Bank Business Models and ESG Performance: Evidence from European Banks*

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Abstract

In this paper, we study the relationship between banks' business models and the Environmental, Social and Governance (ESG) performance. While previous studies mainly examine how business models influence financial variables, little is known about the relationship between ESG performance and banks' financial configurations. We use a threshold regression model (Hansen, 1999) to identify optimal threshold levels in the business models of a sample of 80 European listed banks from 2006 - 2021. We find that higher ESG scores are positively related to stronger capital buffers and greater reliance on deposit-based funding. Moreover, ESG performance is linked to more traditional and stable income structures, with lower dependence on high-risk, market-based activities. These findings suggest that ESG integration contributes to financial resilience and provides policy insights for incorporating sustainability factors into prudential regulation and risk assessment frameworks.

Keywords: Banking, Business model, Bank performance, ESG, Threshold analysis.
J.E.L. Classification Numbers: G21, G28, Q56.

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1 Introduction

The onset of the financial crisis in 2007 emphasized that changes in the operational strategies of banks played a pivotal role in reducing lending standards and amplifying overall risk within the financial system (Berndt & Gupta, 2009; Mian & Sufi, 2009; Stiglitz, 2010; Altunbas et al., 2011; Bord & Santos, 2012; D'Apice et al., 2016). In the years leading up to the global financial crisis, many banks moved away from the traditional method of gathering deposits to fund loans that would be kept on their books until they matured. This approach, known as the "*Originate to Hold*" model, was replaced by a new business model called "*Originate to Distribute*", which focused on market dynamics. Under this model, banks originate loans with the intention of bundling and selling them as securities on financial markets, thus introducing a new aspect of risk (Gennaioli et al., 2012). Analysts attribute the turmoil after the global financial crisis to recent alterations in banking regulations, particularly the Gramm–Leach–Bliley (GLB) Act of 1999, which surpassed the Glass-Steagall Act of 1934 by allowing banks to engage more extensively in activities beyond traditional banking.

Over the years, the complexities of banks' business models (BBMs) have received significant attention from researchers (Ayadi & De Groen, 2014), institutions (Roengpitya et al., 2014), and regulators (Farnè & Vouldis, 2017), for a number of several reasons. First, BBMs directly influence their profitability and financial performance (Roengpitya et al., 2017; Mergaerts & Vander Vennet, 2016). Second, they significantly impact their risk profiles and resilience (Altunbas et al., 2011) and are related to traditional banking risks such as credit, market, liquidity, and operational risks (Köhler, 2015). Third, BBMs play a pivotal role in driving innovation and facilitating the adoption of advanced technologies (Teece, 2010). Finally, an in-depth comprehension of banks' business models is crucial for policymakers, regulators, and stakeholders, as this allows them to better assess the impacts of their decisions and to maintain financial stability (Ayadi et al., 2016).

In this context, the growing significance of Environmental, Social, and Governance (ESG) scores has added a new dimension to explore. Factors such as opportunities in sustainable finance, reputational and competitive pressures, and the broader integration of ESG consider-

ations into financial operations highlight the increasing importance of aligning banks' business strategies with sustainability goals. This motivation inspired us to investigate the extent to which BBMs are sensitive to ESG performance. To this end, we use a threshold regression model (Hansen, 1999) to identify changes in the business models of a sample of 80 continuously listed European banks from 2006 - 2021.

At first glance, the link between banks' strategies and ESG scores may lie in the following motivations. First, banks may play a critical role in promoting sustainable development by financing environmentally friendly projects, supporting the transition to a low-carbon economy, encouraging responsible corporate behavior, and favoring corporate social responsibility practices (De Haas & Popov, 2023). Second, banks may also contribute to the well-being of society by building trust, whose proxy can be viewed among stakeholders in the social pillar. In particular, financial crises remind us of the central role that trust plays in the proper functioning of financial institutions (Lins et al., 2017) and in risk management (Abdelsalam et al., 2024)[1]. Attention to the environmental and social dimensions has gained importance in recent years, while the governance dimension has notably been the subject of extensive literature (Shleifer & Vishny, 1997). Sound governance practices are fundamental for the banking industry's long-term stability and success (Anginer et al., 2018; Scholtens & van't Klooster, 2019; Duan et al., 2021).

While prior research has extensively examined the implications of business model choices on risk, performance, and financial stability (Altunbas et al., 2011; Roengpitya et al., 2014), there is an important gap in understanding how ESG performance influences the banks' management decisions. Some studies have focused on how different BBMs impact their ESG adoption (Chiaramonte et al., 2022), yet few have examined the reverse relationship whether and how a bank's commitment to sustainability translates into tangible changes in its business model. Addressing this gap is essential for understanding whether ESG-conscious banks exhibit distinct financial structures, risk preferences, and income-generation strategies compared to their

[1]For example, considering the role of an intermediary, the trust that short-term lenders place in the bank's ability to identify sound long-term investments is crucial in enabling maturity mismatch. The dimension of trust assumes an even more significant role when we consider that, while in the "*originate to hold*" model, the bank has an incentive to monitor the risks it undertakes, in the case of the "*originate to distribute*" model, this incentive is diminished.

counterparts.

Ayadi & De Groen (2014) propose a framework whereby the business model interacts with ownership structure and performance dimensions. Ownership structure plays a pivotal role in shaping the nature of banking activities. More specifically, commercial banks are aligned with a "*shareholder vision*" whose main aim is profit maximization. In contrast, cooperatives, savings banks, and public banks are associated with a "*stakeholder vision*", in which the primary goal is to generate value for various stakeholders. The emphasis on stakeholders is often compared with the ESG approach. Despite its limitations, the ESG score is a relevant indicator of a company's overall commitment to sustainability issues (Berg et al., 2022; Edmans, 2023).

In this paper, we study the relationship between banks' business models and ESG performance by using a threshold regression model (Hansen, 1999) to identify changes in the business model of a sample of 80 European listed banks from 2006 - 2021. Following Altumbas et al. (2011) and Roengpitya et al. (2014), we firstly investigate four variables to categorize banks' business models: [i] the *capital structure*, proxied by the sum of Tier 1 and Tier 2 capital over the total assets; [ii] the *asset structure*, proxied by the loans to total assets ratio; [iii] the *funding structure*, proxied by the retail deposit to total assets ratio, and [iv] the *income structure*, proxied by the Net Interest Margin (NIM) to the Intermediation Margin (IM) ratio. Our research hypothesis relies on the fact that the choice of a business model is related with a specific strategic choice. At a time when ESG issues have become an unavoidable issue for financial institutions, there is a possibility that certain ESG scores align with particular business models.

The main findings of our study are summarized as follows. First, we find a significant and positive relationship between ESG score and banks with greater capital stability, in which the Social pillar plays a particularly significant role. Second, we find that higher ESG scores are related with a reduction in the loans-to-total-assets ratio for banks that show a low level of loans-to-total-assets, suggesting that banks tend to diversify their asset base away from lending activities. Third, we find a positive relationship between ESG score and the ratio between deposits and total assets. These latter results highlight how greater attention to sustainability policies is related with banks that rely more on deposits as a source of funding. Finally, ESG score is related with an increase in the NIM/IM ratio, confirming that a greater focus on ESG

risks is more in line with banks characterized by traditional activities (where the NIM/IM ratio is higher) and, conversely, less consistent with banks seeking alternative income sources.

Our results are robust to several robustness checks, with the Instrumental Variables (IV) approach and the Generalized Methods of Moments (GMM) controlling for endogeneity; implementation of the Propensity Score Matching Technique (PSM), the Difference-in-Difference technique, and a factor analysis; the exclusions from our dataset banks belonging to PIIGS (Portugal, Ireland, Italy, Greece and Spain) countries; and, finally, the inclusion of different ESG indicators.

The paper contributes to the literature on sustainable finance and banking in different ways. First, while previous research investigated how business models influence ESG adoption, our study shifts the focus to whether ESG performance is related with specific structural and strategic choices in banks. By employing a threshold regression model, we investigate whether banks with higher ESG scores exhibit distinct business model characteristics. Second, our findings report that banks with higher ESG scores have stronger capital buffers and rely more on stable deposit-based funding. This suggests that ESG-conscious banks adopt more risk-averse and financially resilient business models, favoring long-term stability over short-term market-driven profits. Third, our results support the idea that ESG integration can be a mechanism for enhancing financial stability, suggesting that capital adequacy frameworks, disclosure requirements, and incentive structures should further encourage sustainable banking models.

The rest of the paper is structured as follows: Section 2 explains the conceptual framework and formulates the research hypotheses. Section 3 describes the data and the methodology. Section 4 reports the empirical findings and Section 5 provides robustness checks. Section 6 concludes.

2 Conceptual framework and research hypotheses

The notion of business models has its roots in the discussion on strategic groups (Porter, 1979), which refer to clusters of firms operating within the same industry employing similar strategies. In banking, potential strategies and business models are defined by different factors,

such as asset allocation, funding mechanisms, capital structure, and diversification approaches.

Identifying banks' business models entails examining a set of variables that delineate the potential strategic approaches. In this context, the utilization of data from balance sheets and income statements has been a longstanding practice in banking research (Amel & Rhoades, 1988; Passmore, 1985; Ayadi, 2019). Along this line, following Roengpitya et al. (2014) and Altumbas et al. (2011), we select four proxies of banks' business models: [i] *capital structure*; [ii] *asset structure*; [iii] *funding structure*; and [iv] *income structure*. In the next section, we formulate the research hypotheses.

2.1 Capital structure and sustainability

The empirical literature supports the view that more capital increases bank soundness, particularly during periods of crisis and for higher quality forms of capital (Wheelock & Wilson, 2000; Gambacorta & Mistrulli, 2004; Berger et al., 2010; Demirgüç-Kunt & Huizinga, 2010). We use the ratio between the sum of Tier 1 and Tier 2 capital to total assets as a proxy for capital structure. Tier 1 and 2 represent different forms of capital that a bank holds to absorb potential losses and maintain solvency. In particular, Tier 1 is a bank's core capital, representing the highest-quality and most readily available form of capital. It primarily consists of common equity Tier 1 (CET1) capital, which includes common shares and retained earnings. As such, it is considered the most permanent and loss-absorbing capital because it is fully available to absorb losses without triggering liquidation. Tier 2 capital consists of supplementary capital that provides additional loss-absorption capacity for a bank but is not as readily available as Tier 1 capital. It includes instruments such as subordinated debt, hybrid securities, and other instruments with specific characteristics outlined by regulatory authorities. Unlike Tier 1 capital, Tier 2 capital does not have the same level of permanence and loss absorption capacity, hence it is considered less secure.

Regulatory authorities provide guidelines and requirements for the composition and adequacy of Tier 1 and Tier 2 capital to ensure that banks maintain sufficient capital buffers to withstand financial shocks and protect depositors and creditors. The primary objective has

been to ensure that banks maintain higher capital levels, enabling them to absorb losses using their own assets, thereby preventing insolvency or the need for a public bailout (Demirguc-Kunt et al., 2013). By expressing Tier 1 and Tier 2 capital over Total Assets, we provide insights into a bank's capital adequacy and its ability to absorb unexpected shocks. A higher capital structure ratio suggests a stronger capital base, thereby enhancing the bank's resilience to adverse economic conditions.

As stressed by the European Central Bank, ESG factors are also increasingly seen as critical in risk management (ECB, 2022), and the relationship between ESG criteria and capital structure is the subject of an expanding literature. In particular, Asimakopulos et al. (2023) emphasize how optimal leverage ratios (market and accounting) and information asymmetry are reduced when firms are ESG rated. In addition, ESG-rated firms redistribute their sources of financing from public debt (bond issuance) to private debt (bank loans). Our paper fits into this research stream by exploring the possible relationship between banks' capital structure and ESG. At the same time, Abuzayed et al. (2018) find that more diversified banks tend to maintain lower equity buffers; however, the banks' involvement in ESG activities can affect this product diversification (Chiaramonte et al., 2022). We, therefore, explore the relationship between capital structure and ESG scores in depth. In particular, we test whether a higher ESG score is related with a higher Tier 1 + Tier 2 capital ratio.

The first hypothesis can therefore be expressed as follows: ***H1****: an increase in ESG score is positively related with stronger capital adequacy, reflected in a higher Tier 1 and Tier 2 capital ratio.*

2.2 Asset structure and sustainability

The proportion of loans to assets offers valuable information about a bank's asset composition and risk profile. A lower ratio indicates a more diversified asset base, potentially mitigating the impact of credit-related downturns (Bord & Santos, 2012). Conversely, a higher Loans over Total Assets ratio signifies a greater allocation of assets toward lending activities, reflecting the bank's engagement in financial intermediation and potential exposure to credit risk. The

intersection of ESG performance and bank asset composition has emerged as a critical area in sustainable finance research. One compelling dimension of this nexus lies in the observed relationship between ESG scores and lending intensity, as proxied by the loans-to-total-assets ratio. Empirical patterns suggest that banks with higher ESG ratings may exhibit more conservative lending behavior, which can be interpreted as both a risk mitigation strategy and an alignment with long-term sustainability objectives (Kacperczyk & Peydró, 2022).

Banks' attention to ESG issues influences loan activity through several channels, including enhanced risk management, the promotion of green and sustainable lending, adjustments to loan pricing, regulatory compliance, and alignment with market demand for ESG-aligned financing. By integrating ESG considerations into their loan origination, risk assessment, and pricing models, banks can better manage long-term risks, foster sustainability, and contribute to the transition toward a greener economy.

At the same time, according to Köhler (2015), a higher ratio of loans to total assets features a business model more related to "relationship banking." The term relationship banking lacks a strict definition in the literature. We opt to employ this term to describe the commitment to offering financial services aimed at engaging with the same customer on a recurring basis.[2] Although in our paper we do not use those proxies normally applied to identify relationship lending (Degryse et al., 2009), it remains useful to take a cue from Köhler's (2015) insight. Furthermore, it is interesting to highlight here how relationship banking has been associated with a particularly positive role in times of financial crisis, both in terms of share of credit granted and the cost of credit (Sette & Gobbi, 2015).

Relationship banking typically involves building long-term, personalized relationships with clients, often in contrast to transactional or fee-based banking models (Rajan, 1992). Relationship banking and ESG scores can be associated, through several mechanisms: [i] *customer engagement and ESG integration*: relationship banking emphasizes understanding individual clients' unique needs. Banks that practice relationship banking can use these close customer relationships as an opportunity to engage with clients on ESG-related matters; [ii] *risk assess-*

[2]The extent to which the customer must also commit to this relationship varies according to each particular model. Consequently, "relationship banking" has evolved to be synonymous with "relationship lending" (Freixas, 2005).

ment and ESG factors: relationship banking often involves a deeper understanding of a client's business operations. Banks can use this knowledge to assess the environmental and social risks associated with the client's activities. Bank management that considers ESG factors in its risk assessment processes is better equipped to manage ESG-related risks effectively; [iii] *long-term perspective*: relationship banking is often associated with a long-term perspective, in which the bank aims to build enduring relationships with clients. This long-term approach can be congruent with ESG principles, as ESG goals often have a long-term horizon.

We claim that the association between relationship banking and a bank's ESG score can be positive if the bank actively integrates ESG considerations into its client relationships, risk management, and product offerings.

The second hypothesis can therefore be expressed as: ***H2****: banks with higher ESG scores tend to have a higher ratio of loans to total assets, suggesting more conservative lending behavior or a shift toward less asset-intensive business models.*

2.3 Funding structure and sustainability

Recently, several banks have decreased their dependence on conventional retail depositors and instead shifted toward obtaining short-term financing from interbank and wholesale markets. Essentially, these short-term funds enable banks to actively control the size of their balance sheets, which tend to fluctuate in sync with economic cycles (Adrian & Shin, 2010, 2008). Consequently, the expansion of funding approaches is a result of the growing engagement in trading activities. Gorton (2012) demonstrate that the core factor triggering systemic risk during the mortgage crisis was the arrangement of liabilities within financial institutions. The reliance of banks on short-term wholesale funding to finance the expansion of their balance sheets in the run-up to the crisis, together with excessive leverage, have been highlighted as key factors in the buildup of systemic risks and the propagation mechanism (López-Espinosa et al., 2012). On the other side, deposits constitute a primary source of funding for banks, influencing their liquidity and operational flexibility. The Deposits over Total Assets ratio gauges the extent to which a bank relies on customer deposits as a funding source. A higher ratio suggests a

greater dependence on core deposits, implying enhanced stability in times of market volatility. Conversely, a lower ratio may indicate a reliance on alternative funding sources, which could introduce liquidity risk (Vazquez & Federico, 2015).

Studies have shown that depositors discipline banks by either withdrawing deposits or by requiring higher interest rates (Martinez Peria & Schmukler, 2001; Maechler & McDill, 2006). While depositors have traditionally been seen as reactive to fundamental information (Goldberg & Hudgins, 2002), recent evidence has indicated that they are sensitive to other sources of information (e.g., negative press rumors and regulatory signals), mechanisms (e.g., banking relationships and social networks), and bank characteristics (e.g., Euro-area affiliation and perception of too-big-to-fail) (Hasan et al., 2013; Iyer et al., 2016). Among "other sources of information", we may also consider sustainability issues.

The nexus between sustainability and funding structure proxies is evident in the growing prominence of sustainable finance instruments, such as green bonds (Flammer, 2021; Bedendo et al., 2022). Banks that embrace sustainable funding mechanisms may experience changes in their Deposits over Total Assets ratio, influenced by shifts in investor preferences toward ESG-aligned financial products. As sustainable funding sources gain traction, banks' reliance on traditional deposits may evolve, impacting liquidity dynamics and potentially fostering a more resilient funding profile. Analyzing the interplay between sustainability initiatives and funding structure proxies sheds light on how banks navigate the dual objective of ensuring financial stability while advancing sustainable agendas. In this context, Andries and Sprinceau (2023) found that incorporating ESG practices into banks' financial decision-making has a beneficial impact on the cost of raising interest-bearing liabilities (total cost of funds) and the cost of deposits, providing further empirical evidence in favor of stakeholder theory. The decrease in funding expenses can be attributed to the effective utilization of ESG principles in banks' financial decision-making. This serves as a valuable means of mitigating information imbalances, benefiting both shareholders and stakeholders, and consequently drawing in more depositors while lowering funding costs.

The third hypothesis can therefore be expressed as: ***H3****: higher ESG scores are positively related with the ratio of customer deposits to total assets, indicating enhanced stakeholder trust*

and funding stability.

2.4 Income structure and sustainability

The global trend toward more diversification in bank income sources and the expansion of non-interest income revenues (i.e., those revenues derived from trading, investment banking, brokerage fees and commissions) has provided banks with additional sources of revenue (Stiroh, 2010). As a result, the majority of banks veered away from their conventional banking services. This alteration had a notable impact on the composition of banks' financial performance, characterized by an increase in non-interest revenues and a corresponding decline in interest margins. This trend toward relying more on non-interest income was viewed as a strategy to enhance and stabilize bank profitability. This strategy was rooted in the perception that non-interest income and net interest income exhibited a negative or imperfect correlation. Consequently, activities outside the traditional banking realm were considered more stable, exhibiting reduced cyclical fluctuations compared to earnings derived primarily from loans. In essence, diversifying the range of products offered by banks may mitigate the volatility of their profits and subsequently reduce their risk exposure (Köhler, 2014).

To determine how much banks' profits depend on sources different from traditional lending activity, we considered the Net Interest Margin over the Intermediation Margin. Net Interest Margin (NIM) reflects the difference between a bank's interest income and interest expenses, while Intermediation Margin (IM) represents the net revenues of a financial intermediary, as the sum of the gross interest margin and the financial and services margin. The ratio of NIM over IM offers insights into a bank's efficiency in generating net interest income from its lending and borrowing activities. A higher ratio suggests effective management of interest rate spreads and that the bank's model focuses more on traditional activities.

The pursuit of sustainability objectives can also reverberate within income structure proxies. Danisman & Tarazi (2024) find that in periods of crisis, banks with a higher share of loans and deposits in total assets (i.e., traditional activities) and a lower share of non-interest income in total income are the least affected in terms of lending during financial crises when they have

a higher ESG score. This discovery aligns with the existing literature, which demonstrates that conventional banking operations exhibit greater stability over time, primarily due to their reliance on relationship banking. This business model appears less susceptible to termination owing to associated switching and information costs. Conversely, income generated from non-interest sources (such as trading, commissions, and fees) displays a strong correlation with the business cycle (DeYoung & Roland, 2001; Lepetit et al., 2008; Meslier et al., 2014; Köhler, 2015).

In this scenario, we extend the analysis to no-crisis periods and we focus our attention on the ratio of NIM over IM. Banks that prioritize sustainability may channel resources into projects with long-term societal benefits, potentially influencing the risk and the return trade-off associated with their lending activities. This recalibration of risk and return dynamics could manifest in NIM over IM ratio alterations, reflecting the bank's commitment to aligning financial performance with broader sustainability imperatives. A nuanced understanding of the compatibility between profitability and responsible banking practices emerges by examining how sustainability considerations impact income structure proxies.

The fourth hypothesis can, therefore, be expressed as follows: ***H4:*** *an increase in ESG score is positively related with the ratio of Net Interest Margin (NIM) to Interest Margin (IM), implying that more sustainable banks may experience a reduction in interest-related profitability, possibly due to lower risk-taking.*

3 Data and methodology

3.1 Data

Our sample is composed of 80 continuously listed European banks[3]. The sample construction process involves filtering and selecting banks based on the availability of prices, ESG scores, and

[3]Banks credit is an important source of finance for the private sector, particularly in Europe and Asia, which are, in fact, defined as bank-centric markets. For example, funds provided through bank credit constitute 157% of GDP in China and 91% in Europe. By contrast, equity is the most important form of financing for the private sector in the USA at 147% of GDP, while in Europe and China it is around 65% (Zazzara & Cibrario Assereto, 2023).

headquarters. The starting point was the Thomson Asset 4 dataset, which encompasses banks in 25 European Union countries and initially includes 891 firms. The primary selection criterion for identifying banks in this study was the availability of ESG data, which tends to be more consistently reported by public companies. This focus on ESG data availability determined both the sample composition and the temporal scope of the analysis. Within the initial dataset, 189 institutions possess complete price information for the entire 2006–2021 period. This time frame was selected primarily because it aligns with the availability of ESG data, which is central to this research. As a secondary consideration, this period also encompasses several major events that significantly affected the global financial system, including the Global Financial Crisis, the Eurozone sovereign debt crisis, and the COVID-19 pandemic. The selection process was explicitly designed to identify banks for which ESG scores were obtainable as the first requirement, with balanced price data, defined as price observations available for each year within the specified period, serving as a complementary criterion. Among the 189 firms with complete price data, only 113 met both conditions, with the absence of ESG data being the primary reason for exclusion. To enhance the consistency of the dataset and mitigate potential biases, banks with multiple headquarters were excluded from the final sample. A fundamental issue is to observe banks at the level at which business model decisions are taken. In this respect, we deem the consolidated level to be the most relevant. We therefore exclude subsidiaries of each parent bank (Mergaerts & Vander Vennet, 2016). The resulting dataset consists of 80 banks. These 80 banks are representative of the banking industry across the 25 EU countries under consideration. The dataset spans 16 years, from 2006 to 2021, resulting in a total of 1,280 observations. Table 1 reports descriptive statistics regarding the sample[4].

[INSERT SOMEWHERE HERE TABLE 1]

Table 2 reports the correlation matrix between the variables. The correlations do not show any extremely high values. The possibility of multicollinearity among the explanatory variables is tested using Variance Inflation Factors (VIFs). The maximum VIF that results from any of the models is 1.75, which is far below the generally employed cut-off of 10, and the average

[4]The full set of variables and ESG scores for each country are reported in Tables A1 and A2 in the Internet Appendix.

value of the model is not considerably larger than 1 (Chatterjee & Hadi, 2015). Therefore, the results show that multicollinearity is a moderate concern.

[INSERT SOMEWHERE HERE TABLE 2]

3.2 Methodology

We use a threshold regression model to identify changes in the business model of a bank. The threshold model is designed to split up individual observations into regimes. The model is based on Hansen (1999), which proves to be an effective tool with which to investigate possible asymmetric effects:

$$y_{i,t} = \beta_0 + \beta_1 x_{i,t} I(q_{i,t-1} \leq \gamma) + \beta_2 x_{i,t} I(q_{i,t-1} > \gamma) + \varepsilon_{i,t} \tag{1}$$

where $I(\cdot)$ is a function indicator that takes the value 1 if the contents enclosed in parentheses are proven to be true, and 0 in other cases; $q_{i,t-1}$ is the default threshold variable endogenously estimated. Based on Equation (1), we estimate the following model:

$$\begin{aligned} Bus\ Model_{i,t} = &\beta_0 + \beta_1 ESG_{i,t}(Bus\ Model_{i,t-1} \leq \gamma) + \beta_2 ESG_{i,t}(Bus\ Model_{i,t-1} > \gamma) + \\ &+ \beta_3 ESG_{i,t-1}(Bus\ Model_{i,t-1} \leq \gamma) + \beta_4 ESG_{i,t-1}(Bus\ Model_{i,t-1} > \gamma) + \\ &+ \beta_5 ESG_{i,t-2}(Bus\ Model_{i,t-1} \leq \gamma) + \beta_6 ESG_{i,t-2}(Bus\ Model_{i,t-1} > \gamma) + \\ &+ \beta_7 X_{i,t-1} + \eta Banks_i + \delta Time_t + \varepsilon_{i,t} \end{aligned} \tag{2}$$

where, $Bus\ Model_{i,t}$, the dependent variable, is the proxy for the four banks' business models (BM) for bank i at time t. In particular, we alternatively consider: [i] the Tier 1 + Tier 2 capital over Total Asset ratio (**BM 1**$_{i,t}$); [ii] the Loans over Total Asset ratio (**BM 2**$_{i,t}$)[5]; [iii] the Deposits over Total Asset ratio (**BM 3**$_{i,t}$); [iv] the Net-Interest Margin over Intermediation Margin ratio (**BM 4**$_{i,t}$); $ESG_{i,t}$ is our first explanatory variable, expressed in terms of *Environmental*, *Social* and *Governance* scores for bank i at time t; $ESG_{i,t-1}$ is our second explanatory

[5]We refer to the outstanding loans to retail as measured by Refinitiv Worldscope Datastream.

variable, expressed in terms of Environmental, Social and Governance scores for bank i at time $t-1$; $ESG_{i,t-2}$ is our third explanatory, variable expressed in terms of Environmental, Social and Governance scores for bank i at time $t-2$; $X_{i,t-1}$ is a vector that includes these control variables: $NPL_{i,t-1}$ the ratio between non-performing net loans and total outstanding net loans for bank i at time $t-1$; $CAR_{i,t-1}$ is the risk-weighted assets ratio between Tier 1 + Tier 2 capital, the total of which was divided by the total risk-weighted assets for bank i at time $t-1$. Since CAR is an important part of both the micro and macro prudential framework[6], it can provide a common measure for a bank's risks, help ensure that capital allocated to assets is commensurate with the risks, and potentially highlight where destabilizing asset class bubbles arise (Avramova & Le Leslé, 2012); $Size_{i,t-1}$ is the natural logarithm of total assets for for bank i at time $t-1$. The threshold variable, γ, is set to be the last period for each of the four banks' business models.

4 Empirical results

In this section, we report the results of our regression analysis. In each of the tables below, we report the results of the following specifications: [i], [ii], and [iii] include the ESG score and the pillars E, S, G, at times *t*, *t-1*, and *t-2*, respectively. All specifications consider control variables, fixed time effects, and banks' fixed effects.

Following the proposed methodology, the relationship between the explanatory variable and the dependent variable (i.e., one for each of the four business model proxies) is analyzed by two coefficients: the first reports the relation between variable X and variable Y, when the latter has a value below or equal to the threshold; the second reports the relationship when variable Y has a value above the threshold.

The economic interpretation of values above or below the threshold depends on the adopted business model proxy. Values above (below and/or equal to) the threshold for the **BM 1**$_{i,t}$

[6]The Basel Committee's regulatory solvency measures (Tier 1 + Tier 2 , Total Capital, Common Equity Tier 1 + Tier 2 , Additional Tier 1 + Tier 2 and Total Capital under Basel III, as well as other key solvency measures, such as Core Tier 1 + Tier 2 or Tier 1 + Tier 2 Common) are currently all defined in terms of risk-weighted assets (RWAs). However, Basel III gradually introduces a new solvency measure, the leverage ratio, initially defined as (Tier 1 + Tier 2) capital over total unweighted on and off-balance sheet assets. Due to the holding period taken into account, this paper considers RWA ratios (Avramova & Le Leslé, 2012).

proxy indicate banks with more (less) solid core capital. Values for the **BM 2**$_{i,t}$ above the threshold indicate banks with a greater (minor) allocation of assets toward lending activities, as in the case of relationship banking. Values above (below and/or equal to) the threshold for the **BM 3**$_{i,t}$ indicate banks with a greater (minor) dependence on core deposits, implying enhanced stability (instability) in times of market volatility. Values above (below and/or equal to) the threshold for the **BM 4**$_{i,t}$ indicate banks for which income from traditional banking activities is prioritized (minor).

Table 3 reports the results for the first bank's business model. We find a positive and statistically significant relationship between the ESG score, both at time t and t-1, and banks with greater capital. A possible explanation is that banks with higher ESG ratings have higher investor trust and a lower equity risk premium (El Ghoul et al., 2011; Attig et al., 2013). The increasing prevalence of ESG-oriented investment mandates, particularly among institutional investors, has created a differentiated capital market landscape where ESG-compliant banks have preferential access to equity capital markets. This dynamic allows for more efficient issuance of common equity Tier 1 instruments at a lower cost. Furthermore, a diminished perceived risk profile – arising from improved governance, climate risk mitigation, and social responsibility – may lead to reduced regulatory capital buffer requirements (Guidara et al., 2013). In addition, strong ESG performance not only improves the cost-efficiency of common equity Tier 1 but also allows banks to provide sustainable financial products that support the environment and society, including sustainability-linked bonds and green Additional Tier 1 hybrids. These products strengthen Tier 1 and Tier 2 capital positions and reduce funding costs. Our results are also supported by recent empirical evidence that highlights a positive relation between ESG ratings and credit ratings (Brogi et al., 2022; Bonacorsi et al., 2024). Improved market perception and reduced default risk translate into lower yields on subordinated debt instruments, thereby reducing the cost of Tier 2 capital.

When we focus on different ESG pillars, it is worth emphasizing that the Social pillar plays a particularly significant role in this case, encompassing the dimension of trust that underlies capital stability. Empirical evidence suggests that banks with high Social ESG scores benefit from lower equity risk premiums, reduced subordinated debt (Tier 2 capital) cost, and stronger

regulatory standing. Strong social engagement may act as a stability-enhancing mechanism in financial systems with weaker institutional safeguards, mitigating regulatory uncertainties and reinforcing depositor confidence. Thus, the Social pillar of ESG indicates social trust in banking, influencing capital structure optimization and financial stability. By fostering stronger stakeholder relationships and reducing systemic risks, banks with high Social ESG scores are better positioned to achieve sustainable profitability and resilience in financial markets.

Summary for H1: an increase in ESG score is expected to be positively related with stronger capital adequacy, reflected in higher Tier 1 and Tier 2 capital ratios. This hypothesis is supported by the findings in Table 3, which show a significant and positive relationship between ESG scores and capital stability in banks with higher capital-to-asset ratios.

[INSERT SOMEWHERE HERE TABLE 3]

Table 4 reports the results for the second bank's business model. The negative correlation between ESG scores (especially in the Social and Environmental dimensions) and the loans-to-total-assets ratio in banks with lower loan-to-asset ratios reflects a trade-off between sustainable lending practices and the volume of credit extended. Banks with higher ESG scores may be less inclined to aggressively expand their loan portfolios, especially if it compromises their sustainability goals. Rather than pursuing aggressive credit expansion, these banks may adopt a more selective approach to credit origination, emphasizing risk management and reputational safeguards over short-term profitability. Such behavior is consistent with a prudential strategy that prioritizes asset quality, environmental impact assessments, and social responsibility in loan underwriting processes. High ESG-performing banks are increasingly embedding sustainability criteria into their lending frameworks, effectively filtering loan demand based on borrower compliance with ESG standards. This selectivity can reduce overall lending volumes relative to total assets, particularly in markets where ESG-compliant borrowers represent a niche segment. In this context, the lower loans-to-assets ratio is not indicative of underperformance, but rather of a strategic recalibration of credit policy that internalizes ESG risks and opportunities. The implementation of ESG-related exclusionary screening or positive selection mechanisms (e.g., favoring renewable energy projects or socially inclusive enterprises) further supports this shift.

Another explanation relates to the trade-off between ESG commitment and lending growth. Banks oriented to sustainable finance might avoid high-margin lending in sectors such as fossil fuels or contentious enterprises, leading to lower loans-to-assets ratios compared to less ESG-focused banks. This reflects a tension between ESG adherence and financial efficiency. For banks with a conservative lending strategy and low loans-to-assets ratios, this cautious credit extension aligns with strong ESG performance in risk management and long-term sustainability.

Summary for H2: Higher ESG scores are hypothesized to be related with a lower ratio of loans to total assets, potentially reflecting more sustainable or cautious lending practices. The results confirm this expectation, revealing a negative association between ESG scores—particularly in the Environmental and Social dimensions—and loan intensity in banks with relatively low loan-to-asset ratios.

[INSERT SOMEWHERE HERE TABLE 4]

Table 5 shows the results for the third bank's business model. Higher ESG scores lead to more deposit stability in the banking system. Our findings reveal a different relationship between ESG scores and the deposit-to-total-assets ratio. A negative association exists when the ratio is below or equal to a certain threshold, while a positive association emerges when it exceeds that threshold. This pattern is also observable in the Social pillar, where the relationship is beneficial for values above the threshold and detrimental for values at or below it. Furthermore, a similar positive correlation is noted for the Environmental (E) and Governance (G) pillars with respect to the deposit ratio. These findings clearly show that banks with elevated sustainability practices tend to rely more on deposits as a fundamental funding source.

Summary for H3: ESG performance is expected to positively influence deposit stability, with higher ESG scores related with an increased ratio of deposits to total assets. Empirically, this relationship is nuanced: ESG scores are positively related to deposit ratios when the deposit-to-total-assets metric is above the threshold, but negatively related when the ratio is below or equal to it.

[INSERT SOMEWHERE HERE TABLE 5]

Lastly, Table 6 presents the findings regarding the business model of the fourth bank in our analysis. Our results indicate a significant association between the bank's ESG score and a reduction in the net interest margin and intermediation margin ratio when it falls below a specific threshold. This negative correlation implies that banks with lower ESG scores may engage in higher-risk lending practices, allowing them to achieve elevated margins. Such high-risk activities could include extending credit to subprime borrowers or targeting industries with less rigorous ESG criteria. These practices can yield higher interest income, enhancing the net interest margin.

This analysis highlights the complex relationship between ESG scores and banking performance. When banks improve their ESG scores, they often see a decrease in their net interest margin compared to their intermediation margin. This suggests that banks may prioritize sustainable practices over short-term profits. The threshold effect shows that banks with initially lower performance might adopt ESG strategies to transform their business model and create additional value. Higher ESG scores are linked to a lower NIM/IM ratio when it is below a certain point, indicating that banks with lower ESG scores may take on riskier lending to boost earnings. Such high-risk activities can include lending to higher-risk borrowers or sectors with relaxed ESG standards, which may increase their interest income temporarily. Overall, this analysis reveals that banks may reduce short-term profits through sustainable practices but are likely investing in long-term strategic positioning.

In contrast, banks with higher ESG scores may be more willing to lend to lower-risk borrowers or invest in socially responsible projects that typically yield lower returns. These loans often come with lower interest rates than traditional high-risk loans, resulting in a reduced bank intermediation margin. Banks committed to strong ESG practices, such as environmentally sustainable lending or socially responsible investments, might accept lower profit margins on their loans, particularly when they support global sustainability goals or attract low-risk, long-term borrowers. Moreover, green loans or loans issued to businesses with high ESG ratings may have more competitive interest rates or narrower spreads due to their lower perceived risks.

Regarding the pillars, E, S, and G are all characterized by significant coefficients, with a negative sign consistent with the theory. The role of Governance, in particular, appears

predominant in explaining the decision to focus on traditional banking income sources.

Summary for H4: ESG engagement is hypothesized to reduce banks' reliance on interest-based profitability, with higher ESG scores related with lower NIM/IM ratios. This is supported by the analysis, which finds a significant negative relationship between lagged ESG scores (one and two years) and NIM/IM ratios when the latter is below the threshold.

The BM1 effects, while statistically significant, are economically small: in the high regime (above the threshold), a 10-point increase in the S or G pillar is related to about 1 – 1.5 basis points. The effects are more pronounced for BM2 in the low regime (below the threshold), where a 10-point improvement in ESG, especially in S, is related to roughly 7–8 basis points. Regarding the BM3, we find that significant coefficients are mainly above the threshold, at about 0.7–1.2 basis points for a 10-point increase in ESG, with governance among the strongest components. Finally, for BM4, we find that the environmental pillar reports a short-run negative relation, followed by positive lagged effects, and that the effects appear to be below the threshold at around 0.7 – 1.1 basis points for ESG.

[INSERT SOMEWHERE HERE TABLE 6]

Our results also allow for a comparison with important bank-level examples that align with the observed trends. These cases reinforce the relationship between ESG scores and key financial ratios related to banks' capital structure, business model, and profitability.

1. BNP Paribas (France, 2021) and Intesa Sanpaolo (Italy, 2021) exhibit ESG scores above the 93^{rd} percentile, accompanied by solid capital ratios (e.g., 4.5% and 5.9%, respectively). These results are consistent with ***H1***, supporting the positive association between ESG performance and capital stability;

2. BNP Paribas consistently shows loan-to-asset ratios between 32% and 39%, aligning with the hypothesis that higher ESG scores are related with more conservative lending. In addition, St. Galler Kantonalbank (Switzerland, 2018–2019), with ESG scores as low as 2.4–3.6, presents very high loan-to-asset ratios (76%–81%), consistent with a less sustainable loan portfolio structure;

3. BNP Paribas and Intesa Sanpaolo show deposit-to-asset ratios above 39%, suggesting that high ESG performers may attract more stable customer funding. In contrast, Jyske Bank and St. Galler Kantonalbank show lower or more volatile deposit reliance, reinforcing the notion that stronger ESG positioning may be associated with stakeholder trust and funding stability;

4. The NIM/IM ratio for BNP Paribas remains between 0.54–0.65 in high-ESG years, pointing to moderate reliance on interest-based margins. Conversely, St. Galler Kantonalbank displays higher NIM/IM ratios (>0.73), potentially reflecting a profitability model more dependent on interest income and less consistent with ESG-aligned financial practices.

5 Robustness checks

In this section, we provide a set of robustness tests of our findings. In particular, we address potential endogeneity issues using the Instrumental Variables (IV) approach and the Generalized Methods of Moments (GMM) (*5.1*); we validate our results using the Propensity Score Matching Technique (PSM) (*5.2*); we exclude banks belonging to PIIGS countries and we apply a Difference-in-Differences (DiD) technique to estimate causal effects of the European sovereign debt crisis event with a parallel trend assumption test and by implementing a placebo test (*5.3*); we use a different ESG indicator (*5.4*); finally, we implement a factor analysis (*5.5*).

5.1 Endogeneity issues

To check for endogeneity of the regressors, we estimate an IV model, using a Two-Stage Least Squares (2SLS) regression. To verify the robustness of the relationship between ESG performance and the banks' business models, we use the adoption of the Global Reporting Initiative (GRI) as an instrumental variable. GRI adoption captures a firm's commitment to standardized, internationally recognized ESG disclosure practices, which are often adopted due to institutional pressures or reputational considerations rather than immediate strategic alignment with business model outcomes. This exogeneity supports its validity as an instru-

ment. GRI adoption is plausibly correlated with ESG scores due to improved transparency and reporting rigor. However, it is less likely to directly influence a bank's business model decisions, except through its impact on ESG performance. Furthermore, the binary nature of the GRI variable simplifies estimation and interpretation in IV models. Thus, leveraging the GRI dummy as an instrument enhances identification and assesses the causal link between ESG orientation and banks' strategic configurations.

[INSERT SOMEWHERE HERE TABLE 7]

Table 7 reports the results. The results across all specifications confirm the strength and validity of the instrument (GRI). The F-tests of excluded instruments and the Kleibergen-Paap LM statistic are highly significant at the 1% level, indicating that GRI is a relevant instrument for ESG, ENV, SOC, and GOV. In addition, the Shea's partial R^2 values, ranging from 0.07 (GOV) to 0.2 (SOC), suggest a moderate explanatory power of the instrument, with stronger relevance for the ENV and SOC pillars.

We also estimate our models using the GMM estimator. Table 8 reports the results. The validity of the dynamic panel GMM estimations, using the two-step GMM, is supported by the results of the Arellano-Bond tests, which confirm the presence of first-order autocorrelation and the absence of second-order autocorrelation across all specifications and dependent variables. The Hansen and Sargan tests generally did not reject the null hypothesis of instrument validity, although there was marginal significance when the dependent variable was business model n. 2. The Wald tests confirm the joint significance of the regressors in all models, reinforcing the robustness of the estimations, particularly for business models n. 1 and n. 2.

[INSERT SOMEWHERE HERE TABLE 8]

5.2 Propensity Score Matching

We then implement the propensity score matching technique according to Boubaker et al. (2016). Table 9 reports the covariate balance diagnostics across four dependent variables that represent the bank's business models, and for the following independent variables: ESG,

CAR, NPLs, and Size. The table reports the means for treated and control groups, standardized percentage bias (%Bias), t-tests with p-values, and variance ratio (V(T)/V(C)) to assess variance homogeneity. Business models 1 and 3 report good balance with low %Bias values (mostly under 10%) and non-significant t-tests, indicating that the treated and control groups are comparable on observed covariates after adjustment. However, some variance ratios are flagged (marked with *), suggesting differences in variance for specific variables such as ESG and NPLs. Business model 2 reports imbalance, with large %Bias values (up to 79% for the Size variable), highly significant t-tests, and variance ratios well outside acceptable thresholds. This indicates poor covariate balance and potential bias in causal inference for this sample. Finally, Business model 4 reports intermediate results with generally low to moderate %Bias and mostly non-significant t-tests, though some variance ratios are flagged, especially for CAR and NPLs.

[INSERT SOMEWHERE HERE TABLE 9]

5.3 Banks not belonging to PIIGS countries

A potential concern in our analysis is that the relationship between ESG performance and bank business model may be influenced by macroeconomic and financial stability considerations rather than reflecting a genuine strategic shift. To account for this possibility, we re-estimate our baseline model after excluding banks headquartered in Portugal, Ireland, Italy, Greece, and Spain (PIIGS). The rationale for this exclusion is threefold. First, these countries were at the center of the Eurozone sovereign debt crisis, experiencing financial distress and large-scale government interventions that may have distorted banks' capital structures and risk-taking behavior (Altunbas et al., 2017). Second, regulatory responses in these economies deviated from broader European trends, with country-specific measures aimed at stabilizing banking sectors (Acharya et al., 2019). Third, banks in PIIGS countries exhibited higher levels of non-performing loans (NPLs) and faced unique capital constraints, potentially confounding the estimated relationship between ESG and business model choices. By excluding these economies, we ensure that our findings are not driven by financial instability or regulatory interventions

unrelated to ESG considerations. The results, presented in Table A3 in the Internet Appendix, remain consistent with our main findings, reinforcing the robustness of our conclusions.

In addition, we conduct a DiD estimation that allows to assess whether banks with high sovereign debt exposure and high ESG scores may experience a larger shift in their business models. We implement a model with a triple interaction as follows:

$$\begin{aligned} Bus\ Model_{i,t} =& \beta_0 + \beta_1 Treated_i + \beta_2 Post_t + \beta_3 (Treated_i * Post_t) + \\ &+ \beta_4 (Treated_i * Post_t * ESG_{i,t}) + \varepsilon_{i,t} \end{aligned} \tag{3}$$

where: $Bus\ Model_{i,t}$ is the dependent variable representing the four banks' business models; $Treated_i$ is a dummy variable which equals 1 for banks belonging to PIIGS countries and 0 otherwise; $Post_t$ is a dummy variable which equals 1 for the post-European debt crisis period (2013 – 2022) and 0 otherwise; $ESG_{i,t}$ is the moderating variable. Our focus is β_5. If β_5 is >0, the banks with high sovereign debt exposure and high ESG scores experienced a larger shift in their business models after the crisis than similar banks with low ESG scores.

Additionally, we conducted a parallel trends assumption test by examining the validity of the year preceding the event and performing a placebo test to rule out the possibility that pre-existing trends or confounding factors drive the observed effects. We designated the treatment period as 2012 only, a year before the actual onset of the treatment period from 2013 to 2022. We re-estimated the model using the same specification but replaced the post-treatment indicator with a dummy variable set to 1 for 2012 only.

$$\begin{aligned} Bus\ Model_{i,t} =& \beta_0 + \beta_1 Treated_i + \beta_2 PlaceboTest_t + \beta_3 (Treated_i * PlaceboTest_t) + \\ &+ \beta_4 (Treated_i * PlaceboTest_t * ESG_{i,t}) + \varepsilon_{i,t} \end{aligned} \tag{4}$$

Parallel trends assumption: We tested six years before the event: 2007, 2008, 2009, 2010, 2011, and 2012. The output of the T-test is the following: $F(6, 79) = 1.64$, $Prob > F = 0.1463$. The test is not statistically significant, which suggests that the treated and control groups

followed similar trends before treatment, supporting the parallel trends assumption.

The triple interaction term, β_5, $(Treated_i * PlaceboTest_t * ESG_{i,t})$, was not statistically significant in this falsification test. These results support the parallel trends assumption and increase our confidence that spurious correlations or pre-existing trends do not influence the estimated treatment effects in the main analysis of the data. Table 10 reports the results.

[INSERT SOMEWHERE HERE TABLE 10]

5.4 A different ESG indicator and further sensitivity analyses

Another potential concern relates to the measurement of ESG performance. ESG scores are derived from multiple sources, each employing distinct methodologies that may introduce bias. To address this, we verify the stability of our results using two alternative ESG measures: (i) the ESG combined score, which adjusts for significant controversies affecting banks, and (ii) ESG ratings from Bloomberg, which rely on a different data collection framework. The ESG combined score incorporates adjustments for controversies, providing a more risk-sensitive measure of sustainability performance. This adjustment is particularly relevant in the banking sector, where ESG-related controversies can materially affect financial stability and reputational risk (Homanen, 2018). Given that regulatory agencies and investors increasingly consider controversy-adjusted ESG scores in financial assessments, this measure provides an alternative and potentially more comprehensive proxy for ESG performance. The results using the ESG combined score, reported in Table 11, closely align with those of our baseline model, confirming that our conclusions are not driven by the choice of ESG metric.

We further test the robustness of our findings using ESG scores from Bloomberg, which differ from our primary dataset in one key way. Bloomberg scores rely exclusively on publicly disclosed information, reducing potential biases stemming from survey-based or qualitative assessments. Table 12 presents the results using Bloomberg ESG scores, which remain consistent with our main findings. This suggests that the relationship between ESG performance and business model choices is not sensitive to the specific ESG dataset employed.

We compute further sensitivity analyses by: [i] adding country-level macroeconomic con-

trols such as, the GDP growth, the unemployment rate, and the CPI inflation rate, and by incorporating business models as regressors; [ii] comparing large versus small banks; and [iii] excluding from the sample the Global Systemically Important Banks. The results are reported in Tables A4, A5, and A6. These sensitivity analyses confirm the main findings by showing that the results are robust to alternative specifications and sample splits.

[INSERT SOMEWHERE HERE TABLES 11 & 12]

5.5 Factor analysis

Based on well-known banking business model literature (Ayadi et al., 2021; Marques & Alves, 2021; Martín-Oliver et al., 2017), we conduct a factor analysis on a series of standardized variables related to balance sheet and income structure, as established in the literature (Mergaerts & Vander Vennet, 2016). These variables include the ratios of Tier 1 and Tier 2 capital to total assets (BM1), loans to total assets (BM2), deposits to total assets (BM3), and the proportion of interest income within the total intermediation margin (BM4). The factor analysis uncovers two significant latent dimensions.

We find that the first factor shows robust positive loadings on the loans/assets ratio and the share of interest margin, with moderate contributions from the deposits/assets ratio. This factor is identified as the "Retail-Lending Model," reflecting a conventional banking paradigm in which deposit funding and lending activities constitute the primary revenue streams. Conversely, Factor 2 exhibits ambiguous and weak loadings on both deposits and capital structure, indicating a potential yet constrained trade-off between direct funding sources and capital adequacy. Due to its limited explanatory capacity, we opt to retain only Factor 1 as a continuous proxy for assessing business model orientation.

[INSERT SOMEWHERE HERE TABLE 13]

It is particularly noteworthy to consider these two factors encompassing data on lending activity and funding structure, as the loans-to-total assets and deposits-to-total assets ratios are the individual business model variables that exhibit the most significant and nuanced relationships with other variables in our analysis. These relationships yield compelling insights into

the operational dynamics of banking institutions and their performance outcomes. The pronounced explanatory power of these variables suggests important policy implications that may need to be calibrated according to distinct business model configurations rather than applying uniform standards across heterogeneous banking structures.

6 Conclusions

In this paper, we studied the relationship between banks' business models and their ESG performance. We used a threshold regression model (Hansen, 1999) to identify changes in the business models of a sample of 80 European listed banks from 2006 - 2021.

Our results are summarized as follows. First, we find a significant and positive relationship between the ESG score and banks with greater capital stability, and that the Social pillar plays a particularly significant role in these cases. Second, we find that the ESG score is related with a reduction in the loans to total assets ratio when it assumes values below and/or equal to the threshold. Third, we find a negative (positive) relationship between ESG scores and the ratio between deposits and total assets when it assumes values below and/or equal to (above) the threshold and that there is a positive relationship with the ratio even for pillars E and G. Finally, the ESG score is associated with a reduction in the NIM/IM ratio when the latter is below the threshold, confirming that a greater focus on ESG risks is more in line with banks characterized by traditional activities (where the NIM/IM ratio is higher) and, conversely, less consistent with banks seeking alternative income sources.

The findings of this study have several implications for both microprudential and macroprudential regulation, particularly regarding the integration of ESG considerations into banking practices.

First, at the microprudential level, ESG integration can strengthen the resilience of individual banks. Banks with higher ESG performance tend to maintain stronger capital buffers and engage less in high-risk, non-traditional banking activities. Regulators could incorporate ESG indicators into supervisory risk dashboards, allowing for more granular monitoring of banks' exposure to environmental, social, and governance risks. For example, banks with persistently

low ESG scores could face higher qualitative capital buffer requirements or enhanced scrutiny of their risk management processes. Governance is a key driver of ESG performance; thus, regulators might mandate the establishment of dedicated ESG committees at the board level and align senior management incentives with ESG targets to ensure sustainability objectives are implemented. Additionally, banks with significant trading and investment banking activities could be required to disclose their ESG-related exposures in securitizations and derivatives, increasing transparency and supporting risk oversight.

Second, at the macroprudential level, ESG considerations contribute to systemic stability by promoting more stable funding structures and reducing reliance on volatile wholesale financing. Regulators could provide enhanced deposit insurance coverage for banks that meet specific ESG criteria, thereby reinforcing depositor confidence. Central banks and supervisory authorities could also promote ESG-linked deposit instruments, such as green savings accounts, to direct retail funding toward environmentally and socially sustainable projects. Stricter liquidity coverage or capital requirements may be warranted for banks that are heavily reliant on non-deposit funding, particularly if ESG performance is weak, to mitigate systemic risks. More broadly, regulatory incentives, such as preferential treatment or tax benefits for banks demonstrating strong ESG performance, could further encourage sustainable practices while enhancing financial stability.

Overall, these findings suggest that ESG integration not only supports the soundness of individual banks but also serves as a tool for enhancing systemic resilience. Coordinated microprudential and macroprudential measures, informed by ESG metrics, can therefore align sustainability objectives with broader financial stability goals.

Despite offering new insights, this study has several limitations that open avenues for future research. While our analysis focuses on European banks operating within a relatively homogeneous regulatory environment, the observed relationships between ESG performance and bank business models may not generalize to other jurisdictions. Differences in regulatory frameworks, investor expectations, market structures, and economic conditions could influence both the adoption of ESG practices and their impact on bank stability, funding structures, and risk-taking behavior. For instance, in markets with less stringent ESG disclosure requirements or

weaker governance standards, the link between ESG performance and capital stability may be attenuated. Future research could extend this analysis to banks in the U.S., Asia, or emerging markets to examine the robustness of our findings across diverse institutional and regulatory contexts.

In addition, this study relies on composite ESG scores, which aggregate multiple environmental, social, and governance indicators. While these scores provide a useful benchmark, they may obscure the impact of specific ESG subcomponents. Future research could investigate how individual ESG factors (e.g., carbon footprint, board diversity, or community investment) influence banking strategies differently. While our study examines how ESG performance shapes banks' business models, we do not directly assess whether these ESG-driven business model changes enhance long-term financial performance or risk-adjusted returns. Future research could explore this dimension, linking ESG-induced business model adjustments to profitability, market valuation, and risk metrics over extended time horizons.

In conclusion, the findings of this study contribute to advancing the United Nations Sustainable Development Goals (SDGs), particularly SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), and SDG 13 (Climate Action). By demonstrating that higher ESG performance is associated with stronger capital buffers, deposit-based funding, and traditional income structures, this research provides empirical evidence that ESG integration enhances financial stability while supporting sustainable development. These results suggest that banks with higher ESG scores adopt more prudent business models that promote sustainable economic growth (SDG 8), encourage responsible financial innovation (SDG 9), and facilitate the channeling of capital toward climate-resilient investments (SDG 13). Policymakers and regulatory authorities can leverage these insights to design prudential frameworks that explicitly incorporate ESG factors, thereby aligning banking supervision with the 2030 Agenda for Sustainable Development and accelerating the transition toward a more sustainable and resilient financial system.

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Table 1: Descriptive statistics.

Description	**Mean**	**Minimum**	**First quartile**	**Median**	**Third quartile**	**Maximum**	**Standard deviation**
Dependent variables							
Bus. Mod. $1_{i,t}$ (%)	6.86	-4.43	4.56	6.05	7.93	64.06	4.93
Bus. Mod. $2_{i,t}$ (%)	62.79	0.06	53.75	65.61	75.13	98.86	17.79
Bus. Mod. $3_{i,t}$ (%)	53.93	0.64	41.58	54.29	67.20	90.27	18.01
Bus. Mod. $4_{i,t}$ (%)	44.07	-71.99	36.45	45.99	52.12	102.23	13.61
Independent variables							
$ESG_{i,t}$ (%)	52.01	1.53	35.10	52.92	70.37	95.46	22.46
$E_{i,t}$ (%)	57.33	1.02	30.55	61.57	84.06	98.10	28.60
$S_{i,t}$ (%)	52.41	0.64	34.34	53.21	72.02	97.64	23.97
$G_{i,t}$ (%)	52.76	1.12	32.70	54.12	72.51	97.00	24.08
$CAR_{i,t}$ (%)	16.22	-6.10	13.51	16.20	18.73	35.28	4.64
$NPLs_{i,t}$ (%)	5.81	0.00	1.22	2.92	5.81	77.15	9.75
$Size_{i,t}$ (€ Mln)	292,439,085.10	315,457.00	14,645,901.00	47,278,478.00	274,119,987.00	2,630,440,000.00	511,617,230.40

The Table reports the descriptive statistics for the following dependent and independent variables: $Bus\ Model_{i,t}$, the dependent variable, is the proxy for the four banks' business models: *Bus. Mod.* $1_{i,t}$: the Tier 1 and Tier 2 over Total Asset ratio; *Bus. Mod.* $2_{i,t}$: the Loans over Total Asset ratio; *Bus. Mod.* $3_{i,t}$: the Deposits over Total Asset ratio; *Bus. Mod.* $4_{i,t}$: the Net-Interest Margin over the Intermediation Margin ratio; $ESG_{i,t}$ represents the *Environmental*, *Social* and *Governance* scores for banks; $CAR_{i,t-1}$ is the risk-weighted assets ratio between Tier 1 and Tier 2 capital over the risk-weighted assets; $NPLs_{i,t-1}$ the ratio between non-performing net loans and total outstanding net loans; $Size_{i,t-1}$ is the natural logarithm of total assets for for bank.

Table 2: Matrix correlation.

Matrix Correlation	**Bus. Mod.** $\mathbf{1}_{i,t}$	**Bus. Mod.** $\mathbf{2}_{i,t}$	**Bus. Mod.** $\mathbf{3}_{i,t}$	**Bus. Mod.** $\mathbf{4}_{i,t}$	$\mathbf{ESG}_{i,t.1}$	$\mathbf{CAR}_{i,t.1}$	$\mathbf{NPL}_{i,t.1}$	$\mathbf{Size}_{i,t.1}$
Bus. Mod. $\mathbf{1}_{i,t}$	1							
Bus. Mod. $\mathbf{2}_{i,t}$		1						
Bus. Mod. $\mathbf{3}_{i,t}$			1					
Bus. Mod. $\mathbf{4}_{i,t}$				1				
$\mathbf{ESG}_{i,t.1}$	-0.1450*	-0.3834*	-0.2474*	-0.2175*	1			
$\mathbf{CAR}_{i,t.1}$	-0.1730*	0.0848*	0.0297	0.1336*	0.0982*	1		
$\mathbf{NPL}_{i,t.1}$	-0.0918*	-0.0767*	0.0587*	0.0531	0.0526	-0.2913*	1	
$\mathbf{Size}_{i,t.1}$	-0.1489*	-0.3441*	-0.2915*	-0.5354*	0.6418*	-0.0281	0.0615*	1
VIFs	**1.42**	**1.42**	**1.42**	**1.42**	**1.75**	**1.12**	**1.1**	**1.75**

The Table reports the Pearson correlations for dependent and independent variables: $Bus\ Model_{i,t}$, the dependent variable, is the proxy for the four banks' business models: *Bus. Mod.* $1_{i,t}$: the Tier 1 and Tier 2 over Total Asset ratio; *Bus. Mod.* $2_{i,t}$: the Loans over Total Asset ratio; *Bus. Mod.* $3_{i,t}$: the Deposits over Total Asset ratio; *Bus. Mod.* $4_{i,t}$: the Net-Interest Margin over the Intermediation Margin ratio; $ESG_{i,t}$ represents the *Environmental*, *Social* and *Governance* scores for banks; $CAR_{i,t-1}$ is the risk-weighted assets ratio between Tier 1 and Tier 2 capital over the risk-weighted assets; $NPLs_{i,t-1}$ the ratio between non-performing net loans and total outstanding net loans; $Size_{i,t-1}$ is the natural logarithm of total assets for for bank. VIF is the Variance Inflation Factor and is used to detect collinearity of the regressors. denotes the statistical significance at 5% level.

Table 3: Empirical results for Business Model 1.

Dependent variable: BM $1_{i,t}$	**[i]**	**[ii]**	**[iii]**
$ESG_{i,t}(BM_{i,t-1} \leq \gamma)$	0.0000		
	(0.0001)		
$ESG_{i,t}(BM_{i,t-1} > \gamma)$	0.0003**		
	(0.0001)		
$ESG_{i,t-1}(BM_{i,t-1} \leq \gamma)$		0.0001	
		(0.0001)	
$ESG_{i,t-1}(BM_{i,t-1} > \gamma)$		0.0012**	
		(0.0006)	
$ESG_{i,t-2}(BM_{i,t-1} \leq \gamma)$			0.0000
			(0.0001)
$ESG_{i,t-2}(BM_{i,t-1} > \gamma)$			0.0003
			(0.0001)
$CAR_{i,t-1}$	0.1892**	0.1902**	0.1798**
	(0.0788)	(0.0815)	(0.0796)
$NPLs_{i,t-1}$	0.0247	0.021	0.0293
	(0.0221)	(0.0255)	(0.0215)
$Size_{i,t-1}$	-0.0121	-0.0114	-0.0092
	(0.0085)	(0.0074)	(0.0099)
Constant	0.2452	0.2273*	0.2998
	(0.1528)	(0.1336)	(0.1824)
Banks fixed effects	YES	YES	YES
Time dummies	YES	YES	YES
N. Obs.	1,200	1,120	1,040
N. Banks	80	80	80
N. Countries	25	25	25
γ	0.0639	0.1287	0.0639
R^2 *within*	0.12	0.11	0.10
F-Test	6.10***	7.18***	4.29***

Dependent variable: BM $1_{i,t}$	**[i]**	**[ii]**	**[iii]**
$E_{i,t}(BM_{i,t-1} \leq \gamma)$	0.0000		
	(0.0001)		
$E_{i,t}(BM_{i,t-1} > \gamma)$	0.0017		
	(0.0022)		
$E_{i,t-1}(BM_{i,t-1} \leq \gamma)$		-0.0001**	
		(0.0000)	
$E_{i,t-1}(BM_{i,t-1} > \gamma)$		0.0001	
		(0.0001)	
$E_{i,t-2}(BM_{i,t-1} \leq \gamma)$			-0.0001*
			(0.0000)
$E_{i,t-2}(BM_{i,t-1} > \gamma)$			0.00001
			(0.0001)
$CAR_{i,t-1}$	0.2105***	0.1926**	0.1885***
	(0.0790)	(0.0805)	(0.0817)
$NPLs_{i,t-1}$	0.0179	0.026	0.0286
	(0.0264)	(0.0231)	(0.0218)
$Size_{i,t-1}$	-0.0127	-0.0131	-0.0146
	(0.0086)	(0.0093)	(0.0103)
Constant	0.2580	0.2712	0.3092
	(0.1571)	(0.1695)	(0.1900)
Banks fixed effects	YES	YES	YES
Time dummies	YES	YES	YES
N. Obs.	1,200	1,120	1,040
N. Banks	80	80	80
N. Countries	25	25	25
γ	0.1857	0.062	0.062
R^2 *within*	0.11	0.10	0.09
F-Test	9.96***	5.94***	4.26***

Dependent variable: BM $1_{i,t}$	**[i]**	**[ii]**	**[iii]**
$S_{i,t}(BM_{i,t-1} \leq \gamma)$	0.0001		
	(0.0001)		
$S_{i,t}(BM_{i,t-1} > \gamma)$	0.0014**		
	(0.0007)		
$S_{i,t-1}(BM_{i,t-1} \leq \gamma)$		0.0001	
		(0.0001)	
$S_{i,t-1}(BM_{i,t-1} > \gamma)$		0.0013*	
		(0.0007)	
$S_{i,t-2}(BM_{i,t-1} \leq \gamma)$			0.0001
			(0.0001)
$S_{i,t-2}(BM_{i,t-1} > \gamma)$			0.0002
			(0.0002)
$CAR_{i,t-1}$	0.2071**	0.1943**	0.1831**
	(0.0782)	(0.0808)	(0.0291)
$NPLs_{i,t-1}$	0.0191	0.0222	0.0291
	(0.0252)	(0.0255)	(0.0221)
$Size_{i,t-1}$	-0.0101	-0.0109	-0.01444
	(0.0071)	(0.0071)	(0.0098)
Constant	0.2053	0.2201*	0.2982
	(0.1257)	(0.1282)	(0.1807)
Banks fixed effects	YES	YES	YES
Time dummies	YES	YES	YES
N. Obs.	1,200	1,120	1,040
N. Banks	80	80	80
N. Countries	25	25	25
γ	0.1299	0.1287*	0.0639
R^2 *within*	0.12	0.12	0.10
F-Test	5.29***	6.75***	3.95***

Dependent variable: BM $1_{i,t}$	**[i]**	**[ii]**	**[iii]**
$G_{i,t}(BM_{i,t-1} \leq \gamma)$	0.0001		
	(0.0001)		
$G_{i,t}(BM_{i,t-1} > \gamma)$	0.0012**		
	(0.0001)		
$G_{i,t-1}(BM_{i,t-1} \leq \gamma)$		0.0001	
		(0.0001)	
$G_{i,t-1}(BM_{i,t-1} > \gamma)$		0.0018	
		(0.0011)	
$G_{i,t-2}(BM_{i,t-1} \leq \gamma)$			-0.0001
			(0.0001)
$G_{i,t-2}(BM_{i,t-1} > \gamma)$			0.0002**
			(0.0001)
$CAR_{i,t-1}$	0.2032**	0.2035***	0.1824**
	(0.0786)	(0.0747)	(0.0787)
$NPLs_{i,t-1}$	0.0181	0.0217	0.0307
	(0.0250)	(0.0243)	(0.0217)
$Size_{i,t-1}$	-0.0111	-0.0098	-0.0143
	(0.0076)	(0.0063)	(0.0098)
Constant	0.2232	0.2021*	0.3008
	(0.1372)	(0.1144)	(0.0001)
Banks fixed effects	YES	YES	YES
Time dummies	YES	YES	YES
N. Obs.	1,200	1,120	1,040
N. Banks	80	80	80
N. Countries	25	25	25
γ	0.1299	0.1415**	0.0638
R^2 *within*	0.12	0.14	0.10
F-Test	6.05***	5.4***	5.35***

The Table reports the results when the dependent variable is the proxy for the banks's business model 1: the (Tier 1 + Tier 2) over Total Asset ratio; $ESG_{i,t}$ represents the *Environmental*, *Social* and *Governance* scores for banks; $CAR_{i,t-1}$ is the risk-weighted assets ratio between (Tier 1 + Tier 2) capital and dividing the total by the total risk-weighted assets; $NPL_{i,t-1}$ the ratio between non-performing net loans and total outstanding net loans; $Size_{i,t-1}$ is the natural logarithm of total assets for for bank. The thresholds, their confidence level and p-value, has been constructed using 300 bootstraps, and the confidence interval is calculated using the 5% critical value for the non-rejection zone. Robust standard errors are in parentheses ***; **; * denote statistical significance, respectively at 1%, 5% and 10% levels.

Table 4: Empirical results for Business Model 2.

Dependent variable: BM 2$_{i,t}$	**[i]**	**[ii]**	**[iii]**
$ESG_{i,t}(BM_{i,t-1} \leq \gamma)$	-0.0075*		
	(0.0038)		
$ESG_{i,t}(BM_{i,t-1} > \gamma)$	0.0004		
	(0.0005)		
$ESG_{i,t-1}(BM_{i,t-1} \leq \gamma)$		-0.0071**	
		(0.0032)	
$ESG_{i,t-1}(BM_{i,t-1} > \gamma)$		0.0002	
		(0.0001)	
$ESG_{i,t-2}(BM_{i,t-1} \leq \gamma)$			-0.0073*
			(0.0037)
$ESG_{i,t-2}(BM_{i,t-1} > \gamma)$			0.0005
			(0.0005)
$CAR_{i,t-1}$	0.3256**	0.4042**	0.3440**
	(0.1567)	(0.1690)	(0.1575)
$NPLs_{i,t-1}$	-0.0747	-0.0837	-0.0645
	(0.0621)	(0.0659)	(0.0659)
$Size_{i,t-1}$	0.0259	0.0253	0.0300
	(0.0276)	(0.0301)	(0.0266)
Constant	0.1300	0.1400	0.1100
	(0.0005)	(0.0001)	(0.4690)
Banks fixed effects	YES	YES	YES
Time dummies	YES	YES	YES
N. Obs.	1,200	1,120	1,040
N. Banks	80	80	80
N. Countries	25	25	25
γ	0.1174***	0.1009***	0.1174***
R^2 *within*	0.22	0.18	0.21
F-Test	6.60***	8.08***	7.66***

Dependent variable: BM 2$_{i,t}$	**[i]**	**[ii]**	**[iii]**
$E_{i,t}(BM_{i,t-1} \leq \gamma)$	-0.0089		
	(0.1904)		
$E_{i,t}(BM_{i,t-1} > \gamma)$	0.0006		
	(0.0004)		
$E_{i,t-1}(BM_{i,t-1} \leq \gamma)$		-0.0087	
		(0.0058)	
$E_{i,t-1}(BM_{i,t-1} > \gamma)$		0.0004	
		(0.0003)	
$E_{i,t-2}(BM_{i,t-1} \leq \gamma)$			-0.0024*
			(0.0013)
$E_{i,t-2}(BM_{i,t-1} > \gamma)$			0.0006*
			(0.0003)
$CAR_{i,t-1}$	0.4025**	0.4509**	0.432**
	(0.1904)	(0.1880)	(0.2007)
$NPLs_{i,t-1}$	-0.0939	-0.0914	-0.0725
	(0.0686)	(0.0681)	(0.0672)
$Size_{i,t-1}$	0.0151	0.0181	0.0300
	(0.0371)	(0.0359)	(0.0401)
Constant	0.3000	0.2400	0.0600
	(0.6516)	(0.6354)	(0.7176)
Banks fixed effects	YES	YES	YES
Time dummies	YES	YES	YES
N. Obs.	1,200	1,120	1,040
N. Banks	80	80	80
N. Countries	25	25	25
γ	0.098***	0.1009***	0.3132**
R^2 *within*	0.14	0.14	0.14
F-Test	7.54***	8.25***	9.75***

Dependent variable: BM 2$_{i,t}$	**[i]**	**[ii]**	**[iii]**
$S_{i,t}(BM_{i,t-1} \leq \gamma)$	-0.0074**		
	(0.0033)		
$S_{i,t}(BM_{i,t-1} > \gamma)$	0.0003		
	(0.0004)		
$S_{i,t-1}(BM_{i,t-1} \leq \gamma)$		-0.0070**	
		(0.0026)	
$S_{i,t-1}(BM_{i,t-1} > \gamma)$		0.0002	
		(0.0005)	
$S_{i,t-2}(BM_{i,t-1} \leq \gamma)$			-0.0074**
			(0.0031)
$S_{i,t-2}(BM_{i,t-1} > \gamma)$			0.0003
			(0.0004)
$CAR_{i,t-1}$	0.3258**	0.4025**	0.3396**
	(0.1537)	(0.1650)	(0.1570)
$NPLs_{i,t-1}$	-0.0723	-0.0815	-0.0599
	(0.0628)	(0.0661)	(0.0659)
$Size_{i,t-1}$	0.0233	0.0234	0.0234
	(0.0254)	(0.0285)	(0.0248)
Constant	0.1900	0.1700	0.1667
	(0.4438)	(0.4987)	(0.4383)
Banks fixed effects	YES	YES	YES
Time dummies	YES	YES	YES
N. Obs.	1,200	1,120	1,040
N. Banks	80	80	80
N. Countries	25	25	25
γ	0.1174***	0.1009***	0.1174***
R^2 *within*	0.23	0.18	0.22
F-Test	6.68***	8.95***	7.72***

Dependent variable: BM 2$_{i,t}$	**[i]**	**[ii]**	**[iii]**
$G_{i,t}(BM_{i,t-1} \leq \gamma)$	-0.0055*		
	(0.0029)		
$G_{i,t}(BM_{i,t-1} > \gamma)$	0.0003		
	(0.0004)		
$G_{i,t-1}(BM_{i,t-1} \leq \gamma)$		-0.0063**	
		(0.0031)	
$G_{i,t-1}(BM_{i,t-1} > \gamma)$		0.0001	
		(0.0005)	
$G_{i,t-2}(BM_{i,t-1} \leq \gamma)$			-0.0034*
			(0.0018)
$G_{i,t-2}(BM_{i,t-1} > \gamma)$			0.0003
			(0.0005)
$CAR_{i,t-1}$	0.3342**	0.4126**	0.4383**
	(0.1608)	(0.1678)	(0.1828)
$NPLs_{i,t-1}$	-0.0727	-0.0835	-0.0622
	(0.0621)	(0.0659)	(0.0653)
$Size_{i,t-1}$	0.0315	0.028	0.03
	(0.0324)	(0.0312)	(0.0342)
Constant	0.0500	0.0955	-0.0175
	(0.5583)	(0.5417)	(0.6016)
Banks fixed effects	YES	YES	YES
Time dummies	YES	YES	YES
N. Obs.	1,200	1,120	1,040
N. Banks	80	80	80
N. Countries	25	25	25
γ	0.1998***	0.1009***	0.3132***
R^2 *within*	0.22	0.17	0.20
F-Test	8.34***	7.69***	11.72***

The Table reports the results when the dependent variable is the proxy for the banks's business model 2: Total Loans over Total Asset ratio; $ESG_{i,t}$ represents the *Environmental*, *Social* and *Governance* scores for banks; $CAR_{i,t-1}$ is the risk-weighted assets ratio between Tier 1 + Tier 2 capital and dividing the total by the total risk-weighted assets; $NPL_{i,t-1}$ the ratio between non-performing net loans and total outstanding net loans; $Size_{i,t-1}$ is the natural logarithm of total assets for for bank. The thresholds, their confidence level and p-value, has been constructed using 300 bootstraps, and the confidence interval is calculated using the 5% critical value for the non-rejection zone. Robust standard errors are in parentheses ***; **; * denote statistical significance, respectively at 1%, 5% and 10% levels.

Table 5: Empirical results for Business Model 3.

Dependent variable: BM 3$_{i,t}$	**[i]**	**[ii]**	**[iii]**
$ESG_{i,t}(BM_{i,t-1} \leq \gamma)$	-0.0068		
	(0.0048)		
$ESG_{i,t}(BM_{i,t-1} > \gamma)$	0.0007**		
	(0.0003)		
$ESG_{i,t-1}(BM_{i,t-1} \leq \gamma)$		-0.0003	
		(0.0004)	
$ESG_{i,t-1}(BM_{i,t-1} > \gamma)$		0.0009***	
		(0.0003)	
$ESG_{i,t-2}(BM_{i,t-1} \leq \gamma)$			-0.0001
			(0.0004)
$ESG_{i,t-2}(BM_{i,t-1} > \gamma)$			0.0012***
			(0.0003)
$CAR_{i,t-1}$	0.0116	0.0431	0.013
	(0.1179)	(0.1191)	(0.1161)
$NPLs_{i,t-1}$	-0.0109	-0.0045	0.0015
	(0.0449)	(0.0462)	(0.0393)
$Size_{i,t-1}$	-0.0894***	-0.0877***	-0.0887***
	(0.0229)	(0.0149)	(0.0181)
Constant	2.0509***	2.0195***	2.0689***
	(0.2705)	(0.2676)	(0.3316)
Banks fixed effects	YES	YES	YES
Time dummies	YES	YES	YES
N. Obs.	1,200	1,120	1,040
N. Banks	80	80	80
N. Countries	25	25	25
γ	0.5305***	0.5421***	0.5960***
R^2 *within*	0.49	0.48	0.48
F-Test	24.27***	27.83***	17.63***

Dependent variable: BM 3$_{i,t}$	**[i]**	**[ii]**	**[iii]**
$E_{i,t}(BM_{i,t-1} \leq \gamma)$	-0.0003		
	(0.0003)		
$E_{i,t}(BM_{i,t-1} > \gamma)$	0.0007***		
	(0.0002)		
$E_{i,t-1}(BM_{i,t-1} \leq \gamma)$		-0.0003	
		(0.0003)	
$E_{i,t-1}(BM_{i,t-1} > \gamma)$		0.0006**	
		(0.0002)	
$E_{i,t-2}(BM_{i,t-1} \leq \gamma)$			-0.0001
			(0.0003)
$E_{i,t-2}(BM_{i,t-1} > \gamma)$			0.0010***
			(0.0003)
$CAR_{i,t-1}$	-0.0018	0.0487	0.0186
	(0.1125)	(0.1189)	(0.1162)
$NPLs_{i,t-1}$	0.0077	-0.0103	-0.0078
	(0.0466)	(0.0474)	(0.0427)
$Size_{i,t-1}$	-0.0853***	-0.09001***	-0.0923***
	(0.0174)	(0.0155)	(0.0181)
Constant	1.9796***	2.070***	2.1381***
	(0.3080)	(0.2765)	(0.3263)
Banks fixed effects	YES	YES	YES
Time dummies	YES	YES	YES
N. Obs.	1,200	1,120	1,040
N. Banks	80	80	80
N. Countries	25	25	25
γ	0.5819***	0.5421***	0.5819***
R^2 *within*	0.48	0.47	0.47
F-Test	19.82***	26.99***	17.02***

Dependent variable: BM 3$_{i,t}$	**[i]**	**[ii]**	**[iii]**
$S_{i,t}(BM_{i,t-1} \leq \gamma)$	-0.0006*		
	(0.0003)		
$S_{i,t}(BM_{i,t-1} > \gamma)$	0.0006**		
	(0.0002)		
$S_{i,t-1}(BM_{i,t-1} \leq \gamma)$		-0.0004	
		(0.0003)	
$S_{i,t-1}(BM_{i,t-1} > \gamma)$		0.0007***	
		(0.0002)	
$S_{i,t-2}(BM_{i,t-1} \leq \gamma)$			-0.0003
			(0.0003)
$S_{i,t-2}(BM_{i,t-1} > \gamma)$			0.0008***
			(0.0003)
$CAR_{i,t-1}$	0.0131	0.0563	0.0516
	(0.1192)	(0.1152)	(0.1151)
$NPLs_{i,t-1}$	-0.0088	-0.0106	0.0059
	(0.0506)	(0.0458)	(0.0421)
$Size_{i,t-1}$	-0.0897***	-0.0916***	-0.0980***
	(0.0152)	(0.0155)	(0.0165)
Constant	2.0566***	2.0955***	2.2380***
	(0.2717)	(0.2793)	(0.2999)
Banks fixed effects	YES	YES	YES
Time dummies	YES	YES	YES
N. Obs.	1,200	1,120	1,040
N. Banks	80	80	80
N. Countries	25	25	25
γ	0.5278***	0.5309***	0.5315***
R^2 *within*	0.49	0.49	0.48
F-Test	24.17***	29.38***	23.31***

Dependent variable: BM 3$_{i,t}$	**[i]**	**[ii]**	**[iii]**
$G_{i,t}(BM_{i,t-1} \leq \gamma)$	-0.0002		
	(0.0003)		
$G_{i,t}(BM_{i,t-1} > \gamma)$	0.0012***		
	(0.0002)		
$G_{i,t-1}(BM_{i,t-1} \leq \gamma)$		-0.0003	
		(0.0002)	
$G_{i,t-1}(BM_{i,t-1} > \gamma)$		0.0010***	
		(0.0002)	
$G_{i,t-2}(BM_{i,t-1} \leq \gamma)$			-0.0004
			(0.0003)
$G_{i,t-2}(BM_{i,t-1} > \gamma)$			0.0010***
			(0.0002)
CAR	-0.0132	0.0176	0.0131
	(0.1151)	(0.1165)	(0.1159)
$NPLs_{i,t-1}$	-0.0058	-0.0118	0.0014
	(0.0466)	(0.0425)	(0.0367)
$Size_{i,t-1}$	-0.0809***	-0.0830***	-0.0861***
	(0.0172)	(0.0172)	(0.0176)
Constant	1.8961***	1.9463***	2.0361***
	(0.3069)	(0.3079)	(0.3169)
Banks fixed effects	YES	YES	YES
Time dummies	YES	YES	YES
N. Obs.	1,200	1,120	1,040
N. Banks	80	80	80
N. Countries	25	25	25
γ	0.61***	0.5964***	0.5960***
R^2 *within*	0.49	0.48	0.49
F-Test	21.10***	20.79***	19.53***

The Table reports the results when the dependent variable is the proxy for the banks's business model 3: Total Deposits over Total Asset ratio; $ESG_{i,t}$ represents the *Environmental*, *Social* and *Governance* scores for banks; $CAR_{i,t-1}$ is the risk-weighted assets ratio between Tier 1 + Tier 2 capital and dividing the total by the total risk-weighted assets; $NPL_{i,t-1}$ the ratio between non-performing net loans and total outstanding net loans; $Size_{i,t-1}$ is the natural logarithm of total assets for for bank. The thresholds, their confidence level and p-value, has been constructed using 300 bootstraps, and the confidence interval is calculated using the 5% critical value for the non-rejection zone. Robust standard errors are in parentheses ***; **; * denote statistical significance, respectively at 1%, 5% and 10% levels.

Table 6: Empirical results for Business Model 4.

Dependent variable: BM 4$_{i,t}$	**[i]**	**[ii]**	**[iii]**
$ESG_{i,t}(BM_{i,t-1} \leq \gamma)$	-0.0068		
	(0.0048)		
$ESG_{i,t}(BM_{i,t-1} > \gamma)$	-0.0003		
	(0.0004)		
$ESG_{i,t-1}(BM_{i,t-1} \leq \gamma)$		-0.0011**	
		(0.0004)	
$ESG_{i,t-1}(BM_{i,t-1} > \gamma)$		0.0000	
		(0.0003)	
$ESG_{i,t-2}(BM_{i,t-1} \leq \gamma)$			-0.0007**
			(0.0003)
$ESG_{i,t-2}(BM_{i,t-1} > \gamma)$			0.0001
			(0.0002)
$CAR_{i,t-1}$	0.2561*	0.1706	0.2224
	(0.1467)	(0.1155)	(0.1445)
$NPLs_{i,t-1}$	-0.0533	-0.0211	-0.0055
	(0.0449)	(0.0383)	(0.0387)
$Size_{i,t-1}$	0.0539**	0.0544**	0.0432*
	(0.0229)	(0.0219)	(0.0234)
Constant	-0.5441	-0.5226	-0.3377
	(0.4102)	(0.4011)	(0.0002)
Banks fixed effects	YES	YES	YES
Time dummies	YES	YES	YES
N. Obs.	1,200	1,120	1,040
N. Banks	80	80	80
N. Countries	25	25	25
γ	0.0945***	0.43***	0.431***
R^2 *within*	0.21	0.17	0.14
F-Test	3.40***	5.20***	3.22***

Dependent variable: BM 4$_{i,t}$	**[i]**	**[ii]**	**[iii]**
$E_{i,t}(BM_{i,t-1} \leq \gamma)$	-0.0011***		
	(0.0003)		
$E_{i,t}(BM_{i,t-1} > \gamma)$	0.0000		
	(0.0003)		
$E_{i,t-1}(BM_{i,t-1} \leq \gamma)$		-0.0009***	
		(0.0002)	
$E_{i,t-1}(BM_{i,t-1} > \gamma)$		0.0000	
		(0.0002)	
$E_{i,t-2}(BM_{i,t-1} \leq \gamma)$			-0.0008***
			(0.0002)
$E_{i,t-2}(BM_{i,t-1} > \gamma)$			-0.0001
			(0.0002)
$CAR_{i,t-1}$	0.2469	0.1704	0.2271
	(0.1622)	(0.1181)	(0.1484)
$NPLs_{i,t-1}$	-0.0494	-0.1395	0.0024
	(0.0429)	(0.0365)	(0.0384)
$Size_{i,t-1}$	0.0656**	0.0539**	0.0417*
	(0.0327)	(0.0238)	(0.0244)
Constant	-0.7475	-0.516	-0.3059
	(0.5896)	(0.4329)	(0.4428)
Banks fixed effects	YES	YES	YES
Time dummies	YES	YES	YES
N. Obs.	1,200	1,120	1,040
N. Banks	80	80	80
N. Countries	25	25	25
γ	0.378***	0.4203***	0.4124***
R^2 *within*	0.17	0.15	0.13
F-Test	4.52***	5.06***	3.06***

Dependent variable: BM 4$_{i,t}$	**[i]**	**[ii]**	**[iii]**
$S_{i,t}(BM_{i,t-1} \leq \gamma)$	-0.0069		
	(0.0045)		
$S_{i,t}(BM_{i,t-1} > \gamma)$	-0.0002		
	(0.0003)		
$S_{i,t-1}(BM_{i,t-1} \leq \gamma)$		-0.0009**	
		(0.0003)	
$S_{i,t-1}(BM_{i,t-1} > \gamma)$		0.0001	
		(0.0003)	
$S_{i,t-2}(BM_{i,t-1} \leq \gamma)$			-0.0008***
			(0.0003)
$S_{i,t-2}(BM_{i,t-1} > \gamma)$			0.0001
			(0.0002)
$CAR_{i,t-1}$	0.2434*	0.1715	0.2304
	(0.1434)	(0.1135)	(0.1460)
$NPLs_{i,t-1}$	-0.0541	-0.0193	-0.0048
	(0.0441)	(0.0384)	(0.0390)
$Size_{i,t-1}$	0.0511**	0.0543**	0.0433*
	(0.0226)	(0.0220)	(0.2340)
Constant	-0.1975	-0.5254	-0.3365
	(0.4080)	(0.4034)	(0.4303)
Banks fixed effects	YES	YES	YES
Time dummies	YES	YES	YES
N. Obs.	1,200	1,120	1,040
N. Banks	80	80	80
N. Countries	25	25	25
γ	0.0945***	0.431***	0.431***
R^2 *within*	0.23	0.17	0.14
F-Test	3.5***	4.79***	3.03***

Dependent variable: BM 4$_{i,t}$	**[i]**	**[ii]**	**[iii]**
$G_{i,t}(BM_{i,t-1} \leq \gamma)$	-0.0064		
	(0.0044)		
$G_{i,t}(BM_{i,t-1} > \gamma)$	-0.0001		
	(0.0003)		
$G_{i,t-1}(BM_{i,t-1} \leq \gamma)$		-0.0008***	
		(0.0003)	
$G_{i,t-1}(BM_{i,t-1} > \gamma)$		0.0002	
		(0.0002)	
$G_{i,t-2}(BM_{i,t-1} \leq \gamma)$			-0.0005**
			(0.0002)
$G_{i,t-2}(BM_{i,t-1} > \gamma)$			0.0003
			(0.0002)
$CAR_{i,t-1}$	0.2497*	0.1599	0.2119
	(0.1463)	(0.1154)	(0.1447)
$NPLs_{i,t-1}$	-0.0518	-0.0269	-0.0089
	(0.0443)	(0.0391)	(0.0391)
$Size_{i,t-1}$	0.0537**	0.0550**	0.0433**
	(0.0227)	(0.0221)	(0.0234)
Constant	-0.5495	-0.5405	-0.3469
	(0.4073)	(0.4032)	(0.4323)
Banks fixed effects	YES	YES	YES
Time dummies	YES	YES	YES
N. Obs.	1,200	1,120	1,040
N. Banks	80	80	80
N. Countries	25	25	25
γ	0.0945***	0.431***	0.431***
R^2 *within*	0.22	0.17	0.13
F-Test	3.39***	6.04***	3.68***

The Table reports the results when the dependent variable is the proxy for the banks's business model 4: Net Interest Margin over Intermediation Margin; $ESG_{i,t}$ represents the *Environmental*, *Social* and *Governance* scores for banks; $CAR_{i,t-1}$ is the risk-weighted assets ratio between Tier 1 + Tier 2 capital and dividing the total by the total risk-weighted assets; $NPL_{i,t-1}$ the ratio between non-performing net loans and total outstanding net loans; $Size_{i,t-1}$ is the natural logarithm of total assets for for bank. The thresholds, their confidence level and p-value, has been constructed using 300 bootstraps, and the confidence interval is calculated using the 5% critical value for the non-rejection zone. Robust standard errors are in parentheses ***; **; * denote statistical significance, respectively at 1%, 5% and 10% levels.

Table 7: ESG and Banks Business Models - IV.

Description	**Endogenous variables**			
Instrument validity: GRI	**ESG**	**ENV**	**SOC**	**GOV**
Shea's partial R^2	0.19	0.16	0.2	0.07
F-Test of excluded instruments	225.34***	174.14***	258.49***	69.02***
Kleibergen-Paap LM statistic	186.65***	151.28***	202.08***	64.94***

The Table reports the results for the IV approach. ***; **; * denote statistical significance, respectively at 1%, 5% and 10% levels.

Table 8: ESG and Banks Business Models - GMM.

Description	**Endogenous variable with GMM: ESG**			
	$\mathbf{BM1}_{i,t-1}$	$\mathbf{BM2}_{i,t-1}$	$\mathbf{BM3}_{i,t-1}$	$\mathbf{BM4}_{i,t-1}$
Arellano-Bond test for AR (1)	-2.17**	-3.07***	-2.1**	-2.71***
Arellano-Bond test for AR (2)	1.28	0.68	0.46	0.6
Sargan test	21.81	1.4	11.77	0.69
Hansen test	19.45	2.48	18.5	0.1
Wald χ^2	9531.12***	165267.91***	26294.37***	17881.88***

Description	**Endogenous variable with GMM: ENV**			
	$\mathbf{BM1}_{i,t-1}$	$\mathbf{BM2}_{i,t-1}$	$\mathbf{BM3}_{i,t-1}$	$\mathbf{BM4}_{i,t-1}$
Arellano-Bond test for AR (1)	-2.09**	-3.04***	-2.13**	-2.69***
Arellano-Bond test for AR (2)	1.28	0.67	0.42	0.6
Sargan test	20.67	1.3	14.72	0.77
Hansen test	19.25	2.3	18.06	0.11
Wald χ^2	8548.52***	215045.71***	20176.95***	16191.62***

Description	**Endogenous variable with GMM: SOC**			
	$\mathbf{BM1}_{i,t-1}$	$\mathbf{BM2}_{i,t-1}$	$\mathbf{BM3}_{i,t-1}$	$\mathbf{BM4}_{i,t-1}$
Arellano-Bond test for AR (1)	-2.26**	-3.06***	-2.11**	-2.63***
Arellano-Bond test for AR (2)	1.34	0.67	0.45	0.59
Sargan test	15.73	1.35	10.78	0.78
Hansen test	14.58	2.39	15.58	0.11
Wald χ^2	12192.67***	163065.76***	26710.58***	18063.68***

Description	**Endogenous variable with GMM: GOV**			
	$\mathbf{BM1}_{i,t-1}$	$\mathbf{BM2}_{i,t-1}$	$\mathbf{BM3}_{i,t-1}$	$\mathbf{BM4}_{i,t-1}$
Arellano-Bond test for AR (1)	-2.27**	-3.07***	-2.15**	-2.69***
Arellano-Bond test for AR (2)	1.32	0.7	0.48	0.6
Sargan test	25.23*	1.4	10.9	0.72
Hansen test	19.43	2.51	14.3	0.11
Wald χ^2	7324.8***	164232.46***	28820.67***	18362.58***

The Table reports the results for the GMM estimation. ***; **; * denote statistical significance, respectively at 1%, 5% and 10% levels.

Table 9: ESG and Banks Business Models - Propensity Score Matching.

Dependent variables	Independent variables	Mean Treated	Mean Control	%Bias	t-tests	p-value	V(T)/V(C)
$\mathbf{BM1}_{i,t}$	$ESG_{i,t-1}$	40.86	41.79	-4.60	-0.73	0.47	0.83*
	$CAR_{i,t-1}$	0.17	0.17	-5.80	-0.97	0.33	0.81*
	$NPLs_{i,t-1}$	0.06	0.05	5.10	0.87	0.39	1.36*
	$Size_{i,t-1}$	16.87	16.83	2.50	0.46	0.65	0.79*
$\mathbf{BM2}_{i,t}$	$ESG_{i,t-1}$	50.88	46.19	26.50	6.17	0.00	9.66*
	$CAR_{i,t-1}$	0.17	0.17	-15.80	-4.17	0.00	1.01
	$NPLs_{i,t-1}$	0.06	0.04	36.10	8.02	0.00	27.20*
	$Size_{i,t-1}$	17.97	16.62	79.00	19.55	0.00	4.07*
$\mathbf{BM3}_{i,t}$	$ESG_{i,t-1}$	41.35	39.38	9.60	1.48	0.14	0.89
	$CAR_{i,t-1}$	0.17	0.17	-8.50	-1.27	0.20	0.93
	$NPLs_{i,t-1}$	0.06	0.04	11.20	1.80	0.07	1.35*
	$Size_{i,t-1}$	16.80	16.83	-1.80	-0.30	0.76	0.85
$\mathbf{BM4}_{i,t}$	$ESG_{i,t-1}$	47.49	46.19	5.90	1.10	0.27	1.09
	$CAR_{i,t-1}$	0.17	0.17	-0.50	-0.09	0.93	2.01*
	$NPLs_{i,t-1}$	0.07	0.06	9.40	1.56	0.12	1.78*
	$Size_{i,t-1}$	17.68	17.54	7.10	1.39	0.17	0.70*

The Table reports the results related to the Propensity Score Matching. ***; **; * denote statistical significance, respectively at 1%, 5% and 10% levels.

Table 10: ESG and Banks Business Models - DiD.

DiD	BM 1	BM 2	BM 3	BM 4
$Treated_i$	0.0004	0.0706***	-0.0655***	0.0191
	(0.0067)	(0.0152)	(0.0171)	(0.0127)
$Post_t$	0.0037	0.0065	0.0562***	0.0096
	(0.0029)	(0.0129)	(0.0121)	(0.0091)
$Treated_i$*$Post_t$	0.0049	-0.1712***	-0.1411**	-0.0800**
	(0.0174)	(0.0447)	(0.0528)	(0.0375)
$ESG_{i,t}$	-0.0008***	-0.0025***	-0.0027***	-0.0013***
	(0.0001)	(0.0003)	(0.0003)	(0.0002)
$Treated_i$*$Post_t$*$ESG_{i,t}$	-0.0001	0.0024***	0.0039***	0.0013**
	(0.0002)	(0.0006)	(0.0007)	(0.0005)
Constant	0.1072***	0.7352***	0.6606***	0.5045***
	(0.0058)	(0.0170)	(0.0157)	(0.0125)
N. Obs.	1,120	1,120	1,120	1,120
R^2 *adjusted*	0.14	0.09	0.14	0.04
F-Test	29.81***	22.37***	55.22***	9.68***

DiD with placebo test	BM 1	BM 2	BM 3	BM 4
$Treated_i$	0.001	0.0459***	-0.0163	0.0154*
	(0.0037)	(0.0104)	(0.0127)	(0.0085)
$PlaceboTest_t$	-0.0033	-0.024	-0.0231	0.0000
	(0.0045)	(0.0263)	(0.0225)	(0.0163)
$Treated_i$*$PlaceboTest_t$	0.0262	-0.0402	-0.2075*	-0.021
	(0.0596)	(0.0747)	(0.1136)	(0.1101)
$ESG_{i,t}$	-0.0008***	-0.0021***	-0.0019***	-0.0011***
	(0.0001)	(0.0002)	(0.0003)	(0.0002)
$Treated_i$*$PlaceboTest_t$*$ESG_{i,t}$	-0.0005	0.0014	0.0026	0.0001
	(0.0009)	(0.0010)	(0.0017)	(0.0016)
Constant	0.1092***	0.7213***	0.6535***	0.4976***
	(0.0050)	(0.0142)	(0.0155)	(0.0109)
N. Obs.	1,120	1,120	1,120	1,120
R^2 *adjusted*	0.14	0.07	0.06	0.03
F-Test	24.98***	16.08***	17.68***	7.29***

The Table reports the results for the DiD analysis. ***; **; * denote statistical significance, respectively at 1%, 5% and 10% levels.

Table 11: ESG and Banks Business Models with ESG combined scores.

Dependent variables: Business Models	**[i]**	**[ii]**	**[iii]**	**[iv]**
$ESG_{i,t}(BM_{i,t-1} \leq \gamma)$	0.0001	0.0055	0.0001	-0.0003
	(0.0001)	(0.0054)	(0.0002)	(0.0003)
$ESG_{i,t}(BM_{i,t-1} > \gamma)$	0.0003	0.0003	0.0010*	0.0003
	(0.0004)	(0.0004)	(0.0005)	(0.0003)
$ESG_{i,t-1}(BM_{i,t-1} \leq \gamma)$	0.0001	0.0187	-0.0002	-0.0011**
	(0.0001)	(0.0158)	(0.0002)	(0.0004)
$ESG_{i,t-1}(BM_{i,t-1} > \gamma)$	0.0088*	-0.0001	-0.0013	-0.0001
	(0.0052)	(0.0004)	(0.0016)	(0.0003)
$ESG_{i,t-2}(BM_{i,t-1} \leq \gamma)$	0.0001	-0.0289**	-0.0003	0.0003
	(0.0001)	(0.0121)	(0.0003)	(0.0005)
$ESG_{i,t-2}(BM_{i,t-1} > \gamma)$	-0.00788	0.0001	0.0015	0.0001
	(0.0053)	(0.0004)	(0.0013)	(0.0003)
$CAR_{i,t-1}$	0.0828*	0.5199**	-0.0494	0.2499
	(0.0443)	(0.2094)	0.14	(0.1701)
$NPL_{i,t-1}$	0.0396	-0.4500	0.3055**	-0.0411
	(0.0358)	(0.3266)	(0.1259)	(0.0814)
$Size_{i,t-1}$	-0.0118	0.0359	-0.0938***	0.0534
	(0.0071)	(0.0437)	(0.0178)	(0.0361)
Constant	0.2600**	-0.0872	2.1627***	-0.5128
	(0.1253)	(0.7586)	(0.3200)	(0.6491)
Banks fixed effects	YES	YES	YES	YES
Time dummies	YES	YES	YES	YES
N. Obs.	754	754	754	754
N. Banks	80	80	80	80
N. Countries	25	25	25	25
γ	0.128	0.1***	0.6089***	0.4218**
R^2 *within*	0.15	0.21	0.41	0.16
F-Test	66.41***	41.68***	13.11***	5.72***

The Table reports the results when the dependent variable includes different banks business models. In particular: [i] Business Model 1: (Tier1+Tier2)/Total Assets; [ii] Business Model 2: Loans/Total Assets; [iii] Business Model 3: Deposits/Total Assets; [iv] Business Model 4: Net Interest Margin/Intermediation Margin; $ESG_{i,t}$ represents the *Environmental*, *Social* and *Governance* scores for banks; $CAR_{i,t-1}$ is the risk-weighted assets ratio between Tier 1 + Tier 2 capital and dividing the total by the total risk-weighted assets; $NPL_{i,t-1}$ the ratio between non-performing net loans and total outstanding net loans; $Size_{i,t-1}$ is the natural logarithm of total assets for for bank. The thresholds, their confidence level and p-value, has been constructed using 300 bootstraps, and the confidence interval is calculated using the 5% critical value for the non-rejection zone. Robust standard errors are in parentheses ***; **; * denote statistical significance, respectively at 1%, 5% and 10% levels.

Table 12: ESG and Banks Business Models with ESG Bloomberg.

Dependent variable: Business Models	**[i]**	**[ii]**	**[iii]**	**[iv]**
$ESG_{i,t}(BM_{i,t-1} \leq \gamma)$	-0.0002	0.0038	-0.0009	-0.0012
	(0.0002)	(0.0106)	(0.0008)	(0.0011)
$ESG_{i,t}(BM_{i,t-1} > \gamma)$	-0.0007	0.0002	-(0.0001)	0.0006
	(0.0049)	(0.0007)	(0.0005)	(0.0005)
$ESG_{i,t-2}(BM_{i,t-1} \leq \gamma)$	0.0007	-0.0097*	-0.0004	-0.0013
	(0.0007)	(0.0046)	(0.0006)	(0.0009)
$ESG_{i,t-1}(BM_{i,t-1} > \gamma)$	0.0044	0.0005	-0.0002	-0.0001
	(0.0054)	(0.0005)	(0.0007)	(0.0003)
$ESG_{i,t-2}(BM_{i,t-1} \leq \gamma)$	-0.0008	-0.0035	0.0016**	0.0013
	(0.0005)	(0.0058)	(0.0008)	(0.0013)
$ESG_{i,t-2}(BM_{i,t-1} > \gamma)$	-0.0025	0.0006	0.0026***	-0.0003
	(0.0057)	(0.0007)	(0.0008)	(0.0006)
$CAR_{i,t-1}$	0.0755	0.3402*	-0.1578	0.2895*
	(0.0491)	(0.1781)	-0.1305	(0.1494)
$NPL_{i,t-1}$	0.0042	-0.3457	0.2825**	-0.0630
	(0.0741)	(0.3209)	(0.1283)	(0.0872)
$Size_{i,t-1}$	-0.0204	0.0446	-0.0930	0.0488
	(0.0141)	(0.0331)	(0.0171)	(0.0391
Constant	0.4300	-0.2221	2.1361***	-0.4376
	(0.2612)	(0.5807)	(0.3059)	(0.7122)
Banks fixed effects	YES	YES	YES	YES
Time dummies	YES	YES	YES	YES
N. Obs.	754	754	754	754
N. Banks	80	80	80	80
N. Countries	25	25	25	25
γ	0.13	0.25***	0.60***	0.42***
R^2 *within*	0.11	0.33	0.43	0.17
F-Test	7.58***	8.53***	13.73***	3.39***

The Table reports the results when the dependent variable includes different banks business models. In particular: [i] Business Model 1: (Tier1+Tier2)/Total Assets; [ii] Business Model 2: Loans/Total Assets; [iii] Business Model 3: Deposits/Total Assets; [iv] Business Model 4: Net Interest Margin/Intermediation Margin; $ESG_{i,t}$ represents the *Environmental*, *Social* and *Governance* scores for banks; $CAR_{i,t-1}$ is the risk-weighted assets ratio between Tier 1 + Tier 2 capital and dividing the total by the total risk-weighted assets; $NPL_{i,t-1}$ the ratio between non-performing net loans and total outstanding net loans; $Size_{i,t-1}$ is the natural logarithm of total assets for for bank. The thresholds, their confidence level and p-value, has been constructed using 300 bootstraps, and the confidence interval is calculated using the 5% critical value for the non-rejection zone. Robust standard errors are in parentheses ***; **; * denote statistical significance, respectively at 1%, 5% and 10% levels.

Table 13: ESG and Banks Business Models - Factor analysis.

Variables	**Factor1**	**Factor2**	**Factor3**	**Uniqueness**
BM2	0.23	0.09	0.20	0.89
BM3	0.65	-0.01	-0.09	0.56
BM4	0.33	0.31	-0.03	0.78
BM5	0.57	-0.20	0.04	0.62

The Table reports the results for the factor analysis. ***; **; * denote statistical significance, respectively at 1%, 5% and 10% levels.

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Internet Appendix

Appendix A

Table A1: Set of variables used in the empirical application.

Variable	Obs	Mean	Std. Dev.	Min	Max
ESG	940	55.416	23.326	1.53	95.46
ENV	924	62.971	28.403	1.02	98.1
SOC	940	55.984	24.896	.64	97.64
GOV	940	56.019	25.239	1.12	97
Net Income	1279	815432.88	3387992.6	-24964576	46467504
Operating Income	1279	1346981.4	3753201.4	-21380880	46466821
Non-interest income	1200	6175075.1	11803543	-3723396	76373000
Net interest income	1213	3718212.3	6193102.6	93	35816000
Interest expense	1257	3409191.9	6894852.5	-36385	58857000
Interest income	1256	7007778	12224060	99	67706000
Market Equity Value	1277	12234.35	21551.513	23.69	172663.78
TIER2	935	4171610	6782408.9	-479371	45875146
TIER1	1079	14288260	22352748	-4292000	1.410e+08
Risk weighted assets	1121	1.085e+08	1.710e+08	6400	1.015e+09
Common equity	1279	15043937	25625129	-3869770	1.971e+08
Tot Liabilities	1279	2.764e+08	4.866e+08	27205	2.517e+09
Tot Debt	1268	75027943	1.225e+08	9867	8.520e+08
Cash Due from banks	1193	18005066	40764602	259	3.584e+08
Loans net	1238	1.465e+08	2.290e+08	4473	1.428e+09
NPL	1084	7255181.2	12263876	4	84359000
Tot Assets	1279	2.924e+08	5.116e+08	315457	2.630e+09
Tot Deposits	1237	1.222e+08	2.124e+08	301745	1.533e+09

The Table reports the descriptive statistics for each variables used in the empirical application.

Table A2: ESG scores for country.

AUSTRIA	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Deviation**
ESG	51.555	46.98	83	29.2	15.141
ENV	67.209	72.28	86.98	18.32	18.546
SOC	55.73	50.1	91.55	24.33	22.011
GOV	44.502	41.535	83.98	13.86	22.067
BELGIUM	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Deviation**
ESG	37.048	38.06	70.61	3.09	28.965
ENV	58.31	83.67	93.84	16.1	35.197
SOC	42.097	31.14	91.36	1.51	40.667
GOV	26.612	30.73	53.5	4.07	13.123
CZECH REPUBLIC	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Deviation**
ESG	45.434	45.38	70.31	32.19	10.506
ENV	51.129	49.01	65.43	33.25	10.016
SOC	45.668	45.67	66.76	32.53	10.12
GOV	51.076	52.03	84.72	23.06	15.379
DENMARK	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Deviation**
ESG	37.708	30.74	77.67	3.7	24.123
ENV	45.74	47.39	92.13	1.35	29.103
SOC	35.956	37.74	69.97	2.72	20.819
GOV	42.188	33.46	93.48	1.88	28.522
FAROE ISLANDS	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Deviation**
ESG	32.175	32.175	32.5	31.85	0.46
ENV	75.08	75.08	75.27	74.89	0.269
SOC	24.92	24.92	25.52	24.32	0.849
GOV	25	25	25	25	0
FINLAND	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Deviation**
ESG	61.364	65.18	78.56	31.32	13.234
ENV	73.707	75.715	87.77	44.99	13.184
SOC	55.328	55.11	74.17	28.72	13.241
GOV	68.748	78.11	89.96	27.15	19.246
FRANCE	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Deviation**
ESG	77.791	77.265	95.46	60.93	10.555
ENV	92.731	93.925	96.57	82.04	3.647
SOC	76.856	78.565	97.64	49.13	13.577
GOV	74.783	80.725	94.24	33.82	14.544
GERMANY	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Deviation**
ESG	69.279	71.405	85.89	36.47	12.703
ENV	76.203	88.855	98.1	17.8	24.808
SOC	72.505	72.945	89.67	41.5	12.432
GOV	65.699	67.785	92.28	24.43	15.4
GREECE	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Deviation**
ESG	50.834	57.9	86.61	1.53	26.982
ENV	60.098	72.505	92.59	1.61	27.455
SOC	49.872	59.75	89.3	0.64	27.901
GOV	53.606	63.17	94.69	2.41	29.032
IRELAND	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Deviation**
ESG	47.752	44.41	76.22	17.97	14.801
ENV	50.779	55.785	88.86	14.25	19.472
SOC	49.769	48.315	76.38	13.7	14.947
GOV	49.823	47.44	88.56	12.86	22.871
ITALY	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Deviation**
ESG	50.048	53.85	93.55	7.88	25.618
ENV	58.424	69.1	97.47	1.93	30.079
SOC	56.155	63.36	93.91	11.54	25.57
GOV	42.561	31.18	91.51	4.24	27.308
LIECHTENSTEIN	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Deviation**
ESG	53.942	57.885	68.9	37.4	11.239
ENV	39.894	42.05	75.19	13.53	20.123
SOC	55.036	57.08	66.15	41.23	11.304
GOV	58.055	61.11	72.22	41.67	10.752
NETHERLANDS	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Deviation**
ESG	76.075	75.08	84.4	67.34	4.705
ENV	88.474	88.79	94.36	81.01	3.429
SOC	75.957	74.84	92.02	66.76	7.673
GOV	72.887	73.67	90.99	54.09	10.644
NORWAY	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Deviation**
ESG	51.752	46.95	68.61	37.11	12.052
ENV	46.295	34.46	84.93	11.43	28.27
SOC	52.701	46.79	74.3	37.25	13.729
GOV	52.626	55.79	63.33	28.17	10.929
POLAND	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Deviation**
ESG	48.154	49.74	87.14	7.83	18.974
ENV	45.965	50.785	91.8	1.02	25.281
SOC	45.6	40.26	91.07	2.9	23.796
GOV	58.224	64.46	94.66	15.12	21.181
SPAIN	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Deviation**
ESG	75.296	76.94	90.95	33.88	12.444
ENV	81.644	86.27	96.53	32.95	16.102
SOC	74.877	77.3	92.82	33.66	12.886
GOV	76.172	85.06	94.89	34.8	16.872
SWEDEN	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Deviation**
ESG	63.52	65.645	83.59	36.6	12.393
ENV	75.056	83.45	93.9	1.41	24.39
SOC	62.734	64.27	83.99	33.7	13.291
GOV	62.39	65.25	91.36	28.33	15.575
SWITZERLAND	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Deviation**
ESG	31.37	28.91	67.06	1.84	16.901
ENV	33.293	24.13	87.31	3.66	21.964
SOC	29.288	28.02	64.81	1.42	15.674
GOV	38.607	38.91	74.27	1.12	20.233
UNITED KINGDOM	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Deviation**
ESG	67.799	73.6	92.7	11.16	17.667
ENV	75.734	82.83	96.31	3.36	22.179
SOC	68.434	73.49	95.08	10.24	20.127
GOV	68.142	72.62	97	13.34	20.953

The Table reports the ESG scores for country.

Table A3: ESG and Banks Business Models without PIIGS countries.

Dependent variable: BM1$_{i,t}$	**[i]**	**[ii]**	**[iii]**	**[iv]**
$ESG_{i,t}(BM_{i,t-1} \leq \gamma)$	0.0000	0.0014	-0.0005	-0.0008
	(0.0000)	(0.0057)	(0.0004)	(0.0009)
$ESG_{i,t}(BM_{i,t-1} > \gamma)$	-0.0052***	0.0014	0.0012	0.0003
	(0.0017)	(0.0009)	(0.0008)	(0.0004)
$ESG_{i,t-1}(BM_{i,t-1} \leq \gamma)$	-0.0000	0.0200	0.0004	-0.0007
	(0.0001)	(0.0153)	(0.0005)	(0.0007)
$ESG_{i,t-1}(BM_{i,t-1} > \gamma)$	0.0135**	-0.0016	-0.0018	-0.0003
	(0.0064)	(0.0013)	(0.0019)	(0.0007)
$ESG_{i,t-2}(BM_{i,t-1} \leq \gamma)$	0.0000	-0.0256**	-0.0004	0.0007
	(0.0001)	(0.0115)	(0.0005)	(0.0009)
$ESG_{i,t-2}(BM_{i,t-1} > \gamma)$	-0.0074	0.0011	0.0017	0.0000
	(0.0048)	(0.0008)	(0.0013)	(0.0007)
$CAR_{i,t-1}$	0.0941**	0.5133**	-0.0416	0.2508
	(0.0440)	(0.2188)	(0.1326)	(0.1599)
$NPLs_{i,t-1}$	0.0445	-0.4598	0.2922**	-0.0441
	(0.0319)	(0.3205)	(0.1208)	(0.0821)
$Size_{i,t-1}$	-0.0100*	0.0416	-0.0969***	0.0523
	(0.0059)	(0.0445)	(0.0175)	(0.0372)
Constant	0.2259**	-0.2086	2.2210***	-0.4914
	(0.1037)	(0.7764)	(0.3187)	(0.6737)
Banks fixed effects	YES	YES	YES	YES
Time dummies	YES	YES	YES	YES
N. Obs.	754	754	754	754
N. Banks	80	80	80	80
N. Countries	25	25	25	25
γ	0.1327*	0.1009***	0.6089***	0.4218**
R^2 *within*	0.1674	0.2059	0.4149	0.1582
F-Test	30.56***	71.09***	14.28***	3.35***

Dependent variable: BM2$_{i,t}$	**[i]**	**[ii]**	**[iii]**	**[iv]**
$ESG_{i,t}(BM_{i,t-1} \leq \gamma)$	-0.0000	-0.1739	-0.0003	-0.0008
	(0.0001)	(0.1174)	(0.0003)	(0.0005)
$ESG_{i,t}(BM_{i,t-1} > \gamma)$	-0.0072	0.0005	-0.0001	0.0003
	(0.0050)	(0.0004)	(0.0002)	(0.0002)
$ESG_{i,t-1}(BM_{i,t-1} \leq \gamma)$	-0.0000	0.2920	0.0003	0.0011*
	(0.0001)	(0.2266)	(0.0005)	(0.0006)
$ESG_{i,t-1}(BM_{i,t-1} > \gamma)$	-0.0063**	0.0001	0.0002	0.0000
	(0.0031)	(0.0002)	(0.0001)	(0.0001)
$ESG_{i,t-2}(BM_{i,t-1} \leq \gamma)$	-0.0000	-0.1345	-0.0005	-0.0011*
	(0.0001)	(0.1088)	(0.0003)	(0.0006)
$ESG_{i,t-2}(BM_{i,t-1} > \gamma)$	0.0133*	0.0003	0.0005*	-0.0001
	(0.0076)	(0.0002)	(0.0003)	(0.0001)
$CAR_{i,t-1}$	0.1057**	0.4579**	-0.0601	0.26
	(0.0480)	(0.2101)	(0.1301)	(0.1718)
$NPLs_{i,t-1}$	0.0239	-0.4371	0.3155**	-0.0600
	(0.0443)	(0.3266)	(0.1401)	(0.0820)
$Size_{i,t-1}$	-0.0161	0.0137	-0.0976***	0.0491
	(0.0101)	(0.0445)	(0.0178)	(0.0366)
Constant	0.3486*	0.2714	2.2426***	-0.4387
	(0.1839)	(0.7972)	(0.3145)	(0.6574)
Banks fixed effects	YES	YES	YES	YES
Time dummies	YES	YES	YES	YES
N. Obs.	754	754	754	754
N. Banks	80	80	80	80
N. Countries	25	25	25	25
γ	0.1399	0.0906***	0.6089***	0.4218**
R^2 *within*	0.1325	0.2224	0.3963	0.1574
F-Test	N.S.S.	N.S.S.	14.28***	3.00***

Dependent variable: BM3$_{i,t}$	**[i]**	**[ii]**	**[iii]**	**[iv]**
$ESG_{i,t}(BM_{i,t-1} \leq \gamma)$	0.0002	-0.0055	-0.0007**	-0.0007
	(0.0001)	(0.0071)	(0.0003)	(0.0007)
$ESG_{i,t}(BM_{i,t-1} > \gamma)$	0.0118	0.0006	0.0006	0.0000
	(0.0145)	(0.0005)	(0.0004)	(0.0002)
$ESG_{i,t-1}(BM_{i,t-1} \leq \gamma)$	-0.0000	0.0836***	-0.0000	0.0007
	(0.0001)	(0.0264)	(0.0005)	(0.0005)
$ESG_{i,t-1}(BM_{i,t-1} > \gamma)$	0.0000	-0.0003	-0.0004	0.0000
	(0.0001)	(0.0005)	(0.0008)	(0.0003)
$ESG_{i,t-2}(BM_{i,t-1} \leq \gamma)$	0.0000	-0.0807***	0.0003	-0.0010*
	(0.0001)	(0.0238)	(0.0008)	(0.0006)
$ESG_{i,t-2}(BM_{i,t-1} > \gamma)$	-0.0216***	0.0002	0.0008	-0.0001
	(0.0021)	(0.0004)	(0.0006)	(0.0004)
$CAR_{i,t-1}$	0.1137**	0.4534**	-0.0428	0.2715
	(0.0412)	(0.1804)	(0.1341)	(0.1693)
$NPLs_{i,t-1}$	0.0676***	-0.3831	0.3124**	-0.0544
	(0.0237)	(0.3200)	(0.1291)	(0.0791)
$Size_{i,t-1}$	-0.0039	0.0331	-0.0977***	0.0512
	(0.0056)	(0.0349)	(0.0186)	(0.0377)
Constant	0.1124	-0.0279	2.2356***	-0.4667
	(0.0985)	(0.6190)	(0.3341)	(0.6806)
Banks fixed effects	YES	YES	YES	YES
Time dummies	YES	YES	YES	YES
N. Obs.	754	754	754	754
N. Banks	80	80	80	80
N. Countries	25	25	25	25
γ	0.1399**	0.1546***	0.6089***	0.4218**
R^2 *within*	0.2354	0.2958	0.4002	0.1498
F-Test	250.49***	12.73***	13.36***	2.94***

Dependent variable: BM4$_{i,t}$	**[i]**	**[ii]**	**[iii]**	**[iv]**
$ESG_{i,t}(BM_{i,t-1} \leq \gamma)$	0.0000	0.0110	-0.0001	-0.0004
	(0.0001)	(0.0088)	(0.0003)	(0.0004)
$ESG_{i,t}(BM_{i,t-1} > \gamma)$	-0.0036**	0.0008	0.0009*	0.0004
	(0.0016)	(0.0005)	(0.0004)	(0.0003)
$ESG_{i,t-1}(BM_{i,t-1} \leq \gamma)$	0.0000	-0.0038	0.0000	-0.0010**
	(0.0001)	(0.0124)	(0.0001)	(0.0004)
$ESG_{i,t-1}(BM_{i,t-1} > \gamma)$	0.0066*	-0.0008	-0.0010	-0.0001
	(0.0034)	(0.0006)	(0.0010)	(0.0003)
$ESG_{i,t-2}(BM_{i,t-1} \leq \gamma)$	-0.0000	-0.0107**	-0.0006***	0.0009
	(0.0001)	(0.0124)	(0.0002)	(0.0006)
$ESG_{i,t-2}(BM_{i,t-1} > \gamma)$	-0.0023	0.0008	0.0011	0.0001
	(0.0019)	(0.0005)	(0.0009)	(0.0003)
$CAR_{i,t-1}$	0.0970**	0.5225**	-0.0505	0.2611
	(0.0443)	(0.2224)	(0.1327)	(0.1667)
$NPLs_{i,t-1}$	0.0424	-0.4838	0.2423**	-0.0627
	(0.0443)	(0.3166)	(0.1136)	(0.0799)
$Size_{i,t-1}$	-0.0104	0.0393	-0.0963***	0.0542
	(0.0064)	(0.0448)	(0.0163)	(0.0353)
Constant	0.2399**	-0.1734	2.2231***	-0.5436
	(0.1149)	(0.7752)	(0.0009)	(0.6421)
Banks fixed effects	YES	YES	YES	YES
Time dummies	YES	YES	YES	YES
N. Obs.	754	754	754	754
N. Banks	80	80	80	80
N. Countries	25	25	25	25
γ	0.1327*	0.1009***	0.6089***	0.4218**
R^2 *within*	0.1664	0.2051	0.4237	0.1709
F-Test	35.50***	60.02***	15.69***	2.84***

The Table reports the results when the dependent variable includes different banks business models. In particular: [i] Business Model 1: (Tier1+Tier2)/Total Assets; [ii] Business Model 2: Loans/Total Assets; [iii] Business Model 3: Deposits/Total Assets; [iv] Business Model 4: Net Interest Margin/Intermediation Margin; $ESG_{i,t}$ represents the *Environmental*, *Social* and *Governance* scores for banks; $CAR_{i,t-1}$ is the risk-weighted assets ratio between Tier 1 + Tier 2 capital and dividing the total by the total risk-weighted assets; $NPL_{i,t-1}$ the ratio between non-performing net loans and total outstanding net loans; $Size_{i,t-1}$ is the natural logarithm of total assets for for bank. The thresholds, their confidence level and p-value, has been constructed using 300 bootstraps, and the confidence interval is calculated using the 5% critical value for the non-rejection zone. Robust standard errors are in parentheses ***; **; * denote statistical significance, respectively at 1%, 5% and 10% levels.

Table A4: ESG and Banks Business Models with macro and business models as controls.

Dependent variable: $BM1_{i,t}$	[i]	[ii]	[iii]
$ESG_{i,t}(BM1_{i,t-1} \leq \gamma)$	0.0000		
	(0.0001)		
$ESG_{i,t}(BM1_{i,t-1} > \gamma)$	0.0003**		
	(0.0001)		
$ESG_{i,t-1}(BM1_{i,t-1} \leq \gamma)$		0.0001	
		(0.0001)	
$ESG_{i,t-1}(BM1_{i,t-1} > \gamma)$		0.0014	
		(0.0011)	
$ESG_{i,t-2}(BM1_{i,t-1} \leq \gamma)$			-0.0000
			(0.0001)
$ESG_{i,t-2}(BM1_{i,t-1} > \gamma)$			0.0003
			(0.0001)
$BM2_{i,t-1}$	0.0000	0.0107	0.0211
	(0.0238)	(0.0239)	(0.0269)
$BM3_{i,t-1}$	-0.0021	-0.0062	-0.0194
	(0.0217)	(0.0210)	(0.0233)
$BM4_{i,t-1}$	0.0028	-0.0037	-0.0010
	(0.0165)	(0.0187)	(0.0289)
$CAR_{i,t-1}$	0.0472	0.2076**	0.1764**
	(0.0345)	(0.0622)	(0.0602)
$NPLs_{i,t-1}$	-0.0120	0.0393	0.0415
	(0.0285)	(0.0270)	(0.0082)
$Size_{i,t-1}$	-0.0120	-0.011*	-0.0168**
	(0.0064)	(0.0053)	(0.0082)
Constant	0.2484**	0.2252**	0.3382**
	(0.1151)	(0.0982)	(0.1480)
Banks fixed effects	YES	YES	YES
Marco controls	YES	YES	YES
N. Obs.	1,140	1,064	988
N. Banks	80	80	80
N. Countries	25	25	25
γ	0.0639	0.1415	0.0622
R^2 *within*	0.1126	0.11	0.1033
F-Test	7.38***	3.33***	3.65***

Dependent variable: $BM2_{i,t}$	[i]	[ii]	[iii]
$ESG_{i,t}(BM2_{i,t-1} \leq \gamma)$	-0.0062*		
	(0.0037)		
$ESG_{i,t}(BM2_{i,t-1} > \gamma)$	0.0003		
	(0.0005)		
$ESG_{i,t-1}(BM2_{i,t-1} \leq \gamma)$		-0.0053*	
		(0.0032)	
$ESG_{i,t-1}(BM2_{i,t-1} > \gamma)$		0.0001	
		(0.0001)	
$ESG_{i,t-2}(BM2_{i,t-1} \leq \gamma)$			-0.0059*
			(0.0032)
$ESG_{i,t-2}(BM2_{i,t-1} > \gamma)$			0.00001
			(0.0000)
$BM1_{i,t-1}$	0.0426	0.1272	0.1778
	(0.3594)	(0.3674)	(0.3867)
$BM3_{i,t-1}$	-0.0924	-0.1111	-0.0648
	(0.0709)	(0.0735)	(0.0842)
$BM4_{i,t-1}$	0.2786**	0.2567**	0.2047
	(0.1224)	(0.1124)	(0.1471)
$CAR_{i,t-1}$	0.0156	0.0793	0.1193
	(0.1206)	(0.1238)	(0.1434)
$NPLs_{i,t-1}$	-0.0348	-0.0203	-0.0157
	(0.0748)	(0.0798)	(0.0852)
$Size_{i,t-1}$	-0.0146	-0.0081	0.0085
	(0.0261)	(0.0284)	(0.0373)
Constant	0.7977*	0.7013	0.3797
	(0.4138)	(0.4601)	(0.6297)
Banks fixed effects	YES	YES	YES
Macro controls	YES	YES	YES
N. Obs.	1,140	1,064	988
N. Banks	80	80	80
N. Countries	25	25	25
γ	0.1094***	0.2031***	0.1009***
R^2 *within*	0.2436	0.2059	0.1334
F-Test	16.62***	9.81***	3.56***

Dependent variable: $BM3_{i,t}$	[i]	[ii]	[iii]
$ESG_{i,t}(BM3_{i,t-1} \leq \gamma)$	-0.0003		
	(0.0005)		
$ESG_{i,t}(BM3_{i,t-1} > \gamma)$	0.0014**		
	(0.0007)		
$ESG_{i,t-1}(BM3_{i,t-1} \leq \gamma)$		-0.0001	
		(0.0005)	
$ESG_{i,t-1}(BM3_{i,t-1} > \gamma)$		0.0016***	
		(0.0004)	
$ESG_{i,t-2}(BM3_{i,t-1} \leq \gamma)$			-0.0001
			(0.0005)
$ESG_{i,t-2}(BM3_{i,t-1} > \gamma)$			0.0016***
			(0.0004)
$BM1_{i,t-1}$	-0.1153	-0.1134	-0.1166
	(0.1404)	(0.1280)	(0.1116)
$BM2_{i,t-1}$	-0.0237	-0.0243	-0.0205
	(0.0397)	(0.0397)	(0.0381)
$BM4_{i,t-1}$	0.0671*	0.0641	0.0404
	(0.0342)	(0.1199)	(0.0532)
$CAR_{i,t-1}$	0.4317**	0.4791***	0.4439***
	(0.1301)	(0.1199)	(0.1210)
$NPLs_{i,t-1}$	0.1295**	0.0927	0.075
	(0.0610)	(0.0609)	(0.0573)
$Size_{i,t-1}$	-0.0349***	-0.0454**	-0.0574***
	(0.0127)	(0.0130)	(0.0140)
Constant	1.078***	1.2629***	1.5112***
	(0.2305)	(0.2372)	(0.2642)
Banks fixed effects	YES	YES	YES
Macro controls	YES	YES	YES
N. Obs.	1,140	1,064	988
N. Banks	80	80	80
N. Countries	25	25	25
γ	0.4775***	0.5421***	0.5377***
R^2 *within*	0.3301	0.3318	0.3457
F-Test	14.17***	14.31***	13.70***

Dependent variable: $BM4_{i,t}$	[i]	[ii]	[iii]
$ESG_{i,t}(BM4_{i,t-1} \leq \gamma)$	-0.0059		
	(0.0042)		
$ESG_{i,t}(BM4_{i,t-1} > \gamma)$	-0.0006**		
	(0.0003)		
$ESG_{i,t-1}(BM4_{i,t-1} \leq \gamma)$		-0.0011***	
		(0.0003)	
$ESG_{i,t-1}(BM4_{i,t-1} > \gamma)$		-0.0002	
		(0.0003)	
$ESG_{i,t-2}(BM4_{i,t-1} \leq \gamma)$			-0.0008**
			(0.0003)
$ESG_{i,t-2}(BM4_{i,t-1} > \gamma)$			-0.0000
			(0.0002)
$BM1_{i,t-1}$	-0.0638	-0.0900	-0.1183
	(0.1867)	(0.1932)	(0.2000)
$BM2_{i,t-1}$	0.2803***	0.2092***	0.1682***
	(0.5556)	(0.0436)	(0.0534)
$BM3_{i,t-1}$	0.0225	0.0344	0.0172
	(0.0486)	(0.0410)	(0.0441)
$CAR_{i,t-1}$	0.1747	0.0958	0.1577
	(0.1527)	(0.1224)	(0.1418)
$NPLs_{i,t-1}$	-0.0127	0.0077	0.0158
	(0.0473)	(0.0421)	(0.0416)
$Size_{i,t-1}$	0.0513***	0.0455***	0.0334*
	(0.0100)	(0.0140)	(0.0007)
Constant	-0.6642***	-0.513**	-0.2812
	(0.2350)	(0.2555)	(0.3423)
Banks fixed effects	YES	YES	YES
Macro controls	YES	YES	YES
N. Obs.	1,140	1,064	988
N. Banks	80	80	80
N. Countries	25	25	25
γ	0.08	0.4214***	0.4211***
R^2 *within*	0.3029	0.2558	0.1954
F-Test	17.76***	16.77***	5.83***

The Table reports the results when the dependent variables are the proxy for the banks' business models 4: Business Model 1: (Tier1+Tier2)/Total Assets; Business Model 2: Loans/Total Assets; Business Model 3: Deposits/Total Assets; Business Model 4: Net Interest Margin/Intermediation Margin $ESG_{i,t}$ represents the *Environmental*, *Social* and *Governance* scores for banks; $CAR_{i,t-1}$ is the risk-weighted assets ratio between Tier 1 + Tier 2 capital and dividing the total by the total risk-weighted assets; $NPL_{i,t-1}$ the ratio between non-performing net loans and total outstanding net loans; $Size_{i,t-1}$ is the natural logarithm of total assets for for bank. Macro controls are: ΔGDP, *Unemployment rate*, *CPI rate*. The thresholds, their confidence level and p-value, has been constructed using 300 bootstraps, and the confidence interval is calculated using the 5% critical value for the non-rejection zone. Robust standard errors are in parentheses ***; **; * denote statistical significance, respectively at 1%, 5% and 10% levels.

Table A5: ESG and Banks Business Models: large versus small banks.

Dependent variable: BM1$_{i,t}$	**[i]**	**[ii]**	**[iii]**
ESG$_{i,t}$(BM1$_{i,t-1}\leq\gamma$)	0.0004		
	(0.0003)		
ESG$_{i,t}$(BM1$_{i,t-1}>\gamma$)	0.0013***		
	(0.0005)		
ESG$_{i,t-1}$(BM1$_{i,t-1}\leq\gamma$)		0.0000	
		(0.0003)	
ESG$_{i,t-1}$(BM1$_{i,t-1}>\gamma$)		0.0001*	
		(0.0003)	
ESG$_{i,t-2}$(BM1$_{i,t-1}\leq\gamma$)			-0.0000
			(0.0003)
ESG$_{i,t-2}$(BM1$_{i,t-1}>\gamma$)			0.0005
			(0.0004)
CAR$_{i,t-1}$	0.0979	0.0534	0.0559
	(0.0726)	(0.0793)	(0.0776)
NPLs$_{i,t-1}$	-0.0149	-0.0339	-0.0399
	(0.0743)	(0.0900)	(0.0985)
Size$_{i,t-1}$	-0.0133	-0.0169	-0.0238
	(0.0117)	(0.0142)	(0.0171)
Constant	0.3326	0.376	0.5002
	(0.2123)	(0.2498)	(0.2974)
Banks fixed effects	YES	YES	YES
Marco controls	YES	YES	YES
Business Models	YES	YES	YES
N. Obs.	420	420	420
γ	0.1277	0.0632	0.0632
R^2 *within*	0.1126	0.1176	0.1096
F-Test	7.20***	9.47***	5.84***

Dependent variable: BM2$_{i,t}$	**[i]**	**[ii]**	**[iii]**
ESG$_{i,t}$(BM2$_{i,t-1}\leq\gamma$)	-0.0008		
	(0.0001)		
ESG$_{i,t}$(BM2$_{i,t-1}>\gamma$)	0.0022***		
	(0.0005)		
ESG$_{i,t-1}$(BM2$_{i,t-1}\leq\gamma$)		-0.0007	
		(0.0007)	
ESG$_{i,t-1}$(BM2$_{i,t-1}>\gamma$)		0.0018***	
		(0.0004)	
ESG$_{i,t-2}$(BM2$_{i,t-1}\leq\gamma$)			-0.0059*
			(0.0032)
ESG$_{i,t-2}$(BM2$_{i,t-1}>\gamma$)			0.00001
			(0.0000)
CAR$_{i,t-1}$	0.2688	0.2456	0.1193
	(0.1663)	(0.1727)	(0.1434)
NPLs$_{i,t-1}$	-0.3355	-0.2663	-0.0157
	(0.3685)	(0.4038)	(0.0852)
Size$_{i,t-1}$	-0.0669**	-0.0505*	0.0085
	(0.0259)	(0.0284)	(0.0373)
Constant	1.5352***	1.2977***	0.3797
	(0.3495)	(0.3895)	(0.6297)
Banks fixed effects	YES	YES	YES
Macro controls	YES	YES	YES
Business Models	YES	YES	YES
N. Obs.	420	420	420
γ	0.5919**	0.5866***	0.1009***
R^2 *within*	0.348	0.2489	0.1334
F-Test	8.42***	7.32***	3.56***

Dependent variable: BM3$_{i,t}$	**[i]**	**[ii]**	**[iii]**
ESG$_{i,t}$(BM3$_{i,t-1}\leq\gamma$)	-0.0006		
	(0.0007)		
ESG$_{i,t}$(BM3$_{i,t-1}>\gamma$)	0.0022***		
	(0.0005)		
ESG$_{i,t-1}$(BM3$_{i,t-1}\leq\gamma$)		-0.0004	
		(0.0007)	
ESG$_{i,t-1}$(BM3$_{i,t-1}>\gamma$)		0.0021***	
		(0.0006)	
ESG$_{i,t-2}$(BM3$_{i,t-1}\leq\gamma$)			-0.0000
			(0.0007)
ESG$_{i,t-2}$(BM3$_{i,t-1}>\gamma$)			0.0022***
			(0.3124)
CAR$_{i,t-1}$	0.2043	0.2321	0.2105
	(0.1654)	(0.1692)	(0.1622)
NPLs$_{i,t-1}$	0.55035***	0.4907***	0.3893***
	(0.0897)	(0.0920)	(0.1007)
Size$_{i,t-1}$	-0.0295	-0.0383**	-0.0457**
	(0.0181)	(0.0163)	(0.0170)
Constant	0.9947***	1.1525***	1.3168***
	(0.3077)	(0.2933)	(0.3129)
Banks fixed effects	YES	YES	YES
Macro controls	YES	YES	YES
Business Models	YES	YES	YES
N. Obs.	420	420	420
γ	0.635***	0.635***	0.653***
R^2 *within*	0.346	0.3386	0.366
F-Test	15.00***	11.34***	10.51***

Dependent variable: BM4$_{i,t}$	**[i]**	**[ii]**	**[iii]**
ESG$_{i,t-1}$(BM4$_{i,t}\leq\gamma$)	-0.0012***		
	(0.0004)		
ESG$_{i,t}$(BM4$_{i,t-1}>\gamma$)	0.0003		
	(0.0003)		
ESG$_{i,t-1}$(BM4$_{i,t-1}\leq\gamma$)		-0.0011***	
		(0.0003)	
ESG$_{i,t-1}$(BM4$_{i,t-1}>\gamma$)		-0.0002	
		(0.0003)	
ESG$_{i,t-2}$(BM4$_{i,t-1}\leq\gamma$)			-0.0008**
			(0.0003)
ESG$_{i,t-2}$(BM4$_{i,t-1}>\gamma$)			-0.0000
			(0.0002)
CAR$_{i,t-1}$	0.3406	0.0958	0.1577
	(0.2108)	(0.1224)	(0.1418)
NPLs$_{i,t-1}$	0.1769*	0.0077	0.0158
	(0.0902)	(0.0421)	(0.0416)
Size$_{i,t-1}$	0.0688***	0.0455***	0.0334*
	(0.0176)	(0.0140)	(0.0007)
Constant	-0.9325***	-0.513**	-0.2812
	(0.3158)	(0.2555)	(0.3423)
Banks fixed effects	YES	YES	YES
Macro controls	YES	YES	YES
Business Models	YES	YES	YES
N. Obs.	420	420	420
γ	0.4094**	0.4214***	0.4211***
R^2 *within*	0.3997	0.2558	0.1954
F-Test	17.12***	16.77***	5.83***

The Table reports the results when the dependent variables are the proxy for the banks' business models 4: Business Model 1: (Tier1+Tier2)/Total Assets; Business Model 2: Loans/Total Assets; Business Model 3: Deposits/Total Assets; Business Model 4: Net Interest Margin/Intermediation Margin $ESG_{i,t}$ represents the *Environmental*, *Social* and *Governance* scores for banks; $CAR_{i,t-1}$ is the risk-weighted assets ratio between Tier 1 + Tier 2 capital and dividing the total by the total risk-weighted assets; $NPL_{i,t-1}$ the ratio between non-performing net loans and total outstanding net loans; $Size_{i,t-1}$ is the natural logarithm of total assets for for bank. Macro controls are: ΔGDP, *Unemployment rate*, *CPI rate*. The thresholds, their confidence level and p-value, has been constructed using 300 bootstraps, and the confidence interval is calculated using the 5% critical value for the non-rejection zone. Robust standard errors are in parentheses ***; **; * denote statistical significance, respectively at 1%, 5% and 10% levels.

Table A6: ESG and Banks Business Models: excluding Global Systemically Important Banks.

Dependent variable: BM1$_{i,t}$	[i]	[ii]	[iii]
$ESG_{i,t}(BM1_{i,t-1} \leq \gamma)$	0.0000		
	(0.0001)		
$ESG_{i,t}(BM1_{i,t-1} > \gamma)$	0.0003*		
	(0.0002)		
$ESG_{i,t-1}(BM1_{i,t-1} \leq \gamma)$		0.0001	
		(0.0001)	
$ESG_{i,t-1}(BM1_{i,t-1} > \gamma)$		0.0015	
		(0.0011)	
$ESG_{i,t-2}(BM1_{i,t-1} \leq \gamma)$			-0.0000
			(0.0002)
$ESG_{i,t-2}(BM1_{i,t-1} \leq \gamma)$			0.0003
			(0.0002)
$CAR_{i,t-1}$	0.1880***	0.2075***	0.1727***
	(0.0636)	(0.6425)	(0.6025)
$NPLs_{i,t-1}$	0.0472	0.0404	0.0441*
	(0.0289)	(0.0287)	(0.0256)
$Size_{i,t-1}$	-0.0119*	-0.0108*	-0.0166
	(0.0066)	(0.0060)	(0.0084)
Constant	0.2487**	0.2232**	0.3363**
	(0.1155)	(0.0982)	(0.1472)
Banks fixed effects	YES	YES	YES
Marco controls	YES	YES	YES
Business Models	YES	YES	YES
N. Obs.	1,035	966	897
γ	0.0637	0.1415	0.0613
R^2 *within*	0.1107	0.1079	0.1031
F-Test	7.39***	3.02***	3.49***

Dependent variable: BM2$_{i,t}$	[i]	[ii]	[iii]
$ESG_{i,t}(BM2_{i,t-1} \leq \gamma)$	-0.0081**		
	(0.0034)		
$ESG_{i,t}(BM2_{i,t-1} > \gamma)$	0.0006		
	(0.0004)		
$ESG_{i,t-1}(BM2_{i,t-1} \leq \gamma)$		-0.0085**	
		(0.0032)	
$ESG_{i,t-1}(BM2_{i,t-1} > \gamma)$		0.0004	
		(0.0005)	
$ESG_{i,t-2}(BM2_{i,t-1} > \gamma)$			-0.0085***
			(0.0029)
$ESG_{i,t-2}(BM2_{i,t-1} > \gamma)$			0.0057
			(0.0004)
$CAR_{i,t-1}$	0.0242	0.1042	0.1477
	(0.1238)	(0.1248)	(0.1313)
$NPLs_{i,t-1}$	-0.0316	-0.0128	-0.0119
	(0.0710)	(0.0760)	(0.0788)
$Size_{i,t-1}$	-0.0115	-0.0098	-0.0052
	(0.0234)	(0.0230)	(0.0237)
Constant	0.8130**	0.8038**	0.7001**
	(0.3594)	(0.3562)	(0.3769)
Banks fixed effects	YES	YES	YES
Macro controls	YES	YES	YES
Business Models	YES	YES	YES
N. Obs.	1,035	966	897
γ	0.3289***	0.3289***	0.3289***
R^2 *within*	0.3275	0.3078	0.2814
F-Test	26.10***	20.13***	8.49***

Dependent variable: BM3$_{i,t}$	[i]	[ii]	[iii]
$ESG_{i,t}(BM3_{i,t-1} \leq \gamma)$	-0.0003		
	(0.1339)		
$ESG_{i,t}(BM3_{i,t-1} > \gamma)$	0.0014***		
	(0.0004)		
$ESG_{i,t-1}(BM3_{i,t-1} \leq \gamma)$		-0.0004	
		(0.0005)	
$ESG_{i,t-1}(BM3_{i,t-1} > \gamma)$		0.0014***	
		(0.0004)	
$ESG_{i,t-2}(BM3_{i,t-1} \leq \gamma)$			-0.0003
			(0.0005)
$ESG_{i,t-2}(BM3_{i,t-1} > \gamma)$			0.0014***
			(0.0004)
$CAR_{i,t-1}$	0.4022***	0.4490***	0.4201***
	(0.1246)	(0.1193)	(0.1238)
$NPLs_{i,t-1}$	0.1225**	0.0818	0.0725
	(0.0599)	(0.0622)	(0.0554)
$Size_{i,t-1}$	-0.0366**	-0.0477**	-0.0581***
	(0.0142)	(0.0144)	(0.0147)
Constant	1.1176***	1.1525***	1.5323***
	(0.2481)	(0.2581)	(0.2697)
Banks fixed effects	YES	YES	YES
Macro controls	YES	YES	YES
Business Models	YES	YES	YES
N. Obs.	1,035	966	897
γ	0.5013***	0.5327***	0.5303***
R^2 *within*	0.3281	0.3281	0.3427
F-Test	15.00***	13.28***	12.42***

Dependent variable: BM4$_{i,t}$	[i]	[ii]	[iii]
$ESG_{i,t}(BM4_{i,t-1} \leq \gamma)$	-0.0059		
	(0.0041)		
$ESG_{i,t}(BM4_{i,t-1} > \gamma)$	-0.0001**		
	(0.0003)		
$ESG_{i,t-1}(BM4_{i,t-1} \leq \gamma)$		-0.0011***	
		(0.0002)	
$ESG_{i,t-1}(BM4_{i,t-1} > \gamma)$		-0.0002	
		(0.0003)	
$ESG_{i,t-2}(BM4_{i,t-1} \leq \gamma)$			-0.0008**
			(0.0003)
$ESG_{i,t-2}(BM4_{i,t-1} > \gamma)$			-0.0000
			(0.0002)
$CAR_{i,t-1}$	0.192	0.1106	0.1577
	(0.1549)	(0.1247)	(0.1445)
$NPLs_{i,t-1}$	-0.0087	0.0143	0.0232
	(0.0477)	(0.0423)	(0.0419)
$Size_{i,t-1}$	0.0525***	0.0469***	0.0349*
	(0.0126)	(0.0144)	(0.0182)
Constant	-0.6608***	-0.5216**	-0.2848
	(0.2375)	(0.2564)	(0.3453)
Banks fixed effects	YES	YES	YES
Macro controls	YES	YES	YES
Business Models	YES	YES	YES
N. Obs.	1,035	966	897
γ	0.08	0.4214***	0.4214***
R^2 *within*	0.3208	0.2587	0.1938
F-Test	22.34***	21.27***	5.50***

The Table reports the results when the dependent variables are the proxy for the banks' business models 4: Business Model 1: (Tier1+Tier2)/Total Assets; Business Model 2: Loans/Total Assets; Business Model 3: Deposits/Total Assets; Business Model 4: Net Interest Margin/Intermediation Margin $ESG_{i,t}$ represents the *Environmental*, *Social* and *Governance* scores for banks; $CAR_{i,t-1}$ is the risk-weighted assets ratio between Tier 1 + Tier 2 capital and dividing the total by the total risk-weighted assets; $NPL_{i,t-1}$ the ratio between non-performing net loans and total outstanding net loans; $Size_{i,t-1}$ is the natural logarithm of total assets for for bank. Macro controls are: ΔGDP, *Unemployment rate*, *CPI rate*. The thresholds, their confidence level and p-value, has been constructed using 300 bootstraps, and the confidence interval is calculated using the 5% critical value for the non-rejection zone. Robust standard errors are in parentheses ***; **; * denote statistical significance, respectively at 1%, 5% and 10% levels.