

# Gender diversity in bank boardrooms and green lending: Evidence from euro area credit register data

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## Abstract<sup>†</sup>

Do female directors in banks' boards influence lending decisions towards more/less polluting firms? By using granular credit register data matched with information on 539,928 firm-level greenhouse gas (GHG) emission intensities, we isolate credit supply and find that banks with more gender-diverse boards provide more credit to greener companies. This evidence is robust when we differentiate among different types of GHG emissions and control for endogeneity concerns. In addition, we also show that female director-specific characteristics matter for lending behaviour to more/less polluting firms as better-educated directors grant lower credit volumes to more polluting firms. Finally, we document that the “greening” effect of the female members in banks' boardrooms is stronger in countries with more female climate-oriented politicians.

**JEL classification:** G01; G21; G30; Q50

**Keywords:** GHG emissions; Gender; Board diversity; Credit registry; Bank lending

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# 1 Introduction

Over recent years, climate change and its impact have been central to the debate worldwide, with policymakers starting to recognize the necessity to timely tackling this pressing threat (Bailey, 2021; Lagarde, 2021). The number of natural disasters worldwide and the associated economic losses have risen sharply over the last four decades, peaking at 820 events in 2019 and recording a total loss for the period 1980-2019 of USD 5,200 billion (MunichRe). Furthermore, the majority of the extreme weather events, causing extensive devastation and economic disruption, are found to be likely exacerbated by human activity.<sup>1</sup>

The Paris Agreement, which represents a landmark treaty on climate change signed in December 2015, aims to maintain the global average temperature below 2°C above pre-industrial levels and the increase limited to 1.5°C.<sup>2</sup> Moreover, according to the Paris Agreement, countries are required to set out their plans and strategies for climate actions through the nationally determined contributions (NDCs), which are regularly assessed and updated within a transparent and accountable framework.<sup>3</sup> Reducing pollution and the emissions of greenhouse gases (GHGs) are key objectives to attain the main purpose of sustainable economic growth, preserving ecosystems and biodiversity. Achieving carbon neutrality by 2050 represents the world’s most urgent priority. The rules for the Paris climate accord have been finalised at the 26th Conference of the Parties (COP 26) in November 2021, including transparency regulations for how countries report their emissions and funding to help countries to adapt to climate change.

By relying on a unique sample of almost a million loans extracted from the analytical credit register (AnaCredit) of the European System of Central Banks (ESCB), for the year 2019, and matched with 539,928 firm-level information on GHG emissions, we explore the potential influence of women in the boardroom on banks’ lending strategies. To the best of our knowledge, this is the first paper to investigate whether and to what extent a greater female representation in the boardrooms influences banks’ capability in ”greening” the economy. In particular, we are interested in testing whether a greater diversity in the board can shape banks’ decisions

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<sup>1</sup>See [www.carbonbrief.org/mapped-how-climate-change-affects-extreme-weather-around-the-world](http://www.carbonbrief.org/mapped-how-climate-change-affects-extreme-weather-around-the-world).

<sup>2</sup>The Paris Agreement is a legally binding internationally treaty negotiated by 196 countries at the 21st UN Climate Change Conference of the Parties (COP21) held in December 2015 in Paris. The Agreement has entered into force in November 2016.

<sup>3</sup>Based on a revised NDC, submitted in December 2020, the EU has committed to reducing its emissions by at least 55% by 2030, compared to 1990 (see <https://www4.unfccc.int/sites/NDCStaging/pages/Party.aspx?party=EUU>).

to discriminate lending between more and less polluting firms/sectors, thereby driving more effective environmental policies. In light of the increasing relevance of climate change, also in terms of financial and price stability (Pereira da Silva, 2019; Lagarde, 2021), and the global effort in combating this phenomenon, this paper’s focus on the link between banks’ gender diversity and sustainable lending appears to be particularly timely and significant.

To preview our main findings, there are indications that banks with more gender-diverse boards provide less credit to more polluting companies. This inverse relationship between bank lending volumes and GHG emission intensities for boards with more female directors is confirmed also when we differentiate among Scope 1, 2 and 3 GHG emissions. In addition, we also show that female director-specific characteristics matter for lending behaviour towards more/less polluting firms as better-educated directors grant lower credit volumes to polluting firms. Finally, we document that the “greening” effect associated with female members in banks’ boardrooms is stronger in countries with more female climate-oriented politicians. These results are robust when we control for potential endogeneity concerns, such as sorting effect and sample selection biases. Given that banks more socially responsible may be more likely to hire female directors in their boards, compared to other banks, and women may self-select into banks that are *per se* more socially responsible than others, we employ the instrumental variable (IV) approach to extract the exogenous components from the percentage of female directors. Moreover, we employ an additional loan-level dataset, which covers the period 2014-2018, to evaluate the robustness of our main findings when we compare bank lending to more/less polluting firms in the case of a transition from a male-to-female director within the board.

Our findings hold important implications for both regulators and policymakers. We underline the crucial role played by banks in potentially driving the transition towards a greener economy. Furthermore, we identify a central contribution of female presence on boards in shaping banks’ lending strategies in support of less polluting firms/sectors, thereby confirming the beneficial effects of more gender-diverse decision-making groups on firms’ outcomes and, in a wider perspective, on the global economy.

As a major channel of credit to the real economy, banks have the potential to play a pivotal role in the global effort to promote green(er) projects and an effective shift towards a low-carbon economy. In order to meet the climate targets on time, most of the transition will

likely be funded by the private financial sector, including banks (De Haas and Popov, 2019). Moreover, increasing pressure from policymakers, investors and customers could significantly influence banks' lending and investing activities.<sup>4</sup> At the same time, regulatory constraints, in terms of increasing capital requirements, associated with the higher risk of green energy projects (Hain et al., 2018; Brunnermeier and Landau, 2020), compared to fuel-based energy options, as well as lower returns might hinder banks' strategy to finance less-polluting firms.<sup>5</sup> In addition, banks need to identify and effectively manage emerging risks associated with climate change. In particular, two broad categories of climate-related financial risks have been recognized: (i) the *transition risks*, which relate to the process of adjustments towards a low-carbon economy and are posed, among others, by rapid (unexpected) changes in relevant policies that adversely affect the value of financial assets and liabilities; and (ii) the *physical risks*, which relate to the economic losses arising from extreme climate-related events able to erode the value of financial assets and/or increase that of liabilities.

A bank's climate strategy and the commitment to align to the global sustainability agenda strongly depends on the direction assumed by the board. Climate-related decisions often involve sizeable investments with potentially complex and uncertain implications whose impact on different stakeholder groups can be varying (Walls et al., 2012). Therefore, a bank board must be sufficiently diverse to undertake effective decision-making through the sharing of a broader range of experiences and opinions, which ensure the representation of distinct interest groups, including financial and non-financial stakeholders. The existing literature has reported empirical evidence on the significance of board diversity for governance outcomes, which in turn influence financial, social and reputational dimensions (Adams and Ferreira, 2009; Bernile et al., 2018).

Prior empirical evidence seems to overall agree on the fact that firms with a greater female representation in their boards tend to have better financial performance (Liu et al., 2014; Post

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<sup>4</sup>In this respect, it is worth mentioning that both the French and UK bank regulators have started to conduct stress tests that account for climate-related risks. In 2021, the European Banking Authority (EBA) has ran an EU-wide pilot exercise on a sample of 29 volunteer banks from 10 countries. In the same year, the European Central Bank (ECB) has conducted an economy-wide climate stress test on both firms and banks in the European Union (EU), with a horizon of 30-years into the future.

<sup>5</sup>The Basel Committee on Banking Supervision (BCBS) is currently assessing and developing a suite of potential measures – spanning disclosure, supervisory and regulatory measures – to address climate-related financial risks to the global banking system. To that end, the BCBS agreed to consult in November 2021 on a set of principles for the effective management and supervision of climate-related financial risks at internationally active banks. On disclosure measures, the Committee is exploring the use of the Pillar 3 framework to promote a common disclosure baseline for climate-related financial risks.

and Byron, 2015), improved firm value (Gul et al., 2011; Kim and Starks, 2016) and greater governance quality and disclosure (Adams and Ferreira, 2009). The dynamics according to which women in the boardroom can add value are explained by sociological and physiological theories (Cumming et al., 2015). Both socialisation and gender socialisation perspectives support the evidence of a positive impact of female directors on corporate social responsibility (CSR) because of women's lower likelihood, compared to men, to damage the environment and their greater concerns about ethical issues (Kennedy and Kray, 2014). The *social role theory* (Eagly, 1987) suggests that women and men behave on the basis of stereotypes and beliefs, depending on the social role they hold. In particular, across cultures, women are seen to be more community-minded than men and characterised by traits such as empathy, caring and remarkable concern for others (Dobbins, 1985; Eagly and Karau, 1991; Fondas, 1997). In this respect, women appear to be more socially-oriented than their male peers, thereby likely to be more sensitive to environmental issues. Female directors reveal a stronger orientation towards CSR, compared to male directors who are, instead, more focused on economic performance (Ibrahim and Angelidis, 1994). Moreover, by bringing different perspectives to the table and by adopting a more participative leadership style, women on boards might facilitate conversations and decisions on CSR-related tasks, being better able to manage the relationships with various stakeholder groups (Eagly et al., 2003).

A growing body of the literature has linked gender representation on corporate boards to specific value-enhancing business strategies, such as greater firm innovation (Griffin et al., 2021) and initiatives in the sphere of CSR (McGuinness et al., 2017). In recent contributions, gender diversity has been associated with reduced cases of accounting misreporting (García Lara et al., 2017), environmental violations (Liu, 2018) and misconduct sanctions (Arnaboldi et al., 2021). Limited is the evidence with respect to the banking industry. Existing studies have mainly focused on the link between gender diversity and risk-taking (Berger et al., 2014; Cardillo et al., 2020). Furthermore, recent literature investigates the link between the financial sector activity and climate change, from the perspective of a transition to a low-carbon economy (De Haas and Popov, 2019; Reghezza et al., 2021). A number of contributions focus on the way central banks worldwide can effectively adopt climate policies in order to meet climate targets, as well as the implications of climate change in terms of financial stability and monetary policy (Batten et al., 2016; Campiglio et al., 2018; Bolton et al., 2020; FSB, 2020; Bernardini et al., 2021). However,

to the best of our knowledge, there is a void in the existing literature on the role played by greater gender diversity on banks' boards as a factor with the potential to influence lending strategies in favour of less polluting firms/sectors.

Our study informs different strands of the literature. First, we contribute to the emerging body of research that analyses the role played by the financial sector in decarbonizing the global economy, thereby addressing climate change (De Haas and Popov, 2019; Mesonnier, 2019; Reghezza et al., 2021). We add to prior literature on gender diversity in the boardroom and corporate outcomes (Adams and Ferreira, 2009; Bernile et al., 2018) with a specific lens on the banking industry. We provide novel evidence of the impact of a greater female representation on the banks' environmental decision-making process. In this respect, we shed some light on the debated relationship between gender, climate change and sustainable development (UNEP, 2016; Collins, 2019). Finally, we extend the relatively unexplored and still limited literature that focuses on the environmental dimension with reference to the banking sector (Thompson and Cowton, 2004).

We differentiate from prior literature by drawing on the high granularity of our data. Recent studies on bank lending and corporate pollution mostly rely on data on large exposures (Reghezza et al., 2021) or syndicated loans (Delis et al., 2018). In our paper, by using detailed loan-level data from the AnaCredit dataset and very granular fixed-effects, i.e. firm or industry-location-size (ILS) fixed-effects, we are able to disentangle credit supply effects from demand effects and effectively capture cross-sectional demand of bank credit for all the considered firms. While multiple bank relationships and firm fixed-effects allow us to grasp the heterogeneity in credit demand across firms, we also include single bank-lending relationships *via* ILS fixed-effects. This is essential in order to obtain a complete representation of firms' credit demand as in most of the countries single-bank relationships represent a large share of the universe of borrowing firms (Ongena and Smith, 2001; Kysucki and Norden, 2016). Furthermore, compared to existing studies on single countries (Mesonnier, 2019; Faiella and Lavecchia, 2020), by employing a European-wide credit register, we are able to exploit full heterogeneity across countries with different national settings. We can, this way, benefit from a large variation in cultural and institutional elements and investigate peculiarities in the "gender-green-lending" nexus of banks located in northern and southern euro area economies and in countries that adopted legislative board gender quotas. Lastly, we rely on detailed corporate-level data on GHG emissions, also

distinguishing between Scope 1, 2 and 3 emissions.<sup>6</sup> In this respect, and differently from related contributions (Delis et al., 2018; De Haas and Popov, 2019), we consider the entire spectrum of GHG emissions and not only carbon dioxide (CO<sub>2</sub>) emissions. Following this approach, we can, therefore, draw inference on wider industry coverage and include economic sectors that are commonly omitted, such as the agricultural one. In addition, by using corporate-specific information, we can conduct a very comprehensive analysis without relying on external indicators of pollution, such as the Environmental, Social and Governance (ESG) ratings.

The remainder of the paper is organized as follows. Section 2 develops the hypothesis central to our study. Section 3 presents the data and methodology. Section 4 discusses the baseline results. Section 5 provides additional analyses. Section 6 presents the robustness tests. Section 7 concludes the paper and discusses the main policy implications.

## **2 Key testable hypothesis: Board gender diversity and green(er) bank lending**

We believe that gender diversity in the boardroom has the potential to influence banks' lending behaviour in favour of less polluting firms, thereby enhancing decision-making related to the environmental sphere. This prediction stems from prior literature, which suggests that female directors, compared to their male peers, demonstrate a lower propensity to damage the environment, greater concerns about ethical issues and a stronger orientation towards the CSR firm's dimension (Liu, 2018). They are also more likely to undertake actions to mitigate perceived risks (Schubert et al., 1999; Carter et al., 2003; Adams and Ferreira, 2009; Huang and Kisgen, 2013). The evidence of a relatively lower risk appetite of women compared to men, as well as differences in terms of judgment, are also documented in psychology and business studies (Lundeberg et al., 1994; Byrnes et al., 1999; Barber and Odean, 2001). Previous research finds that women (i) invest in less risky assets (Sundén and Surette, 1998); (ii) are more conservative in simulated gambles (Levin et al., 1988); (iii) and are less prone to assume risks than men (Prince, 1993). With reference to the banking industry, a number of contributions explore how boardroom gender diversity affects bank risk-taking (Berger et al., 2014; Palvia et al., 2015;

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<sup>6</sup>Scope 1 covers direct emissions from owned or controlled sources. Scope 2 covers indirect emissions from the generation of purchased electricity, steam, heating and cooling consumed by the reporting company. Scope 3 includes all other indirect emissions that occur in a company's value chain. More details are provided in Section 3.1.

Cardillo et al., 2020). A counter-argument could contend that female directors might be less proactive in promoting greener lending. This is because such a promotion might result in being against the interests of the immediate groups of stakeholders, being focused on wider societal challenges. However, gender socialization and ethically theories lend support to the vision that female directors might present a greater propensity to address environmental concerns, including global warming. In general, women appear more community-minded, altruistic and caring than men (Gilligan, 1977; Eagly and Crowley, 1986) and, in relation to the environment, they are reported to show more concern and assume more pro-environmental behaviours than males (Zelezny, 2000). They are more likely to assume positions that prevent environmental risks with the potential to harm communities.

On a global scale, women undertake most of the decisions affecting households' energy consumption and these decisions in many cases appear to be mindful and prudent (Collins, 2019). Women tend to have a reduced carbon footprint compared to men (Kanyama et al., 2021) and, most likely, women in leadership positions would exploit their power to select more sustainable options. In this regard, Atif et al. (2021) find a beneficial impact of the board gender diversity on the consumption of renewable energy. These considerations, therefore, support the intuition of a positive association between a greater female representation in the boardroom and a bank's environmental policy and related lending strategy. In this respect, by enhancing the collective decision-making process, board gender diversity reveals a key role in driving the lending policies of a bank.

Fighting climate change is costly but essential. On the other hand, fighting climate change represents an opportunity of a "lifetime" (or "for a lifetime") that the financial sector is keen to exploit (Carney, 2020).<sup>7</sup> By playing a pivotal role in modern financial systems, banks can significantly contribute to a faster transition to a carbon-neutral economy. Sustainable lending decisions, in support of less polluting firms and industrial sectors, represent a core element of a wider "greening" strategy. A bank's climate strategy and the commitment to align its lending portfolios to the expectations set at the international level strongly relies on the trajectory followed by the board. Board diversity can entail both benefits and costs. Diversity in a management body can foster independence of opinions and the freedom to challenge core decisions (Westphal and Bednar, 2005), thereby enhancing strategic decision-making (Bantel and Jack-

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<sup>7</sup>Refer to [www.weforum.org/videos/christine-lagarde-says-fighting-climate-change-is-costly](https://www.weforum.org/videos/christine-lagarde-says-fighting-climate-change-is-costly).



son, 1989) and effective governance (Hillman and Dalziel, 2003). Furthermore, a sufficient degree of diversity in the boardroom leads to a higher set of information, unique skills and expertise with the potential to improve group decision-making (Kim and Starks, 2016). However, communication issues among different members and sub-groups can generate conflicts and hamper collective decisions (Giannetti and Zhao, 2018).

To sum up, we contend that female directors are more likely to care about long-term societal issues, including climate change, and should therefore be more likely to promote greener lending than their male counterparts. Furthermore, greater gender diversity is expected to drive enhanced board dynamics and decision-making. Hence, we formulate the central hypothesis of our study:

*H1: Banks with a greater female representation in the board lend less to more polluting firms.*

## 3 Data and methodology

### 3.1 Data and sample construction

To test our hypothesis, we construct a comprehensive dataset from multiple sources. Specifically, we gather (i) loan-level information from the AnaCredit database; (ii) firm-level data on GHG emissions from Urgentem; (iii) banks' corporate governance variables from Refinitiv Eikon (hereafter, Eikon); (iv) bank balance-sheet characteristics from the ECB's supervisory database; (v) firm-specific characteristic from Orbis Amadeus; and (vi) cultural/institutional variables from the European Institute for Gender Equality (EIGE). Given the relatively limited time coverage of the AnaCredit database, for which the data collection started in September 2018, and the likely effect of the Covid-19 pandemic on banks' lending patterns, we focus on the year 2019. Bank balance-sheet and firm-specific characteristics are sampled as of December 2018, given their potential to influence subsequent lending decisions. Furthermore, the construction of our bank sample is driven by the availability of corporate governance information. In the end, we are able to consider the lending behaviour of 52 banks, accounting for about 60% of banking total assets in the euro area. The high granularity of our loan-level dataset, which covers almost a million loans, enables us to fully exploit the heterogeneity in our sample, thereby enhancing the reliability of our inferences. In this respect, the use of confidential AnaCredit data has deeply benefited our study, allowing for a finer and more robust analysis of banks' lending

exposures.<sup>8</sup>

To classify our sample of loans into different industrial sectors, we follow the Statistical Classification of Economic Activities in the European Community (NACE Rev. 2) codes.<sup>9</sup> In particular, we exploit the whole granularity of the classification, i.e. from NACE-1 to 4-digits, based on which we are able to identify 931 industrial sectors within our dataset. Climate-warming data, measured in tonnes of GHG emissions, are gathered from Urgentem. The Urgentem Carbon Dataset covers the full spectrum of Scope 1, 2 and 3 emissions reported by more than 6,000 global companies at a consolidated level. In addition, emissions for all other companies are inferred by Urgentem via estimation models based on industry and intensity category. In our analysis, we use the relative GHG emissions and consider all three "scopes".<sup>10</sup> In the spirit of Bolton and Kacpercyk (2021), the relative GHG emissions, which measure the carbon intensity of a company, are expressed as tonnes of GHG equivalent divided by the company's revenues, expressed in EUR millions. Based on the Greenhouse Gas Protocol, GHG emissions are classified into three groups ("scopes"), depending on the source. *Scope 1* accounts for direct emissions that occur from sources owned or controlled by a firm. *Scope 2* covers indirect emissions associated with the purchase of electricity, steam, heating and cooling consumed by a firm. *Scope 3* comprises all other indirect emissions generated in a firm's value chain. Table 1, among others, reports the summary statistics for our GHG emission variables in 2019 (Panel B). With reference to the entire spectrum of scopes (i.e. from 1 to 3), the average firm in our sample produced 772.96 GHG relative emissions. The related distribution spans from a minimum of 126.11 GHG tonnes/millions to a maximum of 5,395.31 GHG tonnes/millions and the dispersion around the mean is relatively large (the standard deviation is 888.31 tonnes/millions).

The decision to consider firm-level GHG emission intensities, rather than sectoral or country breakdowns, is motivated by the substantial heterogeneity in the level of pollution across firms

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<sup>8</sup>The AnaCredit database, based on the Regulation ECB/2016/13 and developed by the ESCB, provides monthly loan-by-loan information on credit granted by credit institutions to firms and other legal entities, covering both euro area and European, non-euro area, countries. For further details, refer to [www.ecb.europa.eu/stats/money\\_credit\\_banking/anacredit/html/index.en.html](http://www.ecb.europa.eu/stats/money_credit_banking/anacredit/html/index.en.html).

<sup>9</sup>NACE Rev. 2 classification is based on a hierarchical structure, which consists of first-level sections (alphabetical code), second-level divisions (2-digit numerical code), third-level groups (3-digit numerical code) and fourth-level classes (4-digit numerical code). Refer to <https://ec.europa.eu/eurostat/documents/3859598/5902521/KS-RA-07-015-EN.PDF>

<sup>10</sup>Based on the 1997 Kyoto Protocol, seven greenhouse gases are considered. These are (i) carbon dioxide (CO<sub>2</sub>); (ii) methane (CH<sub>4</sub>); (iii) nitrous oxide (N<sub>2</sub>O); (iv) hydrofluorocarbons (HFCs); (v) perfluorocarbons (PCFs); (vi) sulphur hexafluoride (SF<sub>6</sub>); and (vii) nitrogen trifluoride (NF<sub>3</sub>).

within each industrial sector and country. [Figure 1](#) shows the difference between the median GHG emission intensity within a region (left-hand chart) and the firm-level GHG emission intensities (right-hand chart), with the latter representing the measure used in our analysis. As shown, the aggregate GHG emission intensity is relatively homogeneous in each region. By contrast, firm-level GHG emissions allow capturing a greater heterogeneity in the level of pollution caused by firms. Consequently, we add to several existing studies employing sector-level GHG emissions (e.g. [Delis et al., 2018](#); [Mesonnier, 2019](#); [Faiella and Lavecchia, 2020](#); [Degryse et al., 2020](#)) by combining the use of sector-level information with data on the pollution propensities of individual firms. This enables us to also account for production processes and technologies, which in turn influence the level of pollution generated by each firm.

[Insert Figure 1 Here]

Panel A of [Table 1](#) provides the summary statistics for our dependent variable. *Lending*, as per the AnaCredit manual, is the outstanding amount indebted by a debtor to a creditor. Our data covers a large number of loans, which is reflected in a relatively large variation in the size of the loans. The average loan size is €648,453 and the median €150,707. The distribution ranges from a minimum of €25,000 to a maximum of €10,500,000.

Panel C of [Table 1](#) reports the summary statistics for the bank corporate governance variables. Relevant information are obtained from Eikon. The percentage of women on boards (*Female on board*) ranges between 0 and 57.14%. The mean value, 32.94%, is not distant from the median of 33.33%. In our analysis, we use a dummy variable (*Board\_female*) which takes the value 1 if the percentage of female members in the board is above the 75th-percentile, and 0 otherwise.<sup>11</sup> We anticipate an inverse relationship between our gender variables and the amount of bank credit towards less polluting firms (“greener” firms), as motivated in Section 2. Gender diversity in the boardroom might enhance the shared perception of green values among individuals, as well as fostering non-financial outcomes and thereby build environmental strengths. A larger proportion of female directors should, ultimately, exercise more pressure on environmental issues, thus resulting in an increased commitment towards the environment when shaping lending decisions.

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<sup>11</sup>The approach of using dummy variables to identify firms’ boards with a higher/lower female representation is widely adopted in the corporate governance literature. See, for instance, [Gul et al. \(2011\)](#) and [Liu \(2018\)](#), amongst others.

Besides the presence of female directors in the board, we account for board size (*Board\_size*), the tenure of the board members (*Board\_tenure*) and whether the bank has in place a system of compensation for senior executives that is linked to CSR objectives (*CSR\_comp*). *Board\_size* is computed as the number of directors elected to the board, expressed in logarithm. The average board size in our sample is 15.19 directors as represented by a logarithm of 2.70. [de Villiers et al. \(2011\)](#) document a positive relationship between board size and firm environmental performance, seen as a company’s capability to strategically manage its impact on the environment. The authors argue that larger boards bring together different backgrounds, experiences and knowledge. This, in turn, increases the probability of having experts in environmental fields among the members which can contribute to the adoption of effective green practices. A positive association between board size and environmental performance is also revealed in [Walls et al. \(2012\)](#) and [Liu \(2018\)](#). On the other hand, studies by [Eisenberg et al. \(1998\)](#) and [Boone et al. \(2007\)](#) show that larger boards result in a lower degree of efficiency due to coordination and free-riding issues, which can result in underestimating environmental concerns. *Board\_tenure* is employed to control for the directors’ experience. The variable is measured as the average number of years that each board member has been on the board. Based on the *resource dependence theory*, a greater human and social capital, which also factors the length of the directorship term, can be conducive for better addressing environmental issues, thereby influencing environmental performance ([Hillman and Dalziel, 2003](#)). *CSR\_comp* accounts for the system of executives’ compensation, which is considered to play an important role in fostering effective environmental practices. As argued in [Berrone and Gomez-Mejia \(2009\)](#), structuring the managers’ pay around environmental performance can positively affect a firm, producing desirable outcomes for shareholders, managers and society.

Panel D of [Table 1](#) provides the summary statistics for the bank-level controls, commonly employed in the banking literature. Confidential information is collected from the ECB’s supervisory dataset. On average, banks have total assets (*TotAss*) of €647 billion. The median value is €639 billion, reflecting a relatively symmetrical distribution. The ratio of total deposits to total liabilities (*Dep\_tl*), a proxy for the stability of banks’ funding structure, is on average 76.79%. The ratio of non-performing loans to gross loans (*NPL\_r*), which captures a bank’s asset quality, presents a mean value of 7.07%. The average profitability of the banks in our sample, measured by the ratio of the net income to total assets (*ROA*), ranges between -0.49%

and 1.01%. The ratio of cash and cash equivalents to total assets (*Cash\_ta*), capturing banks' liquidity, is on average 6.99%. Banks' business model is proxied by the ratio of fees and commissions to operating income (*Fee\_opInc*). The indicator for business diversification with respect to traditional intermediation activity ranges between 15.82% and 56.85%, presenting a relatively large dispersion around the mean (9.32%). Lastly, the average ratio of common equity tier 1 ratio (*CET1\_r*) is 12.74%, thus reflecting relatively high soundness of banks within our sample.

Panel E of [Table 1](#) reports the summary statistics for the firm-level characteristics, collected from Orbis Amadeus. The average size of the firm included in our sample (*Firm\_size*) is €9.56 million. The average ratio of cash holdings to current liabilities (*Firm\_cash*), a proxy for the firm degree of short-term liquidity, is 22.16%, while the median is 9.23%. The average debt ratio, measured as the sum of current liabilities and non-current liabilities to total assets (*Firm\_debt*), is 73.00%. The median is 74.24%, indicating a relatively symmetrical distribution. The ratio of earnings before interest and taxes to total assets (*Firm\_ROA*), a proxy for firm profitability, is on average 3.81%. The *Firm\_WC* indicator (working capital to total assets) spans from -22.93% and 85.06%, with an average value of 24.87%. Lastly, the average *Firm\_gearing*, i.e. interest paid to earnings before interest and taxes, is 22.67%.

Panel F of [Table 1](#) reports summary statistics for the cultural/institutional variables collected from the EIGE database. First, we assess whether cultural elements play a significant role in influencing a bank's lending strategy. To this end, we construct a dummy variable (*South*) that assumes value 1 if the considered bank is located in a southern euro area country (i.e. Greece, Italy, Portugal and Spain), and 0 otherwise. Second, we consider whether the country where the bank is located has adopted binding board gender quotas to promote gender balance in the top decision-making bodies. We, therefore, construct a dummy variable (*Quotas*), which takes value 1 in case a bank is located in a country with legislative gender quotas (i.e. Austria, Belgium, France, Germany, Italy and Portugal), and 0 otherwise.<sup>12</sup> Lastly, we consider the potential influence of female climate-oriented political representation in national parliaments. Specifically, we construct a dummy variable (*Cpol*) that takes value 1 in case a bank is located in a country with a proportion of female ministers and government executives dealing with environment and climate change above 50%, 0 otherwise.

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<sup>12</sup>To construct this variable we only consider countries that adopted binding gender quotas, excluding those that implemented softer measures. For further details, refer to [eige.europa.eu/gender-statistics/dgs/data-talks/legislative-quotas-can-be-strong-drivers-gender-balance-boardrooms](https://eige.europa.eu/gender-statistics/dgs/data-talks/legislative-quotas-can-be-strong-drivers-gender-balance-boardrooms).

[Insert Table 1 Here]

Table 2 presents the selected variables and provides the labels, related sources and definitions.

[Insert Table 2 Here]

### 3.2 Methodology

In order to explore whether and to what extent the presence of female members on boards influence banks' lending towards firms with higher/lower GHG emissions, we employ loan-level fixed-effects regressions on our cross-section as they allow to effectively disentangle credit supply from credit demand.

For identification purposes, we follow two distinct approaches. First, and in the spirit of Khwaja and Mian (2008), we exploit multiple bank-firm relationships to control for firm credit demand, hence firms that borrow from multiple banks and within-firm comparisons across banks with more/less female representation on board. However, one shortcoming of the Khwaja and Mian (2008) econometric identification strategy is represented by the exclusion of single-bank relationships, which are absorbed by firm fixed-effects. Since the majority of single-bank relationships involve small and medium enterprises (SMEs), which are predominant in most European countries, we follow the approach by Popov and Van Horen (2015), Acharya et al. (2019) and Degryse et al. (2019) and construct ILS fixed-effects. The industry clusters are based on 4-digit NACE codes. The location clusters are based on 5-digit postal codes and the size clusters are built on quartiles of firms' total assets. The inclusion of ILS fixed-effects allows us to retain more than 300,000 additional single bank-firm relationships in our estimation. The baseline econometric equation is specified as follows:

$$\begin{aligned} Lending_{bj} = & \alpha_j + \beta Board\_female_b + \delta GHGmissions_j + \\ & \gamma Board\_female_b * GHGmissions_j + \theta X_{b,t-1} + \tau T_{b,t-1} + \nu Z_{j,t-1} + \epsilon_{bj} \quad (1) \end{aligned}$$

where  $b$  indicates the bank and  $j$  the firm, respectively. The reference year is 2019. Our dependent variable, *Lending*, is the logarithm of the outstanding amount indebted by a debtor  $j$  to a bank  $b$ .  $\alpha$  alternately indicates firm ( $j$ ) or ILS fixed-effects, employed to control for the heterogeneity of credit demand across firms. *Board\_female* is a dummy variable that takes

the value 1 if the percentage of female members in the board of bank  $b$  at the end of 2018 is above the 75th-percentile, 0 otherwise. The 75th-percentile of the distribution corresponds to 36.82% of female directors on board. In our sample, 18 (34) banks have 36.82% or more (or less) of the seats in the boardroom assigned to female members.  $GHG_{emissions}$  is a variable that captures the emission of climate-warming gases of firm  $j$ . We employ the GHG relative emissions, measured as tonnes over revenues (EUR millions), and separately account for (i) total emissions, i.e. Scope 1, 2 and 3 emissions ( $GHG_{tot}$ ); (ii) Scope 1 and 2 emissions ( $GHG_{12}$ ); and (iii) Scope 3 emissions ( $GHG_3$ ).  $Board\_female * GHG_{emissions}$ , a central variable of our analysis, is included to test whether banks' lending behaviour towards more polluting *vis-à-vis* less polluting firms is influenced by a greater/lower representation of women in the boardroom (i.e. above/below the 75th-percentile).

$X$  is a vector of lagged (end of 2018) bank corporate governance characteristics, including  $Board\_size$  (i.e. the logarithm of the number of directors elected to the board),  $Board\_tenure$  (i.e. the average number of years that each board member has been on the board) and  $CSR\_comp$  (i.e. a dummy to account whether the compensation of senior executives is linked to CSR objectives).  $T$  is a vector of lagged (end of 2018) bank-level controls, which comprises bank size ( $TotAss$ ), measured by the logarithm of total assets, and a number of relevant ratios, such as (i) deposits to total liabilities ( $Dep\_tl$ ); (ii) NPLs to gross loans ( $NPL\_r$ ); (iii) net income to total assets ( $ROA$ ); (iv) cash and equivalents to total assets ( $Cash\_ta$ ); (v) fees and commissions to operating income ( $Fee\_opInc$ ); and (vi) CET1 capital to risk-weighted assets ( $CET1\_r$ ).  $Z$  is a vector of lagged (end of 2018) firm-level characteristics, such as (i)  $Firm\_size$ , measured as the logarithm of firm total assets; (ii) the ratio of cash holdings to current liabilities ( $Firm\_cash$ ); (iii) current liabilities plus non-current liabilities to total assets ( $Firm\_debt$ ); (iv) the ratio of earnings before interest and taxes to total assets ( $Firm\_ROA$ ); (v) working capital to total assets ( $Firm\_WC$ ); (vi) and interest paid to earnings before interest and taxes ( $Firm\_gearing$ ). Robust standard errors ( $\varepsilon_{bj}$ ) are two-way clustered at the bank-firm level.

## 4 Empirical findings

This section discusses the empirical results for the cross-sectional regression based on [Equation \(1\)](#). Table 3 reports the main findings of our analysis, with *Lending* as the dependent

variable and, respectively, the inclusion of (i) the total amount of GHG emissions (columns 1 and 4); (ii) Scope 1 and 2 GHG emissions (columns 2 and 5); and (iii) Scope 3 GHG emissions (columns 3 and 6). The rationale for separately considering the different scopes is to increase the degree of detail in investigating the lending behaviour of banks in our sample towards more/less polluting. Columns 1, 2 and 3 report the estimates with the inclusion of firm fixed-effects, whilst columns 4, 5 and 6 are those with ILS fixed-effects. Bank and firm two-way clustering technique is adopted to adjust the robust standard errors. The model specifications control for credit demand, bank corporate governance factors and other relevant bank-specific characteristics.

#### 4.1 Board gender diversity, bank lending and firms' GHG total emissions

[Table 3](#) (columns 1 and 4) reports the results for our regression analysis including all the spectrum of firms' GHG emission intensities (i.e. Scope 1, 2 and 3 emissions). The results are interesting for a number of reasons. First, the single coefficient on the *GHGtot* variable for the ILS fixed-effects specification (column 4) indicates a positive and statistically significant (at the 1% level) relationship between firms' GHG emission intensities and bank lending. *Ceteris paribus*, banks with a % of female directors on board below the 75th-percentile of the distribution display larger lending volumes to more polluting firms. Second, the coefficient on the interaction *Board\_female\*GHGtot* is negative and statistically significant at the 5% level for the firm fixed-effects regression (column 1) and at the 1% level for the ILS fixed-effect regression (column 4), suggesting that banks with a more female-oriented board tend to reduce their lending volumes as the level of firms' total GHG emissions increases, compared to the other group of banks.

To investigate whether the effect on bank lending is economically meaningful, we plot in [Figure 2](#) the estimated relationship between GHG emissions (x-axis) and the log of lending volumes (y-axis). The coefficients are taken from the specification in column 4 of [Table 3](#). Specifically, the left-hand chart of [Figure 2](#) reports the estimated log of lending volumes at different levels of GHG emissions between the categories of banks with a % of female directors below and above the 75th percentile, whilst the right-hand chart reports the estimated difference in lending volumes at different levels of GHG emissions between the two groups of banks. For the selection of the GHG levels, we rely on the descriptive statistics and select the 5th (245 GHG tonnes/revenues), 25th (300 GHG tonnes/revenues), 50th (564 GHG tonnes/revenues), 75th (847 GHG tonnes/revenues) and 95th (1,386 GHG tonnes/revenues) percentiles of the



distribution. As shown in the left-hand chart of [Figure 2](#), lending volumes to firms with a level of GHG emissions equal to and/or below 847 tonnes/revenues (75th percentile) are not statistically different for the two groups of banks (the related confidence intervals overlap). This evidence suggests that banks with a greater female representation in the boardroom tend to grant lending volumes to low and mid-polluting firms comparable to those granted by banks with a greater male representation. However, we find that banks with more female board members lend less to firms with a level of GHG emissions equal to and/or above 1,386 tonnes/revenues (95th percentile), i.e. more polluting firms. As an illustration of the marginal effect, in the right-hand chart of [Figure 2](#), banks with an above-75th percentile of female directors display about 10% lower lending volumes (statistically significant at the 10% level) towards firms with 1,386 tonnes (last quartile) of relative GHG emissions compared to the other group of banks. Our findings point at a key role played by female directors in shaping banks' lending strategies, on the one hand, and greater consideration for the environmental dimension within a more gender-diverse board, on the other hand.

[\[Insert Figure 2 Here\]](#)

Among bank-specific controls (columns 1-6), we document a positive association between bank size and lending volumes. Controlling for other factors, a 1pp increase in *L.TotAss* is associated with about 0.10-0.15% lower lending. We also find a negative and statistically significant (at the 5% level) relationship between bank liquidity (*L.Cash.ta*) and bank lending. To a 1pp lower cash and cash equivalent to total assets corresponds an increase in bank lending volumes by about 1.7-2.5%.

Regarding firm-specific controls, significant associations are documented for size, liquidity, debt, profitability and gearing proxies (columns 4-6). Arguably, larger and more profitable firms tend to borrow more than smaller firms, which is reflected in the positive and highly statistically significant relationship between our dependent variable and *Firm\_size* and *Firm\_ROA*, respectively. Reasonably, more leveraged firms (as captured by *Firm\_debt* and *Firm\_gearing*) are shown to receive more bank lending. Working capital (*Firm\_WC*) does not appear to have a significant impact on the volumes of funds granted by banks.

Among banks' corporate governance factors (columns 1 and 6), our findings reveal a positive

and economically significant impact of board size on the volumes of bank lending. Specifically, a 1% increase in board size increases lending by about 0.5-0.7% (column 3). Finally, we find that the coefficient on *Board.tenure* is also positive and statistically significant, suggesting that a greater degree of board members' experience has the potential to influence bank lending.

## 4.2 Board gender diversity, bank lending and firms' Scope 1&2 GHG emissions

Columns 2 and 5 of [Table 3](#) report the results for the regression analysis that accounts only for firms' Scope 1 and 2 GHG emissions (*GHG12*). Scope 1 emissions are those caused directly by a firm's activities, while Scope 2 emissions include indirect emissions arising from a firm's energy consumption. These two categories of emissions can be measured relatively easily, referring to the firm's utility bills and fuel expenses.

Similarly to the results presented in columns 1 and 4, we find a positive and statistically significant relationship between *GHG12* and the logarithm of lending volumes (column 5), indicating that banks with a % of female directors below the 75th-percentile lend more to firms with higher levels of Scope 1 and 2 relative GHG emissions. The interaction terms are, once again, negative and statistically significant at the 5% (column 2) and at the 1% level (column 5), suggesting that banks with more female directors on the board reduce their lending volumes as GHG emissions increase, compared to the other banks.

[Figure 3](#) (left-hand chart) compares the estimates of the log of lending volumes at different levels of Scope 1 and 2 relative GHG emissions for both banks with a % of female directors above and below the 75th percentile. For the selection of the GHG levels, we rely on the descriptive statistics and select the 5th (10 GHG tonnes/revenues), 25th (14 GHG tonnes/revenues), 50th (27 GHG tonnes/revenues), 75th (52 GHG tonnes/revenues) and 95th (232 GHG tonnes/revenues) percentiles of the related distribution. The right-hand chart reports the estimated difference in lending volumes at different levels of GHG relative emissions for the two groups of banks. While lending volumes increase for banks with fewer female directors (solid blue line), this pattern is not shown for banks with more female members on the board. For GHG values equal and/or below the 75th percentile (52 GHG tonnes/revenues), we do not find a statistically significant difference between the two groups of banks (the confidence

intervals overlap). However, for GHG values equal and/or above the 95th percentile (232 GHG tonnes/revenues) the difference is statistically significant, indicating that banks with a greater female representation showcase lower lending volumes to more polluting firms. As displayed in the right-hand chart, institutions with an above 75th percentile of female directors display 12.5% lower lending volumes to firms with 232 tonnes of Scope 1 & 2 GHG emissions per million revenues.

[Insert Figure 3 Here]

### 4.3 Board gender diversity, bank lending and firms' Scope 3 GHG emissions

Columns 3 and 6 of [Table 3](#) display the results for the regression analysis that accounts only for firms' Scope 3 GHG emissions (*GHG3*). This category, among the three, is the most difficult to be measured, given that it covers indirect, value chain and product-related emissions (not captured in Scope 2) and includes both upstream and downstream emissions. Scope 3 emissions often represent a corporate's largest GHG impact ([GHG Protocol](#)) and should be carefully tracked and assessed. Based on the Protocol, there are 15 categories of Scope 3 emissions and often firms' disclosure is limited to those deemed to be material. While the level of regulation is increasing, there is still room for a certain degree of case-by-case interpretation. However, the increased transparency in terms of reporting, fostered by the recommendations stemming from international authorities, such as the Task Force on Climate-Related Financial Disclosure set by the Financial Stability Board (FSB), contribute to enhancing banks' awareness and commitment to reducing the carbon emissions they fund.<sup>13</sup>

Our results confirm a beneficial effect associated with a larger proportion of female directors in the boardroom on bank lending towards firms generating higher levels of climate-warming emissions. The relationship between *GHG3* and our dependent variable (*Lending*) is positive and statistically significant at the 1% level, reflecting a direct link between firms' GHG emission intensities and bank lending. The interaction term (*Board\_female\*GHG3*) is negative and statistically significant at the 1 and 5% levels, across all model specifications, suggesting that banks with more female directors in the board reduce their lending volumes as GHG relative emissions increase, compared to their peers. The graphical evidence in [Figure 4](#) displays similarities with that reported for all spectrum of GHG emissions ([Figure 2](#)). It appears that greater

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<sup>13</sup>See [www.fsb-tcfd.org/](http://www.fsb-tcfd.org/).

attention to the environmental dimension associated with bank lending is paid by banks with more women in leadership positions. In a wider perspective, this evidence assumes a specific relevance if considering the contribution of climate-related risks, within the banking sector, in terms of overall financial stability.

[Insert Table 3 Here]

[Insert Figure 4 Here]

## 5 Additional analyses: Explaining the "gender-green-lending" nexus

In this section, we discuss some additional analyses we performed. First, we try to understand whether there is a difference in banks' lending behaviour depending on the country where the bank is located. In particular, we aim at evaluating if the beneficial effect of a more gender-diverse board, in terms of lending towards less polluting firms, is linked to the geographical area where the bank operates. In this respect, different cultural factors could potentially enhance or hinder the influence of female directors on greener banks' lending strategies. In Equation (1), we include a dummy variable (*South*) that takes value 1 if the bank is located in a southern euro area country (i.e. Greece, Italy, Portugal and Spain) and zero otherwise. The rationale underlying the differentiation between these geographical areas and countries lies in the historical predominance of the "male-breadwinner" model (Gonzalez et al., 1999; Pfau-Effinger, 2004). Based on this theoretical rationale, there exists a clear hierarchical and patriarchal division of labour and power within the nuclear family, where only male members participate in the labour market, being the family providers, and women are mostly housewives.

Second, we are interested in understanding how and to what extent the female climate-oriented representation in the national political settings play a relevant role in influencing banks' lending decisions in favour of more/less polluting firms. To test this hypothesis, we include in Equation (1) a dummy variable (*Cpol*) equal to 1 if a bank is located in a country with a proportion of female ministries and government executives dealing with environment and climate change above 50% and 0 otherwise. The politicians' gender might have implications for national policy outcomes, such as the provision of services in the health (Bhalotra and

Clots-Figueras, 2014) or education (Clots-Figueras, 2012) sphere, also including climate change initiatives. Mavisakalyan and Tarvedi (2019), based on a cross-country analysis, argue that female political representation positively contributes to the adoption of more stringent climate change actions, also leading to lower CO2 emissions.

Third, we aim to test whether the adoption of legislative gender quotas to promote the gender-equality in decision-making bodies has relevance in the “gender-green-lending” nexus we identified in our baseline analysis. To this end, we construct and include in our cross-sectional regression a dummy variable (*Quotas*) that takes value 1 if a bank is located in a country with legislative gender quotas (Austria, Belgium, Germany, France, Italy and Portugal), and 0 otherwise. The significant under-representation of women in corporate boards worldwide is a timely topic of great interest to policymakers, practitioners and academics (Reding, 2012; OECD, 2015; Terjesen and Sealy, 2016). Assessing the implications associated with the adoption of gender quotas is a core part of the current debate on how to improve gender equality in decision-making positions. To date, the evidence is mixed. Ahern and Dittmar (2012) document a negative impact of quotas on the value and performance of Norwegian firms.<sup>14</sup> A similar evidence is shown in Matsa and Miller (2013) and Greene et al. (2020). Other studies reveal a relatively neutral impact of gender quotas on firms’ value (Eckbo et al., 2021) or a beneficial impact in terms of the labour market for directors (Ferreira et al., 2019). Terjesen and Sealy (2016) argue that female directors positively impact social capital within the board, acting as knowledge brokers between others. The related discussion also involves the banking industry (Cardillo et al., 2020).

## 5.1 The role of cultural factors

In columns 1 and 4 of Table 4, we report the results for the analysis including the *South* dummy in Equation (1). The estimated coefficient on the double interaction term (*Board\_female\*GHGTot*) is negative and statistically significant in the ILS fixed-effects regression (column 4) - although it loses statistical significance in the firm fixed-effects regression (column 1). However, when we turn our attention to the triple interaction term (*Board\_female\*GHGTot\*South*), we can infer that the discussed inverse relationship between more gender-diverse boards and lending towards less polluting firms does not hold for banks located in southern euro area countries. The

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<sup>14</sup>In 2003, Norway was the first country in the world to introduce binding gender quotas for all publicly traded and state-owned companies.

related coefficients are positive and, in the ILS fixed-effects specification, statistically significant at the 10% level, suggesting that banks with more female directors on boards and located in southern euro area countries lend more to more polluting firms, compared to northern euro area banks. This evidence might be explained by a predominance of the "male-breadwinner" model in southern Europe, which places women in the role of housewives, mostly excluded from the labour market. This collective cultural approach would tend to undermine female empowerment within the organizations and in the top-level decision-making positions.

## 5.2 The role of female climate-oriented politicians

In columns 2 and 5 of [Table 4](#), we report the results for the cross-sectional regression analysis, based on Equation (1), with the inclusion of the *Cpol* dummy variable (equal to 1 if a bank is located in a country with more than 50% of female ministries and government executives dealing with environment and climate change, and 0 otherwise). The triple interaction term ( $Board\_female * GHGTot * Cpol$ ) is negative across all specifications (columns 2 and 5) and highly statistically significant. This evidence suggests that banks with more female representation on board and that are located in countries with an above-median proportion of female climate-oriented politicians tend, *ceteris paribus*, to lend lower volumes of funds to more polluting firms. This result is in line with the literature analysing the relationship between women's political empowerment and CO2 emissions, which points to a negative and statistically significant correlation between the number of ministerial positions held by women and CO2 emission reductions ([Ergas and York, 2012](#)). Either because of the greener orientation of women, which could be crucial for successful environmental policy-making or because of the general effect that more gender equality at the political level might have on the way people perceive the environment, a higher number of female ministers and climate-government executives contribute to promoting gender equality and environmental instances, which in turn ease the task of bank female directors in achieving better environmentally-related results.

## 5.3 The role of gender quotas

In columns 3 and 6 of [Table 4](#), we report the findings with the inclusion of the dummy variable *Quotas* that takes value 1 if a bank is located in a country with legislative gender quotas, and 0 otherwise. In columns 1 to 3 both the double ( $Board\_female * GHGTot$ ) and the

triple interaction terms ( $Board\_female*GHGtot*Quotas$ ) are lacking statistical significance (the sum of the two coefficients is statistically significant), suggesting that there are no differences in terms of lending to more/less polluting firms between banks operating in countries with/without legislative gender quotas. In this respect, gender quotas do not appear to play a relevant role in enhancing female influence on banks' lending strategies, within a pro-environmental vision. As suggested by [Ahern and Dittmar \(2012\)](#), this evidence could be explained by a lack of work and leadership experience of post-quota female directors, compared to male counterparts. Furthermore, as argued in [Terjesen and Sealy \(2016\)](#), it might be the case that post-quota female directors are "busier" because simultaneously sit on multiple boards, thereby being less capable to exert their power. Lastly, a problem in terms of female directors' legitimacy in quota-mandating countries ([Tienari et al., 2009](#)) might undermine women's influence on the board and on strategic decisions.

[Insert Table 4 Here]

#### 5.4 The role of female directors' specific characteristics: Age, education & background

Based on the evidence we obtain in the previous analyses, in this section, we aim to shed the light on the specific characteristics of female directors in our sample. To this end, we deepen our investigation by looking at three aspects that differentiate the women on the banks' boards. Specifically, we consider their (i) age; (ii) level of education; and (iii) background. We, therefore, include three additional variables in the model specification presented in Section 3.2 (Equation (1)) and, alternatively, interact them with the *Board\_female* indicator. The first inclusion is *Age*, which measures the average age of the female directors on the board. The second one is *PhD*, which accounts for the number of female directors who hold a doctoral degree. The third one is *Academic*, which indicates whether a female director has an academic background. For the latter variable, we construct a dummy that takes value 1 if the director is an academic, 0 otherwise. All information is manually gathered from the banks' annual reports.

[Table 5](#) provides the results of our investigation. Although age is found to largely explain the variance in moral judgment, with older individuals displaying higher moral reasoning ([Ruegger and King, 1992](#)), we do not find any relationship between *Age* and lending to more/less pollut-

ing firms as the coefficient on the interaction term  $Board\_female*GHGTot*Age$  is negative and lacking statistical significance.

In exploring the impact of the directors' level of education on banks' lending to more/less polluting firms, we find that better-educated female directors, i.e. holding a doctoral degree, positively influence the collective decisions towards greener borrowers. The coefficient on the triple interaction  $Board\_female*GHGTot*PHD$  is negative and statistically significant at the 10% (column 2) and 1% level (column 5). The educational level is seen to impact managers' cognitive skills and value system, which in turn influence a firm's strategic decisions (Hitt and Tyler, 1991). Furthermore, the managers' educational background can affect a firm's degree of innovativeness and, thus, a firm's strategic address (Hambrick and Mason, 1984). More educated managers, with greater environmental awareness, due to an enhanced capability to develop and leverage a larger breadth of understanding, may be able to put higher green pressure on firms than their less-educated peers (Rest and Narvaez, 1994; Diamantopoulos et al., 2003). Our findings appear to corroborate the evidence that more educated female directors can effectively exert greater pressure on decision-making towards greener options.

Given the central role played by universities in driving societal changes and pushing for a more sustainable future (Cortese et al., 2003; Wang et al., 2013), it is reasonable to expect that directors with an academic background might be more responsive to younger generations' concerns, including those related to the environment. However, our findings do not support the hypothesis of grater attention to the environment of female directors with an academic background. The coefficient on the  $Board\_female*GHGTot*Academic$  term is lacking statistical significance (column 6).

[Insert Table 5 Here]

## 6 Robustness checks to account for endogeneity

### 6.1 Sorting effect

It is well acknowledged that corporate governance studies may suffer from endogeneity problems (Coles et al., 2012). Consequently, in this section, we control for the so-called *sorting effect*, namely for the possibility that reverse causality drives our results. Indeed, banks more



socially responsible may be more likely to hire female directors on their boards than other banks. In addition, women may *self-select* into banks that are *per se* more socially responsible than others. Lastly, given that we suggest that women are more risk-averse than their male peers, it is also plausible that women tend to select boards of less risk-taking banks.<sup>15</sup>

We account for these endogeneity concerns by employing the instrumental variable (IV) approach and estimate the regressions using a two-stage least squares (2SLS) framework to extract the exogenous component from the percentage of female directors. The main challenge in using 2SLS is the identification of exogenous IVs that are not directly correlated with the dependent variable. We, therefore, need to identify a source of exogenous variation in our main variable of interest. To this end, we employ the ratio of female participation in the workforce at the country level (*Womenpart*) as our instrumental variable. We borrow the idea about the instrument from [Huang and Kisgen \(2013\)](#) and [Chen et al. \(2017\)](#), who suggest that the greater the female participation in the workforce, the higher is the probability for a bank (or firm) to find talented female candidates from a larger pool of contenders. The IV econometric identification is specified as follows:

$$\begin{aligned} \text{Stage1 : } E[\text{Board\_female}_b | \text{Womenpart}, \text{Controls}] = \\ \Phi(\text{Womenpart}_k, \text{Controls}_{b,t-1}) \end{aligned} \quad (2)$$

$$\begin{aligned} \text{Stage2 : } \text{Lending}_{bj} = \alpha_j + \beta \text{Fitted\_Board\_female}_b + \delta \text{GHGtot}_j + \\ \gamma \text{Board\_female}_b * \text{GHGtot}_j + \theta X_{b,t-1} + \tau T_{b,t-1} + \nu Z_{j,t-1} + \epsilon_{bj} \end{aligned} \quad (3)$$

In the first stage of [Equation \(2\)](#), we rely on a probit model and regress our main variable of interest (*Board\_female*) on the instrumental variable (*Womenpart*), as well as the bank- and corporate governance-specific characteristics used throughout the paper to capture the probability of having an above-75th percentile of females on board. In the second stage, we introduce the fitted values of *Board\_female* from the stage 1 regression into [Equation \(3\)](#) and regress our main dependent variable (*Lending*) on the same set of variables employed in [Equation \(1\)](#).

Column 1 of [Table 6](#) reports the results of the first-stage regression. In line with the re-

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<sup>15</sup>In Section 7.2, we discuss alternative methods employed to control for endogeneity concerns.

quirements for a valid instrument, *Womenpart* is statistically significant at the 1% level and positively correlated with the probability of having an above-75th percentile of females in the bank boardroom, suggesting the validity of the IV. Moreover, the instrument employed is strong as suggested by the Kleibergen-Paap, Cragg-Donald test statistics (Cragg and Donald, 1993; Stock and Yogo, 2005). Columns 2 and 3 of Table 6 display the results for the second-stage regression, which makes use of the predicted probability from the first-stage regression (*Fitted\_Board\_female*) to estimate the bank lending behaviour to more/less polluting firms. The results retain signs and statistical significance in line with those obtained for the baseline regression (Table 3), suggesting an inverse relationship between a higher percentage of female directors and lending volumes to more polluting firms, which further corroborates our main findings.

[Insert Table 6 Here]

## 6.2 Sample selection biases

### 6.2.1 Large exposures

As a second robustness check, we account for sample selection biases. In the previous analyses, we show that the presence of female directors in the boardroom has a significant effect in shaping banks' lending decisions towards more/less polluting firms. However, the average lending amount granted by the banks in the credit register sample is relatively small (€648,453) and reflects a composition oriented to SMEs. While credit register data are fundamental to assess the effect of female members in bank boards for a broader spectrum of borrowing firms - in contrast to studies that focus on specific loan categories (Delis et al., 2018; Reghezza et al., 2021) - it may be the case that female directors' "voice" on a greener lending behaviour is less heard when loans are large and directed to international corporations. This could be due to a lower female's perception of self-efficacy and confidence (Lenney, 1977; Barber and Odean, 2001), compared to men, in undertaking complex financial decisions (Endres et al., 2008). With this additional test, we, therefore, aim to understand whether the greening effect of female directors holds regardless of the category of loans and related board decisions.

To tackle this concern, we employ an additional loan-level dataset which is collected under the large exposures regime.<sup>16</sup> An exposure to a single borrower or a connected group of borrowers is

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<sup>16</sup>Information on euro area bank large exposures data to individual counterparties is taken from the Supervisory Reporting (COREP 27-31), which requires banks to report to the Single Supervisory Mechanism (SSM) detailed

considered to be a large exposure when, before the application of credit risk mitigation measures and exemptions, is equal to or higher than 10% of an institution’s eligible capital or has a value equal to or higher than €300 million (Article No.393 of the Capital Requirements Regulation, CRR).<sup>17</sup> As for AnaCredit, we match the large exposure dataset with bank corporate governance variables, bank-specific characteristics and GHG emissions. Our large exposures sample covers 40 large banks lending to 124 large corporations over the period 2014-2018, leading to a total of 2,270 observations. The econometric identification we employ in this analysis is very similar to that presented in Equation (1) and is specified as follows:

$$Lending_{bjt} = \alpha_{jt} + \beta Board\_female\_p75_{bt} + \gamma Board\_female\_p75_{bt} * GHG12_{jt} + \theta X_{bt} + \tau T_{bt} + \epsilon_{bjt} \quad (4)$$

As in the baseline specification, we use as a dependent variable the logarithm of bank lending volumes (*Lending*). In addition, we define a dummy *Board\_female\_p75* equal to 1 for those banks with a percentage of female directors above the 75th percentile of the distribution, 0 otherwise. We capture firms’ GHG emission intensities by weighting Scope 1 and 2 emissions over firm total assets (*GHG12*). Differently from credit register data, the large exposure dataset enables us to exploit a panel dataset as the time series spans from 2014 to 2018. Table A in the Appendix reports the summary statistics for the variables employed in this further analysis. *X* is a vector of lagged bank-level controls, which includes bank size (*TotAss*), measured by the logarithm of total assets, and some relevant ratios, such as (i) deposits to total liabilities (*Dep\_tl*); (ii) NPLs to gross loans (*NPL\_r*); (iii) net income to total assets (*ROA*); (iv) cash and equivalents to total assets (*Cash\_ta*) and the common equity tier 1 ratio (*CET1\_r*). *T* is a vector of lagged bank corporate governance characteristics, including *Board\_size* (i.e. the logarithm of the number of directors elected to the board), *Board\_tenure* (i.e. the average number of years that each board member has been on the board) and *CSR\_comp* (i.e. a dummy variable to account whether the compensation of senior executives is linked to CSR objectives). Given that the large exposures

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information on their large exposures since 2014. Introduced in the EU in 2014, the regime aims to ensure that risks arising from large exposures are reduced by limiting the maximum loss a bank can incur in the event of a sudden counterparty’s failure.

<sup>17</sup>The large exposure dataset encompasses detailed information on the exposures (e.g. instruments) and reporting entities, which allows us to link the large-exposure dataset to the complementary data source. The large-exposure templates used here are reported at the highest level of consolidation and also, form the most relevant group sub-structures, at the individual level.

dataset only covers large corporations that borrow from multiple banks (firms have on average about 4 large exposure loans), we follow the approach of [Khwaja and Mian \(2008\)](#) and include borrower\*time fixed-effects to control for the time-varying heterogeneity in credit demand across firms. Robust standard errors are two-way clustered at the bank-firm level.

Columns 1 and 2 of [Table 7](#) display the results based on [Equation \(4\)](#). As in the baseline results, we find an inverse and statistically significant relationship between the lending volumes of banks with more female directors and *GHG12* relative emissions (at the 5 and 1% levels, respectively). This evidence suggests that our main results are not driven by the sample composition and they are robust also when considering larger loans and a longer sample period. The magnitude of the effect is also economically meaningful. As an illustration, banks with a percentage of female directors on board above the 75th percentile lend about 1.2% less to firms that generate 285 tonnes of GHG emissions/million assets (i.e. firms in the 75th percentile of the GHG emissions distribution), in comparison to the other banks.

### **6.2.2 Transition effects in bank boardroom composition: From male-to-female director**

As a third robustness check, we control for the possibility that psychological traits and/or risk-aversion of women in the bank boardroom may not differ from those of their male peers. The key rationale underlying our analysis contends that female directors are more environmentally-oriented than men due to their psychological traits and/or a different level of risk-aversion. For instance, [Adams and Funk \(2012\)](#), by using data from the European Social Survey (ESS) and survey data on directors' psychological traits show that women in the boardroom can be very different from women in the general population. Specifically, they argue that female directors are both less tradition-oriented than women in the population at large and less tradition-oriented than male directors. Their analysis suggests that it is important to consider the choices women might face to attain their positions before making assumptions about the preferences of women in corporate leadership positions.

To account for this possibility, we follow the approach of [Huang and Kisgen \(2013\)](#) and [Faccio et al. \(2016\)](#) and compare banks' lending to more/less polluting corporations before and after a transition from a male to a female director with a control group of banks that face a

female-to-male transition. Specifically, we define a dummy equal to 1 if in the bank boardroom one or more male directors are replaced by one or more female directors (*male-to-female*). The inclusion of bank fixed-effects allows for the dummy to be time-varying within banks, hence the same bank can face a male-to-female transition in one year and a female-to-male transition in a different year. In contrast to previous studies (see, for instance, [Huang and Kisgen, 2013](#)), we do not use an indicator (dummy) variable at  $t+1$  to capture the effect on the outcome variable (*Lending*) after the executive transition as decisions to grant new large exposure loans and/or the renewal of existing ones are commonly revised at the board level several times within the same year ([EBA](#)). Consequently, a female replacing a male director can immediately affect the decision on whether the large exposure loan is granted, extended or renewed.

The results of this additional test are presented in columns 3 and 4 of [Table 7](#). As observable, the coefficient that captures the transition from male-to-female (interaction *male-to-female\*GHG12*) is negative and statistically significant at the 5% level, thus indicating that in years where a male director is replaced by a female director, lending volumes to more polluting/large corporations are lower. This evidence should further strengthen the core hypothesis of this paper, which sees female directors more inclined, than their male peers, to account for the risks (and related implications) arising from climate change.

[\[Insert Table 7 Here\]](#)

## 7 Conclusions

This study aims to investigate the impact of gender diversity on banks' boards on lending decisions towards more/less polluting firms. While existing academic papers explore the role of gender diversity in banks' decision-making ([Berger et al., 2014](#); [Owen and Temesvary, 2018](#); [Cardillo et al., 2020](#); [Arnaboldi et al., 2021](#)), there is a lack of evidence about the impact of gender diversity in banks' boards in shaping lending strategies in favour of greener options. Given the extremely relevance of climate change and the increasing attention on how to combat its effects, this paper represents a timely and significant contribution to the extant literature, of interest to policymakers, academics and practitioners.

Using granular credit register data matched with GHG firms' emissions, as well as an exten-

sive range of bank- and firm-specific information, we show that banks with more gender-diverse boards lend less to more polluting firms. This "greening" effect is robust to a variety of additional analyses and tests, including those to rule out endogeneity concerns. An investigation of the female-director specific characteristics suggests that better-educated directors pay greater attention to the environment, thereby granting lower credit volumes to browner firms. We also document that the "greening" effect associated with female members in banks' boardrooms is stronger in countries with more female climate-oriented politicians

Our results have important implications for policymakers. Policies that envisage a larger percentage of women at the bank management level not only have an impact on gender diversity imbalances but allow for more efficient fulfilment of environmental objectives. However, our results do not investigate the potential trade-off between the environmental results achieved by females in the bank boardroom and the corporate financial performance and risk objectives. Is the achievement of climate objectives also in the interest of bank shareholders? Additional research is needed to study the alignment (or potential misalignment) between the climate-related benefits and the financial repercussions that might stem the deployment of green lending strategies. Recent empirical evidence shows that the stock market values carbon emissions, as investors require higher compensation for holding the stocks of more polluting companies ([Bolton and Kacpercyk, 2021a](#); [Bolton and Kacpercyk, 2021b](#)). The increasing cost of equity for companies with higher emissions can be regarded as an alternative system of decentralised taxation and a way to pass the problem to financial markets. Our study offers an alternative view, as also banks can do their part through their lending decisions, and with the help of a greater presence of females in bank boardrooms.

## References

- Adams, R.B., Ferreira, D. (2009). Women in the boardroom and their impact on governance and performance. *Journal of Financial Economics*, 94, 291-309.
- Adams, R.B., Funk, P. (2012). Beyond the glass ceiling: Does gender matter? *Management Science*, 58, 219-235.
- Ahern, K. R., Dittmar, A. K. (2012). The changing of the boards: The impact on firm valuation of mandate female board representation. *The Quarterly Journal of Economics*, 127, 137-197.
- Albaum G, Peterson R.A. (2006). Ethical attitudes of future business leaders: Do they vary by gender and religiosity? *Business Society*, 45, 300-321.
- Arcury, T.A. (1990). Environmental attitude and environmental knowledge. *Human Organization*, 49, 300-304.
- Arnaboldi, F., Casu, B., Gallo, A., Kalotychou, E., Sarkisyan, A. (2021). Gender diversity and bank misconduct. *Journal of Corporate Finance*, 101834, <https://doi.org/10.1016/j.jcorpfin.2020.101834>
- Atif, M., Hossain, M., Alam, Md S., Goergen, M. (2021). Does board gender diversity affect renewable energy consumption? *Journal of Corporate Finance*, 66, 101665.
- Bantel, K.A., Jackson, S.E. (1989). Top management and innovations in banking: Does the composition of the top team make a difference? *Strategic Management Journal*, 10, 107-124.
- Barber, B.M., Odean, T. (2001). Boys will be boys: Gender, overconfidence, and common stock investment. *The Quarterly Journal of Economics*, 116, 261-292.
- Batten, S. Sowerbutts, R., Tanaka, M. (2016). Let's talk about the weather: The impact of climate change on central banks. *Bank of England Working Paper* No. 603.
- Bayle, A. (2021). Tackling climate for real: The role of central banks. *Speech at Reuters Events Responsible Business 2021*, June. [www.bankofengland.co.uk/speech/2021/june/andrew-bailey-reuters-events-global-responsible-business-2021](http://www.bankofengland.co.uk/speech/2021/june/andrew-bailey-reuters-events-global-responsible-business-2021)

- Berger, A.N., Kick, T., Schaeck, K. (2014). Executive board composition and bank risk taking. *Journal of Corporate Finance*, 28, 48-65.
- Bernardini, E., Faiella, I., Lavecchia, L., Mistretta, A., Natoli, F. (2021). Central banks, climate risks and sustainable finance. *Bank of Italy, Occasional Papers* No. 608.
- Bernile, G., Bhagwat, V., Yonker, S. (2018). Board diversity, firm risk, and corporate policies. *Journal of Financial Economics*, 127, 588-612.
- Berrone, P., Gomez-Mejia, L.R. (2009). Environmental performance and executive compensation: An integrated agency-institutional perspective. *The Academy of Management Journal*, 52, 103-126.
- Bhalotra, S., Clots-Figueras, I. (2014). Health and the political agency of women. *American Economic Journal: Economic Policy*, 6, 164-97.
- Bolton, P., Despres, M., Pereira de Silva, L.A., Samama, F., Svartzman, R. (2020). The green swan. Central banking and financial stability in the age of climate change. *Bank for International Settlements (BIS)*, [www.bis.org/publ/othp31.pdf](http://www.bis.org/publ/othp31.pdf).
- Bolton, P., Kacperczyk, M. (2021). Do investors care about carbon risk? *Journal of Financial Economics*, 142, 517-549.
- Boone, A.L., Casares Field, L., Karpoff, J.M., Raheja, C.G. (2007). The determinants of corporate board size and composition: An empirical analysis. *Journal of Financial Economics*, 85, 66-101.
- Brunnermeier, M.K., Landau, J. (2020). Central banks and climate change. *VoxEU* [www.voxeu.org/article/central-banks-and-climate-change](http://www.voxeu.org/article/central-banks-and-climate-change).
- Byrnes, J.P., Miller, D.C., Schafer, W.D. (1999). Gender differences in risk taking: A meta-analysis. *Psychological Bulletin*, 125, 367-383.
- Campiglio, E., Dafermos, Y., Monnin, P., Ryan-Collins, J., Schotten, G., Tanaka, M. (2018). Climate change challenges for central banks and financial regulators. *Nature Climate Change*, 8, 462-468.
- Cardillo, G., Onali, E., Torluccio, G. (2020). Does gender diversity on banks' boards



matter? Evidence from public bailouts. *Journal of Corporate Finance*, 101560, <https://doi.org/10.1016/j.jcorpfin.2020.101560>

Carter, D.A., Simkins, B.J. and Simpson, W.G. (2003), Corporate governance, board diversity, and firm value. *Financial Review*, 38, 33-53.

Clots-Figueras, I. (2012). Are female leaders good for education? Evidence from India. *American Economic Journal: Applied Economics*, 4, 212-44.

Collins, C. (2019). Can improving women's representation in environmental governance reduce greenhouse gas emissions? [www.climate.org/wp-content/uploads/2019/02/WomenGhG2.pdf](http://www.climate.org/wp-content/uploads/2019/02/WomenGhG2.pdf).

Coles, J.F., Lemmon, M.L., Meschke, J.F. (2012). Structural models and endogeneity in corporate finance: The link between managerial ownership and corporate performance. *Journal of Financial Economics*, 103, 149-168.

Cortese, A.D (2003). The critical role of higher education in creating a sustainable future. *Planning for higher education*, 31, 15-22.

De Haas, R., Popov, A. (2019). Finance and carbon emissions. *European Central Bank (ECB) Working Paper Series* No. 2318.

De Villiers C., Naiker V., van Staden C.J. (2011). The effect of board characteristics on firm environmental performance. *Journal of Management*, 37, 1636-1663.

Degryse, H., De Jonghe, O., Jakovljević, S., Mulier, K., Schepens, G. (2019). Identifying credit supply shocks with bank-firm data: Methods and applications. *Journal of Financial Intermediation*, 40, 100813, <https://doi.org/10.1016/j.jfi.2019.01.004>

Degryse, H., Roukny, T., Tielens, J. (2020). Banking barriers to the green economy. *National Bank of Belgium Working Paper* No. 391.

Delis, M., De Greiff, K. and Ongena, S. (2018). Being stranded on the carbon bubble? Climate policy risk and the pricing of bank loans. *Swiss Finance Institute Research Paper Series*, No. 18-10, Swiss Finance Institute.

Diamantopoulos, A., Schlegelmilch, B.B., Sinkovics, R.R., Bohlen, G.M. (2003). Can

socio-demographics still play a role in profiling green consumers? A review of the evidence and an empirical investigation. *Journal of Business Research*, 56, 465-480.

Dobbins, G.H. (1985). Effects of gender on leaders' responses to poor performers: An attributional interpretation. *Academy of Management*, 28, 587-598.

Eagly, A.H. (1987). Sex differences in social behavior: A social-role interpretation. *New Jersey: Hillsdale*.

Eagly, A.H., Crowley, M. (1986). Gender and helping behavior: A meta-analytic review of the social psychological literature. *Psychological Bulletin*, 100, 283-308.

Eagly, A.H., Johannesen-Schmidt, M.C., van Engen, M.L. (2003). Transformational, transactional, and laissez-faire leadership styles: A meta-analysis comparing women and men. *Psychological Bulletin*, 129, 569-591.

Eagly, A.H., Karau, S.J. (1991). Gender and the emergence of leaders: A meta-analysis. *Journal of Personality and Social Psychology*, 60, 685-710.

Eckbo, B.E., Nygaard, K., Thorburn, K.S. (2021). Valuation effects of Norway's board gender-quota law revisited. *Management Science*, forthcoming, <https://doi.org/10.1287/mnsc.2021.4031>

Eisenberg, T., Sundgren, S., Wells, M.T. (1998). Larger board size and decreasing firm value in small firms. *Journal of Financial Economics*, 48, 35-54.

Endres, M.L., Chowdhury, S.K., Alam, I. (2008). Gender effects on bias in complex financial decisions. *Journal of Managerial Issues*, 20, 238-254.

Ergas, C., York, R. (2012). Women's status and carbon dioxide emissions: A quantitative cross-national analysis. *Social Science Research*, 41, 965-976.

Faccio, M., Marchica, M-T., Mura, R. (2016). CEO gender, corporate risk-taking, and the efficiency of capital allocation. *Journal of Corporate Finance*, 39, 193-209.

Faiella, I., Lavecchia, L. (2020). The carbon footprint of Italian loans. *Bank of Italy, Occasional Papers*, N. 557.

Ferreira, D., Ginglinger, E., Laguna, M-A., Skalli, Y. (2019). Board quotas and director-

firm matching. *American Finance Association 2019 Annual Meeting*, Jan 2019, Atlanta, [www.hal.archives-ouvertes.fr/hal-02302287/document](http://www.hal.archives-ouvertes.fr/hal-02302287/document).

Fondas, N. (1997). Feminization unveiled: Management qualities in contemporary writings. *The Academy of Management Review*, 22, 257–282.

Forte, A. (2004). Antecedents of managers moral reasoning. *Journal of Business Ethics*, 51, 315–347.

FSB, 2020. The implications of climate change for financial stability. *Financial Stability Board (FSB)*, November. [www.fsb.org/wp-content/uploads/P231120.pdf](http://www.fsb.org/wp-content/uploads/P231120.pdf)

García Lara, J.M., García Osma, B., Mora, A., Scapin, M. (2017). The monitoring role of female directors over accounting quality. *Journal of Corporate Finance* 45, 651-668.

Giannetti, M., Zhao, M. (2019). Board ancestral diversity and firm-performance volatility. *Journal of Financial and Quantitative Analysis*, 54, 1117-1155.

Gilligan, C. (1977). In a different voice: Women’s conceptions of self and of morality. *Harvard Educational Review*, 47, 481–517.

Gilligan, C. (1982). In a different voice: Psychological theory and women’s development. *Cambridge, MA: Harvard University Press*.

González, M.J., Jurado, T., Naldini, M. (1999). Introduction: Interpreting the transformation of gender inequalities in Southern Europe. *South European Society and Politics*, 4, 4-34.

Greene, D., Intintoli, V.J., Kahle, K.M. (2020). Do board gender quotas affect firm value? Evidence from California Senate Bill No. 826. *Journal of Corporate Finance*, 60, 101526, <https://doi.org/10.1016/j.jcorpfin.2019.101526>

Griffin, D., Li, K., Xu, T. (2021). Board gender diversity and corporate innovation: International evidence. *Journal of Financial and Quantitative Analysis*, 56, 123-154.

Gul, F.A., Srinidhi, B., Ng, A.C. (2011). Does board gender diversity improve the informativeness of stock prices? *Journal of Accounting and Economics*, 51, 314-338.

Hain, M., Schermeyer, H., Uhrig-Homburg, M., Fichtner, W. (2018). Managing renewable

energy production risk. *Journal of Banking & Finance*, 97, 1-19.

Hambrick, D.C., Mason, P.A. (1984). Upper echelons: The organization as a reflection of its top managers. *The Academy of Management Review*, 9, 193–206.

Hillman, A.J., Dalziel, T. (2003). Boards of directors and firm performance: Integrating agency and resource dependence perspectives. *The Academy of Management Review*, 28, 383–396.

Hitt, M.A., Tyler, B.B. (1991). Strategic decision models: Integrating different perspectives. *Strategic Management Journal*, 12, 327-351.

Huang, J., Kisgen, D.J. (2013). Gender and corporate finance: Are male executives overconfident relative to female executives? *Journal of Financial Economics*, 108, 822-839.

Ibrahim, N. A., Angelidis, J. P. (1994). Effect of board members gender on corporate social responsiveness orientation. *Journal of Applied Business Research*, 10, 35-40.

Jaffee, S., Hyde, J.S. (2000). Gender differences in moral orientation: A meta-analysis. *Psychological Bulletin*, 126, 703–726.

Kanyama, A.C., Nässén, J., Benders, R. (2021). Shifting expenditure on food, holidays and furnishings could lower greenhouse gas emissions by almost 40%. *Journal of Industrial Ecology*, 1-15.

Kennedy, J.A., Kray L.J. (2014). Who is willing to sacrifice ethical values for money and social status?: Gender differences in reactions to ethical compromises. *Social Psychological and Personality Science*, 5, 52-59.

Khwaja, A.I., Mian, A. (2008). Tracing the impact of bank liquidity shocks: Evidence from an emerging market. *American Economic Review*, 98, 1413-42.

Kim, D., Starks, L.T. (2016). Gender diversity on corporate boards: Do women contribute unique skills? *American Economic Review*, 106, 267-71.

Kysucky, V., Norden, L. (2016). The benefits of relationship lending in a cross-country context: A meta-analysis. *Management Science*, 62, 90-110.

Lagarde, C. (2021). Climate change and central banking. *Speech at the ILF conference on*

*Green Banking and Green Central Banking*, January. [www.ecb.europa.eu/press/key/date/2021/html/ecb.sp210125~f87e826ca5.en.html](http://www.ecb.europa.eu/press/key/date/2021/html/ecb.sp210125~f87e826ca5.en.html)

Lenney, E. (1977). Women's self-confidence in achievement settings. *Psychological Bulletin*, 84, 1–13.

Levin, I.P., Snyder M.A., Chapman, D.P. (1988) The interaction of experiential and situational factors and gender in a simulated risky decision-making task. *The Journal of Psychology*, 122, 173-181.

Liu, C. (2018). Are women greener? Corporate gender diversity and environmental violations. *Journal of Corporate Finance*, 52,118-142.

Liu, Y., Wei, Z., Xie, F. (2014). Do women directors improve firm performance in China? *Journal of Corporate Finance*, 28, 169-184.

Lundeberg, M.A., Fox, P.W., Punécohaí, J. (1994). Highly confident but wrong: Gender differences and similarities in confidence judgments. *Journal of Educational Psychology*, 86, 114-121.

Matsa, D.A., Miller, A.R. (2013). A female style in corporate leadership? Evidence from Quotas. *American Economic Journal: Applied Economics*, 5, 136-169.

Mavisakalyan, A., Tarverdi, Y. (2019). Gender and climate change: Do female parliamentarians make difference? *European Journal of Political Economy*, 56, 151-164.

McGuinness, P.B., Vieito, J.P., Wang, M. (2017). The role of board gender and foreign ownership in the CSR performance of Chinese listed firms. *Journal of Corporate Finance*, 42,75-99.

Mesonnier, J. S. (2019). Banks' climate commitments and credit to brown industries: New evidence for France. *Banque de France Working Papers* No. 743.

Mohai, P., Twight, B.W. (1987). Age and environmentalism: An elaboration of the Buttel model using national survey evidence. *Social Science Quarterly* 68, 798–815.

OECD, (2015). G20/OECD Principles of Corporate Governance. <https://doi.org/10.1787/9789264236882-en>.

- Ongena, S. Smith, D.C. (2001). The duration of bank relationships. *Journal of Financial Economics*, 61, 449-475.
- Owen, A.L., Temesvary, J. (2018). The performance effects of gender diversity on bank boards. *Journal of Banking & Finance* 90, 50-63.
- Palvia, A., Vähämaa, E., Vähämaa, S. (2015). Are female CEOs and chairwomen more conservative and risk averse? Evidence from the banking industry during the financial crisis. *Journal of Business Ethics*, 131, 577-594.
- Pereira Da Silva, L.A. (2019). Research on climate-related risks and financial stability: An "epistemological break"? *Speech at the Conference of the Central Banks and Supervisors Network for Greening the Financial System (NGFS)*, April. [www.bis.org/speeches/sp190523.htm](http://www.bis.org/speeches/sp190523.htm)
- Pfau-Effinger, B. (2004), Socio-historical paths of the male breadwinner model – an explanation of cross-national differences. *The British Journal of Sociology*, 55, 377-399.
- Post, B., Byron, K. (2015). Women on boards and firm financial performance: A meta-analysis. *Academy of Management*, 58, 1546–1571.
- Prince, M. (1993). Women, men and money styles. *Journal of Economic Psychology*, 14, 175-182.
- Reding, V. (2012). The tug-of-war over the women quota. *Speech at DLDwomen*, July. [www.ec.europa.eu/commission/presscorner/detail/en/SPEECH\\_12\\_547](http://www.ec.europa.eu/commission/presscorner/detail/en/SPEECH_12_547)
- Reghezza, A., Altunbas, Y., Marques-Ibanez, D., Rogriguez d’Acri, C., Spaggiari, M. (2020). Do banks fuel climate change? *European Central Bank (ECB) Working Paper Series* No. 2550.
- Rest, J.R., Narvaez, D. (1994). Moral development in the professions: Psychology and applied ethics. *Hillsdale, NJ: Lawrence Erlbaum*.
- Ruegger, D., King, E.W. (1992). A study of the effect of age and gender upon student business ethics. *Journal of Business Ethics*, 11, 179–186.
- Schubert, R., Brown, M., Gysler, M., Brachinger, H.W. (1999). Financial decision-making:

Are women really more risk-averse? *American Economic Review*, 89, 381-385.

Sundén, A.E., Surette, B.J. (1998). Gender differences in the allocation of assets in retirement savings plans. *American Economic Review*, 88, 207-211.

Terjesen, S., Sealy, R. (2016). Board gender quotas: Exploring ethical tensions from A multi-theoretical perspective. *Business Ethics Quarterly*, 26, 23-65.

Thompson, P., Cowton, C.J. (2004). Bringing the environment into bank lending: Implications for environmental reporting. *The British Accounting Review*, 36, 197-218.

Tienari, J., Holgersson, C., Meriläinen, S., Höök, P. (2009). Gender, management and market discourse: The case of gender quotas in the Swedish and Finnish media. *Gender, Work, and Organization*, 16, 501-521.

UNEP (2016). Global Gender and Environment Outlook (GGEO). [www.unep.org/resources/report/global-gender-and-environment-outlook-ggeo](http://www.unep.org/resources/report/global-gender-and-environment-outlook-ggeo)

Walls, J.L., Berrone, P., Phan, P.H. (2012). Corporate governance and environmental performance: Is there really a link? *Strategic Management Journal*, 33, 885-913.

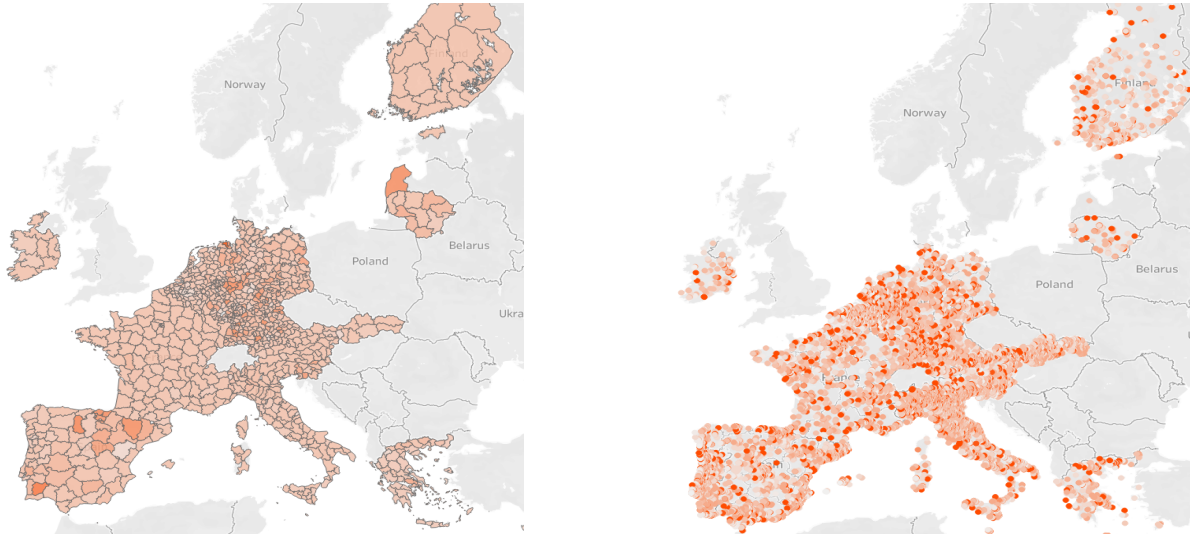
Wang, Y., Shi, H., Sun, M., Huisingh, D., Hansson, L., Wang, R. (2013). Moving towards an ecologically sound society? Starting from green universities and environmental higher education. *Journal of Cleaner Production*, 61, 1-5.

Westphal J.D., Bednar M.K. (2005). Pluralistic ignorance in corporate boards and firms' strategic persistence in response to low firm performance. *Administrative Science Quarterly*, 50, 262-298.

Zelezny, L.C., Chua, P.P., Aldrich, C. (2000). New ways of thinking about environmentalism: Elaborating on gender differences in environmentalism. *Journal of Social Issues*, 56, 443-457.

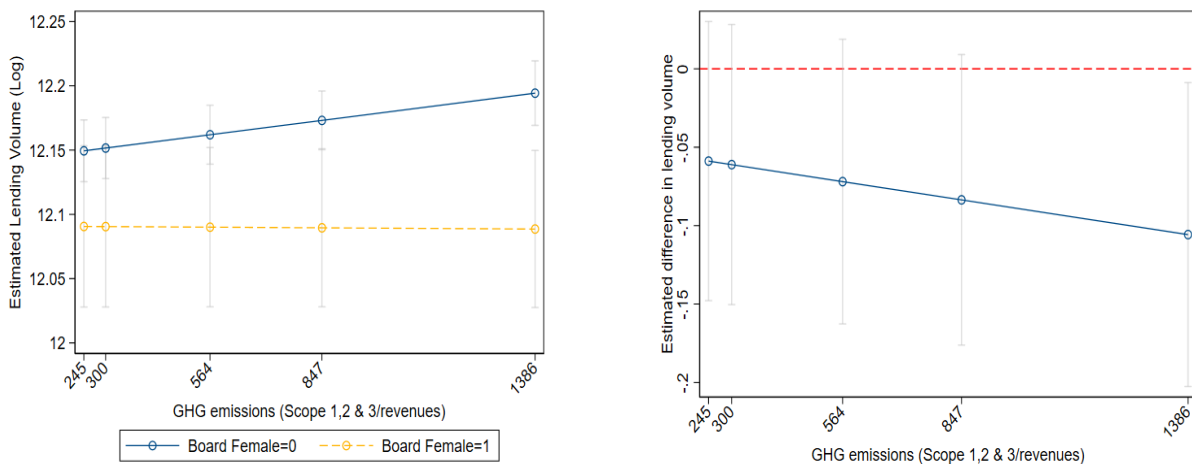
**Figure 1. Comparison of GHG emissions**

This figure displays the difference between the median of the sectoral GHG emission intensities within a region (left-hand chart) and the firm-level GHG emission intensities (right-hand chart). GHG emissions are relative to firm’s revenues in logarithm.



**Figure 2. Estimated relationship between GHG emissions (Scope 1, 2 & 3) and bank lending**

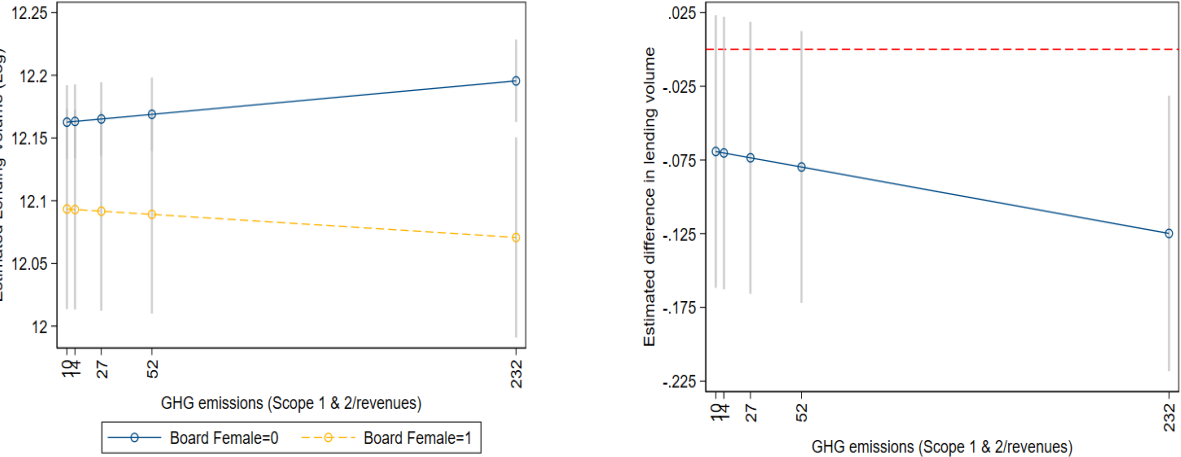
The left-hand chart plots the estimated relationship between GHG emissions (Scope 1, 2 & 3) and lending for banks with a below-75th percentile of female directors in the boardroom (blue solid line) and banks with an above-75th percentile of female directors in the board (yellow dashed line). The right-hand chart plots the estimated difference in bank lending at different levels of GHG emissions for banks with a below-75th percentile of female directors in the board and banks with an above-75th percentile of female directors in the board. In both charts, the y-axis refers to the estimated logarithm of lending volume whilst the x-axis indicates the GHG emissions over firm revenues. The coefficients are taken from the specification in column 4 of [Table 3](#).





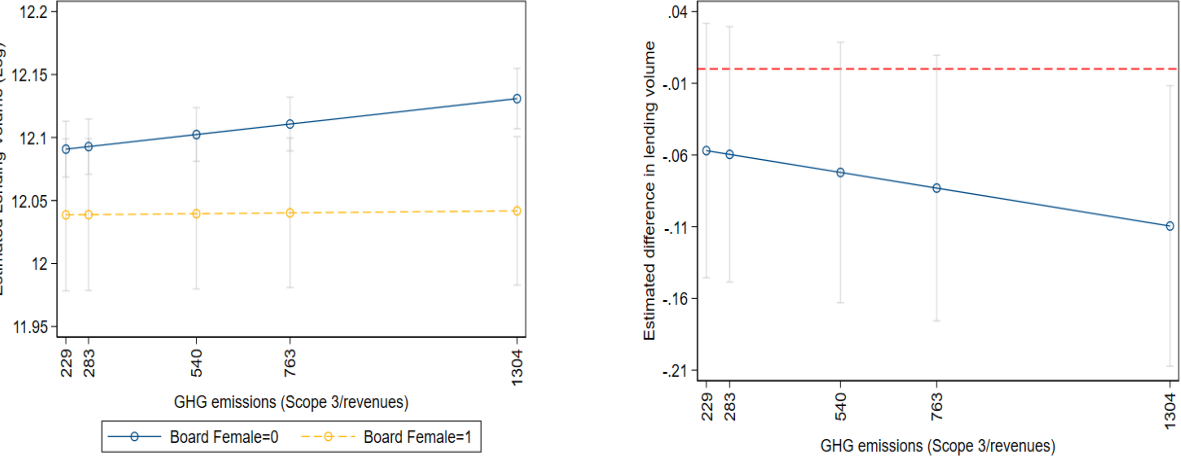
**Figure 3. Estimated relationship between GHG emissions (Scope 1 & 2) and bank lending**

The left-hand chart plots the estimated relationship between GHG emissions (Scope 1 & 2) and lending for banks with a below-75th percentile of female directors in the board (blue solid line) and banks with an above-75th percentile of female directors in the board (yellow dashed line). The right-hand chart plots the estimated difference in bank lending at different levels of GHG emissions for banks with a below-75th percentile of female directors in the board and banks with an above-75th percentile of female directors in the board. In both charts, the y-axis refers to the estimated logarithm of lending volume whilst the x-axis indicates the GHG emissions over firm revenues. The coefficients are taken from the specification in column 5 of Table 3.



**Figure 4. Estimated relationship between GHG emissions (Scope 3) and bank lending**

The left-hand chart plots the estimated relationship between GHG emissions (Scope 3) and lending for banks with a below-75th percentile of female directors in the board (blue solid line) and banks with an above-75th percentile of female directors in the board (yellow dashed line). The right-hand chart plots the estimated difference in bank lending at different levels of GHG emissions between banks with a below-75th percentile of female directors in the board and banks with an above-75th percentile of female directors in the board. In both charts, the y-axis refers to the estimated logarithm of lending volume whilst the x-axis indicates the GHG emissions over firm revenues. The coefficients are taken from the specification in column 6 of Table 3.



**Table 1. Summary statistics**

This table reports the summary statistics for the variables employed in the empirical analysis. Specifically, *Panel A* provides the statistics for the dependent variable, *Panel B* for the GHG emission variables, *Panel C* for the lagged bank corporate governance variables, *Panel D* for the lagged bank-specific variables, *Panel E* for the lagged firm-specific variables and *Panel F* for the cultural/institutional variables. A description of each variable and related source is provided in Table 2.

	Obs	Min	Max	p25	Median	p75	Mean	SD
<b>Panel A. Dependent Variable</b>								
Lending (log)	910,895	10.12	16.16	11.06	11.92	12.98	12.15	1.39
Lending (€)	910,895	25,000	10,500,000	63,593	150,707	435,160	648,453	1,614,857
<b>Panel B: GHG emission variables</b>								
Scope 1-3 relative GHG (%)	910,895	126.11	5,395.31	300.57	564.76	847.41	772.96	888.31
Scope 1 and 2 relative GHG (%)	910,895	5.47	928.37	14.96	27.22	52.36	60.80	134.88
Scope 3 relative GHG (%)	910,895	107.85	4,529.76	283.06	540.92	763.87	707.10	769.65
<b>Panel C: Bank corporate governance variables</b>								
Female on board (%)	910,895	0.00	57.14	30.00	33.33	36.82	32.94	8.22
Board Female (dummy)	910,895	0.00	1.00	0.00	0.00	1.00	0.28	0.45
Board size (level)	910,895	9.00	21.00	14.00	15.00	17.00	15.19	2.42
Board size (log)	910,895	2.19	3.04	2.63	2.70	2.83	2.70	0.16
CSR compensation (dummy)	910,895	0.00	1.00	0.00	0.00	1.00	0.48	0.49
Board tenure (years)	910,895	1.76	12.15	3.43	5.48	7.88	5.64	2.60
<b>Panel D: Bank-specific variables</b>								
Bank size (log total assets)	910,895	23.78	28.23	25.80	27.18	27.51	26.64	1.19
Bank size (€bn)	910,895	21.30	1,830.00	160.00	639.00	887.00	647.00	571.00
Deposits (%)	910,895	44.41	96.24	71.14	79.26	82.07	76.79	10.17
NPLs (%)	910,895	1.20	45.52	3.19	3.77	7.52	7.07	7.47
ROA (%)	910,895	-0.49	1.01	0.27	0.55	0.64	0.48	0.30
Cash (%)	910,895	0.72	14.62	4.05	7.85	8.87	6.99	3.29
Fees and commissions (%)	910,895	15.82	56.85	32.39	37.58	44.20	39.09	9.39
CET1 ratio (%)	910,895	11.02	18.35	11.75	12.05	13.54	12.74	1.49
<b>Panel E: Firm-level variables</b>								
Firm size (log total assets)	910,895	11.42	18.91	14.11	14.31	15.39	14.72	1.42
Firm size (€ml)	910,895	0.09	163	1.34	1.64	4.83	9.56	26.20
Liquidity ratio (%)	910,895	0.03	411.00	3.68	9.23	13.59	22.16	53.13
Debt (%)	910,895	14.19	148.40	65.66	74.24	83.41	73.00	20.46
Firm ROA (%)	910,895	-28.23	30.84	2.19	3.54	5.01	3.81	6.90
Working capital (%)	910,895	-22.93	85.06	12.10	20.86	35.17	24.87	21.59
Gearing ratio (%)	910,895	-151.87	194.51	9.48	15.22	34.11	22.67	43.30
<b>Panel F: Cultural/Institutional variables</b>								
South (dummy)	910,895	0.00	1.00	0.00	1.00	1.00	0.73	0.44
Gender quotas (dummy)	910,895	0.00	1.00	0.00	1.00	1.00	0.56	0.49
C/pol (dummy)	910,895	0.00	1.00	0.00	0.00	0.00	0.14	0.35

**Table 2. Variables, definitions and sources**

<b>Variable (label)</b>	<b>Definition</b>	<b>Source</b>
<b>Dependent variable</b>		
Lending ( <i>Lending</i> )	The outstanding amount (in logarithm) indebted by a debtor to a creditor	AnaCredit
<b>GHG emission variables</b>		
Scope 1-3 GHG relative emissions ( <i>GHGtot</i> )	The sum of Scope 1, 2 and 3 GHG emissions to firm's revenues in logarithm	Urgentem
Scope 1-2 GHG relative emissions ( <i>GHG12</i> )	The sum of Scope 1 and 2 GHG emissions to firm's revenues in logarithm	Urgentem
Scope 3 GHG relative emissions ( <i>GHG3</i> )	Scope 3 GHG emissions to firm's revenues in logarithm	Urgentem
<b>Bank corporate governance variables</b>		
Female on board ( <i>Female_board</i> )	Percentage of women on board	Refinitiv Eikon
Board Female ( <i>Board_female</i> )	Dummy variable equal to 1 for banks with an above-median percentage of female on board, 0 otherwise	Authors' calculation
Board size ( <i>Board_size</i> )	Number of members on bank board (in logarithm)	Refinitiv Eikon
CSR compensation ( <i>CSR_comp</i> )	Dummy variable equal to 1 if the senior executive's compensation is linked to CSR targets, 0 otherwise	Refinitiv Eikon
Board tenure ( <i>Board_tenure</i> )	Average number of years each board member has been on the board	Refinitiv Eikon
<b>Bank-specific variables</b>		
Bank size ( <i>TotAss</i> )	Logarithm of bank total assets	Supervisory data
Deposits ( <i>Dep_tl</i> )	Ratio of customer deposits to total liabilities	Supervisory data
NPLs ( <i>NPL_r</i> )	Ratio of non-performing loans to gross loans	Supervisory data
ROA ( <i>ROA</i> )	Ratio of net income to total assets	Supervisory data
Cash ( <i>Cash_ta</i> )	Ratio of cash and cash equivalent to total assets	Supervisory data
Fees and commissions ( <i>Fee_opInc</i> )	Ratio of fees and commissions to operating income	Supervisory data
Capitalisation ( <i>CET1_r</i> )	Common equity tier1 to risk weighted assets	Supervisory data
<b>Firm-specific variables</b>		
Firm size ( <i>Firm_ta</i> )	Logarithm of firm total assets	Orbis Amadeus
Liquidity ratio ( <i>Firm_cash</i> )	Ratio of cash and cash equivalent to current liabilities	Orbis Amadeus
Debt ( <i>Firm_debt</i> )	Ratio of current liabilities + non-current liabilities to total assets	Orbis Amadeus
Firm ROA ( <i>Firm_ROA</i> )	Ratio of earnings before interest and taxes to total assets	Orbis Amadeus
Working capital ( <i>Firm_WC</i> )	Ratio of working capital to total assets	Orbis Amadeus
Gearing ratio ( <i>Firm_gearing</i> )	Ratio of interest paid to earnings before interest and taxes	Orbis Amadeus
<b>Cultural/Institutional variables</b>		
South ( <i>South</i> )	Dummy variable equal to 1 if a bank is located in a southern euro area country (Greece, Italy, Portugal and Spain), 0 otherwise	Authors' calculation
Gender quotas ( <i>Quotas</i> )	Dummy variable equal to 1 if a bank is located in a country with legislative gender quotas (Austria, Belgium, France, Germany, Italy and Portugal), 0 otherwise	European Institute for Gender Equality
Climate politicians ( <i>Cpol</i> )	Dummy variable equal to 1 if a bank is located in a country with an above-median proportion of female ministries and government executives dealing with environment and climate change, 0 otherwise	European Institute for Gender Equality

**Table 3. Baseline results (Total, Scope 1&2 and Scope 3 GHG emissions)**

This table reports the results of the baseline regression that accounts for all three scopes of GHG emissions. Lending, the dependent variable, is the logarithm of the outstanding amount indebted by a debtor to a creditor. Banks' corporate governance variables, balance-sheet controls and firm-level characteristics are included. For more details on the variables' construction and sources, refer to Table 2. ILS indicates industry\*location\*size fixed-effects. All variables are winsorized at the 1st and 99th percentiles. Robust standard errors clustered at the bank-firm level are reported in parentheses. \*\*\* p<.01, \*\* p<.05, \* p<.1.

VARIABLES	(1) Lending	(2) Lending	(3) Lending	(4) Lending	(5) Lending	(6) Lending
Board_female	-0.07543 (0.069)	-0.08721 (0.072)	-0.07274 (0.069)	-0.04874 (0.053)	-0.06674 (0.056)	-0.04574 (0.053)
GHGTot				0.00004*** (0.000)		
GHG12					0.00015*** (0.000)	
GHG3						0.00004*** (0.000)
Board_female*GHGTot	-0.00002** (0.000)			-0.00004*** (0.000)		
Board_female*GHG12		-0.00010** (0.000)			-0.00025*** (0.000)	
Board_female*GHG3			-0.00003** (0.000)			-0.00005*** (0.000)
L.TotAss	0.15415*** (0.034)	0.15421*** (0.034)	0.15415*** (0.034)	0.10888*** (0.038)	0.10881*** (0.038)	0.10892*** (0.038)
L.Dep_tl	0.01369*** (0.004)	0.01371*** (0.004)	0.01369*** (0.004)	0.00767 (0.005)	0.00767 (0.005)	0.00767 (0.005)
L.NPL_r	0.00407 (0.005)	0.00410 (0.005)	0.00407 (0.005)	0.00383 (0.004)	0.00382 (0.004)	0.00383 (0.004)
L.ROA	-0.16996* (0.092)	-0.17019* (0.091)	-0.16994* (0.092)	-0.13753 (0.101)	-0.13766 (0.101)	-0.13754 (0.101)
L.Cash_ta	-0.02513** (0.010)	-0.02508** (0.010)	-0.02514** (0.010)	-0.01758** (0.009)	-0.01751** (0.009)	-0.01758** (0.009)
L.Fees_opinc	0.00398 (0.005)	0.00398 (0.005)	0.00398 (0.005)	0.00280 (0.004)	0.00278 (0.004)	0.00280 (0.004)
L.CET1_r	0.00455 (0.015)	0.00450 (0.015)	0.00458 (0.015)	0.01266 (0.020)	0.01258 (0.020)	0.01271 (0.020)
L.Firm_ta				0.58324*** (0.022)	0.58339*** (0.022)	0.58328*** (0.022)
L.Firm_cash				0.00056*** (0.000)	0.00056*** (0.000)	0.00056*** (0.000)
L.Firm_debt				0.00786*** (0.000)	0.00786*** (0.000)	0.00786*** (0.000)
L.Firm_ROA				0.00501*** (0.000)	0.00500*** (0.000)	0.00501*** (0.000)
L.Firm_WC				-0.00007 (0.000)	-0.00007 (0.000)	-0.00007 (0.000)
L.Firm_gearing				0.00031*** (0.000)	0.00031*** (0.000)	0.00031*** (0.000)
L.Board_size	0.73001*** (0.092)	0.73004*** (0.093)	0.72998*** (0.092)	0.48038*** (0.113)	0.48047*** (0.113)	0.48032*** (0.113)
L.CSR_comp	-0.09867** (0.040)	-0.09862** (0.040)	-0.09866** (0.040)	-0.07172 (0.043)	-0.07183 (0.043)	-0.07167 (0.043)
L.Board_tenure	0.02800** (0.012)	0.02799** (0.012)	0.02801** (0.012)	0.01747 (0.014)	0.01735 (0.014)	0.01749 (0.014)
Observations	607,445	607,445	607,445	910,895	910,895	910,895
R-squared	0.7314	0.7314	0.7315	0.6327	0.6326	0.6327
Firm FE	Yes	Yes	Yes	No	No	No
ILS FE	No	No	No	Yes	Yes	Yes
N.Banks	52	52	52	52	52	52
N.Firms	236,478	236,478	236,478	539,928	539,928	539,928
Cluster	Bank-firm	Bank-firm	Bank-firm	Bank-firm	Bank-firm	Bank-firm

**Table 4. The "gender-green-lending" nexus: The role of cultural and institutional factors**

This table reports the results of the regression model specification that also accounts for cultural and institutional variables (South, Cpol and Quotas). Lending, the dependent variable, is the logarithm of the outstanding amount indebted by a debtor to a creditor. Banks' corporate governance variables, balance-sheet controls and firm-level characteristics are included. For more details on the variables' construction and sources, refer to Table 2. ILS indicates industry\*location\*size fixed-effects. All variables are winsorized at the 1st and 99th percentiles. Robust standard errors clustered at the bank-firm level are reported in parentheses. \*\*\*p<.01, \*\*p<.05, \*p<.1.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Lending	Lending	Lending	Lending	Lending	Lending
Board_female	-0.15585* (0.078)	-0.34161*** (0.064)	-0.40044*** (0.073)	-0.07592 (0.053)	-0.26618*** (0.059)	-0.21195* (0.123)
GHGTot	0.00000 (0.000)	0.00000 (0.000)	0.00000 (0.000)	0.00005** (0.000)	0.00004*** (0.000)	0.00003 (0.000)
Board_female*GHGTot	-0.00003 (0.000)	-0.00000 (0.000)	-0.00000 (0.000)	-0.00005*** (0.000)	-0.00001* (0.000)	-0.00003 (0.000)
South	0.26431*** (0.075)			0.19117** (0.077)		
Board_female*South	-0.13463 (0.087)			-0.17134*** (0.063)		
South*GHGTot	0.00000 (0.000)			-0.00001 (0.000)		
Board_female*South*GHGTot	0.00002 (0.000)			0.00004* (0.000)		
Cpol		-0.47128*** (0.064)			-0.22568*** (0.083)	
Board_female*Cpol		0.47691*** (0.070)			0.30360*** (0.069)	
Cpol*GHGTot		0.00007*** (0.000)			0.00002* (0.000)	
Board_female*Cpol*GHGTot		-0.00010*** (0.000)			-0.00006*** (0.000)	
Quotas			0.16899 (0.149)			0.18887* (0.101)
Board_female*Quotas			0.06492 (0.103)			-0.02576 (0.139)
Quotas*GHGTot			-0.00000 (0.000)			0.00002 (0.000)
Board_female*Quotas*GHGTot			-0.00002 (0.000)			-0.00001 (0.000)
Observations	607,445	607,445	607,445	910,895	910,895	910,895
R-squared	0.7265	0.7260	0.7259	0.6150	0.6147	0.6151
Firm FE	Yes	Yes	Yes	No	No	No
ILS FE	No	No	No	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
Governance controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
N.Banks	52	52	52	52	52	52
N.Firms	236,478	236,478	236,478	539,928	539,928	539,928
Cluster	Bank-firm	Bank-firm	Bank-firm	Bank-firm	Bank-firm	Bank-firm

**Table 5. The "gender-green-lending" nexus: The role of female directors' specific characteristics**

This table reports the results of the regression model specification that also accounts for female directors' specific characteristics (Age, PhD, Academic). Lending, the dependent variable, is the logarithm of the outstanding amount indebted by a debtor to a creditor. Banks' corporate governance variables, balance-sheet controls and firm-level characteristics are included. For more details on the variables' construction and sources, refer to Table 2. ILS indicates industry\*location\*size fixed-effects. All variables are winsorized at the 1st and 99th percentiles. Robust standard errors clustered at the bank-firm level are reported in parentheses. \*\*\*p<.01, \*\*p<.05, \*p<.1.

VARIABLES	(1) Lending	(2) Lending	(3) Lending	(4) Lending	(5) Lending	(6) Lending
Board_female	1.93909** (0.897)	0.27114*** (0.099)	0.25368*** (0.095)	2.01628** (0.987)	0.12424 (0.106)	0.16097* (0.093)
GHGTot	0.00000 (0.000)	0.00000 (0.000)	0.00000 (0.000)	-0.00004 (0.000)	0.00003* (0.000)	0.00004** (0.000)
Board_female*GHGTot	0.00018 (0.000)	-0.00000 (0.000)	-0.00003* (0.000)	0.00007 (0.000)	-0.00001 (0.000)	-0.00005** (0.000)
Age	0.00144 (0.005)			-0.00412 (0.007)		
Board_female*Age	-0.03458** (0.015)			-0.03554** (0.017)		
GHGTot*Age	0.00000*** (0.000)			0.00000 (0.000)		
Board_female*GHGTot*Age	-0.00000 (0.000)			-0.00000 (0.000)		
PhD		0.10075*** (0.028)			0.04784 (0.029)	
Board_female*PhD		-0.19732*** (0.039)			-0.10449** (0.045)	
GHGTot*PhD		0.00000* (0.000)			0.00001*** (0.000)	
Board_female*GHGTot*PhD		-0.00001* (0.000)			-0.00002*** (0.000)	
Academic			0.17159*** (0.054)			0.14235** (0.056)
Board_female*Academic			-0.41028*** (0.083)			-0.30460*** (0.088)
Academic*GHGTot			0.00000 (0.000)			0.00001 (0.000)
Board_female*Academic*GHGTot			0.00001 (0.000)			0.00001 (0.000)
Observations	607,445	607,445	607,445	910,895	910,895	910,895
R-squared	0.7317	0.7328	0.7325	0.6330	0.6332	0.6334
Firm FE	Yes	Yes	Yes	No	No	No
ILS FE	No	No	No	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
Governance controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
N.Banks	52	52	52	52	52	52
N.Firms	236,478	236,478	236,478	539,928	539,928	539,928
Cluster	Bank-firm	Bank-firm	Bank-firm	Bank-firm	Bank-firm	Bank-firm

**Table 6. Robustness check: Instrumental variable regressions**

This table reports the results of the instrumental variable (IV) regressions. Lending, the dependent variable, is the logarithm of the outstanding amount indebted by a debtor to a creditor. *Womenpart* is the ratio of female participation in the workforce at the country level. Banks' corporate governance variables, balance-sheet controls and firm-level characteristics are included. For more details on the variables' construction and sources, refer to Table 2. ILS indicates industry\*location\*size fixed-effects. All variables are winsorized at the 1st and 99th percentiles. Robust standard errors clustered at the bank or the bank-firm level are reported in parentheses. \*\*\*p<.01, \*\*p<.05, \*p<.1.

VARIABLES	(1) Board Female	(2) Lending	(3) Lending
Womenpart	0.1155*** (0.0007)		
Fitted_Board_female		0.0181 (0.1151)	0.1711 (0.1264)
GHGTot			0.0001*** (0.0000)
Fitted_Board_female*GHGTot		-0.0001*** (0.0000)	-0.0002*** (0.0000)
L.TotAss	-0.9227*** (0.0051)	0.1376*** (0.0380)	0.1101** (0.0431)
L.Dep_tl	-0.1465*** (0.0007)	0.0122*** (0.0040)	0.0086* (0.0049)
L.NPL_r	0.0871*** (0.0006)	0.0043 (0.0046)	0.0033 (0.0040)
L.ROA	2.4006*** (0.0198)	-0.1508 (0.0961)	-0.1497 (0.1076)
L.Cash_ta	0.0322*** (0.0012)	-0.0230** (0.0109)	-0.0195** (0.0093)
L.Fees_opInc	-0.0693*** (0.0006)	0.0033 (0.0051)	0.0038 (0.0045)
L.CET1_r	-0.3500*** (0.0021)	0.0049 (0.0136)	0.0150 (0.0177)
Firm_ta			0.4290 (0.0202)
Firm_cash			0.0004*** (0.0000)
Firm_debt			0.0068*** (0.0001)
Firm_ROA			0.0044*** (0.0004)
Firm_WC			0.0000 (0.0002)
Firm_gearing			0.0002*** (0.0000)
Board_size	-1.0883*** (0.0239)		0.4711*** (0.1086)
CSR_comp	2.2249*** (0.0123)	-0.0948** (0.0359)	-0.0787** (0.0389)
Board_tenure	-0.5105*** (0.0040)	0.0259** (0.0123)	0.0210 (0.0148)
Observations	1,853,303	607,445	910,895
Firm FE		Yes	No
ILS FE		No	Yes
Kleibergen-Paap rk LM statistic	13.174		
Cragg-Donald Wald F-statistic	8.4e+04		
Stock-Yogo weak ID test critical values at 10% IV size	16.87		
Cluster	Bank	Bank-firm	Bank-firm

**Table 7. Sample selection bias: Large exposures and transition effects**

This table reports the results for the regression analysis that considers the large exposure dataset. Lending, the dependent variable, is the logarithm of the outstanding amount indebted by a debtor to a creditor. The *male-to-female* variable accounts for the replacement, over time, of male directors by female directors. Banks' corporate governance variables and balance-sheet controls are included. For more details on the variables' construction and sources, refer to Table 2. All variables are winsorized at the 1st and 99th percentiles. Robust standard errors clustered at the bank level. \*\*\*p < .01, \*\*p < .05, \*p < .1.

VARIABLES	(1) Lending	(2) Lending	(3) Lending	(4) Lending
Board_female_p75	0.0223 (0.078)	0.0994 (0.084)		
Male-to-Female			0.1831** (0.075)	0.1852*** (0.066)
Board_female_p75*GHG12	-0.0004** (0.000)	-0.0004*** (0.000)		
Male-to-Female*GHG12			-0.0003** (0.000)	-0.0003** (0.000)
TotAss	0.5865*** (0.096)	0.5725*** (0.087)	-0.4768 (0.434)	-0.5259 (0.597)
Dep_tl	0.0072 (0.008)	0.0063 (0.009)	-0.0233 (0.017)	-0.0265 (0.0203)
NPL_r	0.0278 (0.036)	0.0297 (0.035)	0.0442** (0.019)	0.0582** (0.026)
ROA	0.0757 (0.201)	0.0143 (0.221)	-0.1394 (0.113)	-0.1477 (0.102)
Cash_ta	-0.0056 (0.022)	-0.0157 (0.021)	-0.0381 (0.022)	-0.0381* (0.020)
CET1_r	-0.0129 (0.0338)	-0.0067 (0.0291)	0.0665*** (0.021)	0.0620*** (0.019)
Board_size		0.0206 (0.025)		-0.0515** (0.019)
CSR_comp		0.0253 (0.079)		0.1264 (0.077)
Board_tenure		0.0498 (0.031)		-0.0628 (0.039)
Observations	2,270	2,270	2,263	2,263
R-squared	0.426	0.430	0.46	0.471
Borrower*time FE	Yes	Yes	Yes	Yes
Bank FE	No	No	Yes	Yes
N.Banks	40	40	33	33
N.Firms	124	124	123	123
Cluster	Bank	Bank	Bank	Bank



## Appendix A

Table A. Descriptive statistics for the dataset on the large exposures

	(1)	(2)
	Mean	SD
Lending (log)	18.378	1.63
Lending (€ml)	269	462
GHG12 (tonnes)	17,300,000	34,600,000
GHG12 (tonnes/millions)	230.81	451.87
Board_size (log)	27.65	0.67
TotAss (€bn)	1141.08	520.55
Dep_tl (%)	61.06	12.10
ROA (%)	0.31	0.38
Cash_ta (%)	7.09	3.81
NPL_r (%)	4.47	3.73
CET1_r (%)	12.10	1.56
Female_board (%)	35.95	9.95
Board_size (level)	15.84	3.59
CSR_comp (%)	0.44	0.50
Board_tenure	5.92	2.18
Observations	2417	