

Environmental committee characteristics, female director interlocking and stock liquidity

Minh Phuc Nguyen

*Department of Accounting, Economics and Finance,
School of Business, Law and Entrepreneurship, Swinburne University of Technology,
Melbourne, Australia and*

*Faculty of Finance and Banking, University of Finance – Marketing,
Ho Chi Minh City, Vietnam, and*

Roshanthi Dias and Christine Jubb

*Department of Accounting, Economics and Finance,
School of Business, Law and Entrepreneurship, Swinburne University of Technology,
Melbourne, Australia*

Abstract

Purpose – This study draws on the resource-based view to investigate how characteristics of environmental committees, specifically the presence of a female chair, the number of female members and interlocked directors, affect capital market efficiency, as measured by stock liquidity in Australian listed companies.

Design/methodology/approach – Using a two-step system generalised method of moments (GMM) estimation, this study analyses a sample consisting of S&P/ASX 300 companies with environmental or similarly purposed committees between 2009 and 2018.

Findings – We find that the presence of a female chair of the environmental committee, a greater number of female members and director interlocked members (male or female), along with other environmental committee characteristics, are positively associated with committee effectiveness and improved stock liquidity. Interestingly, female interlocking is of greater economic significance than male interlocking. However, an environmental committee member holding the dual role of board chair is negatively related to stock liquidity.

Originality/value – This research addresses the global regulatory push for increased female representation on corporate boards, focusing on firm environmental committees. Our findings reveal the significant impact of female environmental committee members on capital market efficiency via enhanced stock liquidity. This study uniquely contributes to the literature by highlighting the role of female environmental committee members in improving stock liquidity and expanding the understanding of director interlocking's influence on reporting practices. By uncovering the benefits of female environmental committee members interlocking within environmental, social and governance (ESG) contexts, this research underscores the necessity of effective environmental committees to boost non-financial performance and stock liquidity.

Keywords Environmental committee characteristics, Gender, Interlocking, Stock liquidity

Paper type Research paper

JEL Classification — G10, G39, Q56

© Minh Phuc Nguyen, Roshanthi Dias and Christine Jubb. Published by Emerald Publishing Limited. This article is published under the Creative Commons Attribution (CC BY 4.0) licence. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this licence may be seen at <http://creativecommons.org/licenses/by/4.0/legalcode>

Thank you to members of the Swinburne Social and Environmental Sustainability Research Group for the feedback received on this paper.

Statements and declarations

Declaration of conflicting interest: No conflicts of interest are declared.

Funding statement: This paper is from Phuc Minh Nguyen's PhD, which was funded by a Moet Scholarship from Vietnam and a Tuition Fee Scholarship from Swinburne University of Technology.

Data availability: All data are from publicly available sources.



1. Introduction

In capital markets, stock liquidity is a crucial topic because of its essential impact on many stakeholders, including investors, regulators, stock exchanges and listed companies (Ali *et al.*, 2017). Much evidence supports an association between financial performance and stock liquidity; however, limited research examines the impact of environmental, social and governance (ESG) performance on stock liquidity, with Gao *et al.* (2016) being an important exception. There is even less research on the role played by environmental committees [1] or committee member characteristics in ESG performance and the impact on stock liquidity. This gap leads to the main objective of this study, which is to investigate the potential relationship between environmental committee members' gender, multiple directorships and stock liquidity.

ESG issues are a growing concern for corporations as climate change impacts become clearer, prompting companies to improve their ESG performance (Nizam *et al.*, 2019). Orazalin (2020) finds that establishing an environmental committee can enhance ESG performance by designing ESG policies, with Eberhardt-Toth (2017) noting that effective environmental committees correlate with higher ESG performance. Previous studies identify key environmental committee characteristics, including member number, independence, diligence, board chair inclusion, and higher average age (Eberhardt-Toth, 2017; Appuhami, 2018), which, we argue, could improve ESG performance and stock liquidity (Gao *et al.*, 2016) through reduced information asymmetry and increased monitoring.

Gender diversity and interlocking members also enhance environmental committees (Eberhardt-Toth, 2017; Liu, 2018; Zou *et al.*, 2018). Studies show female board members improve stock liquidity (Loukil *et al.*, 2019) and ESG performance (Liu, 2018), likely due to their comparatively greater moral orientation than males (Larrieta-Rubín de Celis *et al.*, 2015). Environmental committee member interlocks are likely to reduce ESG information asymmetry and disseminate effective sustainability-related practices, promoting participation in ESG initiatives (Zou *et al.*, 2019) and at an enhanced pace (Al-Dah (2019). However, the impact of gender on the role of environmental committee interlocks in enhancing stock liquidity remains underexplored.

This research responds to regulatory calls to appoint more female board members in nations like Sweden and the United Kingdom (UK) (Lee and Lee, 2014), while countries such as Spain, France, Ireland, Italy, Germany, Belgium, Austria and the Netherlands, have implemented legal board gender quotas (Biswas *et al.*, 2018). The Australian Institute of Company Directors (AICD) aimed for 30% female representation on Australian Securities Exchange (ASX) top 200 boards by 2018 (AICD, 2015). In 2019, the ASX Corporate Governance Council modified the ASX Corporate Governance Principles and Recommendations to recommend that listed companies report their gender diversity. Under Australia's "comply or explain why not" regime, companies must report their diversity policy and the number of female directors and establish measurable objectives or explanations for non-reporting.

As of July 2023, 35.6% of S&P ASX 300 board seats were held by females (AICD 2023), compared with 8.8% in 2009 (AICD, 2020; For 2018, the study period-end for this paper, the percentage of females was 29.2% (Ownership Matters, 2020). However, the growth in female director numbers between 2009 and 2018 meant that the comparatively few females with established directorial expertise were in high demand and tended to be appointed to multiple boards. This lack of supply of directors is compounded by "a strong bias toward appointing existing ASX 300 directors to vacancies" (Ownership Matters, 2020, p. 2). Consequently, ASX300 female directors held an average of 1.33 board seats within the ASX300 in 2009, but this increased to 1.43 seats in 2018. In comparison, males held an average of 1.23 board seats in 2009, but this had declined to 1.19 by 2018 (Ownership Matters, 2020). This phenomenon, plus the fact that Australia has never regulated multiple directorships, makes it an ideal research setting in which to investigate gendered membership of environmental committees and their director interlocks in association with stock liquidity. The vast distance between

Australia's east and west coasts is another factor since pre-COVID-19, when virtual meetings were rare, separate pools of directors on each coast tended to be maintained, leading to a historical normalisation of multiple directorships (Alexander, 2003; Wright, 2023).

Environmental committees are positively related to community performance, and females encourage ESG disclosure and performance (Zhang *et al.*, 2013; Setó-Pamies, 2015; Hollindale *et al.*, 2019; Zaid *et al.*, 2020). Thus, studying the effectiveness of these committees, especially the impact of female members and their interlocks with other companies' female committee members in association with stock liquidity, may yield valuable insights.

Lu *et al.* (2022, p. 10) review board characteristics and corporate outcomes, noting "some aspects of board structure like board interlocking have not been studied much in regard to their effect" on corporate social responsibility. This study uses resource-based view and resource dependence theories to explain the roles of environmental committees, female members, and interlocking, viewing the first two as internal resources for competitive advantage and the last as social capital enabled by external outreach under resource dependence theory (Granovetter, 1985).

Analysing S&P ASX 300 companies from 2009 to 2018, we find that female chairs and more female environmental committee members enhance stock liquidity. Finally, a greater number of interlocking environmental committee members is positively associated with stock liquidity, and, interestingly, while both male and female member interlocking enhance stock liquidity, female interlocking is of greater economic significance. Environmental committee size, independence, the number of meetings, meeting attendance, and the average age of members are also positively associated with environmental committee effectiveness, which improves stock liquidity.

This study contributes to the literature by supporting the unique role of female environmental committee members in enhancing stock liquidity, adding to knowledge on director interlocking's impact on reporting practices, uncovering the benefits of female environmental committee member interlocking in ESG contexts and emphasising the need for effective environmental committees to boost non-financial performance and stock liquidity.

The remainder of the study is structured as follows: First, we discuss the theoretical framework and prior literature and then develop the hypotheses. Section 3 details the data and variables. Section 4 presents the analysis and results, with robustness tests and discussion in Section 5. Finally, Section 6 concludes.

2. Theory, literature review and hypotheses

We use the resource-based view, which emphasises internal resources, to explain how managers develop companies using available assets (Dollinger, 2003) and the importance of ESG, which creates a sustained competitive advantage through unique resource bundles (Barney, 1991; Conner and Prahalad, 1996). ESG's influence on corporate performance varies between companies and is not imitable by competitors (Branco and Rodrigues, 2006), influencing employee interactions and stakeholder relationships (Brammer *et al.*, 2007) essential for competitive advantage. Scholars view ESG as a valuable resource foundational to competitive advantage, encompassing human rights, business ethics, stakeholder relationships, product responsibility, and reputation. Establishing an environmental committee to address environmental and social issues reflects a commitment to ESG engagement (Hussain *et al.*, 2018).

2.1 Environmental committees and stock liquidity

A sub-committee focused on environmental and social issues can help directors fulfil their responsibilities (Burke *et al.* (2019), signal societal concerns about ESG issues, enhance ESG disclosure (Orazalin, 2020) and ESG performance (Wijethilake *et al.*, 2017; Helfaya and

Moussa, 2017). For example, using U.S. data, Hussain *et al.* (2018) show that effective ESG strategies can result in higher ESG performance and (Amama *et al.*, 2016; Helfaya and Moussa, 2017) find similarly using U.K. data, with Biswas *et al.* (2018) finding that an environmental committee assists Australian companies in designing ESG strategies, which improves their ESG performance.

2.2 Gender diversity, interlocking, and effectiveness of environmental committees

To innovate, companies need new knowledge and consistent with the resource-based view, a source of knowledge resides in board diversity (Nguyen *et al.*, 2020). Adam Smith, in *Theory of Moral Sentiments* (1759), rejected that women are always subordinate (Kuchař, 2023) and argued in *Wealth of Nations* (1776) that profit-driven companies enhance the public good, leading to corporate social responsibility (Bristy *et al.*, 2021). Female board members excel in generating ideas, fostering innovation, and addressing stakeholders' interests (Larrieta-Rubín de Celis *et al.*, 2015; Konrad and Kramer, 2006). A key role of the board is meeting stakeholders' interests (Mallin and Michelin, 2011). Mallin *et al.* (2013) found that gender diversity on boards boosts ESG engagement and performance. Al-Shaer *et al.* (2025) note that a higher number of female directors on the board alleviates the market's negative reaction to ESG engagements. Walls *et al.* (2012) note female managers' contributions to environmental outcomes. Thus, board gender diversity could lead to greater success if leveraged as a competitive advantage.

2.2.1 Gender diversity and effective environmental committees. Board gender diversity enhances stock liquidity (Ye *et al.*, 2021; Nguyen and Muniandy, 2021) and impacts ESG activities (Liu, 2018; Zaid *et al.*, 2020) as female directors offer broader perspectives and reduce board complacency on social and ecological issues (Zou *et al.* (2018), improving ESG performance and minimising litigation risk (Khaw and Liao, 2018).

Females' greater commitment to ESG engagement (Landry *et al.*, 2016) may stem from their risk aversion, altruism (Zou *et al.*, 2018), moral orientation (Larrieta-Rubín de Celis *et al.*, 2015) and lower overconfidence (Liu, 2018) compared to males, leading to more ESG activities (Liu, 2018) and a higher likelihood of seeking expert advice (Rehman *et al.*, 2020) to mitigate environmental lawsuits.

Previous studies highlight a female board chair's impact on companies' performance, showing a positive association with ROA, ROE and Tobin's Q for French-listed companies from 2001 to 2010 (Bennouri *et al.* (2018) and similarly for China (Jiang *et al.* (2018). The chair of any committee has a crucial role in fostering cooperation (Pucheta-Martínez *et al.* (2016), a female chair with a democratic leadership style enhances decision-making and performance (Nekhili *et al.*, 2017). Pucheta-Martínez *et al.* (2016) found that Spanish companies with audit committees chaired by females had more transparent financial statements and reduced audit fees from 2004–2011.

Eberhardt-Toth (2017) extends this research, focusing on female committee members and chairs in effective environmental committees, finding their presence positively correlates with higher committee effectiveness and ESG performance and arguing that environmental committee female leadership offers new solutions to ESG issues due to their greater altruism.

Environmental committees should also achieve diversity to better meet stakeholder demands, as gender diversity likely increases the knowledge and skills beneficial for ESG performance (McGuinness *et al.*, 2017; Yasser *et al.*, 2017; Yaseen *et al.*, 2019) due to the more empathic nature of females (Tingbani *et al.*, 2020).

We propose that environmental committees with more female members and a female chair are more effective, which correlates with higher ESG performance, leading to greater stock liquidity by reducing information asymmetry. We posit two hypotheses:

- H1.** An environmental committee with more female members is positively related to stock liquidity.

H2. An environmental committee with a female chair is positively related to stock liquidity.

2.2.2 *Interlocks and effective environmental committees.* In addition to factors previously discussed, we argue that interlocking environmental committee members can enhance effectiveness, while female characteristics promote greater ESG engagement (Liu, 2018), member interlocks reduce environmental uncertainty and improve reputation through social networks (Zou et al., 2018).

We examine the role of environmental committee member interlocks, both overall and gendered, on stock liquidity, noting that a board interlock occurs when a director of one company joins another's board (Mizruchi and Stearns, 1988), with environmental committee members primarily sourced from a company's directors.

Resource dependence theory is suitable for studying board behaviour, focusing on the connection between companies and their external environment (Pfeffer, 2003). It assumes companies cannot generate all required resources internally, leading to external relationships for resource acquisition. Interlocking helps networked companies acquire knowledge and information, generating valuable assets (Boyd, 1990) and facilitating access to long-term acquisition of essential resources. Johnson and Greening (1999) and Shropshire (2010) show that companies with interlocked members can improve their ESG practices by accessing more information than those without interlocks. Zou et al. (2018) confirm that information transferred through interlocks is more significant than information from other sources. Companies' strategic behaviours are influenced by their connections to others through board interlocks, such as auditor choice (Davison et al., 1984), having synchronous returns, or adopting tax shelters (Zou et al., 2018). These empirical studies emphasise that board interlocks represent channels that diffuse practices and strategies.

Member interlocks can impact corporate governance by spreading information that influences decision-making (Chan et al., 2017), helping outside members overcome informational disadvantages by insights into the economy (Zou et al., 2019) and enhancing the persuasiveness of decisions (Zou et al. (2019) through shared discussions and empowering monitoring activities. However, research on the role of environmental committee structure or effectiveness influenced by interlocks (Eberhardt-Toth, 2017) is limited.

This study argues that females with board interlocks on environmental committees are positively linked to environmental committee effectiveness and satisfying the diversity of stakeholder demands, enhancing corporate governance and benefiting investors. In testing whether environmental committee members' interlocks are associated with stock liquidity, this study addresses an underexplored issue. The related hypotheses are:

H3. An environmental committee with more interlocking members is positively related to stock liquidity.

H4. An environmental committee with more interlocking female members is positively related to stock liquidity.

The next section explains how these four hypotheses are tested.

3. Data and variables

3.1 Dependent variable

Stock liquidity encompasses various dimensions (Ali et al., 2017). Following Nguyen et al. (2024) we use three proxies to capture these aspects. Amihud's illiquidity ratio indicates depth and resilience, zero return measures tightness, and stock turnover represents immediacy (Daske et al., 2008; Lang and Maffett, 2011). Depth reflects the market's capacity for substantial trading volumes without significant price impact, resilience reflects how quickly prices return to equilibrium after significant trades, and tightness relates to transaction costs for

adjusting positions, while immediacy indicates the time required to complete a trade (Ali *et al.*, 2017). Following Nguyen *et al.* (2024), we employ bid-ask spread and analyst coverage as alternative proxies for robustness tests.

3.1.1 *Amihud's illiquidity ratio.* Amihud's illiquidity (Illiq) is the average ratio of absolute stock return of firm *i* on day *d* of year *t* (Amihud, 2002). Higher values indicate reduced stock liquidity (Kalak *et al.*, 2017).

$$\text{Illiq}_{i,t} = \frac{1}{D_{i,t}} \sum_{d=1}^{D_{i,t}} |r_{i,d,t}| / V_{i,d,t}$$

Where:

$r_{i,d,t}$ = Absolute return on firm *i* on day *d* in year *t*

$V_{i,d,t}$ = Daily trading volume of firm *i* on day *d* in year *t*

$D_{i,t}$ = Number of trading days for firm *i* in year *t*

The price impact aspect reflects the primary effects of asymmetric information (Kyle, 1985; Easley *et al.*, 1987) and reflects a reliable measure of depth and resilience (Roşu, 2009; Karolyi *et al.*, 2012).

3.1.2 *Zero return ratio.* The zero return ratio (Return_zero) (Lesmond *et al.* (1999) measures the tightness aspect of stock liquidity (Ali *et al.*, 2017) and is determined by dividing the days with zero return by the total trading days. Higher ratios indicate poorer stock liquidity (Chai *et al.*, 2010).

$$\text{Return_zero}_{i,t} = \text{Zero return}_{i,t} / \text{Trading day}_{i,t}$$

Where:

Return_zero $_{i,t}$ = Number of zero return days for firm *i* in year *t*

Trading day $_{i,t}$ = Number of trading days for firm *i* in year *t*

The Zero return ratio positively associates with spread measures related to the costs of market position changes (Lesmond *et al.*, 1999; Chai *et al.*, 2010).

3.1.3 *Stock turnover ratio.* The Stock turnover ratio (TO) reflects stock changing hands frequency (Ibbotson *et al.*, 2013; Lagos and Zhang, 2020), calculated as total trading volume divided by outstanding shares (Prommin *et al.*, 2016; Kalak *et al.*, 2017; Gjerde *et al.*, 2013; Chai *et al.*, 2010), with higher ratios indicating more frequent trading and greater stock liquidity (Prommin *et al.*, 2016; Kalak *et al.*, 2017).

$$\text{TO}_{i,t} = \text{Volume}_{i,t} / \text{stock}_{i,t}$$

Where:

Volume $_{i,t}$ = The number of trading shares for firm *i* in year *t*

Stock $_{i,t}$ = The number of outstanding shares for firm *i* in year *t*

3.2 Explanatory variables – female environmental committee members and interlocking memberships

Female environmental committee membership is the number of female committee members and, separately, a female committee chair. An interlocked committee member is a committee member serving on the board of another of Australia's 2,000+ listed companies (Shropshire, 2010). Total interlocking memberships equal the sum of interlocked male and female members on the environmental committee (Barzuza and Curtis, 2014; Larcker *et al.*, 2013; O'Hagan,

2017), indicating a company's broader network and access to external resources (Larcker et al., 2013). Following O'Hagan (2017), female interlocking memberships refer to those held by female environmental committee members.

3.3 Control variables

3.3.1 Determinants of effective audit committees. Effective environmental committees, like audit committees for financial reporting, enhance ESG reporting quality through recommendations regarding ESG strategies (García-Sánchez et al., 2019), improving ESG practices and performance (Hussain et al., 2018; Orazalin, 2020). Eberhardt-Toth (2017) found that effective environmental committees boost performance in social and environmental activities. Companies with effective environmental committees tend to disclose more ESG information (Cucari et al. (2018), reducing information asymmetry, enhancing the monitoring function (Eberhardt-Toth, 2017) and improving stock liquidity.

Eberhardt-Toth (2017) identifies determinants of effective environmental committees, including independence for critical perspectives. José-Luis et al. (2018) find that environmental committees are more effective with independent rather than executive members. Owusu et al. (2025) also show that older environmental committee members, who tend to be more independent, provide valuable expertise for solving ESG issues. The size and diligence of audit committees are positively associated with ESG information disclosure, as larger audit committees can monitor financial reports more effectively, and diligence is essential for their function (Appuhami, 2018).

3.3.2 Determinants of effective environmental committees. The environmental committee's effectiveness is measured by its size (ESG Size), number of meetings (ESG Meetings), meetings attendance (ESG Attendance), independent member proportion (ESG Independence), average age (ESG Average Age), and board chair presence (ESG Board Chair).

Other control variables include financial reporting quality measured through discretionary accruals (Kothari et al., 2005) and BIG4 audit engagement, both of which enhance stock liquidity by lowering capital costs due to reduced information asymmetry (Lambert et al., 2007; Florou and Pope, 2012; Desender et al., 2020; Suharsono et al., 2020). Firm-level controls include financial leverage, market capitalisation, profitability, firm age, dividend payments, and adoption of the Global Reporting Initiative (GRI) framework. Market-level controls encompass stock price, return volatility, and the market-to-book ratio. We also use industry and year fixed effects.

A GRI adoption indicator is also included to account for ESG reporting quality within Australia's voluntary ESG disclosure framework (KPMG, 2020).

3.4 Model specification

Equation (1) presents the model specification where $SL_{i,t}$ includes three proxies (Illiq_{i,t}, Return_zero and TO) added separately.

$$\begin{aligned}
 SL_{i,t} = & \alpha_0 + \beta_1 SL_{i,t-1} + \beta_2 SL_{i,t-2} + \beta_3 \text{Female Environmental committee members}_{i,t} \\
 & + \beta_4 \text{Environmental committee interlocks} + \beta_5 \text{FRQ Controls}_{i,t} \\
 & + \beta_6 \text{Company Controls}_{i,t} + \beta_7 \text{Market Controls}_{i,t} + \delta \text{IND}_i + \phi \text{YR}_i + \varepsilon_{i,t}
 \end{aligned}
 \tag{1}$$

The variables, definitions and measures are summarised in Table 1.

3.4.1 Endogeneity. Following Ali et al. (2017), a system Generalised Method of Moments (System GMM) is employed in this study to address key econometric challenges commonly encountered in corporate governance research, particularly endogeneity arising from omitted variable bias, simultaneity, and dynamic relationships between variables.

Table 1. Variable definitions

Notation	Variable name	Measure
<i>Panel A: dependent variables-stock liquidity dimensions (considered separately)</i>		
<i>Depth and resilience dimensions</i>		
Illiq	Amihud's illiquidity ratio	Average ratio of absolute stock return to Australian dollars transaction volume (higher ratio indicates lower stock liquidity)
<i>Tightness dimension</i>		
Return_zero	Zero return ratio	Ratio of zero return days to total trading days per year (higher ratio indicates lower stock liquidity)
<i>Immediacy dimension</i>		
TO	Stock turnover ratio	Shares traded divided by shares outstanding (higher ratio indicates higher stock liquidity)
<i>Robustness test variables</i>		
Bid-ask spread	Time-weighted quoted bid-ask spread	The daily average of the ratio between the time-weighted bid-ask spread and the time-weighted midpoint spread
AnC	Stock coverage by analysts	Analyst number following the company
<i>Panel B: variables of interest</i>		
ESG female	Environmental committee female	Number of female members on the environmental committee
ESG male	Environmental committee male	Number of male members on the environmental committee
ESG female chair	Environmental committee female chair	A dummy variable indicating a female environmental committee chair, where 1 indicates presence, otherwise 0
ESG interlocking	ESG interlock memberships	Environmental committee interlocking members with board members of all other ASX-listed companies in that year
ESG female interlocking	ESG female interlocks	Number of female interlocking environmental committee members with board members of all other ASX-listed companies in that year
ESG male interlocking	ESG male interlocks	Number of male interlocking environmental committee members with board members of all other ASX-listed companies in that year
<i>Panel C: control variables</i>		
<i>Environmental committee effectiveness</i>		
ESG size	Environmental committee size	Number of environmental committee members
ESG independence	Environmental committee independence	Proportion of non-executive members on environmental committee
ESG meetings	Environmental committee meetings	Number of environmental committee meetings held
ESG attendance	Environmental committee attendance	Proportion of environmental committee meetings attended
ESG average age	Environmental committee average age	Average age of environmental committee members
ESG board chair	Environmental committee board chair	A dummy variable indicating board chair membership of the environmental committee, where 1 indicates presence, 0 otherwise
<i>Financial reporting quality</i>		
DA	Discretionary accruals	Residuals $\epsilon_{i,t}$ (Kothari <i>et al.</i> , 2005) estimated for firm i in year t
<i>Audit committee effectiveness</i>		
AudComSize	Audit committee size	Number of audit committee members

(continued)

Table 1. Continued

Notation	Variable name	Measure
AudComInd	Audit committee independence	Percentage of non-executive audit committee members
AudComExp	Audit committee expert	Percentage of audit committee members holding accounting or finance qualifications(e.g. CPA, CA)
AudComMeet	Audit committee meetings	Number of audit committee meetings
AudComAttend	Audit committee attendance	Average percentage attendance of audit committee members
BIG4Aud	Big 4 audit firm	A dummy variable indicating audit quality, 1 if Big 4 auditor, 0 otherwise
<i>Company characteristics</i>		
MktCap	Market capitalisation	Financial year-end market capitalisation (AUD)
Institutional investors	Institutional investors	Institutional investor share holdings as %
LEV	Company leverage	Total debt scaled by total assets
ROA	Return on assets	Net profit scaled by total assets
AGE	Company age	Duration of firm's listing in years
DPS	Dividend per share	Dividends divided by shares outstanding
GRI	GRI guidelines	Indicator = 1 if company's ESG report follows GRI guidelines, otherwise 0
<i>Stock characteristics</i>		
PRICE	Share price	Share price at financial year-end
Trading volume	Trading volume	Number of shares traded in a year
R_Vol	Return volatility	Standard deviation of daily stock returns
MTB	Market-to-book ratio	Market value scaled by book value
Source(s): Authors' own work		

Given the likely reverse causality between Environmental committee characteristics and stock liquidity, traditional panel estimation techniques would yield biased results. System GMM, improves estimation efficiency by combining moment conditions from equations in first differences and levels, making it especially suitable for panels with a short time dimension and a large cross-sectional sample (Arellano and Bover, 1995; Blundell and Bond, 1998).

Therefore, we use a two-step system GMM with lagged dependent variables. The consistency of the GMM estimation relies on the absence of second-order serial correlation in the residuals (AR(2)) and the validity of instruments, assessed using the Hansen J-statistic. While AR(1) is expected due to differencing, AR(2) should not be present. The Hansen test evaluates whether the instruments are exogenous. As highlighted by Ali *et al.* (2017), compared to 2SLS, system GMM utilises internally generated instruments rather than external instruments, and it models the dynamic nature of the relationship by including lagged dependent variables.

3.4.2 Introductory analyses. We analyse how the variables of interest influence stock price (PRICE), trading volume, and financial performance (ROA) as dependent variables to verify that environmental committee member gender diversity enhances firm value and attracts investor attention (Zhang *et al.*, 2013), validating significant relationships with each variable and providing a foundation to test the impact of environmental committee gender diversity on stock liquidity, given that our stock liquidity measures incorporate both price and volume data [2].

3.5 The sample

The sample consists of S&P ASX 300 companies with environmental or similarly purposed committees in any year from 2009 to 2018. In March 2018, these companies accounted for 89% of ASX market capitalisation. The sample is truncated in 2018 to ensure that the analysis

reflects normal market conditions, free from the distortions caused by the COVID-19 pandemic. By late 2019, the onset of the pandemic introduced unprecedented volatility and structural shifts in financial markets (Uddin *et al.*, 2021), affecting stock prices in ways unrelated to the fundamental drivers examined in this study. Truncating the sample before these disruptions ensures that the findings are not confounded by extraordinary, exogenous shocks, thereby preserving the validity and reliability of the results. The final sample includes 590 company-year observations and 104 unique companies.

Financial reporting and audit information are obtained from the DatAnalysis, ORBIS and Refinitiv [3] Eikon and Boardroom databases, supplemented by annual report information.

4. Results and analysis

4.1 Summary statistics

Table 2 presents summary statistics. Amihud's Illiquidity has a mean of 0.000018, Zero return has a mean of 0.082, and Turnover has a mean of 1.069. Amihud's Illiquidity has a lower

Table 2. Summary statistics

Variable	Mean	Median	Min	Max	SD
Amihud's illiquidity	0.000018	0.000001	0.000000	0.000935	0.000070
Zero return	0.082	0.060	0.000	0.579	0.080
Turnover	1.069	0.906	0.017	14.546	0.891
ESG size	3.919	4.000	1.000	10.000	1.349
ESG independence	0.879	1.000	0.000	1.000	0.183
ESG meetings	3.649	4.000	0.000	10.000	1.310
ESG attendance	0.961	1.000	0.000	1.000	0.089
ESG average age	60.624	60.938	43.000	76.000	5.047
ESG board chair	0.354	0.000	0.000	1.000	
ESG female	0.839	1.000	0.000	3.000	0.775
ESG male	3.167	3.000	0.000	8.000	1.330
ESG female chair	0.219	0.000	0.000	1.000	
ESG interlocking	2.408	2.000	0.000	7.000	1.404
ESG female interlocking	0.583	0.000	0.000	3.000	0.687
ESG male interlocking	1.931	2.000	0.000	6.000	1.219
DA	-0.047	0.004	-44.388	42.301	3.413
AC Size	3.947	4.000	2.000	9.000	1.039
AudComInd	0.986	1.000	0.667	1.000	0.058
AudComExp	0.943	1.000	0.000	1.000	0.154
AudComMeet	4.825	4.000	0.000	14.000	1.710
AudComAttend	0.967	1.000	0.563	1.000	0.064
BIG4AUD	0.971	1.000	0.000	1.000	
MktCap (\$M)	9700.000	2800.000	52.100	233000.000	27900.000
Institutional investors	0.676	0.753	0.007	1.000	0.297
LEV	0.444	0.435	0.007	0.994	0.187
ROA	0.036	0.054	-1.663	0.294	0.151
AGE	21.125	18.000	0.000	45.000	13.014
DPS	26.464	13.000	0.000	760.430	49.229
GRI guidelines	0.514	1.000	0.000	1.000	
PRICE	7.665	3.845	0.030	85.470	11.323
R_Vol	0.017	0.014	0.006	0.074	0.010
MTB	2.173	1.400	0.160	211.100	8.874

Note(s): Table 2 presents descriptive statistics. Table 1 reports the definitions and measures of variables. Amihud's Illiquidity is reported to 6 decimal places. The sample size is reduced for the system GMM regressions due to lagged measures of the dependent variable. ($N = 590$ company-years (104 unique companies) with environmental committees)

Source(s): Authors' own work

standard deviation, while Zero return, and Turnover have relatively higher standard deviations, indicating different performance across different dimensions of stock liquidity. There is high variation in environmental committee size, frequency of meetings and members' average age. On average, environmental committee size is 3.9 members, with 88% independent. Meetings occur close to four times annually, with attendance of 96%. Member age averages 60.6 years, and the board chair is a committee member for 35% of environmental committees. Close to 80% have female chairs and interlocks are almost 2.5 per member, with female interlocking just over 0.5 per member. The average value of discretionary accruals is -0.047 . Audit committees average 4 members, 98.6% of whom are independent and 94% of whom have financial expertise. Big 4 accounting firms audit 97% of companies. On average, market capitalisation is AUD9,700M with a large range, with institutional shareholders holding 67.6% of shares, leverage is 0.444, return on assets 3.6%, company age 21 years, dividends per share 26.5 cents and GRI adoption 51.4%, stock market price is AUD7.665, returns volatility is 0.017 and market-to-book is 2.173.

The correlation matrix between dependent, explanatory, and control variables is presented in [Table 3](#). No correlation is over 0.7, and preliminary testing reveals no variance inflation factor is over 2.2, implying that multicollinearity is not at a concerning level.

4.2 Environmental committee female membership and stock liquidity

Columns (1)–(3) of [Table 4](#) report the system-GMM results for female environmental committee membership. Models for each of the three dependent stock liquidity variables meet the Arellano-Bond test for AR (2) and Hansen test criteria.

Column (1) of [Table 4](#) shows a statistically significant negative coefficient for female members for Amihud's Illiquidity at 5%, suggesting a positive influence on environmental committee effectiveness, improving the depth and resilience aspects of stock liquidity (lower values indicate higher stock liquidity and vice versa). The coefficient for female members is significantly negative for Zero return at 1% in column (2) and weakly significantly positive for Turnover at 10% in column (3), suggesting that female environmental committee membership is positively related to stock liquidity's tightness and immediacy dimensions.

The coefficient for male membership is significantly negative at 5% in column (1). Column (2) in [Table 5](#) shows a significantly negative coefficient for male membership for Zero return at 1%. These results suggest that male membership is positively associated with depth, resilience and tightness aspects of stock liquidity. However, the coefficient for males for stock Turnover in column (3) is not significant, suggesting that male membership is unrelated to the immediacy dimension of stock liquidity.

In terms of economic significance, a one standard deviation increase in female members (0.775) improves the depth and resilience aspects of stock liquidity (Illiquidity ratio) by 0.311 or 40.1% (0.311/0.775). However, a one standard deviation increase in male members (1.330) improves stock liquidity by 0.298 or 22.42% (0.298/1.330). Hence, the economic significance of females in enhancing stock liquidity is almost double that of males.

Similarly, for the immediacy dimension (Turnover ratio), a one standard deviation increase in the number of females (0.775) improves stock liquidity on average by 0.101 or 13.01% (0.101/0.775), while a one standard deviation increase in the number of males (1.330) increases stock liquidity only by 0.031, an improvement of 2.32% (0.031/1.330). This outcome means that female members are about six times more likely to improve stock liquidity than males. Various control variables are also significant at various levels in [Table 4](#), but for brevity, these significances are not detailed in the narrative.

4.3 The presence of a female chair on the environmental committee and stock liquidity

Columns (1)–(3) of [Table 5](#) report the system-GMM results for the female chair of the environmental committee variable. The models meet the Arellano-Bond test for AR (2) and Hansen test. Column (1) in [Table 5](#) shows a significant negative coefficient for female chair for

Table 3. Pearson's correlation matrix ($N = 590$)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	
(2)	0.14*	1.00																		
(3)	0.15*	0.12*	1.00																	
(4)	-0.07	0.01	0.04	1.00																
(5)	0.11*	0.28*	0.05	0.06	1.00															
(6)	0.30*	-0.04	-0.10*	-0.05	0.03	1.00														
(7)	-0.13*	0.11*	0.07	-0.01	-0.08	-0.04	1.00													
(8)	0.33*	0.20*	0.12*	0.00	-0.10*	-0.17*	0.42*	1.00												
(9)	0.84*	0.02	0.09*	-0.07	0.18*	0.41*	-0.38*	-0.24*	1.00											
(10)	0.65*	0.15*	0.20*	-0.05	0.01	0.29*	-0.05	0.25*	0.52*	1.00										
(11)	0.28*	0.18*	0.10*	0.00	-0.04	-0.12*	0.37*	0.78*	-0.17*	0.48*	1.00									
(12)	0.58*	0.07	0.18*	-0.05	0.04	0.40*	-0.26*	-0.15*	0.69*	0.87*	-0.02	1.00								
(13)	-0.05	0.04	0.02	0.01	-0.02	-0.05	0.00	0.00	-0.04	-0.04	0.00	-0.05	1.00							
(14)	0.33*	0.07	0.21*	-0.06	0.05	0.08	0.02	0.23*	0.20*	0.28*	0.20*	0.21*	-0.09*	1.00						
(15)	0.03	-0.04	-0.02	0.09*	-0.06	0.06	-0.02	-0.09*	0.08	0.04	-0.05	0.08	0.07	-0.04	1.00					
(16)	0.07	0.06	0.19*	0.04	-0.02	0.01	0.06	0.12*	0.00	0.13*	0.09*	0.09*	0.00	0.00	0.03	1.00				
(17)	0.09*	0.20*	0.39*	0.02	0.07	-0.03	0.00	0.10*	0.02	0.01	0.02	0.01	0.15*	0.00	0.10*	1.00				
(18)	-0.01	0.11*	0.04	0.23*	0.08	-0.01	0.09*	0.13*	-0.08	0.02	0.11*	-0.04	-0.03	-0.03	-0.05	0.05	0.07	1.00		
(19)	-0.07	0.08	-0.01	-0.01	0.00	-0.15*	0.06	0.04	-0.09*	-0.05	0.08	-0.10*	0.00	-0.05	-0.05	-0.02	0.10*	0.07	1.00	
(20)	0.08	0.13*	0.33*	0.09	0.13*	-0.14*	-0.04	-0.02	0.09*	-0.10*	-0.11*	-0.05	-0.03	0.20*	0.03	0.09*	0.42*	0.06	0.05	1.00
(21)	0.00	-0.03	0.07	0.05	0.11*	-0.11*	-0.05	0.02	-0.01	-0.10*	-0.10*	-0.06	-0.01	0.40*	0.03	0.07	0.14*	0.07	0.04	0.04
(22)	-0.19*	-0.18*	-0.19*	-0.06	-0.15*	0.11*	-0.18*	-0.26*	-0.04	-0.10*	-0.19*	-0.01	0.01	-0.19*	0.07	-0.06	-0.13*	-0.11*	-0.21*	-0.21*
(23)	0.04	0.14*	0.11*	0.16*	0.06	-0.02	0.08	0.21*	-0.08	0.22*	0.27*	0.10*	-0.01	0.09*	0.02	0.09*	0.05	0.09	0.08	0.08
(24)	0.08	0.01	0.15*	-0.02	-0.08	-0.03	0.08	0.21*	-0.04	0.10*	0.07	0.08	-0.01	0.19*	0.01	0.19*	0.09*	0.07	0.17*	0.17*
(25)	0.04	0.05	0.08	0.11*	0.01	0.02	0.09*	0.10*	-0.02	0.00	0.05	-0.03	-0.01	0.07*	-0.09*	0.03	0.11*	0.08	0.12*	0.12*
(26)	0.12*	0.15*	0.22*	0.02	0.13*	-0.13*	0.00	0.10*	0.06	0.12*	0.13*	0.06	-0.06	0.25*	-0.07	0.06	0.10*	0.12*	0.05	0.05
(27)	0.14*	0.16*	0.26*	0.07	0.12*	-0.15*	0.08	0.10*	0.09*	-0.05	-0.05	-0.03	-0.05	0.23*	0.00	0.05	0.21*	0.12*	0.04	0.04
(28)	0.18*	0.20*	0.32*	0.07	0.20*	-0.17*	0.00	0.06	0.16*	-0.04	-0.08	-0.01	-0.09*	0.26*	0.00	0.12*	0.25*	0.11*	0.05	0.05
(29)	-0.11*	-0.15*	-0.17*	0.01	-0.06	0.06	-0.29*	-0.29*	0.05	-0.03	-0.15*	0.05	0.12*	-0.14*	0.05	-0.02	-0.05	-0.17*	-0.11*	-0.11*
(30)	-0.02	-0.04	0.01	0.02	-0.04	-0.03	-0.01	0.08	-0.07	-0.08*	0.01	-0.09*	-0.01	-0.06	0.01	0.02	-0.03	0.03	0.02	0.02
(31)	0.07	0.00	-0.04	-0.04	-0.03	-0.02	0.03	0.01	0.06	0.03	-0.01	0.04	0.05	0.00	0.02	0.06	-0.03	-0.03	0.05	0.05

	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)
(20)	1.00									
(21)	0.11*	1.00								
(22)	0.09*	-0.03	1.00							

(continued)

Table 3. Continued

	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)
(23)	0.14*	0.02	0.08	1.00						
(24)	0.34*	0.02	0.17*	0.10*	1.00					
(25)	0.57*	-0.05	0.16*	0.15*	0.42*	1.00				
(26)	0.72*	-0.08	0.14*	0.18*	0.47*	0.79*	1.00			
(27)	-0.20*	-0.01	-0.18*	-0.29*	-0.26*	-0.28*	-0.30*	1.00		
(28)	0.03	0.02	0.19*	0.04	-0.02	0.03	0.03	-0.08	1.00	
(29)	-0.03	-0.09	0.03	0.03	0.00	0.01	0.00	-0.02	-0.02	1.00

Note(s): This table presents the Pearson's correlations for the independent variables (1): ESG Size; (2): ESG Independence; (3): ESG Meeting; (4): ESG Attendance; (5): ESG Average Age; (6): ESG Board Chair; (7): ESG Female Chair; (8): ESG Female; (9): ESG Male; (10): ESG Interlock; (11): ESG Interlocking Female; (12): ESG Interlocking Female; (13): Discretionary Accrual; (14): AudComSize; (15): AudComInd; (16): AudComExp; (17): AudComMeet; (18): AudComAttend; (19): BIG4AUD; (20): MktCap; (21): Institutional Investors; (22) Leverage; (23): ROA; (24): AGE; (25): DPS; (26): PRICE; (27): R_Vol; (28): MTB; (29) GRI Guidelines. Asterisks show significance levels at 5%
Source(s): Authors' own work

Table 4. The number of environmental committee female members and stock liquidity

Dependent variables	(1) Model 1 L_ILLiquidity	(2) Model 2 SR_Zero_return	(3) Model 3 L_Turnover
L1	0.306* [0.123]	0.215*** [0.027]	0.186*** [0.053]
L2	0.134 [0.099]	-0.085** [0.029]	-0.189*** [0.035]
<i>ESG female</i>	-0.222*** [0.078]	-0.014*** [0.003]	0.132* [0.056]
<i>ESG male</i>	-0.139** [0.053]	-0.006** [0.002]	0.015 [0.031]
ESG independence	-0.112 [1.163]	0.020 [0.013]	-0.419* [0.192]
ESG meetings	-0.168 [0.121]	-0.002 [0.001]	0.149*** [0.038]
ESG attendance	-7.985*** [2.272]	-0.022 [0.014]	0.723* [0.293]
ESG average age	-0.062* [0.025]	-0.001 [0.001]	0.018 [0.009]
ESG board chair	0.143 [0.161]	0.013*** [0.004]	-0.062 [0.088]
DA	-0.247 [0.778]	0.011 [0.027]	-0.805* [0.387]
AudComSize	0.015 [0.069]	-0.005** [0.002]	0.126*** [0.021]
AudComInd	1,176,000 [1.168]	-0.023 [0.038]	-0.405 [0.314]
AudComExp	-0.454 [0.464]	-0.112*** [0.013]	0.258 [0.183]
AudComMeet	0.069 [0.130]	0.003 [0.002]	-0.038 [0.020]
AudComAttend	3.992* [1.606]	0.057* [0.029]	-0.514 [0.354]
BIG4AUD	0.567 [0.295]	-0.013 [0.008]	0.051 [0.116]
MktCap	-0.000 [0.000]	0.000*** [0.000]	-0.000 [0.000]
Institutional investors	-1069,000 [0.709]	0.000 [0.010]	0.204 [0.139]
LEV	-1.970* [0.893]	0.117*** [0.028]	-0.500** [0.178]
ROA	-2.810** [1.058]	-0.156*** [0.014]	0.233 [0.264]
AGE	0.001 [0.016]	-0.002*** [0.001]	0.000 [0.002]
DPS	-0.002 [0.003]	0.000 [0.000]	-0.000 [0.001]
GRI guidelines	0.220 [0.263]	-0.006 [0.004]	-0.105*** [0.028]
PRICE	0.021 [0.024]	-0.004*** [0.001]	0.002 [0.006]
RETURN_Vol	99.317*** [9.992]	0.714** [0.262]	17.149** [5.362]
MTB	0.008 [0.004]	-0.000*** [0.000]	-0.001 [0.001]

(continued)

Table 4. Continued

Dependent variables	(1) Model 1 L_Illiquidity	(2) Model 2 SR_Zero_return	(3) Model 3 L_Turnover
N	395	395	395
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Hansen J-statistics	18.637	54.126	32.923
p-value for Hansen test	0.288	0.141	0.239
χ^2	168691.780***	18291.805***	617.098***
AR (1)	-2.518***	-4.353***	-2.869***
AR (2)	0.405	0.924	0.761
No. of instruments	42	71	55

Note(s): This table presents results for the no. of female members on the Environmental committee and stock liquidity. A higher Amihud's Illiquidity in column (1) means lower stock liquidity. The more Zero Return days in column (2) means lower stock liquidity. A higher Stock Turnover ratio in column (3) means more stock liquidity. Variable definitions and measures are in [Table 1](#). Parentheses designate standard errors. ***, ** and * coefficients are significant at 0.1%, 1% and 5% levels, respectively

Source(s): Authors' own work

Amihud's Illiquidity at 1%, suggesting that having a female chair for the environmental committee is positively associated with environmental committee effectiveness and hence improves stock liquidity. At the 5% level, the coefficient for a female chair is negative for Zero Return in column (2). Similarly, the coefficient for female chair is significantly positive for Stock Turnover at 1% in column (3). Control variable significances are not detailed for brevity.

4.4 Interlocking environmental committee members and stock liquidity

[Table 6](#) reports the results for the environmental committee member interlocks. The models for each dependent stock liquidity variable show no significant issues based on the Arellano-Bond test for AR(2) and the Hansen test for overidentifying restrictions. Column (1) shows a weakly significant negative coefficient for ESG interlocking memberships for Amihud's Illiquidity at 10%, suggesting that environmental committees with more interlocking members weakly influence Environmental committee effectiveness and improve stock liquidity. Similarly, at 5%, the interlocking membership coefficient is significantly negative for Zero Return in column (2). Last, the coefficient for interlocking memberships is weakly and significantly positive for Stock Turnover at 10% in column (3). Control variable significances are not detailed for brevity.

4.5 Environmental committee female interlocking memberships and stock liquidity

The results for the environmental committee gendered interlocks are reported in [Table 7](#). Column (1) shows a significant negative coefficient for ESG Female Interlocking for Amihud's Illiquidity at the 1% level, suggesting that ESG Female Interlocking is positively associated with Environmental committee effectiveness and hence improves stock liquidity. At the 5% level, the ESG Female Interlocking coefficient is significantly negative for Zero Return in column (2) and significantly positive for Turnover at the 5% level in column (3). Columns (1) and (2) also show statistically significant negative coefficients for ESG Male Interlocking for Amihud's Illiquidity at the 10% level and Zero return at the 5% level. At the 5% level, ESG Male Interlocking and Stock Turnover are significantly positively associated in column (3). Although ESG Male Interlocking coefficients are lower than those for ESG Female Interlocking, ESG Male Interlocking is also positively associated with Environmental Committee effectiveness and hence improves all dimensions of stock liquidity.

Table 5. The presence of a female chair on the environmental committee and stock liquidity

Dependent variables	(1) Model 1 L_illiquidity	(2) Model 2 SR_Zero_return	(3) Model 3 L_Turnover
L1	0.371*** [0.102]	-0.049 [0.058]	0.305*** [0.037]
L2	0.080 [0.067]	0.020 [0.049]	-0.166*** [0.027]
<i>ESG female chair</i>	-0.445*** [0.152]	-0.008** [0.003]	0.164*** [0.039]
ESG size	-0.088** [0.031]	-0.028*** [0.006]	0.031 [0.022]
ESG independence	0.137 [0.789]	-0.209*** [0.051]	-0.208 [0.162]
ESG meetings	-0.143* [0.063]	-0.002 [0.006]	0.063* [0.027]
ESG attendance	-5.776*** [1.431]	-0.236*** [0.059]	1.464*** [0.240]
ESG average age	-0.081*** [0.015]	-0.002* [0.001]	0.007 [0.004]
ESG board chair	0.201 [0.113]	0.059*** [0.011]	-0.127* [0.052]
DA	0.219 [0.471]	0.199*** [0.050]	-1.224*** [0.219]
AudComSize	0.023 [0.053]	-0.032*** [0.006]	0.094*** [0.018]
AudComInd	0.710 [0.694]	-0.055 [0.053]	-0.664*** [0.179]
AudComExp	-0.945* [0.401]	-0.103 [0.059]	0.245* [0.118]
AudComMeet	-0.003 [0.074]	0.003 [0.003]	-0.002 [0.012]
AudComAttend	3.575*** [0.990]	0.086* [0.043]	-0.428* [0.196]
BIG4AUD	0.582** [0.191]	-0.015 [0.030]	-0.162* [0.076]
MktCap	-0.000 [0.000]	0.000* [0.000]	-0.000* [0.000]
Institutional investors	-0.643 [0.405]	0.011 [0.019]	0.314*** [0.068]
LEV	-1.732** [0.552]	0.025 [0.063]	-0.163 [0.093]
ROA	-3.270*** [0.902]	-0.423*** [0.061]	0.390 [0.249]
AGE	-0.002 [0.009]	-0.001 [0.001]	0.000 [0.002]
DPS	0.000 [0.002]	0.001*** [0.000]	-0.001 [0.000]
GRI guidelines	0.039 [0.063]	0.001 [0.005]	0.001 [0.023]
PRICE	0.002 [0.008]	-0.007*** [0.001]	0.004* [0.002]
RETURN_Vol	96.509*** [11.376]	-2.569*** [0.691]	18.587*** [2.149]
MTB	0.008** [0.003]	-0.000 [0.000]	-0.002* [0.001]

(continued)

Table 5. Continued

Dependent variables	(1) Model 1 L_Illiquidity	(2) Model 2 SR_Zero_return	(3) Model 3 L_Turnover
N	395	395	395
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Hansen J-statistics	22.377	43.106	49.923
p-value for Hansen test	0.718	0.467	0.187
χ^2	16784429.491***	101975.810***	113369.630***
AR (1)	-3.001***	-4.128***	-3.705***
AR (2)	0.371	-1.255	0.509
No. of instruments	53	70	69

Note(s): This table presents results on the presence of a female chair on the Environmental committee and stock liquidity. A higher Amihud’s illiquidity in column (1) means lower stock liquidity. The more zero return days in column (2) means lower stock liquidity. A higher Stock Turnover ratio in column (3) means more stock liquidity. Variable definitions and measures are in Table 1. Parentheses designate standard errors. ***, ** and * coefficients are significant at 0.1%, 1% and 5% levels, respectively

Source(s): Authors’ own work

A one standard deviation (0.687) increase in female interlocking improves stock liquidity (Amihud’s Illiquidity ratio) by 0.311 or 45.24% (0.311/0.687), while a one standard deviation (1.219) increase in male interlocks improves stock liquidity by only 0.291 or 23.86% (0.291/1.219), showing female environmental committee member interlocking is nearly double that of males. For immediacy (Turnover), a one standard deviation increase in interlocking females (0.687) improves stock liquidity by 0.125 or 18.21% (0.125/0.687), whereas males (1.219) only increase it only by 0.066 or 5.44% (0.066/1.219), indicating interlocking female members are about 3.5 times more likely to enhance stock liquidity. These results underscore the importance of female environmental committee members in improving stock liquidity from economic and statistical perspectives. Control variable significances are not detailed for brevity.

5. Robustness analysis

Following Nguyen *et al.* (2024), we test two proxies for stock liquidity: (a) bid-ask spread and (b) analyst coverage.

(1) Bid-Ask Spread

The first is the time-weighted (T.W.) quoted bid-ask spread, derived by averaging the daily ratio of the time-weighted bid-ask spread. Consistent with Ali *et al.* (2016), and Ali *et al.* (2017), this variable measures the tightness dimension of stock liquidity. A higher spread represents lower stock liquidity.

$$\text{T.W. quoted bid – ask spread}_{i,t} = \frac{1}{D_{i,t}} \sum_{d=1}^{D_{i,t}} \frac{\text{T.W. bid – ask spread}_{i,d,t}}{\text{T.W. midpoint spread}_{i,d,t}}$$

Where:

T.W. quoted bid-ask spread $_{i,t}$ = the T.W. bid-ask spread for firm *i* in year *t*

T.W. bid-ask spread [4] $_{i,d,t}$ = the T.W. bid-ask spread for firm *i* on day *d* in year *t*

Table 6. Environmental committee interlocking membership and stock liquidity

Dependent variables	(1) Model 1 L_Illiquidity	(2) Model 2 SR_Zero_return	(3) Model 3 L_Turnover
L1	0.307 [0.184]	0.523 [0.293]	0.114 [0.061]
L2	0.065 [0.155]	-0.190 [0.299]	-0.196*** [0.043]
<i>ESG interlocking</i>	-0.751** [0.252]	-0.023* [0.011]	0.078* [0.038]
ESG independence	-0.990 [3.093]	0.152* [0.066]	-0.553** [0.199]
ESG meetings	-0.405 [0.223]	-0.056*** [0.017]	0.168*** [0.033]
ESG attendance	-13.654** [4.410]	0.230** [0.083]	0.385 [0.301]
ESG average age	-0.056 [0.063]	-0.022*** [0.006]	0.010 [0.010]
ESG board chair	0.726 [0.409]	0.049 [0.035]	-0.141 [0.080]
DA	-1.198 [1.764]	-0.053 [0.115]	-0.661 [0.411]
AudComSize	-0.114 [0.173]	0.022 [0.017]	0.125*** [0.023]
AudComInd	3.155 [2.114]	0.002 [0.130]	-0.442 [0.306]
AudComExp	0.043 [0.834]	-0.114* [0.049]	0.245 [0.179]
AudComMeet	0.457 [0.314]	0.007 [0.011]	-0.041 [0.021]
AudComAttend	3.940 [2.785]	0.059 [0.072]	-0.322 [0.313]
BIG4AUD	-0.639 [0.628]	-0.102 [0.061]	0.096 [0.109]
MktCap	-0.000** [0.000]	0.000 [0.000]	0.000 [0.000]
Institutional investors	1.965 [1.326]	-0.063 [0.074]	0.272* [0.130]
LEV	0.715 [1.937]	0.724*** [0.145]	-0.432* [0.179]
ROA	-2.404 [1.366]	-0.304*** [0.068]	0.127 [0.256]
AGE	0.043 [0.030]	0.012** [0.004]	-0.001 [0.003]
DPS	-0.002 [0.005]	0.000 [0.000]	0.000 [0.001]
GRI guidelines	-0.081 [0.167]	-0.003 [0.010]	-0.038 [0.037]
PRICE	0.043 [0.042]	-0.018** [0.006]	0.003 [0.006]
RETURN_Vol	93.523*** [25.977]	-0.813 [1.536]	20.213*** [5.757]
MTB	-0.003 [0.007]	-0.001** [0.000]	-0.001 [0.001]
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes

(continued)

Table 6. Continued

Dependent variables	(1) Model 1 L_Illiquidity	(2) Model 2 SR_Zero_return	(3) Model 3 L_Turnover
N	395	395	395
Hansen J-statistics	7.628	14.409	34.806
p-value for Hansen test	0.867	0.155	0.116
χ^2	48079.770***	110.025***	456.448***
AR (1)	-2.174***	-2.321***	-1.900***
AR (2)	-1.468	-0.120	0.517
No. of instruments	38	36	52

Note(s): This table presents results for Environmental committee interlocking membership and stock liquidity. A higher Amihud's Illiquidity in column (1) means lower stock liquidity. The more zero return days in column (2) means lower stock liquidity. A higher Stock Turnover ratio in column (3) means more stock liquidity. Variable definitions and measures are in Table 1. Parentheses designate standard errors. ***, ** and * are significant at 1%, 5% and 10% levels, respectively

Source(s): Authors' own work

T.W. midpoint spread [5] i,d,t = the T.W. midpoint price for firm i on day d in year t

$D_{i,t}$ = the number of trading days for firm i in year t .

(2) Analyst coverage

We also consider the number of analysts covering a company as a proxy for information asymmetry in relation to stock liquidity (Cui *et al.*, 2016; Fernando *et al.*, 2018) and expect a positive relationship consistent with Chen *et al.* (2015) and Dang *et al.* (2019).

Columns (1) and (2) in Table 8 summarise the results for the three main models using the two robustness test measures of stock liquidity as the dependent variables. The results are consistent with the main results.

6. Conclusion

Our study tests the influence of environmental committee gender diversity and board interlocking on stock liquidity, which is proxied using Amihud's Illiquidity, Zero Return and Stock Turnover. Two-step system GMM models report robust results consistent with the hypotheses. Analysing S&P ASX300 companies with environmental committees from 2009–2018, we find that committee size, independence, meeting frequency, attendance, and age are positively associated with committee effectiveness and hence improve stock liquidity; however, board chair committee membership negatively impacts stock liquidity. The number of female members and a female chair positively impact stock liquidity, and female members are more economically significant than males in improving the depth and resilience of stock liquidity aspects. These results imply that more interlocking members, regardless of gender, positively impacts stock liquidity, a finding new to the literature to our best knowledge. Separate gendered interlocking testing reveals that female interlocks are more economically significant than male interlocks in improving stock liquidity's depth, resilience and immediacy aspects. These results provide further support for calls (e.g. Khaw and Liao, 2018) concerning the role of females in improving corporate attention to ESG issues.

These results contribute to the debate on the need for more females on environmental committees to improve capital market efficiency via stock liquidity. Overall, the findings explain how environmental committee determinants of stock liquidity can assist with

Table 7. The number of interlocking female and interlocking male members and stock liquidity

Dependent variables	(1) Model 1 L_Illiquidity	(2) Model 2 SR_Zero_return	(3) Model 3 L_Turnover
L1	0.275 [0.164]	0.732** [0.241]	0.115 [0.061]
L2	0.149 [0.116]	-0.273 [0.294]	-0.190*** [0.043]
<i>ESG female interlocking</i>	-0.318** [0.116]	-0.045* [0.018]	0.079* [0.038]
<i>ESG male interlocking</i>	-0.285 [0.171]	-0.024* [0.011]	0.143* [0.056]
ESG independence	-0.078 [1.871]	0.149* [0.064]	-0.550** [0.202]
ESG meetings	-0.257 [0.142]	-0.024*** [0.006]	0.157*** [0.032]
ESG attendance	-9.998** [3.095]	0.126* [0.055]	0.167 [0.325]
ESG average age	-0.068 [0.037]	-0.022*** [0.005]	0.012 [0.009]
ESG board chair	0.233 [0.228]	0.050 [0.027]	-0.203* [0.082]
DA	-0.676 [1.111]	-0.034 [0.102]	-0.625 [0.436]
AudComSize	0.018 [0.096]	0.014 [0.015]	0.113*** [0.026]
AudComInd	1.680 [1.459]	-0.043 [0.120]	-0.448 [0.309]
AudComExp	-0.204 [0.707]	-0.147** [0.047]	0.174 [0.179]
AudComMeet	0.152 [0.173]	-0.006 [0.008]	-0.041 [0.022]
AudComAttend	4.573* [1.873]	0.056 [0.061]	-0.268 [0.306]
BIG4AUD	0.151 [0.373]	-0.104* [0.053]	0.136 [0.099]
MC	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]
Institutional investors	0.126 [0.858]	-0.044 [0.065]	0.235 [0.128]
LEV	-1.017 [1.027]	0.662*** [0.134]	-0.457* [0.183]
ROA	-2.804* [1.161]	-0.295*** [0.069]	0.171 [0.281]
AGE	0.000 [0.023]	0.011** [0.004]	-0.002 [0.003]
DPS	-0.001 [0.003]	0.000 [0.000]	0.000 [0.001]
GRI guidelines	-0.082 [0.104]	-0.002 [0.010]	-0.042 [0.042]
PRICE	0.018 [0.027]	-0.014** [0.005]	0.003 [0.006]
RETURN_Vol	95.873*** [14.833]	-0.758 [1.330]	19.516*** [5.772]
MTB	0.002 [0.005]	-0.002*** [0.000]	-0.001 [0.001]

(continued)

Table 7. Continued

Dependent variables	(1) Model 1 L_Illiquidity	(2) Model 2 SR_Zero_return	(3) Model 3 L_Turnover
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
N	395	395	395
Hansen J-statistics	14.917	18.479	35.563
p-value for Hansen test	0.384	0.140	0.125
χ^2	149278.720***	173.550***	572.632***
AR (1)	-2.131***	-2.066***	-1.782***
AR (2)	-0.484	0.220	0.231
No. of instruments	40	40	54

Note(s): This table presents results of the number of interlocking female and interlocking male members and stock liquidity. A higher Amihud's Illiquidity in column (1) means lower stock liquidity. The more Zero Return days in column (2) means lower stock liquidity. A higher Stock Turnover ratio in column (3) means more stock liquidity. Variable definitions and measures are in Table 1. Parentheses designate standard errors. ***, ** and * are significant at 0.1%, 1% and 5% levels, respectively

Source(s): Authors' own work

Table 8. Robustness tests – alternative proxies for stock liquidity

Hypothesis	Variables of interest	Spread	AnC
H1	ESG female	-0.001*	1.285**
	ESG male	-0.001***	2.555***
H2	ESG female chair	-0.005*	0.831***
H3	ESG interlocking	-0.002***	1.383***
H4	ESG female interlocking	-0.001***	1.487*
	ESG male interlocking	-0.002***	2.924***
	All other controls	Yes	Yes
	Year FE	Yes	Yes
	Industry FE	Yes	Yes

Note(s): This table presents the results of robustness tests using alternative proxies for stock liquidity. The *Spread* represents the time-weighted (T.W.) quoted bid-ask spread, computed as the average daily ratio of the T.W. bid-ask spread, where higher values indicate lower stock liquidity and vice versa. *AnC* denotes the number of analysts covering the company. Definitions and measurement details for other variables can be found in Table 1. Significance levels are indicated as follows: ***, ** and * represent 0.1%, 1% and 5%, respectively

Source(s): Authors' own work

governance mechanisms that influence stock liquidity positively. More gender-diverse environmental committees are related to a more efficient capital market through the stock liquidity channel, highlighting the need for more females on such committees.

Notes

1. The term environmental committee is used throughout to represent similarly named committees such as CSR committee, ESG committee, sustainability committee, etc.
2. These results are not included in this paper due to space constraints but are available upon request.
3. Now LSEG.

$$4. \text{ T.W. bid-ask spread}_{i,t} = \frac{(Ask - Bid) \times Time_1 + (Ask - Bid) \times Time_2 + \dots + (Ask - Bid) \times Time_n}{Time_1 + Time_2 + \dots + Time_n}$$

$$5. \text{ T.W. midpoint spread}_{i,t} = \frac{\frac{(Ask+Bid)}{2} \times Time_1 + \frac{(Ask+Bid)}{2} \times Time_2 + \dots + \frac{(Ask+Bid)}{2} \times Time_n}{Time_1 + Time_2 + \dots + Time_n}$$

References

- AICD (2015), *Recent Research Focuses on Business Case for Gender Diversity on Boards*, Australian Institute of Company Directors.
- AICD (2020), *Gender Diversity Progress Report*, Australian Institute of Company Directors.
- Al-Dah, B. (2019), "Director interlocks and the strategic pacing of CSR activities", *Management Decision*, Vol. 57 No. 10, pp. 2782-2798, doi: [10.1108/md-11-2017-1103](https://doi.org/10.1108/md-11-2017-1103).
- Al-Shaer, H., Kuzey, C., Uyar, A., Karaman, A.S. and Hasnaoui, A. (2025), "Risky firms, ESG and firm value: do women undertake a particular role?", *Journal of Accounting Literature*, Vol. ahead-of-print No. ahead-of-print, doi: [10.1108/jal-04-2024-0065](https://doi.org/10.1108/jal-04-2024-0065).
- Alexander, M. (2003), "Boardroom networks among Australian company directors, 1976 and 1996: the impact of investor capitalism", *Journal of Sociology*, Vol. 39 No. 3, pp. 231-251, doi: [10.1177/00048690030393002](https://doi.org/10.1177/00048690030393002).
- Ali, S., Liu, B. and Su, J.J. (2016), "What determines stock liquidity in Australia?", *Applied Economics*, Vol. 48 No. 35, pp. 3329-3344, doi: [10.1080/00036846.2015.1137552](https://doi.org/10.1080/00036846.2015.1137552).
- Ali, S., Liu, B. and Su, J.J. (2017), "Corporate governance and stock liquidity dimensions: panel evidence from pure order-driven Australian market", *International Review of Economics and Finance*, Vol. 50, pp. 275-304, doi: [10.1016/j.iref.2017.03.005](https://doi.org/10.1016/j.iref.2017.03.005).
- Amama, S., Yan, Q. and Grzegorz, T. (2016), "Board attributes, corporate social responsibility strategy, and corporate environmental and social performance", *Journal of Business Ethics*, Vol. 135 No. 3, pp. 569-585, doi: [10.1007/s10551-014-2460-9](https://doi.org/10.1007/s10551-014-2460-9).
- Amihud, Y. (2002), "Illiquidity and stock returns: cross-section and time-series effects", *Journal of Financial Markets*, Vol. 5 No. 1, pp. 31-56, doi: [10.1016/s1386-4181\(01\)00024-6](https://doi.org/10.1016/s1386-4181(01)00024-6).
- Appuhami, R. (2018), "The signalling role of audit committee characteristics and the cost of equity capital", *Pacific Accounting Review*, Vol. 30 No. 3, pp. 387-406, doi: [10.1108/par-12-2016-0120](https://doi.org/10.1108/par-12-2016-0120).
- Arellano, M. and Bover, O. (1995), "Another look at the instrumental variable estimation of error-components models", *Journal of Econometrics*, Vol. 68 No. 1, pp. 29-51, doi: [10.1016/0304-4076\(94\)01642-d](https://doi.org/10.1016/0304-4076(94)01642-d).
- Barney, J. (1991), "Firm resources and sustained competitive advantage", *Journal of Management*, Vol. 17 No. 1, pp. 99-120, doi: [10.1177/014920639101700108](https://doi.org/10.1177/014920639101700108).
- Barzuza, M. and Curtis, Q. (2014), "Board interlocks and corporate governance", *Delaware Journal of Corporate Law*, Vol. 39, pp. 669-701.
- Bennouri, M., Chtioui, T., Nagati, H. and Nekhili, M. (2018), "Female board directorship and firm performance: what really matters?", *Journal of Banking and Finance*, Vol. 88, pp. 267-291, doi: [10.1016/j.jbankfin.2017.12.010](https://doi.org/10.1016/j.jbankfin.2017.12.010).
- Biswas, P.K., Mansi, M. and Pandey, R. (2018), "Board composition, sustainability committee and corporate social and environmental performance in Australia", *Pacific Accounting Review*, Vol. 30 No. 4, pp. 517-540, doi: [10.1108/par-12-2017-0107](https://doi.org/10.1108/par-12-2017-0107).
- Blundell, R. and Bond, S. (1998), "Initial conditions and moment restrictions in dynamic panel data models", *Journal of Econometrics*, Vol. 87 No. 1, pp. 115-143, doi: [10.1016/s0304-4076\(98\)00009-8](https://doi.org/10.1016/s0304-4076(98)00009-8).
- Boyd, B. (1990), "Corporate linkages and organizational environment: a test of the resource dependence model", *Strategic Management Journal*, Vol. 11 No. 6, pp. 419-430, doi: [10.1002/smj.4250110602](https://doi.org/10.1002/smj.4250110602).
- Brammer, S., Millington, A. and Pavelin, S. (2007), "Gender and ethnic diversity among UK corporate boards", *Corporate Governance: An International Review*, Vol. 15 No. 2, pp. 393-403, doi: [10.1111/j.1467-8683.2007.00569.x](https://doi.org/10.1111/j.1467-8683.2007.00569.x).
- Branco, M. and Rodrigues, L. (2006), "Communication of corporate social responsibility by Portuguese banks", *Corporate Communications: An International Journal*, Vol. 11 No. 3, pp. 232-248, doi: [10.1108/13563280610680821](https://doi.org/10.1108/13563280610680821).

- Bristy, H.J., How, J. and Verhoeven, P. (2021), "Gender diversity: the corporate social responsibility and financial performance nexus", *International Journal of Managerial Finance*, Vol. 17 No. 5, pp. 665-686, doi: [10.1108/IJMF-04-2020-0176](https://doi.org/10.1108/IJMF-04-2020-0176).
- Burke, J.J., Hoitash, R. and Hoitash, U. (2019), "The heterogeneity of board-level sustainability committees and corporate social performance", *Journal of Business Ethics*, Vol. 154 No. 4, pp. 1161-1186, doi: [10.1007/s10551-017-3453-2](https://doi.org/10.1007/s10551-017-3453-2).
- Chai, D., Faff, R. and Gharghori, P. (2010), "New evidence on the relation between stock liquidity and measures of trading activity", *International Review of Financial Analysis*, Vol. 19 No. 3, pp. 181-192, doi: [10.1016/j.irfa.2010.02.005](https://doi.org/10.1016/j.irfa.2010.02.005).
- Chan, A., Lee, E., Petaibanlue, J. and Tan, N. (2017), "Do board interlocks motivate voluntary disclosure? Evidence from Taiwan", *Review of Quantitative Finance and Accounting*, Vol. 48 No. 2, pp. 441-466, doi: [10.1007/s11156-016-0557-1](https://doi.org/10.1007/s11156-016-0557-1).
- Chen, Y., Rhee, S.G., Veeraraghavan, M. and Zolotoy, L. (2015), "Stock liquidity and managerial short-termism", *Journal of Banking and Finance*, Vol. 60, pp. 44-59, doi: [10.1016/j.jbankfin.2015.07.007](https://doi.org/10.1016/j.jbankfin.2015.07.007).
- Conner, K.R. and Prahalad, C.K. (1996), "A resource-based theory of the firm: knowledge versus opportunism", *Organization Science*, Vol. 7 No. 5, pp. 477-501, doi: [10.1287/orsc.7.5.477](https://doi.org/10.1287/orsc.7.5.477).
- Cucari, N., Esposito De Falco, S. and Orlando, B. (2018), "Diversity of board of directors and environmental social governance: evidence from Italian listed companies", *Corporate Social Responsibility and Environmental Management*, Vol. 25 No. 3, pp. 250-266, doi: [10.1002/csr.1452](https://doi.org/10.1002/csr.1452).
- Cui, J., Jo, H. and Na, H. (2016), "Does corporate social responsibility affect information asymmetry?", *Journal of Business Ethics*, Vol. 148 No. 3, pp. 549-572, doi: [10.1007/s10551-015-3003-8](https://doi.org/10.1007/s10551-015-3003-8).
- Dang, T.L., Doan, N.T.P., Nguyen, T.M.H., Tran, T.T. and Vo, X.V. (2019), "Analysts and stock liquidity - global evidence", *Cogent Economics and Finance*, Vol. 7 No. 1, 1625480, doi: [10.1080/23322039.2019.1625480](https://doi.org/10.1080/23322039.2019.1625480).
- Daske, H., Hail, L., Leuz, C. and Verdi, R. (2008), "Mandatory IFRS reporting around the world: early evidence on the economic consequences", *Journal of Accounting Research*, Vol. 46 No. 5, pp. 1085-1142, doi: [10.1111/j.1475-679x.2008.00306.x](https://doi.org/10.1111/j.1475-679x.2008.00306.x).
- Davison, A., Stening, B.W. and Wai, W.T. (1984), "Auditor concentration and the impact of interlocking directorates", *Journal of Accounting Research*, Vol. 22 No. 1, pp. 313-317, doi: [10.1086/228311](https://doi.org/10.1086/228311).
- Desender, K.A., LópezPuertas-Lamy, M., Pattitoni, P. and Petracchi, B. (2020), "Corporate social responsibility and cost of financing—the importance of the international corporate governance system", *Corporate Governance: An International Review*, Vol. 28 No. 3, pp. 207-234, doi: [10.1111/corg.12312](https://doi.org/10.1111/corg.12312).
- Dollinger, M. J.a. (2003), *Entrepreneurship: Strategies and Resources*, Prentice Hall, Upper Saddle River, NJ.
- Easley, D., Amp, A. and Hara, M. (1987), "Price, trade size, and information in securities markets", *Journal of Financial Economics*, Vol. 19 No. 1, pp. 69-90, doi: [10.1016/0304-405x\(87\)90029-8](https://doi.org/10.1016/0304-405x(87)90029-8).
- Eberhardt-Toth, E. (2017), "Who should be on a board corporate social responsibility committee?", *Journal of Cleaner Production*, Vol. 140, pp. 1926-1935, doi: [10.1016/j.jclepro.2016.08.127](https://doi.org/10.1016/j.jclepro.2016.08.127).
- Fernando, G.D., Giboney, J. and Schneible, R.A. (2018), "Voluntary disclosures and market response to earnings announcements", *Review of Accounting and Finance*, Vol. 17 No. 1, pp. 2-17, doi: [10.1108/raf-06-2016-0087](https://doi.org/10.1108/raf-06-2016-0087).
- Florou, A. and Pope, P.F. (2012), "Mandatory IFRS adoption and institutional investment decisions", *The Accounting Review*, Vol. 87 No. 6, pp. 1993-2025, doi: [10.2308/accr-50225](https://doi.org/10.2308/accr-50225).

- Gao, F., Dong, Y., Ni, C. and Fu, R. (2016), "Determinants and economic consequences of non-financial disclosure quality", *European Accounting Review*, Vol. 25 No. 2, pp. 287-317, doi: [10.1080/09638180.2015.1013049](https://doi.org/10.1080/09638180.2015.1013049).
- García-Sánchez, I.M., Gómez-Miranda, M.-E., David, F. and Rodríguez-Ariza, L. (2019), "The explanatory effect of CSR committee and assurance services on the adoption of the IFC performance standards, as a means of enhancing corporate transparency", *Sustainability Accounting, Management and Policy Journal*, Vol. 10 No. 5, pp. 773-797, doi: [10.1108/sampj-09-2018-0261](https://doi.org/10.1108/sampj-09-2018-0261).
- Gjerde, T., Mahenthiran, S. and Cademartori, D. (2013), "Effect of ownership, governance, and transparency on liquidity – Chilean evidence", *Journal of Contemporary Accounting and Economics*, Vol. 9 No. 2, pp. 183-202, doi: [10.1016/j.jcae.2013.09.003](https://doi.org/10.1016/j.jcae.2013.09.003).
- Granovetter, M. (1985), "Economic action and social structure: the problem of embeddedness", *American Journal of Sociology*, Vol. 91 No. 3, pp. 481-510, doi: [10.1086/228311](https://doi.org/10.1086/228311).
- Helfaya, A. and Moussa, T. (2017), "Do board's corporate social responsibility strategy and orientation influence environmental sustainability disclosure? UK evidence", *Business Strategy and the Environment*, Vol. 26 No. 8, pp. 1061-1077, doi: [10.1002/bse.1960](https://doi.org/10.1002/bse.1960).
- Hollindale, J., Kent, P., Routledge, J. and Chapple, L. (2019), "Women on boards and greenhouse gas emission disclosures", *Accounting and Finance*, Vol. 59 No. 1, pp. 277-308, doi: [10.1111/acfi.12258](https://doi.org/10.1111/acfi.12258).
- Hussain, N., Rigoni, U. and Orij, R.P. (2018), "Corporate governance and sustainability performance: analysis of triple bottom line performance", *Journal of Business Ethics*, Vol. 149 No. 2, pp. 411-432, doi: [10.1007/s10551-016-3099-5](https://doi.org/10.1007/s10551-016-3099-5).
- Ibbotson, R.G., Chen, Z., Kim, D. Y.-J. and Hu, W.Y. (2013), "Liquidity as an investment style", *Financial Analysts Journal*, Vol. 69 No. 3, pp. 30-44, doi: [10.2469/faj.v69.n3.4](https://doi.org/10.2469/faj.v69.n3.4).
- Jiang, F., John, K., Li, C.W. and Qian, Y. (2018), "Earthly reward to the religious: religiosity and the costs of public and private debt", *Journal of Financial and Quantitative Analysis*, Vol. 53 No. 5, pp. 2131-2160, doi: [10.1017/s002210901800039x](https://doi.org/10.1017/s002210901800039x).
- Johnson, R.A. and Greening, D.W. (1999), "The effects of corporate governance and institutional ownership types on corporate social performance", *Academy of Management Journal*, Vol. 42 No. 5, pp. 564-576, doi: [10.2307/256977](https://doi.org/10.2307/256977).
- José-Luis, G.-D., Cabeza-García, L., Alonso-Martínez, D. and Fernández-Gago, R. (2018), "Factors influencing board of directors' decision-making process as determinants of CSR engagement", *Review of Managerial Science*, Vol. 12 No. 1, pp. 229-253, doi: [10.1007/s11846-016-0220-1](https://doi.org/10.1007/s11846-016-0220-1).
- Kalak, I.E., Azevedo, A., Hudson, R. and Karim, M.A. (2017), "Stock liquidity and SMEs' likelihood of bankruptcy: evidence from the US market", *Research in International Business and Finance*, Vol. 42, pp. 1383-1393, doi: [10.1016/j.ribaf.2017.07.077](https://doi.org/10.1016/j.ribaf.2017.07.077).
- Karolyi, G.A., Lee, K.-H. and van Dijk, M.A. (2012), "Understanding commonality in liquidity around the world", *Journal of Financial Economics*, Vol. 105 No. 1, pp. 82-112, doi: [10.1016/j.jfineco.2011.12.008](https://doi.org/10.1016/j.jfineco.2011.12.008).
- Khaw, K. L.-H. and Liao, J. (2018), "Board gender diversity and its risk monitoring role: is it significant", *Asian Academy of Management Journal of Accounting and Finance*, Vol. 14 No. 1, pp. 83-106, doi: [10.21315/aamjaf2018.14.1.4](https://doi.org/10.21315/aamjaf2018.14.1.4).
- Konrad, A.M. and Kramer, V.W. (2006), "How many women do boards need?", *Harvard Business Review*, Vol. 84 No. 12, p. 22.
- Kothari, S.P., Leone, A.J. and Wasley, C.E. (2005), "Performance matched discretionary accrual measures", *Journal of Accounting and Economics*, Vol. 39 No. 1, pp. 163-197, doi: [10.1016/j.jacceco.2004.11.002](https://doi.org/10.1016/j.jacceco.2004.11.002).
- Kučař, P. (2023), "Smith at 300: commercial society and the women's question", *Journal of the History of Economic Thought*, Vol. 45 No. 2, pp. 223-225, doi: [10.1017/S1053837222000566](https://doi.org/10.1017/S1053837222000566).
- Kyle, A.S. (1985), "Continuous auctions and insider trading", *Econometrica*, Vol. 53 No. 6, pp. 1315-1335, doi: [10.2307/1913210](https://doi.org/10.2307/1913210).

- Lagos, R. and Zhang, S. (2020), "Turnover liquidity and the transmission of monetary policy", *American Economic Review*, Vol. 110 No. 6, pp. 1635-1672, doi: [10.1257/aer.20170045](https://doi.org/10.1257/aer.20170045).
- Lambert, R., Leuz, C. and Verrecchia, R.E. (2007), "Accounting information, disclosure, and the cost of capital", *Journal of Accounting Research*, Vol. 45 No. 2, pp. 385-420, doi: [10.1111/j.1475-679x.2007.00238.x](https://doi.org/10.1111/j.1475-679x.2007.00238.x).
- Landry, E.E., Bernardi, R.A. and Bosco, S.M. (2016), "Recognition for sustained corporate social responsibility: female directors make a difference", *Corporate Social Responsibility and Environmental Management*, Vol. 23 No. 1, pp. 27-36, doi: [10.1002/csr.1358](https://doi.org/10.1002/csr.1358).
- Lang, M. and Maffett, M. (2011), "Transparency and liquidity uncertainty in crisis periods", *Journal of Accounting and Economics*, Vol. 52 Nos 2-3, pp. 101-125, doi: [10.1016/j.jacceco.2011.07.001](https://doi.org/10.1016/j.jacceco.2011.07.001).
- Larcker, D.F., So, E.C. and Wang, C.C.Y. (2013), "Boardroom centrality and firm performance", *Journal of Accounting and Economics*, Vol. 55 Nos 2-3, pp. 225-250, doi: [10.1016/j.jacceco.2013.01.006](https://doi.org/10.1016/j.jacceco.2013.01.006).
- Larrieta-Rubín de Celis, I., Velasco-Balmaseda, E., Fernández de Bobadilla, S., Alonso-Almeida, M.D.M. and Intxaurburu-Clemente, G. (2015), "Does having women managers lead to increased gender equality practices in corporate social responsibility?", *Business Ethics: A European Review*, Vol. 24 No. 1, pp. 91-110, doi: [10.1111/beer.12081](https://doi.org/10.1111/beer.12081).
- Lee, C.-F. and Lee, J.C. (2014), *Handbook of Financial Econometrics and Statistics*, Springer, New York.
- Lesmond, D.A., Ogden, J.P. and Trzcinka, C.A. (1999), "A new estimate of transaction costs", *The Review of Financial Studies*, Vol. 12 No. 5, pp. 1113-1141, doi: [10.1093/rfs/12.5.1113](https://doi.org/10.1093/rfs/12.5.1113).
- Liu, C. (2018), "Are women greener? Corporate gender diversity and environmental violations", *Journal of Corporate Finance*, Vol. 52, pp. 118-142, doi: [10.1016/j.jcorpfin.2018.08.004](https://doi.org/10.1016/j.jcorpfin.2018.08.004).
- Loukil, N., Yousfi, O. and Yerbanga, R. (2019), "Does gender diversity on boards influence stock market liquidity? Empirical evidence from the French market", *Corporate Governance (Bradford)*, Vol. 19 No. 4, pp. 669-703, doi: [10.1108/cg-09-2018-0291](https://doi.org/10.1108/cg-09-2018-0291).
- Lu, Y., Ntim, C.G., Zhang, Q. and Li, P. (2022), "Board of directors' attributes and corporate outcomes: a systematic literature review and future research agenda", *International Review of Financial Analysis*, Vol. 84, 102424, doi: [10.1016/j.irfa.2022.102424](https://doi.org/10.1016/j.irfa.2022.102424).
- Mallin, C.A. and Michelon, G. (2011), "Board reputation attributes and corporate social performance: an empirical investigation of the US best corporate citizens", *Accounting and Business Research*, Vol. 41 No. 2, pp. 119-144, doi: [10.1080/00014788.2011.550740](https://doi.org/10.1080/00014788.2011.550740).
- Mallin, C., Michelon, G. and Raggi, D. (2013), "Monitoring intensity and stakeholders' orientation: how does governance affect social and environmental disclosure?", *Journal of Business Ethics*, Vol. 114 No. 1, pp. 29-43, doi: [10.1007/s10551-012-1324-4](https://doi.org/10.1007/s10551-012-1324-4).
- McGuinness, P.B., Vieito, J.P. and Wang, M. (2017), "The role of board gender and foreign ownership in the CSR performance of Chinese listed firms", *Journal of Corporate Finance*, Vol. 42, pp. 75-99, doi: [10.1016/j.jcorpfin.2016.11.001](https://doi.org/10.1016/j.jcorpfin.2016.11.001).
- Mizruchi, M.S. and Stearns, L.B. (1988), "A longitudinal study of the formation of interlocking directorates", *Administrative Science Quarterly*, Vol. 33 No. 2, pp. 194-210, doi: [10.2307/2393055](https://doi.org/10.2307/2393055).
- Nekhili, M., Nagati, H., Chtioui, T. and Nekhili, A. (2017), "Gender-diverse board and the relevance of voluntary CSR reporting", *International Review of Financial Analysis*, Vol. 50, pp. 81-100, doi: [10.1016/j.irfa.2017.02.003](https://doi.org/10.1016/j.irfa.2017.02.003).
- Nguyen, H.T. and Muniandy, B. (2021), "Gender, ethnicity and stock liquidity: evidence from South Africa", *Accounting and Finance*, Vol. 61 No. S1, pp. 2337-2377, doi: [10.1111/acfi.12668](https://doi.org/10.1111/acfi.12668).
- Nguyen, P.M., Jubb, C. and Dias, R. (2024), "Motives for environmental and social engagement and stock liquidity: the moderating role of sustainability committees", *Pacific-Basin Finance Journal*, Vol. 87, 102501, doi: [10.1016/j.pacfin.2024.102501](https://doi.org/10.1016/j.pacfin.2024.102501).

- Nguyen, P.A., Kecskés, A. and Mansi, S. (2020), "Does corporate social responsibility create shareholder value? the importance of long-term investors", *Journal of Banking and Finance*, Vol. 112, 105217, doi: [10.1016/j.jbankfin.2017.09.013](https://doi.org/10.1016/j.jbankfin.2017.09.013).
- Nizam, E., Ng, A., Dewandaru, G., Nagayev, R. and Nkoba, M.A. (2019), "The impact of social and environmental sustainability on financial performance: a global analysis of the banking sector", *Journal of Multinational Financial Management*, Vol. 49, pp. 35-53, doi: [10.1016/j.mulfin.2019.01.002](https://doi.org/10.1016/j.mulfin.2019.01.002).
- Orazalin, N. (2020), "Do board sustainability committees contribute to corporate environmental and social performance? The mediating role of corporate social responsibility strategy", *Business Strategy and the Environment*, Vol. 29 No. 1, pp. 140-153, doi: [10.1002/bse.2354](https://doi.org/10.1002/bse.2354).
- Owusu, A., Omoteso, K., Gyimah, D. and Ejiogu, A. (2025), "Are lead independent directors greener? Evidence from climate change commitment and ESG performance", *Journal of Accounting Literature*, Vol. ahead-of-print No. ahead-of-print, doi: [10.1108/JAL-07-2024-0183](https://doi.org/10.1108/JAL-07-2024-0183).
- O'Hagan, S.B. (2017), "An exploration of gender, interlocking directorates, and corporate performance", *International Journal of Gender and Entrepreneurship*, Vol. 9 No. 3, pp. 269-282, doi: [10.1108/ijge-09-2016-0032](https://doi.org/10.1108/ijge-09-2016-0032).
- Pfeffer, J.A. (2003), *The External Control of Organizations a Resource Dependence Perspective*, Stanford Business Books, Stanford, CA.
- Prommin, P., Jumreornvong, S., Jiraporn, P. and Tong, S. (2016), "Liquidity, ownership concentration, corporate governance, and firm value: evidence from Thailand", *Global Finance Journal*, Vol. 31, pp. 73-87, doi: [10.1016/j.gfj.2016.06.006](https://doi.org/10.1016/j.gfj.2016.06.006).
- Pucheta-Martínez, M.C., Bel-Oms, I. and Olcina-Sempere, G. (2016), "Corporate governance, female directors and quality of financial information", *Business Ethics: A European Review*, Vol. 25 No. 4, pp. 363-385, doi: [10.1111/beer.12123](https://doi.org/10.1111/beer.12123).
- Rehman, S., Orij, R. and Khan, H. (2020), "The search for alignment of board gender diversity, the adoption of environmental management systems, and the association with firm performance in Asian firms", *Corporate Social Responsibility and Environmental Management*, Vol. 27 No. 5, pp. 2161-2175, doi: [10.1002/csr.1955](https://doi.org/10.1002/csr.1955).
- Roşu, I. (2009), "A dynamic model of the limit order book", *Review of Financial Studies*, Vol. 22 No. 11, pp. 4601-4641, doi: [10.1093/rfs/hhp011](https://doi.org/10.1093/rfs/hhp011).
- Setó-Pamies, D. (2015), "The relationship between women directors and corporate social responsibility", *Corporate Social Responsibility and Environmental Management*, Vol. 22 No. 6, pp. 334-345, doi: [10.1002/csr.1349](https://doi.org/10.1002/csr.1349).
- Shropshire, C. (2010), "The role of the interlocking director and board receptivity in the diffusion of practices", *Academy of Management Review*, Vol. 35 No. 2, pp. 246-264, doi: [10.5465/amr.35.2.zok246](https://doi.org/10.5465/amr.35.2.zok246).
- Suharsono, R.S., Nirwanto, N. and Zuhroh, D. (2020), "Voluntary disclosure, financial reporting quality and asymmetry information", *Journal of Asian Finance, Economics and Business*, Vol. 7 No. 12, pp. 1185-1194, doi: [10.13106/jafeb.2020.vol7.no12.1185](https://doi.org/10.13106/jafeb.2020.vol7.no12.1185).
- Tingbani, I., Chithambo, L., Tauringana, V. and Papanikolaou, N. (2020), "Board gender diversity, environmental committee and greenhouse gas voluntary disclosures", *Business Strategy and the Environment*, Vol. 29 No. 6, pp. 2194-2210, doi: [10.1002/bse.2495](https://doi.org/10.1002/bse.2495).
- Uddin, M., Chowdhury, A., Anderson, K. and Chaudhuri, K. (2021), "The effect of COVID-19 pandemic on global stock market volatility: can economic strength help to manage the uncertainty?", *Journal of Business Research*, Vol. 128, p. 31, doi: [10.1016/j.jbusres.2021.01.061](https://doi.org/10.1016/j.jbusres.2021.01.061).
- Walls, J.L., Berrone, P. and Phan, P.H. (2012), "Corporate governance and environmental performance: is there really a link?", *Strategic Management Journal*, Vol. 33 No. 8, pp. 885-913, doi: [10.1002/smj.1952](https://doi.org/10.1002/smj.1952).
- Wijethilake, C., Munir, R. and Appuhamy, R. (2017), "Corrigendum to 'proactive sustainability strategy and corporate sustainability performance: the mediating effect of sustainability control systems'", 196 (2017) 569-582, *Journal of Environmental Management*, Vol. 203, Pt 1, p. 616, doi: [10.1016/j.jenvman.2017.07.008](https://doi.org/10.1016/j.jenvman.2017.07.008).

- Wright, C.E. (2023), "Board games: antecedents of Australia's interlocking directorates, 1910–2018", *Enterprise & Society*, Vol. 24 No. 2, pp. 589-616, doi: [10.1017/eso.2021.59](https://doi.org/10.1017/eso.2021.59).
- Yaseen, H., Iskandrani, M., Ajina, A. and Hamad, A. (2019), "Investigating the relationship between board diversity & corporate social responsibility (CSR) performance: evidence from France", *Academy of Accounting and Financial Studies Journal*, Vol. 23 No. 4, pp. 1-11.
- Yasser, Q.R., Al Mamun, A. and Ahmed, I. (2017), "Corporate social responsibility and gender diversity: insights from Asia Pacific: gender diversity, corporate social responsibility", *Corporate Social Responsibility and Environmental Management*, Vol. 24 No. 3, pp. 210-221, doi: [10.1002/csr.1400](https://doi.org/10.1002/csr.1400).
- Ye, J., Zhang, H., Cao, C., Wei, F. and Namunyak, M. (2021), "Boardroom gender diversity on stock liquidity: empirical evidence from Chinese A-share market", *Emerging Markets Finance and Trade*, Vol. 57 No. 11, pp. 3236-3253, doi: [10.1080/1540496x.2019.1684892](https://doi.org/10.1080/1540496x.2019.1684892).
- Zaid, M., Wang, M., Adib, M., Sahyouni, A. and Abuhijleh, S.T.F. (2020), "Boardroom nationality and gender diversity: implications for corporate sustainability performance", *Journal of Cleaner Production*, Vol. 251, 119652, doi: [10.1016/j.jclepro.2019.119652](https://doi.org/10.1016/j.jclepro.2019.119652).
- Zhang, J., Zhu, H. and Ding, H.-b. (2013), "Board composition and corporate social responsibility: an empirical investigation in the post Sarbanes-Oxley Era", *Journal of Business Ethics*, Vol. 114 No. 3, pp. 381-392, doi: [10.1007/s10551-012-1352-0](https://doi.org/10.1007/s10551-012-1352-0).
- Zou, Z., Wu, Y., Zhu, Q. and Yang, S. (2018), "Do female executives prioritize corporate social responsibility?", *Emerging Markets Finance and Trade*, Vol. 54 No. 13, pp. 2965-2981, doi: [10.1080/1540496x.2018.1453355](https://doi.org/10.1080/1540496x.2018.1453355).
- Zou, H., Xie, X., Meng, X. and Yang, M. (2019), "The diffusion of corporate social responsibility through social network ties: from the perspective of strategic imitation", *Corporate Social Responsibility and Environmental Management*, Vol. 26 No. 1, pp. 186-198, doi: [10.1002/csr.1670](https://doi.org/10.1002/csr.1670).

Corresponding author

Roshanthi Dias can be contacted at: rdias@swin.edu.au