

# Green Financial Perspectives



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**Proceeds of the Central European Scientific Conference on Green Finance and  
Sustainable Development, October 2020**



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## Foreword

This unique selection of articles in this publication is intended to provide the reader with a thematic overview on the Central European Scientific Conference on Green Finance and Sustainable Development, held online, October 13, 2020. The event proved the conviction of its organizers and participants that actions on sustainability can be furthered based on a strengthened dialogue built on the results of well-communicated scientific research. It is all the more important, as it is widely agreed, that the role of institutions, in particular that of the central banks, is pivotal in greening the financial system, i.e. pursuing shifting savings towards greener investments.

The conference was organized by the Department of Geography, Geoeconomy and Sustainable Development (GGFF) of the Corvinus University of Budapest (CUB) and the Green Program of the Central Bank of Hungary (MNB). CUB, with a curriculum focused on economics and other social sciences, considers sustainability high on its agenda, and GGFF is strongly committed to endorsing the issue of sustainability in education and academic research. While the conference addressed the issue of sustainability primarily from the perspective of finance, it attracted over 120 participants, about 30% internationally, including scholars, students and policy representatives. With 26 presentations in six thematic sections, it also well complemented the concurrent Central European Green Finance Conference, an outreach event of the Central Banks and Supervisors Network for Greening the Financial System (NGFS), organized in Budapest by the Central Bank of Hungary (MNB) and the European Bank for Reconstruction and Development.

The conference, beyond those thematic subjects usually covered by similar events, gave floor to perspectives from various geographic regions, too, including the Middle-East, Central-Asia and Japan. This versatile approach may well highlight the role and potential of Central European institutions in the global scientific discourse on sustainability.

This publication presents eleven selected articles in two thematic chapters. The chapter titled Institutions and Instruments is focused on the role of institutions, among them the central banks, as well as various financial instruments designed to pursue sustainability at the micro-level, such as corporate reporting on environmental, social and governance performance (ESG), the pricing of carbon, and performance of stock exchange listed shares etc.. The wealth perspective is presented as a framework that offers a comprehensive approach to the issue of sustainability. Articles in the second chapter provide climate and sustainability insights at the macro level in the regions of Central-Asia, the Middle-East and Europe.

The organizers of the conference and editors of this publication appreciate and give thanks to all participants for their contributions.

Géza Salamin

Head of the Department of Geography Geoeconomy and Sustainable Development

# Contents

<b>Chapter I: Institutions, instruments .....</b>	<b>6</b>
<b>The role of central banks in mitigating CO<sub>2</sub> emissions .....</b>	<b>7</b>
Regina Kuzmann	
<b>ESG-rated stock performance under Covid-19 An empirical study of Warsaw-Stock-Exchange-listed companies .....</b>	<b>17</b>
Bogusław Bławat, Marek Dietl, Tomasz Wiśniewski	
<b>Environmental, Social, and Governance (ESG) Scores in the Service of Financial Stability for the European Banking System .....</b>	<b>29</b>
Edit Lippai-Makra, Dániel Szládek, Balázs Tóth, Gábor Dávid Kiss	
<b>Are climate-change-related projections incorporated into mortgage characteristics? .....</b>	<b>39</b>
Eszter Baranyai, Ádám Banai	
<b>Carbon pricing – theory versus practice .....</b>	<b>41</b>
Anna Széchy	
<b>The impact of ESG performance during times of crisis.....</b>	<b>53</b>
Yi Yingxu	
<b>Empirical analysis of the weak and strong sustainability of economic growth: The wealth approach .....</b>	<b>65</b>
Antal Ferenc Kovács	
<b>Chapter II: Regions .....</b>	<b>84</b>
<b>Climate mainstreaming in the MFF 2021-2027: A simple slogan without political will? .....</b>	<b>85</b>
András Báló	
<b>Low-carbon sustainable energy trends towards 2030 in Arab countries .....</b>	<b>94</b>
Prof. Dr Moustafa El-Abdallah Alkafry	
<b>Transition to “Greener Growth” in Central Asia.....</b>	<b>106</b>
Mária Bábosik	
<b>Modelling the economic impact of climate transition and physical risks for Central Eastern European countries .....</b>	<b>121</b>
Zsófia Komuves, Dora Fazekas, Mary Goldman	

# Environmental, Social, and Governance (ESG) Scores in the Service of Financial Stability for the European Banking System

**Authors: Edit Lippai-Makra, Dániel Szládek, Balázs Tóth, Gábor Dávid Kiss – University of Szeged**

## Abstract

The financial stability of the banking system depends mainly on the resilience of the banking system, which can be estimated with traditional variables like the ratio of non-performing loans, capital adequacy ratios, and other balance-sheet-related approaches that represent robustness (like ROA). This paper aims to test how the capital adequacy ratio can be estimated better with the implementation of different ESG scores (total and environmental only).

Since the ESG score can be an appropriate proxy variable for capturing the non-financial ‘soft skills’ of a bank, it can be used to approximate the ethical standards of a bank in the long run. This paper uses an annual set of 247 banks from the European Economic Area between 2002 and 2018 (source of data: Refinitiv database) to test our theoretical model, employing a standard unbalanced panel and a quantile panel regression in Eviews. The latter approach provides better insight into the assumed differences between banks with high and low capital adequacy ratios. Our results support the hypothesis that the ESG score could be useful for capturing a specific, financially more resilient market segment.

**Keywords:** ESG, financial stability, quantile regression, non-financial reporting

**JEL code:** E44, G21, O44, Q56, M40

## 1. Introduction

One of the emerging global trends in the past few decades has been the focus on aspects of sustainability in the field of the economy, even in the financial sector. Various corporate sustainability movements (e.g. triple bottom line, CSR, green economy, etc.) differ in their names but have the same goal of incorporating environmental (E), social (S), and governance (G) aspects into the activities of economic actors (Tóth, 2019). In the present study, the term ‘green finance’ is used to mean that all financial institutions consider not only economic efficiency but also sustainable development in their operations and in their strategies (Pintér & Deutsch, 2012). ESG information refers to the three central factors involved in measuring the sustainability and societal impact of a company.

Companies communicate their contribution to sustainability to their stakeholders in the form of non-financial reports (e.g. integrated reports, sustainability reports, CSR reports, ESG reports, etc.) whose evaluation is a resource and time-consuming task. In relation to its nature, the information received from ESG reports can be either qualitative or quantitative, which may cause difficulties with interpretation for stakeholders. This problem has led to the rise of sustainability rating agencies or ESG rating agencies – following the example of credit rating agencies, which



are already well known in financial markets. These rating agencies, based on company reports and using different methodologies, award ESG scores, thus quantifying qualitative data.

Banks have a dual role: as users of reports on the one hand, and as reporters on the other. As lenders and investors, they collect non-financial (e.g. ESG) information, and measure different risk types based on company reports. We divide the motivating factors and incentives into two groups: mandatory elements, like regulations; and voluntary ones, like stakeholders' information needs. As reporting entities, banks are subject to regulations, but also to the expectations of stakeholders, institutions, etc. Mandatory incentives are regulations: for example, EU Directive 2014/95/EU, which requires the publication of non-financial reports for certain large undertakings of public interest in the European Union from financial year 2017, or EU Directive 2013/34/EU, which defines banks as public interest entities. Apart from regulations, other factors, including voluntary incentives, also influence the reporting behaviour of these institutions – for example, the non-regulated information needs of stakeholders, UN Sustainable Development Goals (SDGs), Science Based Target Initiatives (SBTIs), Principles for Responsible Banking, etc.

## 2. Theoretical Background

Why do companies publish ESG information? Several theories have emerged in relation to corporate disclosure (Lakatos, 2013), of which the following theories can be best linked to the publication of ESG information (Ortas et al., 2015).

Stakeholder theory deals with social actors that are affected by companies. According to the theory, when determining the scope of information to be disclosed, companies seek to serve the information needs of stakeholders (An et al., 2011). Stakeholder demand for information has a direct and indirect impact on companies' ESG disclosure practices. Employees and investors may even request various sustainability-related information directly (via phone or e-mail, etc.), or indirectly (investors influence disclosure practices through rating agencies).

Most authors connect legitimacy theory to the disclosure of ESG information (Ortas et al., 2015). According to the theory of organizational legitimacy, an organization can only operate within a framework that is established by members of society (Pereira Eugénio et al., 2013). The theory, therefore, is based on preconceptions about society and social relations, and suggests that managers should communicate information that influences users' perceptions of their organizations (Cormier & Gordon, 2001).

According to signalling theory, in order to eliminate information asymmetry and make their businesses more attractive, firms provide information to stakeholders that indicates that they are better than their peers (An et al., 2011; Campbell et al., 2001; Shehata, 2014). There are a number of ways to present a positive image of a company, one of the most effective of which is to disclose positive financial and non-financial information to stakeholders (An et al., 2011; Watson et al., 2002). Of course, a company will only adhere to the above practice if expenditure on signalling is less than the increase in revenue thereby generated (Szántó, 2009).

According to agency theory, divergent goals and information asymmetry lead to mutual distrust between the principal and the agent (Kaliczka & Naffa, 2010). Such relationships exist between managers and owners, between creditors and shareholders, and between management and employees (Jensen & Meckling, 1976). Reports are compiled by managers (agents) on the basis of which owners (principals) evaluate their performance in the given year (Jensen – Meckling 1976; Lakatos 2009; Mohl 2013). In this relationship, the managers of a company have an

information advantage, and owners cannot accurately evaluate decisions that are made. The agent – i.e., the manager – can take advantage of the fact that their action is not observable, thus putting their own personal interests first (Barako, 2007). The conflicting interests of the two parties generate agency costs, and additional residual losses can occur if managers seek to maximize their own well-being in contrast to following owners' decisions (Jensen & Meckling, 1976, Shehata 2014).

From the above theories, it can be seen that the disclosure of ESG information can affect profitability, either by reducing agency costs or by providing more attractive investment opportunities, thus reducing the cost of capital for companies.

ESG disclosure-related investigations usually examine the motivation for the ESG disclosure, or the effect of the ESG disclosure on profitability and efficiency. Such research is presented in Table 1.

*Table 1: Literature background of our investigation*

Study	Aim of the research	Sample	Examined period	Method	Findings
Buallay, (2019)	Examine the relationship between profitability and ESG disclosure.	235 banks	2007-2016	linear regression	ESG disclosures have a positive impact on ROA and TQ. CSR disclosures have a negative impact on ROA and TQ. Corporate governance disclosure negatively affects ROA and ROE, and positively affects ROA.
Tommaso & Thornton, (2020)	ESG impact on risk-taking and bank value	European banks	2007-2018	linear regression	High ESG scores are also associated with a reduction in bank value. High ESG scores are associated with a modest reduction in risk-taking.
Ortas et al., (2015)	Financial factors' impact on company environment sustainability reporting	3931 companies from 51 industry	2010	quantile regression	Company size has a positive impact on reporting. Companies with higher leverage tend to provide more voluntary information. R&D spending is correlated positively with environmental reporting. Market return and capitalization have a positive effect on reporting.
Dell'Atti et al., (2017)	Test the relationship between sustainable behavior, firm reputation, and economic performance.	75 large international banks	2008-2012	Principle Component Analysis, multiple linear regression models.	Positive relationship between reputation and social performance, while reputation has a negative relationship with environmental and governance performance.
Birindelli et al., (2018)	Impact of a critical mass of female directors on ESG performance.	Banks from Europe and USA	2011-2016	panel regression	Bank sustainability performance is found to be positively associated with women on the board of directors, board size, CSR committee, and bank size. The relationship between women on the board of directors and a bank's ESG performance is an inverted U-shape. Gender-balanced boards positively impact a bank's performance.

Source: Authors' construction

Buallay (2019) found that ESG disclosure has a positive impact on ROA and TQ. In a very recent article, Tommaso & Thornton (2020) state that high ESG scores are associated with a reduction in bank value, and with a modest reduction in risk-taking.

Ortas et al. (2015) found that company size has a positive impact on ESG reporting. Companies with higher leverage tend to provide more voluntary information. R&D spending is correlated positively with environmental reporting. Market return and capitalization have a positive effect on reporting.

In Dell'Atti et al. (2017) we can read that there is a positive relation between reputation and social performance, while reputation has a negative relationship with environmental and governance performance.

According to Birindelli et al. (2018), bank sustainability performance is found to be positively associated with women on the board of directors, board size, the existence of a CSR committee, and bank size. The relationship between women on the board of directors and a bank's ESG performance is an inverted U-shape. Gender-balanced boards positively impact a bank's performance.

### 3. Theoretical model

Banking is based on the lending of allocated external capital (which can be assumed to be a deposit, bond, interbank-market debt, or other liability), where losses are limited by shock-absorbent tier one and two capital. Later capital adequacy standards were reinforced by the Basel Accords during recent decades, such as that regulatory capital requirements should keep up with owners' profit expectations (otherwise they should pursue other alternate investments), while profitability is a factor of economies of scale – but size determines the level of the supervisory authority in Banking Union countries. The quality of lending or solvency can depend on internal management competencies and external conjuncture variables. Therefore, we can assume that capital adequacy will depend on the following relationship among the above-mentioned variables (1).

$$\text{capital adequacy} = f(\text{profit, size, management, solvency, shocks}) \quad (1)$$

To operationalize the aforementioned set of relationships into a theoretical model (2), this paper employs the Capital Adequacy (as a percentage of total capital,  $CA_t$ ) ratio as an independent variable (while its previous  $t-1$  value was added to the model to avoid autocorrelation in the residual), while profitability will be represented by Return on Assets ( $ROA_t$ ), size by value of total assets ( $TA_t$ ), while management resilience is proxied by the Environmental, Social, and Governance ( $ESG_t$ ) scores and solvency is represented by the proportion of non-performing loans ( $NPL_t$ ). It is worth mentioning that only the  $ESG_t$  ratio can be considered a forward-looking variable, since the others are determined by decisions made in the past. External shocks are represented by dummy variables: regulatory regime changes like the implementation of Basel 2 regulations ( $dummy_{basel2}$ ), institutional regime changes like Eurozone-membership ( $dummy_{ez}$ ), and conjunctural shock like recessions in the Eurozone ( $dummy_{ezrecession}$ ) or in the US ( $dummy_{usrecession}$ ) were added.

$$\begin{aligned} \Delta(\ln(CA_t)) = & \omega + \beta_1 \Delta(\ln(CA_{t-1})) + \beta_2 \Delta(\ln(ROA_t)) + \beta_3 \Delta(\ln(TA_t)) + \beta_4 \Delta(\ln(ESG_t)) + \\ & \beta_5 \Delta(\ln(NPL_t)) + \beta_6 dummy_{basel2} + \beta_7 dummy_{ez} + \beta_8 dummy_{ezrecession} + \\ & \beta_9 dummy_{usrecession} + \varepsilon_t \end{aligned} \quad (2)$$

Intuition would suggest that we can anticipate the following results: Capital Adequacy will increase in case of increased profitability ( $\beta_2 > 0$ ), growth in the balance sheet ( $\beta_3 > 0$ ), if

operations are guided by better established internal standards ( $\beta_4 > 0$ ), and if losses on lending decrease ( $\beta_5 < 0$ ).

## 4. Data and methods

### 4.1. Data

This paper analyses all 247 European banks whose data was made available in the Refinitiv Eikon database between 2002 and 2018. The only criteria for acceptance in the sample was that the latter had to report in one of the countries of the European Economic Area, creating unbalanced panel data.

Table 2 indicates that all the time series meet the input requirements for linear regressions: they are similarly scaled, their expected value is near to zero, and they lack a unit root. However, their distribution is not normal, since it shows excess kurtosis or 'fat-tails'. This result supports the later implementation of the quantile regression model.

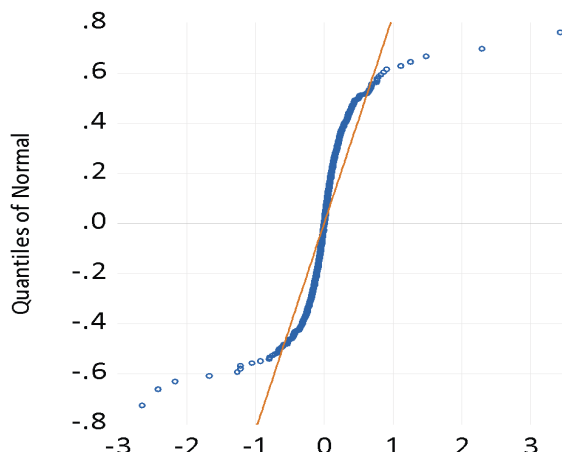
*Table 2.: Descriptive statistics*

	D(LN_CA)	D(LN_ROA)	D(LN_TA)	D(LN_ESG)	D(LN_NPL)
Mean	0.0341	0.0061	-0.0033	0.0176	-0.0002
Median	0.0242	0.0032	0.0069	0.0106	-0.0148
Maximum	0.8012	4.3766	9.2355	0.6733	1.3176
Minimum	-0.3562	-4.3638	-9.1479	-0.6312	-1.2540
Std. deviation	0.1330	1.0377	1.0084	0.0962	0.3198
Skewness	1.0343	0.1570	-1.2549	0.5954	-0.0182
Kurtosis	7.5360	7.3954	78.7642	15.7598	6.9601
Normal dist.: Jarque-Bera-stat.	422.5209	330.1145	97690.7900	2791.9380	266.6182
<i>p</i>	0.0000	0.0000	0.0000	0.0000	0.0000
No. of observations	408	408	408	408	408
Unit root: Im, Pesaran & Shin W-stat	-13,8031	-34,0422	-94,0126	-11,6013	-5,8620
<i>p</i>	0,0000	0,0000	0,0000	0,0000	0,0000

*Source: Authors' edition, using Eviews 11*

During the later defined quantile analysis, we analyse how the different changes in the Capital Adequacy ratio affect the theoretical model's behaviour. Figure 1. shows the fat-tailed nature of the ratio that supports the use of quantile regression.

Figure 1.: The QQ-plot of the logarithmic change of the Capital Adequacy ratio



Source: Authors' edition, using Eviews 11

### 4.2. Methods

Quantile models are based on quantiles of the conditional distribution of the response variable and are expressed as functions of observed covariates. While classical linear regression assumes that grouped data means fall on some linear surface, and the parameters can be estimated on this basis. Least squares regression offers a model:  $\min_{\mu \in \mathbb{R}} \sum_{i=1}^n (y_i - \mu)^2$  for the random  $y$  and  $\mu$  unconditional population mean. The quantile regression follows a similar approach for conditional quantile functions: the scalar  $\mu$  is replaced by a parametric function and  $\xi(x_i, \beta)$  estimates of the conditional expectation function with a  $\rho_\tau(\cdot)$  absolute value function that yields the  $\tau$ th sample quantile as its solution:  $\min_{\beta \in \mathbb{R}^p} \sum_{i=1}^n \rho_\tau(y_i - \xi(x_i, \beta))$  (Koenker & Hallock, 2001).

For panel data, according to Lamarche (2010), it is necessary to employ the classical Gaussian random effects model first (3):

$$y = X\beta + Z\alpha + u \tag{3}$$

where  $Z$  is an “incidence matrix” of dummy variables, and  $\alpha$  and  $u$  are independent random vectors. The parameter of primary interest  $\beta$  can be estimated by two alternative (fixed and random effect) models. Because the error term  $u$  is assumed to be mean zero and orthogonal to the independent variables, the conditional mean function of the unobserved effects model is:  $E(y_{i,t} | x_{i,t}, \alpha_i) = x'_{i,t}\beta + \alpha_i$ , where  $y_{i,t}$  is the response,  $x_{i,t}$  is the vector of covariates, and  $\alpha_i$  is an individual fixed effect. For quantile panel regression, it is necessary to use an analogous conditional quantile model:  $QY_{i,t}(\tau_j | x_{i,t}, \alpha_i) = x'_{i,t}\beta(\tau_j) + \alpha_i$  for all quantiles  $\tau_j$  in the interval (0, 1). The individual effect is assumed not to represent a distributional shift, since this is unrealistic in the case of a small number of individual observations. Therefore, the individual specific effect  $i$  will be the pure location shift effect on the conditional quantiles of the response. It is necessary to test slope equality across quantiles to show that linear models can generate inadequate conclusions for specific quantiles since there is a link between the explanatory and dependent variables. Therefore, coefficients of the estimated quantiles are valid for cases of  $p < 0.1$ . There is also a test for symmetry between quantiles to check the heterogeneous impact of the explanatory

variables, which suggests major discrepancies when comparing the upper and lower tails of the distribution (Škrinjarić, 2018).

The research for this paper employed an OLS panel regression to backtest the results of the quantile regressions.

## 5. Results

The estimated conventional OLS panel regression and the median result of the quantile regression results are presented in Table 3. This shows that only changes in the ESG ratio contributed to the near-median development of capital adequacy, meaning an improving ESG ratio contributed to the achievement of higher capital adequacy ratios. Meanwhile, the introduction of the Basel 2 regulations had an obvious impact on the increase in capital adequacy ratios. Both diagnostic requirements are met, since both the Symmetric Quantiles (Wald) Test and the Quantile Slope Equality (Wald) Test proved to be significant – meaning that it is worth analysing quantiles and there are significant differences between the two sides of the data change distribution.

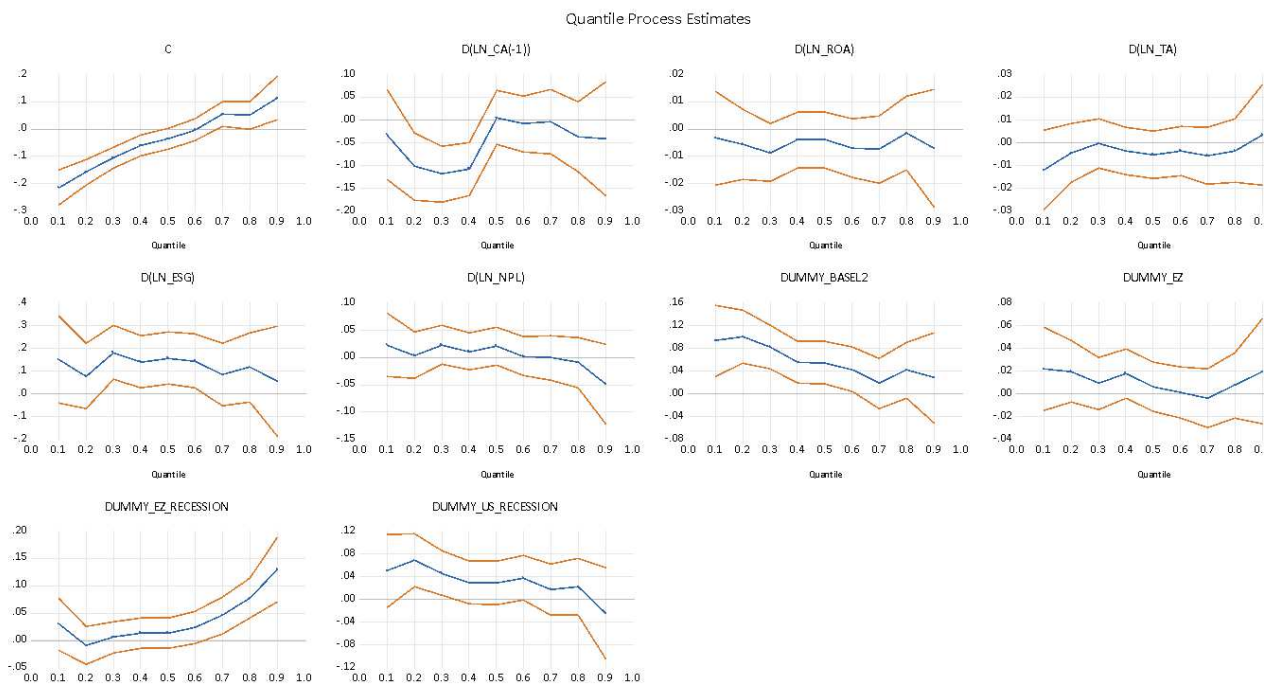
*Table 3.: Results, based on the Panel Least Squares and the Median Quantile Regression*

Modell	Panel Least Squares		Quantile Regression (Median) (Ordinary (IID) Standard Errors & Covariance)	
	Coefficient	Prob.	Coefficient	Prob.
C	-0.0323	0.1741	-0.0366	0.1127
D(LN_CA(-1))	-0.0040	0.9146	0.0047	0.8966
D(LN_ROA)	-0.0099	0.1261	-0.0039	0.5280
D(LN_TA)	-0.0046	0.4860	-0.0052	0.4124
D(LN_ESG)	0.1346	0.0622	0.1566	0.0253
D(LN_NPL)	-0.0077	0.7223	0.0212	0.3143
DUMMY_BASEL2	0.0454	0.0545	0.0541	0.0181
DUMMY_EZ	0.0166	0.2267	0.0061	0.6448
DUMMY_EZ_RECESSION	0.0521	0.0032	0.0140	0.4129
DUMMY_US_RECESSION	0.0189	0.4274	0.0292	0.2062
Durbin-Watson stat	2.2370			
R-squared	0.0661			
Pseudo R-squared			0.0363	
S.E. of regression	0.1323		0.1341	
Symmetric Quantiles (Wald) Test			18.7809	0.0431
Quantile Slope Equality (Wald) Test			27.8402	0.0645

Source: Authors' edition, using Eviews 11

Focusing on the deciles of the Capital Adequacy changes (see Figure 2), none of the variables made a significant contribution, except for the ESG-rate changes in-between the 30-60% deciles not too far from the median. This means that extreme changes in the Capital Adequacy ratio can be triggered by exogenous shocks, but not by model variables. However, under nominal circumstances, the improvement of ESG rates can contribute to further stability.

*Figure 2.: Quantile regression results for each decile*



Source: Authors' construction using Eviews 116.

## 6. Conclusion

A resilient banking system is a fundamental component of financial stability. Our research tested the hypothesis that a higher environmental, social, and governance (ESG) score may strengthen a bank, proxied by the capital adequacy ratio. We utilized a sample of 247 financial institutions from the European Economic Area, covering the period between 2002 and 2018, as provided by the Refinitiv database.

Our quantile regression results suggest that the ESG score is a significant contributor to a bank's capital adequacy. The higher the ESG score, the higher the capital adequacy ratio. Our results imply that banks should be encouraged either by regulation or by stakeholders to achieve higher ESG scores in order to maintain higher capital adequacy, which may contribute to greater financial stability.

An interesting issue for further research would be analysing the sub-indices of the ESG score separately to reveal whether the different parts of the ESG (i.e. environmental, social, or governance) ratings affect capital adequacy in different ways. Results could also be compared to those for other prominent countries – for example, the United States and Japan.

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