurance effectiveness. However, prolonged relationships may lead to excessive familiarity, potentially diminishing the assurer's objectivity and professional scepticism (Martínez-Ferrero et al. 2018). While these arguments are grounded in financial audit research, a key distinction in the sustainability assurance setting is the typically short-term nature of contractual relationships between firms and assurance providers. Consistent with financial audit research by Carcello and Nagy (2004) and Gul et al. (2009), we categorise relationships of 3 years or fewer as short tenure. Following this approach, Model 3 replaces these three variables with dummy variables identifying only the turnover of assurers with contractual relationships of 3 years or fewer. Additionally, we control for other attributes of the provider using the dummy variable Accountant, which takes the value of 1 if the assurer is an accounting firm, and 0 otherwise (i.e., Cohen and Simnett 2015). Sectoral specialisation is also considered with the *AssuSpe* variable, calculated as the percentage of sales per sector that the assurance provider serves annually in each country (Balsam et al. 2003).

To mitigate potential biases in the analysis, we include 16 control variables drawn from prior studies on sustainability assurance (Martínez-Ferrero and García-Sánchez 2017; Martínez-Ferrero et al. 2018; Clarkson et al. 2019). These variables represent various business and institutional characteristics that may influence the relationships investigated. We control for financial variables that reflect firm characteristics, aligning with economic theories of information disclosure and corporate transparency. These include company size (Size), measured as the logarithm of total assets; growth opportunities (GroOpp), calculated as the variation in sales between consecutive periods; return on assets (ROA); level of indebtedness (Leverage), measured as the total debt to total assets ratio; accruals by cash flow from operations (Accruals); and analyst coverage (N_Ana). To account for social and environmental dimensions of corporate behaviour, we include a *CSR* variable based on the firm's ESG performance score. Additionally, we control for other dimensions of corporate transparency related to the reputation of the financial auditor, identified through the Audit_Big4 dummy and the degree of GRI guideline adoption, captured by the GRI ordinal variable. Board of directors' characteristics conducive to corporate transparency, such as diversity, independence and specialisation, are proxied by the percentage of female directors (%Female), the percentage of independent directors (%Indep), the existence of a CSR committee (CSR_Comm) and CEO duality when the CEO serves as chair of the board (CEOduality).

Finally, we capture institutional forces using six control variables: EU, a dummy variable equal to 1 when the company is

headquartered in Europe and, therefore, subject to non-financial reporting requirements since 2014; and the aggregated indicators ICSRPI and NCSRPI from Amor-Esteban et al. (2018a, 2018b), which control for isomorphism in CSR/ESG matters at the sector and country level. Finally, we include Country, Industry and Year fixed effects to control for unobserved heterogeneity across these dimensions. Table A4 in the Appendix A provides the complete list of variable definitions and acronyms.

4 | Results

4.1 | Descriptive Statistics

Panel A of Table 1 shows the means and standard deviations of the variables examined. *AssuBreadth* has a mean value of 6.408 on a scale of 0–13, with a standard deviation of 3.204 points. *AssuDepth* has a mean value of 3.484 on a scale of 0–6, with a standard deviation of 1.252 points. In the period investigated, assurer rotation occurred in 21.80% of the companies sampled, resulting in a change of provider type in fewer than 8% of all sampled firms. Specifically, 4.26% of companies (roughly 20% of those opting for rotation) switched from a consultant/engineer/other provider to an accounting firm provider, whereas 3.32% (approximately 16% of companies hiring a new assurer) made the opposite transition. These rotations involved assurance providers with contractual relationships equal to or lower than 3 years with their clients.

Panel B of Table 1 presents differences in assurance breadth and depth across three dimensions: whether assurance provider rotation occurred, whether the provider is an accounting firm versus a consultancy and whether the assurance provider is a Big4 firm. The results indicate that accounting firms and companies audited by Big4 firms receive significantly greater breadth and depth of assurance services. For assurance provider rotation, however, statistically significant differences emerge only for assurance depth, not breadth. Panel C of Table 1 reports the breakdown of assurance depth and breadth across their respective components. Analysing these descriptive statistics allows us to observe relevant aspects of the hired assurance service. For example, the data for D2 Coverage, which identifies the proportion of assured sustainability performance indicators relative to reported ones, reveal that, on average, assurance providers have reviewed 65% of the sustainability-related indicators reported. Regarding B10 Veracity, while all assurance reports contained a paragraph dedicated to conclusions, our coding captures a qualitative distinction in conclusion quality. Specifically, we differentiate between (1) well-founded, detailed conclusions grounded in assurance evidence gathered versus (0) generic, boilerplate conclusions offering minimal substantive insight into the veracity of reported information.

Table 2 summarises the bivariate correlations among the variables used in the analysis. The correlation coefficients indicate the absence of multicollinearity problems in the regression models.

4.2 | Main Analysis

Table 3 presents the results obtained for the proposed models. The assurer's rotation variable (*AssuRotation*) exhibits a statistically significant positive association with assurance statement breadth (*AssuBreadth*) at the 95% confidence level across all specifications (Model 1: coeff. = 0.253; Model 2: coeff. = 0.254; Model 3: coeff. = 0.251). A similar pattern emerges for assurance statement depth (*AssuDepth*), where coefficients remain positive and statistically significant across all specifications (Model 1: coeff. = 0.249; Model 2: coeff. = 0.252; Model 3: coeff. = 0.234). These findings indicate that, controlling for assurance quality in the year preceding the assurer switch, on average both dimensions of assurance quality—breadth and depth—are positively associated with assurer rotation.

However, this general positive relationship masks substantial heterogeneity across rotation types. When clients transition from nonaccounting to accounting assurers, the association with assurance breadth becomes negative and statistically significant at the 95%–99% confidence level (Model 1: coeff. = −0.718; Model 2: coeff. = −0.756; Model 3: coeff. = −0.645). In contrast, for assurance depth, the relationship is weaker—significant only at the 90%–95% level (Model 2: coeff. = −0.624; Model 3: coeff. = −0.526) or not significant at all (Model 1: coeff. = −0.256). Furthermore, our findings show that the *Accountant* variable is statistically significant in all models for the *AssuBreadth* variable with a confidence level of 99% (Model 1: coeff. = 0.616; Model 2: coeff. = 0.617; Model 3: coeff. = 0.618). In contrast, the *Accountant* variable remains insignificant in models where *AssuDepth* is the dependent variable. These contrasting patterns suggest accounting firms and nonaccounting providers differ systematically in their assurance strategies. While accounting firms are generally associated with broader statements, switching to accounting firms from other providers is associated with narrower scope—suggesting that accounting firms deliberately constrain engagement scope in the initial years, consistent with prior research (O'Dwyer and Owen 2005; O'Dwyer 2011; Perego and Kolk 2012). Over time, however, as they gain client-specific knowledge, accounting firms tend to expand the breadth of the assurance statement. Hummel et al. (2019) hypothesise and find that a firm's sustainability performance is related to assurance depth, whereas the affiliation of the assurance provider with the accounting profession is related to the breadth of the assurance statement. Our results partially confirm their findings. Differences in sample composition (limited to European companies) and the time frame analysed (one reporting year only, 2011) could plausibly explain the divergence from our results. Nevertheless, our evidence indicates that assurance depth is not significantly associated with accounting assurers, thereby supporting the view that these assurance providers primarily influence the breadth of the assurance statement (cf. O'Dwyer and Owen 2005). The results further indicate that switches from accounting firms to consultants/engineers/others than an auditor yield no statistically significant effects. Similarly, regression coefficients for provider rotation conditional on longer tenure are not significant, implying that the accumulation of client-specific knowledge over time does not alter the rotation effect.

In summary, our findings suggest that voluntary assurer rotation is positively linked with higher absolute levels of both breadth and depth. However, this aggregate effect masks important provider-type heterogeneity: accounting firms systematically adopt narrower engagement scopes in initial years, while nonaccounting providers tend towards broader statements.

TABLE 1 | Descriptive analysis.

Panel A. Descriptive statistics

Variable	Mean	SD	Variable	%
AssuBreadth	6.408	3.204	*AssuRotation*	21.80%
AssuDepth	3.484	1.252	*AssuRotConsbyAud*	4.26%
TenAssuRotation	1.512	0.912	*AssuRotAudbyCons*	3.32%
TenAssuRotConsbyAud	1.087	0.285	*Accountant*	63.40%
TenAssuRotAudbyCons	1.171	0.146	*Ten < 4AssuRotation*[a]	96.00%
AssuSpe	0.150	0.069	*Ten < 4AssuRotConsbyAud*[b]	100.00%
CSR	63.550	29.926	*Ten < 4AssuRotAudbyCons*[c]	100.00%
GRI	2.147	0.677	*Audit_Big4*	58.44%
Size	18.441	2.740	*CEOduality*	65.90%
GroOpp	0.077	0.043	*CSR_Comm*	69.37%
ROA	0.053	0.074	*EU*	17.40%
Leverage	0.198	0.379		
Accruals	0.392	0.493		
N_Ana	17.933	10.644		
%Indep	0.473	0.295		
%Female	0.134	0.124		
NCSRPI	1.897	8.736		
ICSRPI	0.664	3.043		

Panel B. *t*-tests of mean assurance breadth and depth

	Assurance breadth			Assurance depth		
	Mean	diff.	*t*-test	Mean	diff.	*t*-test
Rotation	6.545	−0.176	−1.383	3.589	−0.163	−3.180***
Non	6.369			3.426		
Accountant	7.159	−2.054	−19.820***	3.544	−0.226	−5.162***
Non	5.105			3.318		
Big4	7.281	−1.972	−19.600***	3.585	−0.279	−6.582***
Non	5.309			3.306		

Panel C. Descriptive statistics for assurance depth and breadth components

	Mean	SD
Components of assurance depth		
D1 Scope	2.669	0.882
D2 Coverage	0.651	0.316
D3 Methods	2.882	1.753
D4 Level	1.096	0.719
D5 Materiality	0.709	0.454
D6 Recommendations	0.540	0.588
Components of assurance breadth		

(Continues)

TABLE 1 | (Continued)

Panel C. Descriptive statistics for assurance depth and breadth components		
	Mean	**SD**
B1 Addressees	0.771	0.420
B2 Assurance standard	0.753	0.562
B3 Miscellaneous information	0.845	0.362
B4 Provider competence	0.751	0.399
B5 Provider independence	0.839	0.448
B6 Area of responsibility	0.640	0.498
B7 Scope	0.925	0.264
B8 Methods	0.818	0.386
B9 Level	0.876	0.329
B10 Veracity	0.339	0.473
B11 Materiality	0.709	0.454
B12 Limitations	0.270	0.294
B13 Recommendations	0.409	0.454

Note: ***$p < 0.01$. This table presents the means and relative frequencies of variables included in the explanatory models according to the numerical or dichotomic nature of them. Panel A shows the values for the final variables. Panel B presents the *t*-tests of mean assurance breadth and depth. Panel C presents the values for the dimensions of the dependent variables. The values are obtained for an unbalanced panel data of 604 firms (3508 observations) over the period 2011–2017. All variables are defined in Table A4. The values are obtained for an unbalanced panel data of 604 firms (3508 observations) over the period 2011–2017.
[a]This percentage represents 96.00% of the assurance rotation cases, which constitutes 21.80% of the total sample. Therefore, it is 20.93% of the total sample.
[b]This percentage represents 100% of assurance rotation consultant cases by auditor, which constitutes 4.26% of the total sample. Therefore, it constitutes 4.26% of the total sample.
[c]This percentage represents 100% of assurance rotation auditor cases by consultant, which constitutes 3.32% of the total sample. Therefore, it constitutes 3.32% of the total sample.

These are structural differences in how different provider types conduct assurance rather than evidence that rotation itself dynamically improves quality in the post-switch period.

Further analysis using change-based specifications is required to distinguish between equilibrium-level differences and temporal dynamics of improvement. Table 4 presents the evidence for Model 1 when we examine the year-to-year changes in the scope of the assurance depth and breadth. Table 4 reports the results of Model 1 when the dependent variables are specified as year-on-year changes in assurance breadth and depth. In contrast to the positive associations observed in Table 3, the coefficients for assurer rotation are not statistically significant when focusing on annual variation. This suggests that while rotation is linked to differences in the absolute level of assurance quality, it does not systematically drive abrupt year-to-year changes in breadth or depth. In other words, the effect of rotation appears to be structural rather than dynamic, reflecting steady differences across engagements rather than sharp shifts from one reporting cycle to the next.

We additionally introduced refinements to the baseline results. First, since the coding framework for assurance statement breadth is closely aligned with AccountAbility AA1000AS standard, it is appropriate to include an AA1000 dummy variable as a control in the regressions. Second, because 100% of the rotation cases involve a tenure of 3 years or less, it is advisable to analyse tenure variability in situations where the provider rotates within the same typology, restricting the analysis to cases with tenure shorter than 4 years. This specification enables us to assess whether the tenure effect arises from the short duration of the relationship itself or from the fact that it does not exceed the period typically required to build sufficient client-specific knowledge and familiarity to deliver a more effective assurance service. The results are presented in Table 5. Columns 1–4 show that the adoption of the AA1000 Assurance Standard does not have a statistically meaningful relationship with assurance breadth. Regarding provider rotation within the same typology, the results reported in Columns 2–7 mirror those of the baseline analysis.

4.3 | Robustness Tests

As initial robustness check, we assess the potential for selection bias, which may arise if the observed sample of assurers systematically differs from the broader population and, in turn, biases the estimated effects of rotation. This concern is particularly relevant in our setting, since the decision to rotate an assurer is not random but may depend on firm- or engagement-specific characteristics. To address this issue, we implement the two-step procedure proposed by Heckman (1979). In the first stage, we estimate a selection model that includes the entire population of assurers—both those who rotate and those who do not—and compute the inverse Mills ratio (*imr*), which captures the nonrandomness of the selection mechanism. In the second stage, we incorporate the *imr* as an additional regressor into the main models. A statistically

TABLE 2 | Bivariate correlations.

		1	2	3	4	5	6	7	8
1	AssuBreadth	1							
2	AssuDepth	0.741***	1						
3	AssuRotation	0.022	0.053***	1					
4	AssuRotConsbyAud	0.029*	0.024	0.274***	1				
5	AssuRotAudbyCons	−0.060***	0.003	0.264***	−0.039***	1			
6	Accountant	0.308***	0.031**	−0.062***	0.160***	−0.244***	1		
7	TenAssuRotation	−0.042**	0.017	0.014	−0.005	0.026	−0.080***	1	
8	TenAssuRotConsbyAud	0.017	0.026	0.200***	0.601***	−0.021	0.096***	0.106***	1
9	TenAssuRotAudbyCons	−0.078***	−0.036*	0.130***	−0.022	0.644***	−0.141***	0.116***	−0.001
10	Ten < 4AssuRotation	−0.007***	0.003	0.215***	0.052***	0.078***	−0.112***	0.680***	0.203***
11	Ten < 4AssuRotConsbyAud	0.021	0.026	0.231***	0.621***	−0.021	0.100***	0.099***	0.967***
12	Ten < 4AssuRotAudbyCons	−0.072***	−0.024	0.176***	−0.024	0.702***	−0.153***	0.097***	−0.01
13	AssuSpe	−0.084***	0.015	0.043***	−0.014	0.019	−0.038***	0.065***	−0.043**
14	CSR	0.059***	0.015	0.052***	0.020	−0.021	0.108***	0.022	−0.022
15	GRI	0.070***	0.110***	0.013	0.007	0.014	−0.047***	0.001	0.017
16	Size	0.051***	0.112***	0.138***	0.019	0.048***	−0.125***	0.093***	0.057***
17	GroOpp	−0.002	0.009	−0.009	−0.003	−0.003	0.012	0.013	−0.002
18	ROA	−0.044***	−0.040***	−0.010	0.020	0.006	−0.008	−0.043**	−0.013
19	Leverage	0.016	0.010	0.001	−0.006	−0.005	0.021	−0.011	−0.004
20	Accruals	0.012	−0.009	−0.033	0.003	−0.001	0.025	0.013	0.007
21	Audit_Big4	−0.082***	−0.019	−0.008	0.007	−0.012	−0.016	−0.027	0.001
22	N_Ana	0.043***	0.011	0.053***	−0.002	0.009	−0.019	0.054***	0.055***
23	%Indep	−0.052***	−0.071***	−0.025	0.001	0.037**	−0.025	−0.031	0.002
24	CEOduality	−0.015	0.008	−0.002	−0.009	−0.002	0.020	0.004	−0.005
25	CSR_Comm	0.037**	0.016	0.077***	−0.003	−0.016	0.071***	0.041*	−0.013
26	%Female	0.023	−0.039**	−0.023	−0.001	−0.044***	0.181***	−0.023	−0.031
27	EU	0.128***	0.029*	0.025	−0.030*	−0.029*	0.235***	0.043**	0.001
28	NCSRPI	0.044***	0.053***	−0.024	−0.012	−0.044***	0.188***	−0.025	−0.007
29	ICSRPI	0.051***	0.049***	−0.004	0.010	0.025	0.018	−0.008	0.013
		9	**10**	**11**	**12**	**13**	**14**	**15**	**16**
9	TenAssuRotAudbyCons	1							
10	Ten < 4AssuRotation	0.167***	1						
11	Ten < 4AssuRotConsbyAud	−0.014	0.210***	1					
12	Ten < 4AssuRotAudbyCons	0.917***	0.183***	−0.015	1				
13	AssuSpe	0.050***	0.085***	−0.044**	0.045***	1			
14	CSR	−0.004	0.036*	−0.022	0.001	−0.008	1		
15	GRI	0.010	−0.024	0.019	0.024	0.009	0.056***	1	
16	Size	0.032*	0.148***	0.060***	0.041**	−0.003	−0.109***	−0.006	1
17	GroOpp	−0.002	0.032	−0.002	−0.002	−0.013	−0.002	0.020	0.026
18	ROA	−0.004	0.002	−0.014	0.001	0.037**	0.046***	0.011	−0.126***

(Continues)

TABLE 2 | (Continued)

		9	10	11	12	13	14	15	16
19	Leverage	−0.003	−0.014	−0.005	−0.004	−0.004	0.001	0.021	−0.007
20	Accruals	0.002	0.017	0.008	0.002	0.009	0.028	0.014	−0.010
21	Audit_Big4	−0.016	−0.001	0.007	−0.026	0.080***	0.007	−0.141***	−0.026
22	N_Ana	0.023	0.024	0.054***	0.024	−0.050***	0.091***	0.143***	0.257***
23	%Indep	0.019	−0.021	0.006	0.029	−0.023	0.142***	−0.081***	−0.117***
24	CEOduality	−0.005	−0.024	0.001	−0.002	0.001	0.009	0.012	−0.008
25	CSR_Comm	−0.009	0.075***	−0.014	0.002	−0.010	0.647***	0.042**	−0.023
26	%Female	0.001	−0.080***	−0.028	−0.005	−0.034*	0.261***	−0.078***	−0.227***
27	EU	−0.034*	−0.083***	0.006	−0.036*	−0.017	0.005	0.018	−0.235***
28	NCSRPI	−0.049***	−0.048***	0.001	−0.045**	0.051***	0.063***	0.023	−0.239***
29	ICSRPI	0.035	−0.010	0.009	0.031	−0.091***	0.041**	0.063***	−0.163***

		17	18	19	20	21	22	23	24
17	GroOpp	1							
18	ROA	0.063***	1						
19	Leverage	0.001	−0.030*	1					
20	Accruals	−0.004	−0.002	0.001	1				
21	Audit_Big4	0.005	−0.058***	−0.001	−0.001	1			
22	N_Ana	−0.029*	0.069***	−0.008	−0.016	−0.187***	1		
23	%Indep	0.009	0.019	−0.021	−0.020	0.070***	0.047***	1	
24	CEOduality	−0.025	0.021	0.011	0.025	−0.017	−0.045***	−0.107***	1
25	CSR_Comm	0.012	0.014	0.006	0.023	−0.009	0.062***	−0.009	0.038**
26	%Female	−0.020	0.011	0.021	0.001	0.043***	−0.009	0.243***	0.061***
27	EU	−0.008	−0.045***	−0.001	0.006	−0.011	0.107***	−0.049***	0.054***
28	NCSRPI	−0.001	−0.089***	0.012	0.036**	0.291***	−0.066***	0.028	0.125***
29	ICSRPI	0.007	0.026	−0.002	0.016	−0.124***	−0.014	−0.016	−0.012

		25	26	27	28	29
25	CSR_Comm	1				
26	%Female	0.104***	1			
27	EU	−0.055***	0.194***	1		
28	NCSRPI	0.055***	0.156***	0.344***	1	
29	ICSRPI	0.045***	−0.047***	0.021	−0.011	1

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$ and indicate statistical significance at the 1%, 5% and 10% levels, respectively. This table presents Pearson correlations between variables included in the regression models. The coefficients are calculated for panel data of 604 firms (3508 observations) over the period 2011–2017. All variables are defined in Table A4.

significant coefficient on the *imr* would suggest the presence of selection bias, in which case the corrected second-stage estimates should be interpreted. Conversely, if the *imr* is not significant, the uncorrected estimates from the baseline model can be considered reliable.

A key step in the Heckman approach is the identification of valid instruments for the first-stage selection equation. Drawing on prior literature, we focus on organisational governance factors that are expected to influence the likelihood of voluntary assurer rotation but not directly the outcome variables of interest. For instance, Alsahali et al. (2023) provide evidence that board monitoring quality—proxied by the presence of a CSR committee and the frequency of board meetings—significantly affects both the type of assurer selected and the assurer's level of expertise. In addition, Simic et al. (2024) find that firms with sustainability-linked CEO compensation are more likely to engage in voluntary carbon assurance. Building on this evidence, we use board monitoring quality and sustainability-related CEO incentives as instruments in the selection model, ensuring both their relevance for predicting rotation and their plausibility as exclusion restrictions in the outcome equation.

TABLE 3 | Regression models results.

	AssuBreadth			AssuDepth		
	(1)	(2)	(3)	(4)	(5)	(6)
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)
$Breadth_{t-1}$	0.244***	0.244***	0.244***			
	(0.017)	(0.017)	(0.017)			
$Depth_{t-1}$				0.285***	0.284***	0.285***
				(0.021)	(0.021)	(0.021)
AssuRotation	0.253**	0.254**	0.251**	0.249**	0.252**	0.234*
	(0.118)	(0.118)	(0.120)	(0.122)	(0.122)	(0.124)
AssuRotConsbyAud	−0.718***	−0.756**	−0.645**	−0.256	−0.624**	−0.526*
	(0.236)	(0.296)	(0.302)	(0.237)	(0.292)	(0.298)
AssuRotAudbyCons	0.110	0.0301	0.0854	0.0486	−0.107	−0.0293
	(0.277)	(0.349)	(0.356)	(0.290)	(0.369)	(0.377)
TenAssuRotation		0.012			0.008	
		(0.052)			(0.053)	
TenAssuRotConsbyAud		0.079			0.799**	
		(0.374)			(0.366)	
TenAssuRotAudbyCons		0.181			0.337	
		(0.470)			(0.484)	
Ten < 4AssuRotation			0.016			0.040
			(0.110)			(0.112)
Ten < 4AssuRotConsbyAud			−0.171			0.654
			(0.445)			(0.445)
Ten < 4AssuRotAudbyCons			0.057			0.192
			(0.532)			(0.554)
Accountant	0.616***	0.617***	0.618***	0.120	0.118	0.121
	(0.111)	(0.111)	(0.111)	(0.112)	(0.112)	(0.112)
AssuSpe	−0.263	−0.284	−0.293	−0.399	−0.374	−0.383
	(0.676)	(0.682)	(0.681)	(0.725)	(0.728)	(0.728)
GRI	0.220***	0.219***	0.222***	0.213***	0.205***	0.207***
	(0.067)	(0.067)	(0.067)	(0.069)	(0.069)	(0.070)
CSR	0.003	0.003	0.003	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Size	0.015	0.014	0.014	0.083***	0.082***	0.082***
	(0.018)	(0.018)	(0.018)	(0.021)	(0.020)	(0.021)
GroOpp	−0.048*	−0.048*	−0.048*	−0.034	−0.034	−0.034
	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)

(Continues)

TABLE 3 | (Continued)

	AssuBreadth			AssuDepth		
	(1)	(2)	(3)	(4)	(5)	(6)
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)
ROA	−0.008	−0.008	−0.008	0.001	0.001	0.001
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Leverage	0.001	0.001	0.001	−3.23e-05	−2.09e-05	−2.15e-05
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Accruals	0.001	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Audit_Big4	−0.159	−0.158	−0.157	−0.177	−0.177	−0.177
	(0.170)	(0.170)	(0.171)	(0.185)	(0.184)	(0.185)
N_Ana	0.001	0.001	0.001	−0.002	−0.002	−0.002
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
%Indep	−0.001	−0.001	−0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
CEOduality	−0.111	−0.111	−0.110	−0.062	−0.063	−0.064
	(0.095)	(0.095)	(0.095)	(0.098)	(0.097)	(0.097)
CSR_Comm	−0.171	−0.170	−0.172	−0.161	−0.158	−0.161
	(0.133)	(0.133)	(0.133)	(0.138)	(0.138)	(0.138)
%Female	0.001	0.001	0.001	−0.001	−1.97e-05	−2.83e-05
	(0.001)	(0.001)	(0.004)	(0.004)	(0.004)	(0.004)
EU	0.231	0.231	0.232	0.272*	0.270*	0.270*
	(0.154)	(0.154)	(0.154)	(0.156)	(0.156)	(0.156)
NCSRPI	0.013**	0.013**	0.013**	0.014**	0.014**	0.014**
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
ICSRPI	0.009	0.009	0.009	0.014	0.013	0.013
	(0.021)	(0.021)	(0.021)	(0.023)	(0.023)	(0.023)
Country effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood	−3227.928	−3227.786	−3227.843	−4235.200	−4232.515	−4233.744
Wald chi2	409.070***	409.400***	409.120***	297.490***	305.660***	302.840

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$ and indicate statistical significance at the 1%, 5%, and 10% levels, respectively. This table reflects the regression results for Models (1–3). Column (1) reflects the regression results using Model 1 to analyse the effect of assurer's turnover on assurance breadth. Columns (2) reflect the regression results using Model 2 to analyse the effect of assurer's turnover and tenure on assurance breadth. Columns (3) reflect the regression results using Model 3 to analyse the effect of assurer's turnover and levels of tenure on assurance breadth. Column (4) reflects the regression results using Model 1 to analyse the effect of assurer's turnover on assurance depth. Columns (5) reflect the regression results using Model 2 to analyse the effect of assurer's turnover and tenure on assurance depth. Columns (6) reflect the regression results using Model 3 to analyse the effect of assurer's turnover and the levels of tenure on assurance depth. The results are calculated for panel data of 604 firms (3508 observations) over the period 2011–2017. All variables are defined in Table A4.

TABLE 4 | Changes in assurance breadth and depth.

	ΔAssuBreadth	ΔAssuDepth
	(1)	(2)
	Model 1	
	Coeff.	Coeff.
	(SE)	(SE)
AssuRotation	0.169	0.092
	(0.120)	(0.119)
AssuRotConsbyAud	−0.403*	−0.167
	(0.237)	(0.234)
AssuRotAudbyCons	0.088	0.124
	(0.303)	(0.296)
Accountant	−0.336	−0.084
	(0.412)	(0.107)
AssuSpe	0.237	−0.514
	(0.703)	(0.691)
AA1000	−0.282***	
	(0.109)	
GRI	−0.019	0.018
	(0.067)	(0.066)
CSR	0.001	−0.001
	(0.002)	(0.002)
Size	0.003	−0.004
	(0.019)	(0.018)
GroOpp	−0.054*	−0.046*
	(0.028)	(0.027)
ROA	0.005	0.003
	(0.006)	(0.006)
Leverage	0.001	0.001
	(0.001)	(0.001)
Accruals	0.001	−2.20e-05
	(0.001)	(0.001)
Audit_Big4	0.038	−0.045
	(0.175)	(0.173)
N_Ana	0.002	0.001
	(0.004)	(0.004)
%Indep	−0.001	−0.001
	(0.001)	(0.001)
CEOduality	0.020	0.040
	(0.096)	(0.095)
CSR_Comm	−0.145	−0.110
	(0.135)	(0.133)
%Female	−0.001	−0.001
	(0.004)	(0.004)
EU	0.081	0.001
	(0.156)	(0.152)
NCSRPI	0.005	0.002
	(0.006)	(0.006)
ICSRPI	−0.013	−0.045**
	(0.021)	(0.021)
Country effect	Yes	Yes
Industry effect	Yes	Yes
Year effect	Yes	Yes
Log likelihood	−3611.395	−4684.375
Wald chi2	33.220***	17.490***

Note: ***$p<0.01$, **$p<0.05$, *$p<0.1$ and indicate statistical significance at the 1%, 5%, and 10% levels, respectively. This table presents the regression results for Model 1. Column (1) reflects the regression results using Model 1 to analyse the effect of the assurer's turnover on changes to the assurance breadth. Column (2) reflects the regression results using Model 1 to analyse the effect of the assurer's turnover on changes to the assurance depth. The results are calculated for panel data of 604 firms (3508 observations) over the period 2011–2017. All variables are defined in Table A4. Regarding the new dependent variables, ΔAssuBreadth measures the year-over-year change in the AssuBreadth score. ΔAssuDepth represents the year-over-year change in the AssuDepth score.

$$\begin{aligned}\text{AssuRotation}_{it} = {} & \omega_0 + \omega_1 \text{CEOcompensation}_{i,t} \\ & + \omega_2 \text{CEOduality}_{i,t} + \omega_3 \text{CSR\_Comm}_{i,t} + \omega_4 \%\text{Indep}_{i,t} \\ & + \omega_5 \%\text{Female}_{i,t} + \omega_6 \text{BoardActivity}_{i,t} + \omega_7 \text{GRI}_{i,t} \\ & + \omega_8 \text{CSR} + \omega_9 \text{Size}_{i,t} + \omega_{10} \text{GroOpp}_{i,t} + \omega_{11} \text{ROA}_{i,t} \\ & + \omega_{12} \text{Leverage}_{i,t} + \omega_{13} \text{Accruals}_{i,t} + \omega_{14} \text{Audit\_Big4}_{i,t} \\ & + \omega_{15} \text{N\_Ana} + \omega_{16} \text{EU}_{i,t} + \omega_{17} \text{NCSRPI}_{i,t} + \omega_{18} \text{ICSRPI}_{i,t} \\ & + \omega_{19} \text{Country}_i + \omega_{20} \text{Industry}_i + \omega_{21} \text{Year}_t + \varepsilon_{it} + \eta_i \end{aligned} \quad (4)$$

Considering Model 0, a variant of Model 1 that omits AssuRotConsbyAud and AssuRotAudbyCons, the results in Table 6 indicate no evidence of selection bias (coefficient of *imr_Breadth* = 0.216; *p*-value > 0.10 and *imr_Depth* = 0.140; *p*-value > 0.10, respectively). Accordingly, the estimates from the proposed regression models can be considered valid.

To further assess the robustness of our results, we re-estimated the models using alternative proxy variables for assurance quality, namely *AScope*, *AQ* and *Ainvestors*. The *AScope* variable,

TABLE 5 | Basic models redefinition.

	AssuBreadth				AssuDepth		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Model 1	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)
$Breadth_{t-1}$	0.242***	0.245***	0.244***	0.245***			
	(0.017)	(0.017)	(0.017)	(0.017)			
$Depth_{t-1}$					0.285***	0.285***	0.285***
					(0.021)	(0.021)	(0.021)
AssuRotation	0.245**	0.181**	0.226**	0.167**	0.022***	0.056***	0.034***
	(0.119)	(0.074)	(0.102)	(0.078)	(0.009)	(0.018)	(0.017)
AssuRotConsbyAud	−0.728***						
	(0.237)						
AssuRotAudbyCons	0.107						
	(0.277)						
AssuRotEquals		0.453**	0.743*	0.803**	0.328*	0.580**	0.122*
		(0.188)	(0.380)	(0.356)	(0.191)	(0.196)	(0.063)
TenAssuRotation			0.011			0.019	
			(0.021)			(0.023)	
TenAssuRotEquals			−0.235			−0.210	
			(0.267)			(0.287)	
Ten < 4AssuRotation				0.011			0.019
				(0.021)			(0.023)
Ten < 4AssuRotEquals				−0.367			−0.466
				(0.875)			(0.999)
Accountant	0.640***	0.572***	0.570***	0.573***	0.101	0.099	0.098
	(0.117)	(0.113)	(0.113)	(0.113)	(0.107)	(0.107)	(0.108)
AssuSpe	−0.273	−0.209	−0.180	−0.226	−0.413	−0.376	−0.394
	(0.677)	(0.675)	(0.676)	(0.676)	(0.727)	(0.728)	(0.728)
AA1000	0.067	0.054	0.054	0.055			
	(0.108)	(0.108)	(0.108)	(0.108)			
GRI	0.216***	0.217***	0.220***	0.216***	0.215***	0.217***	0.216***
	(0.067)	(0.067)	(0.067)	(0.067)	(0.070)	(0.070)	(0.070)
CSR	0.003	0.003	0.002	0.003	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Size	0.012	0.015	0.015	0.015	0.085***	0.084***	0.084***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.021)	(0.021)	(0.021)
GroOpp	−0.048*	−0.049*	−0.049*	−0.049*	−0.034	−0.034	−0.034
	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)

(Continues)

TABLE 5 | (Continued)

	AssuBreadth				AssuDepth		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Model 1	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)
ROA	−0.008	−0.009	−0.009	−0.009	0.001	8.64e-05	−8.82e-05
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Leverage	0.001	0.001	9.95e-05	0.001	−3.91e-05	−4.05e-05	−4.07e-05
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Accruals	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Audit_Big4	−0.148	−0.169	−0.168	−0.169	−0.185	−0.184	−0.186
	(0.171)	(0.171)	(0.171)	(0.171)	(0.186)	(0.186)	(0.186)
N_Ana	0.001	0.001	0.001	0.001	−0.001	−0.002	−0.002
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
%Indep	−0.001	−0.001	−0.001	−0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
CEOduality	−0.110	−0.100	−0.102	−0.099	−0.052	−0.055	−0.054
	(0.095)	(0.095)	(0.095)	(0.095)	(0.098)	(0.098)	(0.098)
CSR_Comm	−0.168	−0.167	−0.169	−0.168	−0.165	−0.168	−0.165
	(0.133)	(0.133)	(0.133)	(0.133)	(0.139)	(0.139)	(0.139)
%Female	0.001	0.001	0.001	0.001	−0.001	−0.001	−0.001
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
EU	0.237	0.254	0.255*	0.254	0.283*	0.281*	0.282*
	(0.155)	(0.155)	(0.155)	(0.155)	(0.156)	(0.156)	(0.156)
NCSRPI	0.012**	0.013**	0.013**	0.013**	0.014**	0.014**	0.014**
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
ICSRPI	0.008	0.011	0.011	0.012	0.016	0.015	0.016
	(0.021)	(0.021)	(0.021)	(0.021)	(0.023)	(0.023)	(0.023)
Country effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood	−3227.734	−3229.751	−3229.361	−3229.661	−4234.331	−4234.072	−4234.225
Wald chi2	409.250***	405.580***	406.130***	405.680***	297.270***	299.280***	298.140***

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$ and indicate statistical significance at the 1%, 5% and 10% levels, respectively. This table presents the regression results for Models (1–3). Column (1) reflects the regression results using Model 1 to analyse the effect of assurer's turnover on assurance breadth controlling AA1000 impact. Column (2) reflects the regression results using Model 1 to analyse the effect of assurer's turnover on assurance breadth considering the rotation for the same assurance provider. Columns (3) reflects the regression results using Model 1 to analyse the effect of assurer's turnover and tenure on assurance breadth, considering the rotation for the same assurance provider. Columns (4) reflects the regression results using Model 3 to analyse the effect of assurer's turnover and levels of tenure on assurance breadth, considering the rotation for the same assurance provider. Column (5) reflects the regression results using Model 1 to analyse the effect of assurer's turnover on assurance depth considering the rotation for the same assurance provider. Columns (6) reflects the regression results using Model 1 to analyse the effect of assurer's turnover and tenure on assurance depth, considering the rotation for the same assurance provider. Columns (7) reflects the regression results using Model 3 to analyse the effect of assurer's turnover and levels of tenure on assurance depth, considering the rotation for the same assurance provider. The results are calculated for panel data of 604 firms (3508 observations) over the period 2011–2017. All variables are defined in Table A4. Regarding the new variables, AA1000 is a dummy variable that takes the value 1 if the AccountAbility 1000 Assurance Standard was used in the verification. TenAssuRotEquals identifies the tenure of the service provider that has rotated to the same typology (i.e., consultant by consultant and auditor by auditor). Ten < 4AssuRotEquals identifies that the tenure of the service provider that has rotated to the same typology is less than 4 years.

TABLE 6 | Validation test by Heckman procedure.

	AssuRotation		AssuBreadth		AssuRotation		AssuDepth	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
	Model 4	Model 0	Model 0	Model 1	Model 4	Model 0	Model 0	Model 1
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)
$AssuBreadth_{t-1}$	−0.027**	0.377***	0.255***	0.253***				
	(0.013)	(0.065)	(0.023)	(0.023)				
$AssuDepth_{t-1}$					−0.0002	0.440***	0.296***	0.296***
					(0.015)	(0.056)	(0.023)	(0.023)
Imr_Breadth			0.216	0.250				
			(0.377)	(0.376)				
Imr_Depth							0.140	0.155
							(0.377)	(0.378)
AssuRotation		0.412**	0.188**	0.317**		0.511**	0.235**	0.312**
		(0.210)	(0.043)	(0.156)		(0.253)	(0.044)	(0.157)
AssuRotConsbyAud				−0.707**				−0.259
				(0.295)				(0.293)
AssuRotAudbyCons				0.0113				−0.348
				(0.364)				(0.363)
Accountant		0.386*	0.451***	0.517***		0.234	0.0956	0.0888
		(0.301)	(0.135)	(0.141)		(0.335)	(0.130)	(0.136)
AssuSpe		−3.977	−0.398	−0.508		−4.627*	−1.058	−1.104
		(2.798)	(0.870)	(0.869)		(2.412)	(0.883)	(0.883)
GRI	0.003	0.144	0.270***	0.276***	−0.002	0.420*	0.278***	0.285***
	(0.069)	(0.273)	(0.087)	(0.087)	(0.068)	(0.238)	(0.086)	(0.086)
CSR	0.002	0.009	0.004*	0.004	0.002	0.003	0.001	0.001
	(0.002)	(0.009)	(0.002)	(0.002)	(0.002)	(0.008)	(0.002)	(0.002)
Size	0.080***	−0.039	0.038	0.041	0.076***	−0.018	0.105***	0.105***
	(0.019)	(0.098)	(0.034)	(0.034)	(0.020)	(0.086)	(0.034)	(0.034)
GroOpp	−0.227	0.226	−0.051	−0.051	−0.218	1.067	−0.038	−0.038
	(0.269)	(1.153)	(0.031)	(0.031)	(0.269)	(0.992)	(0.029)	(0.029)
ROA	0.016**	0.001	−0.004	−0.002	0.017**	0.015	0.007	0.008
	(0.007)	(0.025)	(0.009)	(0.009)	(0.007)	(0.022)	(0.009)	(0.009)
Leverage	0.001	0.001	0.001	−0.001	0.001	−0.001	−0.001*	−0.001**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Accruals	0.001	−0.004	0.001	0.001	0.001	−0.004	0.001	0.001
	(0.001)	(0.003)	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)	(0.001)
Audit_Big4	0.092	−0.096	−0.193	−0.166	0.130	0.174	−0.005	0.002
	(0.172)	(0.693)	(0.218)	(0.219)	(0.171)	(0.606)	(0.223)	(0.224)

(Continues)

TABLE 6 | (Continued)

	AssuRotation		AssuBreadth		AssuRotation		AssuDepth	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
	Model 4	Model 0	Model 0	Model 1	Model 4	Model 0	Model 0	Model 1
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)
N_Ana	−0.008*	0.002	−0.007	−0.007	−0.008*	−0.010	−0.009	−0.009
	(0.005)	(0.021)	(0.006)	(0.006)	(0.005)	(0.019)	(0.006)	(0.006)
CEOCompensation	−0.090				−0.095			
	(0.101)				(0.101)			
BoardActivity	0.007				0.007			
	(0.005)				(0.005)			
%Indep	0.002	0.003	0.001	0.001	0.002	0.001	0.002	0.002
	(0.002)	(0.006)	(0.002)	(0.002)	(0.002)	(0.006)	(0.002)	(0.002)
CEOduality	0.089	−0.165	−0.128	−0.116	0.095	−0.240	−0.120	−0.113
	(0.097)	(0.378)	(0.126)	(0.126)	(0.097)	(0.327)	(0.124)	(0.124)
CSR_Comm	0.222*	−0.124	−0.176	−0.178	0.214	−0.154	−0.107	−0.113
	(0.134)	(0.599)	(0.177)	(0.177)	(0.134)	(0.518)	(0.175)	(0.175)
%Female	−0.003	−0.015	−0.005	−0.005	−0.003	−0.008	−0.006	−0.006
	(0.004)	(0.017)	(0.006)	(0.005)	(0.004)	(0.015)	(0.005)	(0.005)
EU	0.199	−0.049	0.294	0.290	0.171	−0.235	0.322*	0.311
	(0.123)	(0.682)	(0.199)	(0.199)	(0.122)	(0.593)	(0.194)	(0.194)
NCSRPI	−0.005	0.038	0.013*	0.012*	−0.006	0.0270	0.013*	0.0125*
	(0.006)	(0.024)	(0.007)	(0.007)	(0.005)	(0.021)	(0.007)	(0.007)
ICSRPI	−0.020	−0.078	−0.001	−0.002	−0.023	0.041	0.018	0.018
	(0.014)	(0.092)	(0.029)	(0.029)	(0.015)	(0.081)	(0.029)	(0.029)
Country effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood	−557.083		−1945.596	−1942.733	−559.173		−2593.813	−2593.036
Wald chi2	52.020***		271.820***	276.940***	47.850***		257.360***	258.580***

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$ and indicate statistical significance at the 1%, 5% and 10% levels, respectively. This table presents the regression results for Model 1 by a two-step estimation approach proposed by Heckman (1979) to address potential selection bias. Column (1a) presents the regression results using a first function that explains assurer's rotation relating to assurance breadth in *t*−1. Columns (1b) presents the regression results using Model 0 (Model 1 without AssuRotConsbyAud and AssuRotAudbyCons variables) to explain assurance breadth. Columns (2a) presents the regression results using Model 0 to explain assurance breadth with the incorporation of an additional regressor in the model, Imr_Breadth, to determine the presence of selection bias. Columns (2b) present the regression results using Model 1 to explain assurance breadth with the incorporation of an additional regressor in the model, Imr_Breadth, to determine the presence of selection bias. Column (3a) presents the regression results using a first function that explains the assuring turnover relating to assurance depth in t-1. Columns (3b) present the regression results using Model 0 to explain assurance depth. Columns (4a) present the regression results using Model 0 to explain assurance depth with the incorporation of an additional regressor in the model, *Imr_Depth*, to determine the presence of selection bias. Columns (4b) present the regression results using Model 1 to explain assurance depth with the incorporation of an additional regressor in the model, *Imr_Depth*, to determine the presence of selection bias. The results are calculated for panel data of 604 firms (3508 observations) over the period 2011–2017. All variables are defined in Table A4. Regarding the new variables, CEOCompensation reflects the use of nonfinancial KPIs in executive compensation, and BoardActivity measures the meetings of the board.

following Farooq and de Villiers (2020), ranges from 0 to 3 and captures the presence of three audit quality parameters: one point is assigned for a reasonable level of assurance (0 if limited), if the assurance scope covers the entire sustainability report (0 if limited to sections), and for the inclusion of a disclaimer regarding adherence to assurance standards (0 if absent). The *AQ* variable measures sustainability assurance quality through a slightly different coding framework than our depth and breadth indices. It is based

on a content analysis of 19 items that capture the assurance report format, the procedures undertaken, and the opinions and recommendations issued by the assurer. Aggregation using a summative approach generates a score ranging theoretically between 0 and 27 points. This coding framework has been widely employed in prior studies within this research stream (e.g., Perego and Kolk 2012; Dalla Via and Perego 2020; García-Sánchez 2020). Lastly, the *Ainvestors* variable, an extension of *AScope* developed by García-Sánchez et al. (2022), incorporates a fourth dimension of the verification process—namely, the inclusion of recommendations in the assurance report.

Table 7 reports the results for the robustness tests. In the first three columns, the *AssuRotation* variable is positively and significantly associated with assurance scope at the confidence level of 90% (Model 1: coeff. = 0.236; Model 2: coeff. = 0.239; Model 3: coeff. = 0.222), consistent with earlier findings for assurance breadth and depth. These coefficients remain robust across alternative specifications of the dependent variable. Additionally, the coefficient values are similar when using the *AScope* and *Ainvestors* proxies, while the coefficient is more pronounced when assurance quality is measured with the *AQ* variable. Specifically, *AssuRotation* exhibits a larger effect, significant at 95% confidence level, on the broader dimensions of assurance quality captured by AQ, which include additional aspects disclosed in the assurance statement.

By contrast, when assurer rotation entails a change in provider type, such as selecting an auditor to terminate a consultant/engineer/other than an auditor, the relationship is negative and statistically significant at the 99% confidence level. This finding is robust and consistent with prior findings, with the effect again more pronounced when using the AQ variable. In addition, the *Accountant* variable is significant in all models at a confidence level of 99%. Consequently, the joint analysis of the *Accountant* and *AssuRotConsbyAud* variables suggests that accounting firms (versus other typologies of providers) tend to adopt a more conservative approach in the initial year of their contractual relationship with the company, thereby limiting the scope of assurance. However, as they acquire more company-specific knowledge, they appear to broaden the scope of their engagement. Moreover, results for rotations in the opposite direction (from auditor to consultant/engineer/other provider) are not statistically significant, nor are the coefficients for variables intended to capture the effect of provider rotation conditional on longer contract duration as a proxy for client-specific knowledge.

Finally, we examine changes in the scope of the assurance engagement, both through variation in the overall *AScope* and through a component-level assessment of its three dimensions. We also assess whether the quality of the sustainability report improves relative to the previous year, using the annual change in ESG disclosure scores sourced from the Bloomberg database (*VarReportQuality*). The measure of ESG/sustainability disclosure quality using the Bloomberg score (0–100 points) is well established. Bloomberg compiles this score from various publicly accessible sources, such as annual reports, sustainability reports, as well as information available on company websites.

Table 8 presents the findings from the robustness checks. Overall, assurer rotation is generally not significantly correlated with year-on-year changes in the aggregate assurance scope (*VarAScope*) or its components. An exception occurs when the client switches from a consultant to an accounting firm, which shows a statistically significant negative association with assurance scope (Model *VarAScope*: coeff. = −0.516). This effect appears to be driven specifically by two key components: the likelihood of issuing a reasonable level of assurance versus a limited one (Model *VarLevel*: coeff. = −0.604), and the likelihood of covering the entire sustainability report rather than selected sections (Model *VarEntire*: coeff. = −0.687). Interestingly, despite the narrower assurance scope observed in these cases, a change in provider type is positively associated with improvements in sustainability reporting quality (Model *VarReportQuality*: coeff. = 3.122). This suggests that the involvement of accounting firms (typically considered more conservative in their assurance practices) is linked to greater reporting discipline, particularly in the initial years of the assurance engagement. Such behaviour is consistent with prior literature documenting the cautious approach of newly appointed assurance providers, who tend to limit engagement depth while simultaneously fostering more standardised and transparent disclosure practices (Hummel et al. 2019; García-Sánchez et al. 2025).

4.4 | Additional Analysis

Previous evidence suggests that accounting firms adopt a more conservative approach in the first year of an assurance engagement. To strengthen our analysis, we therefore examine whether this conservatism diminishes over time as assurers gain client-specific experience, consistent with a potential learning-curve effect. To test this, we specify Model 5, which introduces assurer tenure and its squared term, along with interaction terms capturing the specific case of accounting firm providers (i.e., the interactions of both tenure variables with the Accountant indicator).

$$\begin{aligned}\text{AssuBreadth/AssuDepth}_{it} = {} & \omega_0 + \omega_1 \text{AssuBreadth/AssuDepth}_{i,t-1} + \omega_2 \text{AssuRotation}_{i,t} \\ & + \omega_3 \text{Tenure}_{i,t} + \omega_4 \text{TenureSquare}_{i,t} + \omega_5 \text{Tenure} * \text{Accoutant}_{i,t} + \omega_6 \text{TenureSquare} * \text{Accoutant}_{i,t} \\ & + \omega_7 \text{Accountant}_{i,t} + \omega_8 \text{AssuSpe}_{i,t} + \omega_9 \text{AA1000}_{i,t} + \omega_{10} \text{GRI}_{i,t} + \omega_{11} \text{CSR} + \omega_{12} \text{Size}_{i,t} + \omega_{13} \text{GroOpp}_{i,t} \\ & + \omega_{14} \text{ROA}_{i,t} + \omega_{15} \text{Leverage}_{i,t} + \omega_{16} \text{Accruals}_{i,t} + \omega_{17} \text{Audit\_Big4}_{i,t} + \omega_{18} \text{N\_Ana} + \omega_{19} \%\text{Indep}_{i,t} \\ & + \omega_{20} \text{CEOduality}_{i,t} + \omega_{21} \text{CSR\_Comm}_{i,t} + \omega_{22} \%\text{Female}_{i,t} + \omega_{23} \text{EU}_{i,t} + \omega_{24} \text{NCSRPI}_{i,t} + \omega_{25} \text{ICSRPI}_{i,t} \\ & + \omega_{26} \text{Country}_i + \omega_{27} \text{Industry}_i + \omega_{28} \text{Year}_t + \varepsilon_{it} + \eta_i \end{aligned} \quad (5)$$

The untabulated results (available upon request) do not provide support for the anticipated relationships. Although the coefficient suggests curvilinear patterns (Tenure and Tenure*Accountant < 0; TenureSquare and TenureSquare*Accountant > 0), they are not statistically significant.

TABLE 7 | Robustness check I.

	AScope			*AQ*			*Ainvestors*		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)
$AScope_{t-1}$	0.762***	0.763***	0.762***						
	(0.060)	(0.060)	(0.060)						
AQ_{t-1}				0.336***	0.337***	0.336***			
				(0.023)	(0.023)	(0.023)			
$Ainvestors_{t-1}$							0.750***	0.752***	0.751***
							(0.054)	(0.054)	(0.054)
AssuRotation	0.236*	0.239*	0.222*	1.171**	1.188***	1.112**	0.220*	0.220*	0.227*
	(0.130)	(0.130)	(0.131)	(0.457)	(0.457)	(0.465)	(0.126)	(0.126)	(0.128)
AssuRotConsbyAud	−0.775***	−0.968***	−0.814**	−2.352***	−2.662**	−2.481**	−0.748***	−0.951***	−0.802**
	(0.256)	(0.316)	(0.322)	(0.892)	(1.114)	(1.141)	(0.252)	(0.311)	(0.318)
AssuRotAudbyCons	−0.086	−0.016	0.080	0.714	0.068	0.274	−0.075	−0.002	0.087
	(0.307)	(0.391)	(0.401)	(1.111)	(1.449)	(1.492)	(0.302)	(0.383)	(0.393)
TenAssuRotation		0.037			0.200			0.027	
		(0.057)			(0.202)			(0.056)	
TenAssuRotConsbyAud		0.428			0.618			0.445	
		(0.411)			(1.411)			(0.401)	
TenAssuRotAudbyCons		−0.137			1.261			−0.147	
		(0.508)			(1.783)			(0.500)	
Ten < 4AssuRotation			0.081			0.237			0.064
			(0.118)			(0.419)			(0.115)
Ten < 4AssuRotConsbyAud			0.083			0.287			0.123
			(0.486)			(1.690)			(0.477)

(Continues)

TABLE 7 | (Continued)

	AScope			*AQ*			*Ainvestors*		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)
Ten < 4AssuRotAudbyCons			−0.372			0.934			−0.364
			(0.582)			(2.119)			(0.572)
Accountant	0.343***	0.346***	0.349***	2.441***	2.464***	2.454***	0.356***	0.357***	0.360***
	(0.119)	(0.118)	(0.119)	(0.420)	(0.420)	(0.421)	(0.114)	(0.114)	(0.114)
AssuSpe	0.591	0.608	0.595	−2.927	−3.257	−3.113	0.660	0.690	0.675
	(0.757)	(0.760)	(0.761)	(2.610)	(2.631)	(2.629)	(0.731)	(0.733)	(0.734)
GRI	0.293***	0.290***	0.296***	0.687***	0.676***	0.689***	0.279***	0.276***	0.281***
	(0.074)	(0.074)	(0.074)	(0.256)	(0.256)	(0.256)	(0.072)	(0.072)	(0.072)
CSR	0.003*	0.004*	0.003*	0.010	0.010	0.010	0.003*	0.004*	0.003*
	(0.002)	(0.002)	(0.002)	(0.007)	(0.007)	(0.007)	(0.002)	(0.002)	(0.002)
Size	0.027	0.026	0.026	0.162**	0.154**	0.156**	0.030	0.029	0.029
	(0.020)	(0.020)	(0.021)	(0.071)	(0.071)	(0.071)	(0.020)	(0.020)	(0.020)
GroOpp	−0.098	−0.097	−0.097	−0.270**	−0.269**	−0.270**	−0.097	−0.096	−0.096
	(0.074)	(0.073)	(0.074)	(0.125)	(0.124)	(0.125)	(0.075)	(0.074)	(0.074)
ROA	−0.001	−0.001	−0.001	−0.006	−0.005	−0.007	0.001	0.001	0.001
	(0.007)	(0.007)	(0.007)	(0.025)	(0.025)	(0.025)	(0.007)	(0.007)	(0.007)
Leverage	7.05e-05	7.88e-05	7.43e-05	0.001	0.001	0.001	7.00e-05	7.78e-05	7.38e-05
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Accruals	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Audit_Big4	−0.196	−0.194	−0.196	−1.453**	−1.429**	−1.442**	−0.199	−0.196	−0.199
	(0.192)	(0.191)	(0.192)	(0.649)	(0.649)	(0.650)	(0.183)	(0.182)	(0.183)

(Continues)

TABLE 7 | (Continued)

	AScope			*AQ*			*Ainvestors*		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)
N_Ana	−0.001	−0.001	−0.001	0.004	0.004	0.004	−0.002	−0.001	−0.001
	(0.005)	(0.005)	(0.005)	(0.017)	(0.017)	(0.017)	(0.004)	(0.004)	(0.004)
%Indep	−0.001	−0.001	−0.001	−0.004	−0.003	−0.004	−0.001	−0.001	−0.001
	(0.001)	(0.001)	(0.001)	(0.006)	(0.006)	(0.006)	(0.001)	(0.001)	(0.001)
CEOduality	−0.075	−0.075	−0.075	−0.668*	−0.663*	−0.666*	−0.077	−0.077	−0.078
	(0.104)	(0.103)	(0.104)	(0.362)	(0.361)	(0.362)	(0.101)	(0.100)	(0.101)
CSR_Comm	−0.195	−0.199	−0.200	−0.219	−0.227	−0.229	−0.191	−0.194	−0.194
	(0.146)	(0.146)	(0.146)	(0.511)	(0.511)	(0.511)	(0.142)	(0.141)	(0.142)
%Female	0.001	0.001	0.001	−0.005	−0.005	−0.005	−0.001	−9.81e-06	1.23e-05
	(0.004)	(0.004)	(0.004)	(0.016)	(0.016)	(0.016)	(0.004)	(0.004)	(0.004)
EU	0.084	0.077	0.083	0.423	0.409	0.421	0.127	0.122	0.126
	(0.167)	(0.167)	(0.167)	(0.588)	(0.588)	(0.588)	(0.163)	(0.163)	(0.163)
NCSRPI	0.018***	0.018***	0.018***	0.029	0.028	0.029	0.016**	0.016**	0.016**
	(0.006)	(0.006)	(0.006)	(0.023)	(0.023)	(0.023)	(0.006)	(0.006)	(0.006)
ICSRPI	0.001	0.001	0.001	0.028	0.028	0.029	0.002	0.002	0.002
	(0.023)	(0.023)	(0.023)	(0.081)	(0.081)	(0.081)	(0.022)	(0.022)	(0.022)
Country effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood	−2002.589	−2001.707	−2002.155	−3630.599	−3630.078	−3630.422	−2130.716	−2129.874	−2130.333
Wald chi2	286.310***	289.320***	287.240***	390.130***	390.210***	389.380***	323.810***	327.100***	324.850***

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$ and indicate statistical significance at the 1%, 5% and 10% levels, respectively. This table presents the regression results for Models (1–3). Column (1) presents the regression results using Model 1 to analyse the effect of assurer's turnover on assurance scope. Columns (2) present the regression results using Model 2 to analyse the effect of assurer's turnover and tenure on assurance scope. Columns (3) present the regression results using Model 3 to analyse the effect of assurer's turnover and the levels of tenure on assurance scope. Column (4) presents the regression results using Model 1 to analyse the effect of assurer's turnover on assurance broader scope. Columns (5) present the regression results using Model 2 to analyse the effect of assurer's turnover and tenure on assurance broader scope. Columns (6) present the regression results using Model 3 to analyse the effect of assurer's turnover and the levels of tenure on assurance broader scope. Column (7) presents the regression results using Model 1 to analyse the effect of assurer's turnover on assurance quality. Columns (8) present the regression results using Model 2 to analyse the effect of assurer's turnover and tenure on assurance quality. Columns (9) present the regression results using Model 3 to analyse the effect of assurer's turnover and the levels of tenure on assurance quality. The results are calculated for panel data of 604 firms (3508 observations) over the period 2011–2017. All variables are defined in Table A4.

TABLE 8 | Robustness check II.

	VarAScope	VarLevel	VarEntire	VarStandard	VarReportQuality
	(1)	(2)	(3)	(4)	(5)
			Model 2		
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
	(SE)	(SE)	(SE)	(SE)	(SE)
VarAScope					−0.307
					(0.248)
AssuRotation	0.160	0.088	−0.049	−0.041	0.163
	(0.125)	(0.150)	(0.209)	(0.224)	(0.888)
AssuRotConsbyAud	−0.516**	−0.604**	−0.687*	−0.018	3.122*
	(0.246)	(0.287)	(0.393)	(0.432)	(1.752)
AssuRotAudbyCons	0.112	−0.385	0.291	0.0219	2.269
	(0.309)	(0.354)	(0.503)	(0.539)	(2.130)
Accountant	−0.082	0.077	−0.014	0.084	−0.059
	(0.111)	(0.131)	(0.184)	(0.199)	(1.414)
AssuSpe	0.145	2.009**	−0.580	0.466	2.397
	(0.723)	(0.852)	(1.200)	(1.286)	(7.320)
CSR	0.002	0.001	0.002	−0.001	0.004
	(0.002)	(0.002)	(0.003)	(0.003)	(0.019)
GRI	−0.045	−0.117	0.165	−0.056	0.502
	(0.070)	(0.083)	(0.118)	(0.124)	(0.672)
Size	−0.004	−0.016	0.013	0.014	−0.154
	(0.019)	(0.023)	(0.033)	(0.034)	(0.346)
GroOpp	−0.049*	−0.001	0.002	0.001	0.033
	(0.029)	(0.038)	(0.056)	(0.059)	(0.307)
ROA	0.002	0.001	−0.003	−0.003	−0.002
	(0.006)	(0.008)	(0.012)	(0.012)	(0.085)
Leverage	0.001	0.001	−7.66e-05	−0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Accruals	−6.61e-06	5.86e-06	−0.000382	−8.71e-05	0.00367
	(0.001)	(0.001)	(0.001)	(0.001)	(0.007)
Audit_Big4	0.097	0.187	−0.264	−0.130	−6.995**
	(0.180)	(0.215)	(0.297)	(0.314)	(3.545)
N_Ana	0.003	0.007	0.001	−0.002	−0.009
	(0.004)	(0.005)	(0.007)	(0.008)	(0.069)
%Indep	−0.001	−0.001	0.003	−0.001	−0.004
	(0.001)	(0.002)	(0.002)	(0.003)	(0.016)
CEOduality	0.031	0.117	−0.208	0.153	2.886***
	(0.100)	(0.119)	(0.167)	(0.177)	(0.925)
CSR_Comm	−0.222	−0.203	−0.143	0.0360	−0.915
	(0.141)	(0.169)	(0.234)	(0.248)	(1.219)

(Continues)

TABLE 8 | (Continued)

	VarAScope	VarLevel	VarEntire	VarStandard	VarReportQuality
	(1)	(2)	(3)	(4)	(5)
			Model 2		
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
	(SE)	(SE)	(SE)	(SE)	(SE)
%Female	−0.003	0.001	−0.014*	0.002	0.010
	(0.004)	(0.005)	(0.007)	(0.007)	(0.041)
EU	−0.0556	−0.0993	0.110	−0.268	2.324*
	(0.163)	(0.194)	(0.270)	(0.286)	(1.242)
NCSRPI	0.006	0.008	0.005	0.001	0.027
	(0.006)	(0.007)	(0.011)	(0.011)	(0.111)
ICSRPI	−0.033	−0.027	0.001	−0.022	−0.050
	(0.022)	(0.026)	(0.037)	(0.039)	(0.414)
Country effect	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes
Log likelihood	−2339.021	−1237.842	−698.702	−636.929	−2551.381
Wald chi2	25.840	24.660	20.420	5.790	83.910***

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$ and indicate statistical significance at the 1%, 5% and 10% levels, respectively. This table presents the regression results for Models 1–3. Column (1) presents the regression results using Model 2 to analyse the effect of assurer's turnover on the annual changes in assurance scope. Column (2) presents the regression results using Model 2 to analyse the effect of assurer's turnover on the annual changes in assurance level. Column (3) presents the regression results using Model 2 to analyse the effect of assurer's turnover on the annual changes in assurance over the entire report or not. Column (4) presents the regression results using Model 2 to analyse the effect of assurer's turnover on the annual changes in assurance standard. Column (5) presents the regression results using Model 2 to analyse the effect of assurer's turnover on the annual changes in assurance quality. The results are calculated for panel data of 604 firms (3508 observations) over the period 2011–2017. All variables are defined in Table A4.

Additionally, we test whether switching to the same firm for both the financial statement audit and sustainability assurance leads to systematic differences, such as a less conservative approach. To explore this, we specify Model 6, which retains the tenure variables and introduces JointProvision, a dummy variable equal to 1 when the assurer is also the financial statements auditor and 0 otherwise.

$$\begin{aligned}\text{AssuBreadth/AssuDepth}_{\text{it}} = {} & \omega_0 + \omega_1 \text{AssuBreadth/AssuDepth}_{i,t-1} + \omega_2 \text{AssuRotation}_{i,t} \\ & + \omega_3 \text{Tenure}_{i,t} + \omega_4 \text{JointProviison}_{i,t} + \omega_5 \text{Accountant}_{i,t} + \omega_6 \text{AssuSpe}_{i,t} + \omega_7 \text{AA1000}_{i,t} + \omega_8 \text{GRI}_{i,t} + \omega_9 \text{CSR} \\ & + \omega_{10} \text{Size}_{\text{i,t}} + \omega_{11} \text{GroOpp}_{i,t} + \omega_{12} \text{ROA}_{i,t} + \omega_{13} \text{Leverage}_{i,t} + \omega_{14} \text{Accruals}_{i,t} + \omega_{15} \text{Audit\_Big4}_{i,t} + \omega_{16} \text{N\_Ana} \\ & + \omega_{17} \%\text{Indep}_{i,t} + \omega_{18} \text{CEOduality}_{i,t} + \omega_{19} \text{CSR\_Comm}_{i,t} + \omega_{20} \%\text{Female}_{i,t} + \omega_{21} \text{EU}_{i,t} + \omega_{22} \text{NCSRPI}_{i,t} \\ & + \omega_{23} \text{ICSRPI}_{i,t} + \omega_{24} \text{Country}_i + \omega_{25} \text{Industry}_i + \omega_{26} \text{Year}_t + \varepsilon_{it} + \eta_i \end{aligned} \quad (6)$$

The untabulated results (available upon request) show that when the financial auditor also provides sustainability assurance, the coefficients for both depth and breadth are positive, though not statistically significant. We also find that the positive effect of tenure becomes marginally significant when the curvilinear specification is excluded. Overall, these findings underscore that while tenure and joint provision may influence assurance quality, their relationship with assurance quality is at best marginal, warranting further investigation in future research.

5 | Conclusion

This study set out to examine the relationship between assurance provider rotation and the quality dimensions of sustainability assurance. The results indicate that provider rotation is positively associated with both breadth and depth of sustainability assurance statements. These links suggest that companies undergoing an assurer switch tend to exhibit broader and more in-depth assurance engagements relative to those that retain the same provider. More importantly, the findings reveal that when a company selects an accounting firm to replace a nonaccounting assurance provider (such as a consultant or engineering firm), there is a negative association with both assurance statement breadth and assurance depth. Transitioning to a different type of assurance provider could thus imply additional information and transaction costs. More specifically, switching

from nonaccounting to accounting assurers may temporarily reduce assurance quality due to methodological differences.

At the same time, our further analyses reveal that these effects are structural rather than dynamic. While the main regressions point to higher absolute levels of breadth and depth following rotation, the change analysis shows no significant year-on-year variation. This suggests that rotation does not trigger abrupt shifts in assurance quality but instead contributes to steady differences across engagements. The benefits of rotation therefore appear to accrue gradually, as new assurers establish their approach and procedures, rather than through immediate jumps in disclosure scope or process depth. Taken together, these findings reject the 'fresh-viewpoint' hypothesis that rotation inherently enhances assurance quality. Instead, they depict a stable segmentation of the assurance market, where differences in breadth and depth reflect enduring methodological and institutional characteristics of provider types rather than time-variant learning or improvement effects.

This study makes several contributions. Drawing on both emerging sustainability assurance studies and established literature in financial auditing research, this paper deepens understanding of the complex dynamics between assurance provider rotation and assurance quality. The findings suggest that firms can view (voluntary) assurance provider rotation as a strategic opportunity to enhance the breadth and depth of sustainability assurance. While the assurer switch may appear resource-intensive, the evidence indicates that meaningful improvements in assurance quality are achievable. However, firms considering a change in assurer type should be cautious: switching to a different type of assurer may inadvertently reduce the scope and rigour of the assurance. Thus, companies should aim for substantive—not merely procedural—change. This necessitates a thorough review of the assurance process and the assurer–client relationship, in alignment with IAASB ISSA 5000 *General Requirements for Sustainability Assurance Engagements* effective on or after December 15, 2026.

This study also provides relevant implications for regulators and standard setters operating in an evolving assurance landscape. In particular, our findings inform ongoing policy debates in jurisdictions such as the European Union (under the Corporate Sustainability Reporting Directive), the UK (with the Financial Reporting Council responsible for developing a policy framework for sustainability assurance) or Australia (with the introduction of *ASSA 5000 General Requirements for Sustainability Assurance Engagements*, effective from January 2025; AUASB 2025). Our results support the view that assurance provider rotation could yield benefits in terms of independence and rigour. However, a rigid, one-size-fits-all approach to mandatory rotation may not be suitable to the dynamics of this emerging assurance market. A more effective alternative could involve phased or flexible regulatory frameworks, allowing for firm-specific justifications while incorporating periodic reviews of assurance engagements. This would help maintain assurance quality without undermining consistency or imposing undue burdens—particularly on smaller reporting firms. Accordingly, national and international standard-setting bodies may consider developing guidance on best practices for assurer rotation, such as recommended transition periods and structured knowledge transfer mechanisms to minimise disruption.

This study also underscores how targeted regulatory interventions—such as assurance provider rotation guidelines—can promote competition, enhance market efficiency, and ultimately strengthen the credibility of ESG disclosures in alignment with global policy priorities. Rotation requirements may play a role in stimulating tendering processes and encouraging market diversification of sustainability assurance services, particularly by creating new opportunities for smaller or non-traditional assurance providers. However, such policies could also impose disproportionate regulatory burdens, especially on firms with limited resources or narrower assurance capacity. Rather than adopting a uniform approach, rotation requirements might be more effective if tailored to firm size or phased in gradually, ensuring that smaller entities are not unduly constrained by compliance demands while still aligning with broader goals of quality enhancement and market integrity. In addition, policies mandating periodic rotation at the audit partner level within the same audit firm, as already applied to financial audits in several countries, could be adapted to the sustainability assurance market.

Our results carry important implications for the AUASB as it progresses with the adoption of ISSA 5000 in Australia and the phased implementation of assurance requirements under ASSA 5010 (AUASB 2025). In the early period of limited assurance (2025–2029), introducing mandatory firm-level assurer rotation could impose excessive disruption in a market still developing its capacity and expertise. Deferring firm-level rotation until the transition to reasonable assurance (from 2030 onward) would allow the market to consolidate its practices before imposing stricter requirements. At that juncture, the potential benefits of firm-level rotation in strengthening credibility could be reassessed and calibrated to market readiness. Moreover, aligning rotation policies with the phased entity groups defined in ASSA 5010 would ensure proportionality—imposing stricter safeguards for Group 1 entities, while allowing greater flexibility for smaller firms. This graduated approach recognises that larger, systemically important entities require higher independence standards, whereas smaller providers benefit from proportionate compliance expectations. To preserve independence without undermining continuity, partner-level rotation should be prioritised during the limited assurance phase, mirroring the requirements already applied in financial audit engagements. Under the revised APES 110 (2025), a so-called Key Sustainability Assurance Leader (partner or director) may serve for a maximum of seven cumulative years, followed by a cooling-off period of 2 to 5 years, depending on the role performed—the same thresholds as financial audit partners. These provisions, effective from 1 July 2026, represent a pragmatic balance between independence and continuity, offering a model that other jurisdictions could emulate. Furthermore, our findings that accounting firms tend to limit breadth and recommendations suggest that AUASB should consider supplementing ISSA 5000 with guidance on assurance quality benchmarks beyond independence, particularly those relating to disclosure scope and stakeholder relevance. Taken together, these considerations highlight that rotation design and timing requirements must be integrated into the broader reform trajectory of sustainability assurance in

Australia. These key issues on the mechanisms governing sustainability (non-financial) assurance services will likely shape future regulatory and standard-setting debates, both nationally and internationally, and warrant continued scholarly attention.

Finally, the limitations of our study point to several promising avenues for future research. Our analysis is constrained by the characteristics of the sample and the timeframe examined, which may restrict the generalisability of our findings. While we mitigated concerns related to causality and endogeneity through lagged variables and panel data, these issues still pose challenges to external validity and highlight the need for replication studies. Specifically, the use of an international database limits our ability to account for nuanced differences in assurance standards and quality frameworks across countries. These contextual variations may influence the consistency of practices among assurers operating in diverse institutional environments. Future research should therefore undertake country-specific analyses, ideally spanning longer reporting periods, to capture these contextual effects and better assess the impact of institutional settings on assurance quality.

Moreover, the inherent complexity of defining and measuring sustainability assurance quality presents substantial opportunities for methodological advancement. Future studies could focus on developing more valid and reliable proxies for assurance quality in this emerging field. In particular, standard-setting bodies like the AUASB might support research that explores the negotiation dynamics and decision-making processes underlying assurer rotation—using qualitative, survey-based or experimental methods that directly involve dyads of assurance providers and their clients. Such dyadic approaches enable scholars to capture both sides of the rotation decision, revealing not only the strategic motivations and expectations of clients but also the constraints, professional judgements, and reputational considerations that shape assurance providers' choices. Additionally, dyadic analysis can uncover informal mechanisms, such as interpersonal relationships and cultural compatibility, that are often overlooked in archival studies but may significantly influence the success of assurer transitions and the effectiveness of assurance engagements. These richer, context-sensitive insights are particularly relevant in the sustainability assurance domain, where standards continue to evolve and professional norms remain less institutionalised than those governing financial audit practice.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Appendix A

TABLE A1a | Sample selection process.

	Number of unique firms
First search criteria	
Firms in Thomson Reuters/Refinitiv ASSET4/EIKON dataset (2011–2017)	
Number of employees equal to or higher than 500	
Data available for assurance report (0 or 1)	
Data available for the rest of the variables investigated	
Data available for at least 4 consecutive years	
First sample	1564
Second search criteria	
Less: firms without an assurance report	−856
Second sample	708
Third search criteria	
Less: firms without an assurance report available on their corporate website	−104
Final sample	**604**

TABLE A1b | Year distribution of the final sample.

Year	Absolute Freq.
2011	315
2012	367
2013	410
2014	604
2015	604
2016	604
2017	604
Total	3508

TABLE A2a | Variable measurement: Sustainability assurance depth (source: Hummel et al. 2019).

Item	Measurement
Assurance process	
D1 Scope	The assurance covers (3) The full report (2) Numerical values *and* qualitative statements (1) Numerical values *or* qualitative statements
D2 Coverage	Proportion of the number of assured sustainability performance indicators relative to the number of reported sustainability performance indicators
D3 Methods	The sum of the following methodologies that are applied in the assurance process: documentation checks, interviews, data analyses, on-site visits and public media search
D4 Level	The assurance level indicated (3) High/reasonable (2) Mixed (1) Moderate/limited (0) None
Conclusions	
D5 Materiality	Whether the assurance statement contains information on the materiality of the report (1) or not (0)
D6 Recommendations	Whether the assurance statement contains information indicating that recommendations are provided to the client (1) or not (0)
Total	0–6

TABLE A2b | Variable measurement: Sustainability assurance breadth (source: Hummel et al. 2019).

Item		Measurement	AA1000	ISAE 3000	GRI
General information					
B1	Addressees	Whether the assurance statement is addressed towards all stakeholders (1) or not (0)	(X)	(X)	(X)
B2	Assurance standard	Whether at least one assurance standard is mentioned as framework for the assurance (1) or not (0)	X	X	X
B3	Miscellaneous information	Whether miscellaneous information (provider's firm name, provider's representative, date and place) is completely mentioned in the assurance statement (1) or not (0)	X	X	X
Provider information					
B4	Provider competence	Whether the assurance statement contains information on the provider's competence (1) or not (0)	X	(X)	—
B5	Provider independence	Whether the assurance statement contains information on the provider's independence (1) or not (0)	X	X	—
B6	Area of responsibility	Whether the assurance statement contains information on both the firm's and the provider's area of responsibility (1) or not (0)	X	X	X
Assurance process					
B7	Scope	Whether the assurance statement contains information on the scope of the assurance process (1) or not (0)	X	X	X
B8	Methods	Whether the assurance statement contains information on the methods and procedures of the assurance (1) or not (0)	X	X	X
B9	Level	Whether the assurance statement specifies the level of the assurance (1) or not (0)	X	X	X
Conclusions					
B10	Veracity	Whether the assurance statement indicates with sufficient details the conclusion/opinion of the assurance provider (1) or not (0)	X	X	X
B11	Materiality	Whether the assurance statement contains information on the materiality of the report (1) or not (0)	X	—	X
B12	Limitations	Whether the assurance statement contains limitations with respect to the sustainability report (1) or not (0)	X	X	X
B13	Recommendations	Whether the assurance statement contains recommendations (1) or not (0)	X	(X)	X
Total		0–13			

Note: () Brackets indicate nonmandatory element.

TABLE A3 | Coding rules for the content analysis.

Step 1: Collection of assurance reports
The members of the research team downloaded the assurance reports for the selected companies, with the workload distributed proportionally based on the number of companies assigned to each member.
Step 2: Creating the coding framework
For the coding framework, the researchers adopted the categories and items proposed by Hummel et al. (2019), compiling them into an Excel file that organised all elements of assurance breadth and assurance depth as columns, with firm-year observations as rows. A shared folder was created to facilitate group access and collaboration on these files.
Step 3: Pilot analysis
To promote familiarisation with the data to be coded, the researchers jointly analysed the assurance reports of 10 companies. This collaborative approach also facilitated the identification of coding inconsistencies and the clarification of potential ambiguities.
Step 4: Coding the content of the assurance reports
The researchers individually and independently coded the content of the assurance reports in accordance with the coding framework developed in Step 2.
Step 5: Review of discrepancies resulting from the coding process
The researchers jointly reviewed the assurance reports of those companies whose scores differed.
Step 6: Generation of scores
The individual coding items were aggregated into the broader assurance breadth and assurance depth variables defined in Step 2.

TABLE A4 | List of variable acronyms and definitions.

	Definition and measurement	Source
Dependent variables		
AssuBreadth	Score that takes the value between 0 and 13 points that determine the presence of general information (addressees, assurance standard and miscellaneous data), provider information (competence, independence and area of responsibility), process information (scope, methods and level) and conclusions (veracity, materiality, limitations and recommendations) as outlined in Tables A2a, A2b	Own elaboration based on the assurance report published on the firm's website
AssuDepth	Score that takes value between 0 and 6 points. The items relate to the assurance process (scope, coverage, methods and level) and conclusions (materiality and recommendations) as outlined in Tables A2a, A2b	
AScope	The score takes values between 0 and 3 points to identify the presence or absence of the three quality parameters. In this sense, 1 point is assigned if there is a reasonable level of assurance (0 for limited level); the assurance scope is realised over the entire CSR report (0 for just sections of the report); and there is a disclaimer according to the assurance standards (0 otherwise)	
Ainvestors	The score takes value between 0 and 4 points, adding to *AScope* a fourth aspect of the verification process, namely the inclusion of recommendations in the assurance report	
AQ	Score from 0 to 27 points calculated by the sum of 19 items related to the format and procedures of the assurance report, and the recommendations and opinions of the assurer	
Independent variables		
AssuRotation	Dichotomic variable with value 1(0) if the company has (or not) changed the assurer	Own elaboration based on Thomson Reuters/Refinitiv ASSET4/EIKON database
AssuRotConsbyAud	Dichotomic variable with value 1(0) if the company has (or not) changed the typology of the assurer: from consultant to auditor	
AssuRotAudbyCons	Dichotomic variable with value 1(0) if the company has (or not) changed the typology of the assurer: from auditor to consultant	
TenAssuRotation	Number of years of the contractual relationship on the contract termination date for all rotations	
TenAssuRotConsbyAud	Number of years of the contractual relationship on the contract termination date for the rotation of consultant by auditor	
TenAssuRotAudbyCons	Number of years of the contractual relationship on the contract termination date for the rotation of auditor by consultant	
Ten < 4AssuRotation	Dichotomic variable with value 1 to identify the rotation of the assurers with a contractual relationship equal to or less than 3 years	
Ten < 4AssuRotConsbyAud	Dichotomic variable with value 1 to identify the rotation of the assurer's typology consultant with a contractual relationship equal to or less than 3 years by auditor	
Ten < 4AssuRotAudbyCons	Dichotomic variable with value 1 (0) to identify the rotation of the assurer's typology auditor with a contractual relationship equal to or less than 3 years by a consultant	
Control variables		
Accountant	Dichotomic variable with value 1 (0) if the assurer is (or not) an accounting firm	Own elaboration based on Thomson Reuters/Refinitiv ASSET4/EIKON database
AssuSpe	Assurer specialisation determined by the percentage of sales per sector by year and country	
Audit_Big4	Dichotomic variable with value 1 (0) if the assurer is (or not) a Big4 audit firm	

(Continues)

TABLE A4 | (Continued)

	Definition and measurement	Source
Size	Logarithm of total assets, proxy of companies' size	Data available on Thomson Reuters/Refinitiv ASSET4/ EIKON database
GroOpp	Firm's growth opportunities estimated by yearly sales variation	
ROA	Firms' profitability by Return on Assets ratio	
Leverage	Total debt to total assets ratio	
Accruals	Total accruals by cash flow from operations	
N_Ana	Number of analysts that follow a firm	
CSR	ESG performance score	
GRI	Ordinal variable that measures the degree of GRI guidelines applications in the elaboration of the sustainability report	
%Female	Proportion of female directors in the board	
%Indep	Proportion of independent directors in the board	
CSR_Comm	Dichotomic variable with value 1 (0) if the firm has (or not) a CSR committee	
CEOduality	Dichotomic variable with value 1 (0) if the CEO is also the Chairperson	
EU	Dichotomic variable with value 1(0) if the company was (or not) headquartered in an EU country in the period 2014–2017	Own elaboration
NCSRPI	The National Corporate Social Responsibility Practices Index	Amor-Esteban et al. (2018b)
ICSRPI	The Industrial Corporate Social Responsibility Practices Index	Amor-Esteban et al. (2018a)