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# How sustainable banking fosters the SDG 10 in weak institutional environments

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## ABSTRACT

The role of the financial sector is central in reducing income inequality – the goal of SDG 10 – by facilitating economic opportunities. However, institutional weaknesses may also undermine this effect. We argue that sustainable banking generates bidirectional trust to overcome institutional weaknesses, particularly the weak rule of law. Empirical evidence from 46 countries aggregating data of 1060 banks over 2010–2017 shows that sustainable banking lessens income inequality in weak rule of law settings. The results are robust after including the effects of bank digitalisation. This study has important implications for sustainable banking expansion into weak institutional environments and demonstrates banks' efforts in their commitment to reducing inequality.

## 1. Introduction

Far from decreasing, income inequality within countries has widened over the last few decades (Bourguignon, 2018). The United Nations (UN) World Social Report (2020) focuses on the inequality challenge and how major forces such as technological progress and climate change exacerbate these disparities. The Decade of Action to achieve the Sustainable Development Goals (SDG) poses significant challenges for attaining SDG 10 'Reduced Inequalities' (Sachs et al., 2021). Finance is one of the more effective tools for fighting inequality. Banking is crucial because fund allocation to investment in health, education, or entrepreneurship contributes to equalising opportunities and has distributional impacts on the economy (Demirgüç-Kunt & Levine, 2008; de Haan & Sturm, 2017; Meniago & Asongu, 2018).

However, weak formal institutions (e.g. weak rule of law) (Acemoglu, 2003) raise a barrier to achieving equality. Weak legal institutional settings undermine trust between borrowers and lenders, such as traditional banks; online banks (Bertsch et al., 2020); and fintech companies, including crowdfunding platforms and peer-to-peer lending (Peong, 2021). As a result, weak legal institutions may impede banks from effectively performing their economic role in inequality reduction.

In these weak formal institutional settings, *sustainable* banking can enable economic opportunities to curb income inequality and foster SDG 10. Sustainable banks can overcome the lack of trust that emanates from weak institutions. Sustainable banking is characterised by a commitment to environmental, social, and governance (ESG) non-financial objectives (Aracil et al., 2021). Self-regulation, such as ESG criteria, can constitute a mechanism to build trust (Mair & Marti, 2009), facilitating credit allocation and savings through financial institutions, even when the rule of law is weak. In this way, sustainable banks can channel financial proceeds in ways that create opportunities to address income inequality.

We build a database of the banking industry from 46 developed and developing countries based on data from 1,060 banks for the period 2010–2017. We find that sustainable banking reduces inequality in countries with poor formal institutions (i.e. weak rule of law). These results are robust to various specifications, after controlling for different sources of endogeneity. We consider the role of banks' digitalisation in the sustainable banks' inequality reduction nexus.

This study fills important research gaps. The literature on SDG (e.g. van Zanten & van Tulder, 2018) analyses how sustainable corporate actions translate to the macro-level to yield sustainable development

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(Shah et al., 2016). Nevertheless, industry-level studies remain scarce, with only a few exceptions (Avrampou et al., 2019). The finance literature is silent on the influence of institutional factors, specifically the rule of law, on the finance-inequality nexus (e.g. Beck et al., 2007; Claessens & Perotti, 2007; Demirgüç-Kunt & Levine, 2009; de Haan & Sturm, 2017). Finally, management studies have not examined the potential role of bank digitalisation in this contested relationship.

This study contributes to the literature in several ways. First, we address the advancement toward SDG 10 (income inequality reduction) from a private sector perspective, unlike most studies that offer macroeconomic or policy approaches (Husted & Salazar, 2020). Second, we focus on the banking industry as a source of economic opportunities that foster SDG 10. While existing studies focus on conventional finance, we differentiate conventional banking from sustainable banking based on the ESG criteria and introduce the effect of digital finance. In doing so, we provide novel insights into the finance-income inequality reduction nexus, based on the role of sustainable banking in generating trust to overcome institutional voids. Third, this is one of the few studies that simultaneously examines the interplay of finance and inequality in developed and developing countries (with a few exceptions, i.e. Chakroun, 2020).

The remainder of this paper proceeds as follows. The next section reviews the market failures in the social, environmental, and governance domains that arise in weak institutional settings, which inhibit the role of banks in delivering more equal opportunities to achieve SDG 10. We then discuss the role of sustainable banking in fostering trust and inequality reduction under weak institutions. Subsequently, we empirically test our hypotheses and discuss our results. Finally, we explore managerial and academic implications and offer concluding remarks.

## 2. Theory and hypothesis

### 2.1. Sources of inequality traps in weak rule of law settings: The bidirectional distrust between lenders and borrowers

Income inequality results, to a large extent, from unequal opportunities (Aiyar & Ebeke, 2020) stemming from differing circumstances, such as parental education levels (French & Strachan, 2015), disparities in health coverage, and uneven access to finance (Mookerjee & Kalipioni, 2010). Formal institutions aim to guarantee wide access to resources and equal opportunities for all. Unfortunately, weak formal institutions undercut equal access to private markets and public social services (La Porta & Lopez-De-Silanes, 1998). Among the formal institutions, we focus on the rule of law as the basis for justice and security.

The rule of law consists of law enforcement mechanisms and an incorruptible judiciary that is reliable and efficient in settling disputes predictably, such that property rights are respected (Nwabuzor, 2005). Absent or minimal rule of law allows for market failures that inhibit financial services and exacerbate inequalities (Karlan et al., 2016). These institutional frameworks spur inequality traps rooted in social, environmental, and governance market failures. Thus, we disentangle the different sources of inequality traps and their effects on inhibiting finance.

From a social perspective, a weak rule of law underlies a lack of confidence. Unreliable legal institutions generate mistrust between borrowers and lenders on both the supply and demand sides. On the

supply side (credit markets), the weak rule of law inhibits credit to the most vulnerable because of the risk of borrowers' opportunistic behaviour and the little or no recourse available in the case of default. Lenders' distrust and perceived risk in weak legal settings also apply to other forms of finance, such as online banking and fintech, in which trust is key (Mukherjee & Nath, 2003). The limited financial penetration caused by these institutional weaknesses may have strong repercussions on poor households, who may turn to costlier funding options in the informal sector (Dupas et al., 2016). Predatory lenders magnify inequality by imposing extra burdens on borrowers (Silverman, 2005), who, therefore, cannot reap the benefits of finance in fostering equal opportunities. Simultaneously, on the demand side (savings markets), households distrust banks where formal institutions are poor because weak monitoring may allow systemic risk (Boudriga et al., 2009). Financial digitalisation has an essential impact on increasing formal savings by eliminating transaction costs and improving accessibility; however, clients' trust issues remain (Karlan et al., 2016). This bidirectional distrust between lenders and borrowers entails unequal access to finance (Claessens & Perotti, 2007; Rajan & Zingales, 2003), subverting the possibilities of economic opportunity creation and inequality reduction (Detragiache et al., 2008; Rajan & Zingales, 2003).

From an environmental perspective, unreliable legal settings tend to be lax in environmental regulations (Kotzé & French, 2018). This relegates environmental stewardship to voluntary programs, which may slow progress toward curbing emissions and disproportionately harm disadvantaged classes (Markkanen & Anger-Kraavi, 2019) and exacerbate inequality (Diffenbaugh & Burke, 2019; UN, 2020). Poor households in developing economies tend to be more affected by global warming than richer ones: they are closer to the equator, where most of the effects will be felt, and are less equipped to neutralise higher temperatures either because they work in primary open-air activities, or because of lack of air-conditioning infrastructure. Productivity falls under hot temperatures, similar to growth (Orlov et al., 2020).

Finally, from the perspective of governance, transparency, and ethical behaviour, a weak rule of law facilitates corruption (Uslaner, 2008) and may enable particularistic interests. Corruption distorts the allocation of financial proceeds and diverts them toward non-productive use (Johnson et al., 2002; Nwabuzor, 2005). These potential misallocations disincentivize finance and its consequent effects on inequality reduction (Beck et al., 2003, 2007). Moreover, corruption allows for information asymmetries between lenders and borrowers, negatively affecting conventional lending (Bermpei et al., 2020). For example, corruption in bank lending (Beck et al., 2006; Houston et al., 2011) may lead to incomplete product information or the diffusion of personal customer information (Mukherjee & Nath, 2003), eroding customer trust. Consequently, corruption hinders the effective functioning of financial institutions, causing adverse distributional effects that impact the worst-off (Ndikumana, 2006).

### 2.2. How sustainable banking breaks inequality traps in weak rule of law settings

We argue that sustainable banking can address market failures stemming from weak institutions by building the trust necessary to underpin financing and create economic opportunities. Trust between lenders and borrowers is crucial to finance because economic

**Table 1**  
Sample. Banks' assets with ESG rating as a proportion of a country's bank assets (2017).

Countries	% of banks' assets with ESG score	Countries	% of banks' assets with ESG score
Argentina	72.6%	Lesotho	91.7%
Australia	99.2%	Malaysia	80.8%
Austria	42.0%	Mexico	39.8%
Brazil	59.7%	Morocco	37.2%
Bulgaria	74.8%	Netherlands	47.6%
Chile	44.4%	New Zealand	84.4%
Colombia	66.8%	Norway	67.1%
Croatia	83.7%	Paraguay	43.7%
Czech Republic	55.9%	Peru	69.9%
Denmark	42.3%	Philippines	49.5%
Estonia	66.1%	Poland	73.9%
Finland	47.0%	Portugal	42.8%
Georgia	73.2%	Qatar	86.2%
Greece	97.8%	Romania	64.6%
Hungary	63.2%	Saudi Arabia	99.8%
India	58.2%	Slovakia	39.6%
Indonesia	74.0%	South Africa	95.0%
Ireland	69.4%	Spain	71.7%
Israel	84.5%	Sweden	53.4%
Italy	65.2%	Thailand	78.3%
Japan	41.0%	Turkey	62.5%
Korea Rep. (S. Korea)	56.9%	United Kingdom	87.7%
Latvia	58.4%	United States	60.4%

transactions involve uncertainty and risk (Guiso et al., 2004). In other words, financial contracts depend on their enforceability and the reciprocal trust between counterparties (Guiso et al., 2004). The need for trust is even more compelling in non-physical financial intermediation (i.e. online banks, crowdfunding platforms, and open banking systems) (Mukherjee & Nath, 2003). Trust may arise from social or institutional structures (Pretty & Ward, 2001) such as sustainable banks and their self-regulatory ESG stance. Some early studies argued that sustainable banks foster an ambiance of ‘mutual trust and support’ (Bennett & Cuevas, 1996: 149), particularly with the poor (Robinson, 2001). Trust strengthens the ties between sustainable banks and their communities, facilitating economic transactions that bypass the high transaction costs associated with weak creditor protection.

Sustainable banking aims to deliver economic and social performance stemming from operations across the three ESG dimensions (Mendez, Forcadell, & Ubeda, 2021). In doing so, sustainable banking may effectively countervail market failures and the consequent inequality traps that prevail under weak legal institutions. In the social dimension, sustainable banking creates confidence in providing financial services to disadvantaged groups (Forcadell & Aracil, 2017, 2019), which prompts society’s propensity for formal credit and savings (Straub, 2005). For example, sustainable banks promote bottom-of-the-pyramid strategies, either directly via microfinance (bypassing expensive informal credit and inefficient informal savings); indirectly by financing infrastructure and other development investments (Mendez & Houghton, 2020); or by the issuance and distribution of social bonds and impact investing funds, among others. Thus, vulnerable households are empowered to invest in human and physical capital (Law et al., 2014). Along the same lines, equalising the conditions of access to finance by micro and small firms can equalise entrepreneurial opportunities (Demirgüç-Kunt & Levine, 2008).

Sustainable banking can tackle inequalities associated with climate change more effectively than conventional banking can. Narrowing these inequalities can be achieved directly through the financing of renewable and sustainable energy sources (Mazzucato & Semieniuk, 2018; Scholtens, 2009), indirectly through portfolio decarbonisation (Rohleder et al., 2020), or by inducing the adoption of climate-friendly initiatives by borrowers (Thompson & Cowton, 2004). Sustainable banking has become a powerful driver of transformative change, even if

strict regulations regarding fuel divestment are missing (Plantinga & Scholtens, 2021). Therefore, in weak rule of law settings, where national governments struggle to enforce environmental protection, sustainable banks may effectively finance low-carbon transitions that mitigate climate change and prevent its dismal effects.

In the governance dimension, sustainable banks are underpinned by solid ethical foundations (Aracil et al., 2021) and stricter governance principles (Chantziaras et al., 2020) drawn from their ESG commitments. Thus, in weak rule of law settings, sustainable banks can counteract the misallocation that corruption exerts on lending, since their strong corporate governance principles back their decisions on financial resource allocation. Granting financial access through digital means can also address corruption by bypassing cash transfers from governments (Banerjee et al., 2020) and allowing quicker remittance payments. This provides economic opportunities for the most vulnerable, narrowing the inequality gap.

As a result of the above considerations, we propose the following hypothesis:

*Sustainable banking fosters income inequality reduction in countries suffering from a weak rule of law.*

### 3. Methods

#### 3.1. Sample

We test our hypothesis using an unbalanced country data panel built on a sample of 1060 listed commercial banks with ESG ratings available from Thomson Reuters between 2010 and 2017 from 46 developed and developing countries (Table 1). The macroeconomic variables come from different sources (Appendix 1), with 287 observations. Appendix 1

**Table 2**  
Identification of the rule of law threshold.

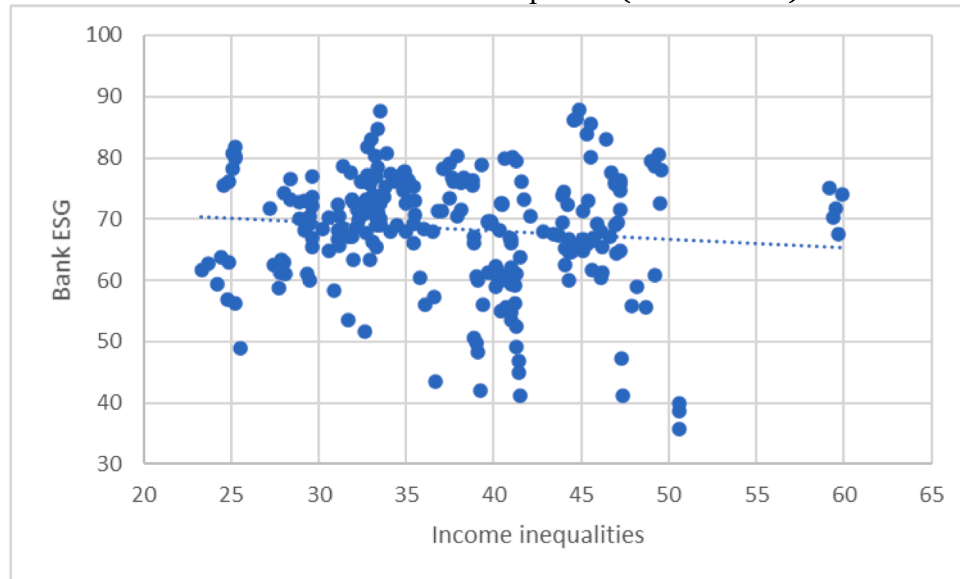
	RL threshold estimate	LM-test
RL threshold	1.617	34.370****

Number of bootstrap replications: 400.

Trimming percentage: 0.15.

\*\*\*\*p < 0.01, \*\*\*p < 0.05, \*p < 0.1.

Countries with weak institutional development ( $RL \leq 1.167$ )



Countries with strong institutional development ( $RL > 1.167$ )

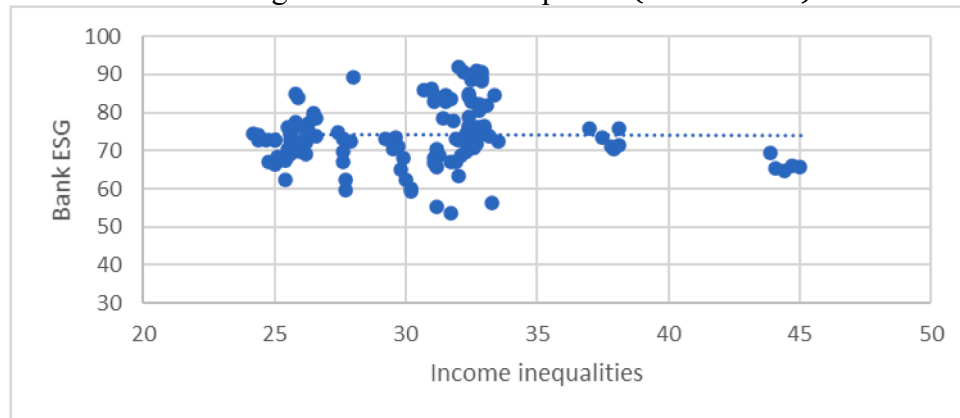


Fig. 1. Sustainability of banks and income inequality for different rule of law levels.

presents descriptive statistics.

3.2. Measures

As a measure of income inequality, we use the Gini coefficient ( $Ineq_{it}$ ) based on household incomes before taxes from the Standardized World Income Inequality Database (SWIID) (Furceri & Loungani, 2015; Jauch & Watzka, 2016). The index ranges from 0 to 100; larger values indicate more unequal income distributions. This measure suffers from a few inconsistencies, such as household versus individual income data, income versus expenditure data, a low observation frequency, and some unexplained jumps observed in the series (Gimet & Lagoarde-Segot, 2011). Nonetheless, SWIID boasts the widest geographical scope (de Haan & Sturm, 2017; Solt, 2015).

We use the scores on ESG dimensions provided by Thomson Reuters<sup>1</sup> (Forcadell et al., 2020) as a proxy for sustainability when identifying sustainable banks (SB). ESG scores provide objective performance data from more than 280 key performance indicators (Dahlsrud, 2008). To measure the quality of the sustainability strategy, we use the ESG

score of headquarters for domestic multinational banks and the ESG score in the host country for foreign multinational bank subsidiaries.

We calculate the aggregate presence of sustainable banks on a per-country basis; thus:

$$SB_{it} = \frac{\sum_{j=1}^{n_i} A_{jit} SB_{jit}}{A_{it}}$$

where  $A_{jit}$  is the total assets of bank  $j$  located in the country  $i$  in the year  $t$ ,  $n_i$  is the number of commercial banks located in country  $i$ ,  $A_{it} = \sum_{j=1}^{n_i} A_{jit}$  is the total assets of banks located in the country  $i$  in the year  $t$ ,  $SB_{jit}$  is the level of sustainability commitment of bank  $j$  located in the country  $i$  in the year  $t$ .

We calculate the total assets of banks ( $A_{jit}$ ) based on their consolidated accounts from the Orbis bank database. To avoid double counts, we group banks into three categories: 1) domestic banks without international branches, 2) multinational domestic banks, and 3) the subsidiaries of foreign multinational banks. Domestic banks' total assets are estimated based on consolidated accounts. In the case of multinational domestic banks, we exclude the assets of foreign branches and those of domestic subsidiaries to avoid double counts. For foreign banks subsidiaries, we consider their total assets in the host country. Table 1 depicts the total assets from banks with sustainability ratings as a percentage of a country's total banking assets. The country selection is

<sup>1</sup> Thomson Reuters is the world's largest financial statistics database and provider of systematic ESG information to professional investors that manage portfolios by integrating non-financial ESG data.

**Table 3**  
Effects of sustainable banking on inequality (endogeneity control).

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Full SampleRE (IV)		Full SampleRE (IV)		Full SampleMixed (C.F.)		Full SampleMixed (C.F.)		RL <sub>t</sub> ≤ 1.617RE(IV)		RL <sub>t</sub> ≤ 1.617Mixed (C.F.)	
	Ineq <sub>it</sub>		Ineq <sub>it</sub>		Ineq <sub>it</sub>		Ineq <sub>it</sub>		Ineq <sub>it</sub>		Ineq <sub>it</sub>	
SB <sub>it-1</sub>	-0.674		-0.626		-0.706		-0.567		-1.662	**	-1.466	**
	(0.746)		(0.775)		(0.699)		(0.752)		(0.659)		(0.619)	
SB <sub>it-1</sub> × I(RL <sub>it-1</sub> ≤ 1.617)			-0.092				-0.253					
			(0.346)				(0.369)					
Development(F1) <sub>it-1</sub>	-3.462	***	-3.438	***	-1.829	***	-1.732	***	-2.749	***	-1.836	***
	(0.579)		(0.581)		(0.572)		(0.547)		(0.587)		(0.510)	
SmallCountries(F2) <sub>it-1</sub>	-1.164	*	-1.158	*	-0.444		-0.423		0.035		0.875	
	(0.626)		(0.628)		(0.680)		(0.683)		(0.601)		(0.561)	
Government(F3) <sub>it-1</sub>	-0.133		-0.140		-0.278		-0.286		-0.321		-0.274	
	(0.468)		(0.469)		(0.273)		(0.269)		(0.426)		(0.315)	
Internationalization(F4) <sub>it-1</sub>	1.013	**	1.015	**	0.512		0.519		0.695	*	0.117	
	(0.381)		(0.378)		(0.473)		(0.466)		(0.354)		(0.402)	
EthnicProblems(F5) <sub>it-1</sub>	3.054	***	3.057	***	2.524	***	2.506	***	2.597	***	1.807	***
	(0.573)		(0.572)		(0.652)		(0.622)		(0.555)		(0.591)	
GFCF(F6) <sub>it-1</sub>	1.102	***	1.090	***	0.673	**	0.639	**	0.521		0.223	
	(0.337)		(0.336)		(0.334)		(0.326)		(0.325)		(0.302)	
û <sub>it</sub>					6.572		7.233				0.965	
					(11.603)		(11.918)				(7.327)	
Constant	36.543	****	36.561	****	35.185	****	35.055	****	37.841	****	36.540	****
	(0.972)		(0.869)		(3.306)		(3.388)		(1.130)		(2.418)	
Number of observations	287		287		287		287		213		213	
Countries	46		46		46		46		39		39	
R <sup>2</sup>	0.665		0.664		0.989		0.995		0.414		0.997	
Temporal Dummies	YES		YES		YES		YES		YES		YES	

based on a 40% minimum threshold for a country’s banking assets being rated as sustainable.

The rule of law index from worldwide governance indicators captures the level of confidence in the quality of contract enforcement, property rights, police, courts, and the likelihood of crime and violence (Kaufmann et al., 2008). The rule of law index (RL<sub>it-1</sub>) moderates the relationship between SB and Ineq. It takes values between -2,5 to + 2,5, where higher values indicate a better rule of law in a country.

The multidimensional nature of Ineq may generate omitted variables, thus posing an endogeneity problem. Therefore, we reviewed the empirical evidence and identified 25 control variables (see Appendix 1, Table A1). However, the large number of variables and small size of the sample pose a multicollinearity problem. For this reason, we applied a factorial analysis to group these control variables into six factors<sup>2</sup>: development (F1), small open country (F2), government size (F3), export countries (F4), ethnic tensions (F5), and gross fixed capital formation (F6) (Appendix 1, Table A2).

### 3.3. Analytical approach

We use the following threshold regression model:

$$Ineq_{it} = \alpha + \beta_1 SB_{it-1} \times I(RL_{it-1} \leq \lambda) + \beta_2 SB_{it-1} \times I(RL_{it-1} > \lambda) + \gamma X_{it-1} + \tau_t + \xi_{it} \tag{1}$$

where SB<sub>it-1</sub>, sustainable banks, and RL<sub>it-1</sub>, the rule of law, are lagged one period; I(RL<sub>it-1</sub> ≤ λ) and I(RL<sub>it-1</sub> > λ) are the threshold variables used to split the sample into countries with weak and strong institutions, respectively, where λ is the unknown threshold differentiating these two groups. Table 2 presents the RL threshold identified by implementing the methodology proposed by Hansen (2000). Fig. 1 shows the linkage between banks’ sustainability at the country-level and income inequality in countries where the rule of law is weak (strong), that is, at or below (above) the threshold calculated in Table 2.

<sup>2</sup> The six factors accumulate 0.893 variance. The Kaiser-Meyer-Olkin test for sampling adequacy for the use of factor analysis is 0.818.

X<sub>it-1</sub> is a vector of control variables that includes the six factors within the factorial analysis lagged by one period; τ<sub>t</sub> is the time dummy that allows removing universal time-related shocks from the errors; all variables are lagged by one period to prevent correlation with ξ<sub>it</sub>.

The fixed-effects estimator removes cross-sectional variation. In our case, this might be a problem because inequality presents high variation between countries, but low variation within countries over time (Eastery, 2007). The modified Wald test reveals a potential problem of heteroskedasticity, while the Wooldridge test highlights the issue of serial correlation due to the limited number of years per country. We use random effects and robust cluster error specifications. In addition, we estimate a linear random-intercept or linear mixed model with a robust standard error using the maximum likelihood.

Factor 1 includes potential sources of endogeneity, such as financial (Clarke et al., 2006; Hamori & Hashiguchi, 2012; Jauch & Watzka, 2016; Nikoloski, 2013) and economic (Jauch & Watzka, 2016) development. As endogeneity caused by economic and financial development is contested (Jauch & Watzka, 2016), we carry out different specifications to control for this issue. We use dummy variables as exogenous instruments to identify the different origins of a country’s legal system<sup>3</sup> (Jauch & Watzka, 2016; Nikoloski, 2013). We use the two-stage least squares procedure (2SLS) and control function<sup>4</sup> specifications to solve potential endogeneity problems.

<sup>3</sup> The use of legal origins as instruments for financial sector development have been criticized. The argument points “to a possible direct effect of some of the colonial/legal origins on initial inequality. Although it might be the case that legal/colonial origins may have had some effect on initial land inequality, their effect on inequality in subsequent periods (t + 1) solely works through the financial system. Given this argument, the usage of our instruments becomes clear and does not violate the instruments’ orthogonality principle” (Nikoloski, 2013: 294).

<sup>4</sup> In the first step, we apply random effects with robust-cluster standard errors to estimate the reduced forms of Factor 1. In the second step, we include the error terms obtained in the reduced forms.



**Table 4**  
Effects of sustainable banking on inequality including banks' digitalization.

	Model 7		Model 8		Model 9		Model 10		Model 11		Model 12	
	Full Sample		Full Sample		Full Sample		Full Sample		RL <sub>t</sub> ≤ 1.617RE(IV)		RL <sub>t</sub> ≤ 1.617Mixed (C.F.)	
	RE (IV)		RE (IV)		Mixed (C.F.)		Mixed (C.F.)					
	Ineq <sub>it</sub>		Ineq <sub>it</sub>		Ineq <sub>it</sub>		Ineq <sub>it</sub>		Ineq <sub>it</sub>		Ineq <sub>it</sub>	
SB <sub>it-1</sub>	0.153		0.191		0.073		0.151		-1.341	**	-1.321	*
	(0.672)		(0.693)		(0.605)		(0.607)		(0.505)		(0.687)	
SB <sub>it-1</sub> × I(RL <sub>it-1</sub> ≤ 1.617)			-0.077				-0.198					
			(0.358)				(0.189)					
DIGI <sub>it-1</sub>	0.549		0.553		0.491	***	0.497	***	0.483		0.457	**
	(0.343)		(0.347)		(0.181)		(0.180)		(0.418)		(0.200)	
Development(F1) <sub>it-1</sub>	-5.038	****	-5.085	****	-2.017	****	-1.963	****	-4.927	****	-2.131	****
	(0.628)		(0.636)		(0.353)		(0.354)		(0.607)		(0.432)	
SmallCountries(F2) <sub>it-1</sub>	-2.238	****	-2.227	****	-1.823	****	-1.776	****	-1.488	***	0.114	
	(0.545)		(0.558)		(0.420)		(0.421)		(0.494)		(0.487)	
Government(F3) <sub>it-1</sub>	-1.086	***	-1.089	***	0.775	***	-0.768	***	-1.306	****	-0.450	
	(0.354)		(0.360)		(0.267)		(0.267)		(0.376)		(0.327)	
Internationalization(F4) <sub>it-1</sub>	0.960	**	0.966	**	0.520	****	0.513	****	0.630		0.0516	
	(0.434)		(0.435)		(0.205)		(0.204)		(0.492)		(0.312)	
EthnicProblems(F5) <sub>it-1</sub>	3.156	****	3.165	****	2.339	****	2.322	****	3.168	****	1.869	****
	(0.599)		(0.603)		(0.431)		(0.431)		(0.555)		(0.515)	
GFCF(F6) <sub>it-1</sub>	0.835	***	0.838	***	0.345	**	0.323	**	0.560	**	0.193	
	(0.268)		(0.268)		(0.187)		(0.187)		(0.239)		(0.228)	
û <sub>it</sub>					7.035		7.499				1.291	
					(7.969)		(7.967)				(1.926)	
Constant	34.850	****	34.861	****	33.732	****	33.69	****	36.029	****	35.235	****
	(0.906)		(0.913)		(1.900)		(1.900)		(1.043)		(2.819)	
Number of observations	249		249		249		249		249		183	
Countries	41		41		41		41		34		34	
R <sup>2</sup>	0.735		0.735		0.992		0.992		0.593		0.995	
Temporal Dummies	YES		YES		YES		YES		YES		YES	

**4. Results**

The coefficients of SB<sub>it-1</sub> in Models 1 to 4 (Table 3) are not significant. Similarly, the coefficients of interaction [SB<sub>it-1</sub> × I(RL<sub>it-1</sub> ≤ 1.617)] in Models 2 and 4, to verify whether institutional development moderates the above relationship, are not significant. Thus, the lack of a statistical relationship between banks' sustainability and inequality remains in countries with weak institutions. However, the high correlation between SB<sub>it-1</sub> and SB<sub>it-1</sub> × I(RL<sub>it-1</sub> ≤ 1.617), since most of the sample refers to weak institutional countries, may cause this result. For this reason, Models 5 and 6 show the results for countries with weak institutional development (RL<sub>it-1</sub> ≤ 1.617). For this subsample, the coefficients of SB<sub>it-1</sub> are negative and significant<sup>5</sup> in all the models. These findings<sup>6</sup> confirm that sustainable banks reduce inequality in countries with weak rule of law, thus supporting our hypothesis<sup>7</sup>.

Omitted variables can cause endogeneity. As digital financial technologies, including fintech, can significantly reduce inequality (Demir et al., 2020), we estimate the level of banks' digitalisation in each country using a stochastic meta-frontier and incorporate it as a control variable. We assume that banks' digitalisation processes influence their cost efficiency. Therefore, we define the digitalisation level of bank *j* in country *i* in year *t* (DIGI<sub>ijt</sub>), as the technical efficiency estimated with a stochastic meta-frontier. We calculate banks' digitalisation on a per-country basis (DIGI<sub>it</sub>); thus:

$$DIGI_{it} = \sum_{j=1}^{n_i} \frac{A_{jit}}{A_{it}} DIGI_{ijt}$$

where A<sub>jit</sub> represents the total assets of bank *j* located in country *i* in

<sup>5</sup> We do not perform our econometric models over the subsample of strong institutional countries due to its small size.

<sup>6</sup> In Models 3 to 6, the coefficients of û<sub>it</sub>û<sub>it</sub> are not significant, which questions the impact of potential endogeneity.

<sup>7</sup> We estimate random effects specifications with control function and obtain the same findings.

year *t*, n<sub>i</sub> is the number of commercial banks located in country *i*, and A<sub>it</sub> = ∑<sub>j=1</sub><sup>n<sub>i</sub></sup> A<sub>jit</sub> is the total assets of banks located in country *i* in year *t*.

We estimate the stochastic meta-frontier using the two-step methodology developed by Huang et al. (2014). We estimate the banks' translog cost function<sup>8</sup> (Berger et al., 2005; Bos & Schmiedel, 2007; Lensink & Meesters, 2014; Lozano-Vivas & Pasiouras, 2010) for our sample of 1,060 banks. Introducing bank digitalisation reduces the sample size from 287 to 249 observations. The main findings remain unchanged (Table 4), with sustainable banks influencing inequality reductions in the presence of a weak rule of law (Models 11 and 12). The inclusion of financial digitalisation in the models solves the endogeneity problem. The empirical results, after including digitalisation, confirm that sustainable banks contribute to inequality reduction in countries with a weak rule of law. Thus, we increase the robustness of our results.

**5. Discussion and conclusions**

Our results from a sample of 46 developed and developing countries over the period 2010–2017 confirm the role of sustainable banking in inequality reduction (SDG 10) in countries with weak rules of law. By contrast, we found no such evidence in countries with a strong rule of law. The countries in our sample feature varied degrees of economic development and inequality, encompassing a range of diverse economic, socio-cultural, and legal institutional settings. Our findings suggest that sustainable banking helps overcome inequality traps in weak rule of law settings arising from market failures in the social, environmental, and governance domains. Resting on ESG logic, sustainable banking promotes bidirectional trust between lenders and borrowers, which supplements weak institutions, promotes equal opportunities, and fosters the SDG 10. Our findings align with Dyllick and Hockerts (2002), who

<sup>8</sup> The independent variable is the total cost of bank *i*, whereas the dependent variables are total consumer loans and the amount of securities and other earning assets it holds, interest expenses over total deposits and total other funding, personnel expenses over total assets, and *t* and *t*<sup>2</sup> as trend variables (Lensink & Meesters, 2014).

theoretically argue that the ‘triple bottom line’ at the firm level scales up to the macro level, progressing toward sustainable development.

Our results suggest that countries with weak legal property rights protection can rely to some extent on sustainable banking to create economic opportunities for households and micro-enterprises. Sustainable banking facilitates access to credit and basic savings instruments for disadvantaged groups. Hence, sustainable banking is paramount in equalising opportunities under a weak rule of law, which is crucial for SDG 10. Our findings extend the well-researched effect of persistent inequality amid low institutional quality (Pande & Udry, 2005), providing evidence that sustainable banks can break inequality traps.

On the other hand, our empirical results also indicate that sustainable banking may not be relevant in narrowing inequality where strong legal protections exist, as there is no institutional void. In brief, solid institutional settings are trust-intensive, and thus, the kind of trust enabled by sustainable banking is not imperative to tackle inequality. These findings align with those of Guiso et al. (2004), who found that trust is less at issues where the rule of law is strong. The existence of solid formal institutions indicates that the state has a preeminent position in guaranteeing social welfare (Maignan & Ralston, 2002) compared to the private sector. In contrast, business plays a significant role in countries with weak regulatory protection, given the substantial role of sustainable banking in enabling equal opportunities.

Finally, factoring in the effects of banking digitalisation confirms our results on the contested relationship between sustainable banks and inequality reduction in weak institutional settings. Earlier literature holds that traditional and modern forms of financial intermediation, such as online banking (Bertsch et al., 2020) and fintech (Frost et al., 2019), are adversely affected by weak institutional structures, which inhibit the formation of trust. The factoring of digitalisation in our models incorporates the effects of financial innovation and confirms earlier empirical results.

Several relevant managerial implications follow from this study that can help practitioners and researchers understand the pivotal role of sustainable banking in addressing the 2030 Agenda, particularly the inequality challenges underscored in the SDG 10. At the industry level, managers learn that sustainable banking amid weak institutions can stimulate institutional change and reduce inequality without affecting a

firm’s return on investment. Our insights may also encourage policy-makers to design institutional reforms to incorporate sustainable banking practices as a bridge to decrease inequality. Nonetheless, this does not preclude the government’s responsibility to strengthen institutional quality and mitigate income inequality through all available means. Understanding the inputs that feed into SDG 10, even intangibles like the ESG criteria, is critical to formulate development policies, particularly if it allows governments to redress inequality in ways that are alternative to redistributive taxation. The panoramic interrelations between sustainability criteria, banking, and many factors of income inequality are a fruitful field for future research.

**CRedit authorship contribution statement**

**Fernando Úbeda:** Methodology, Formal analysis, Data curation, Writing. **Francisco Javier Forcadell:** Conceptualization, Supervision, Writing. **Elisa Aracil:** Writing – review & editing, Writing – original draft, Investigation. **Alvaro Mendez:** Writing – review & editing, Writing – original draft, Investigation.

**Declaration of Competing Interest**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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**Appendix 1. Variable description and factor analysis**

See Table A1 and Table A2.

**Table A1**  
Variable description, sources, and summary statistics.

Variable	Description	Source	Obs	Mean	Std. Dev.	Min	Max
<i>Independent variable</i>							
$Ineq_{it}$	Gini coefficient using (pre-tax, pre-transfer) household income	SWIID	287	35.556	8.290	23.300	65.100
<i>Dependent variable</i>							
$SB_{it}$	Aggregated presence of sustainable banking per country		287	69.465	9.763	35.772	90.825
<i>Moderating Variable</i>							
$RL_{it}$	The rule of law index captures the level of confidence in the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence (Kaufmann et al., 2008).	WGI	287	0.727	0.848	−0.886	2.100
<i>Control Variables</i>							
$DomCred.GDP_{it}$	Financial development in terms of the banking sector’s ability to mobilize resources, estimated by calculating domestic credit to the private sector as a percentage of GDP, excluding central banks as lenders and government and state-owned enterprises as borrowers (Clarke et al., 2006; de Haan & Sturm, 2017; Gimet & Lagoarde-Segot, 2011; Hamori & Hashiguchi, 2012; Jauch & Watzka, 2016; Nikoloski, 2013; Tan & Law, 2012)	WDI	287	81.349	45.170	12.690	193.040
$EFW_{it}$	Financial liberalization: we use the average of EFW-areas 3D, 4C, 4D, and 5A (de Haan & Sturm, 2017)	EFW	287	8.315	1.111	3.970	9.400
$GDP.pc_{it}$	The proxy for economic development levels is GDP per capita in thousands of current U.S. dollars (Clarke et al., 2006; Gimet & Lagoarde-Segot, 2011; Hamori & Hashiguchi, 2012; Jauch & Watzka, 2016; Tan & Law, 2012).	WDI	287	25.395	21.457	1.267	91.549
$GFCF_{it}$	Gross fixed capital formation (% of GDP) (de Haan & Sturm, 2017)	WDI	287	22.187	4.262	11.544	35.631
$VA_{it}$	Voice and accountability: capturing perceptions of the extent to which a country’s citizens can participate in selecting their government, as well as freedom of expression, freedom of association, and a free media (Kaufmann et al., 2008).	WGI	287	0.696	0.709	−1.907	1.738
$PV_{it}$		WGI	287	0.316	0.766	−1.651	1.587

(continued on next page)

Table A1 (continued)

Variable	Description	Source	Obs	Mean	Std. Dev.	Min	Max
$GE_{it}$	Political Stability and Absence of Violence/Terrorism: capturing perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism (Kaufmann et al., 2008). Government Effectiveness: capturing perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies (Kaufmann et al., 2008).	WGI	287	0.808	0.728	-0.933	2.241
$RQ_{it}$	Regulatory Quality: capturing perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development (Kaufmann et al., 2008).	WGI	287	0.860	0.708	-1.074	2.089
$CC_{it}$	Control of Corruption: capturing perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as 'capture' of the state itself by elites and private interests (Kaufmann et al., 2008; Tan & Law, 2012).	WGI	287	0.645	0.935	-0.928	2.405
$GFCF_{it}$	Life expectancy at birth, total (years) (de Haan & Sturm, 2017)	WDI	287	76.934	5.543	47.416	83.329
$Lifē_{it}$	Natural logarithm of total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship (de Haan & Sturm, 2017).	WDI	287	16.624	1.445	14.089	20.959
$Pop_{it}$	General government final consumption expenditure (% of GDP) (Clarke et al., 2006; de Haan & Sturm, 2017; Jauch & Watzka, 2016)	WDI	287	18.497	5.071	8.801	41.888
$Gov_{it}$	Education expenditure refers to the current operating expenditures in education, including wages and salaries but excluding capital investments in buildings and equipment (% of GNI) (de Haan & Sturm, 2017)	WDI	287	4.686	1.381	1.760	8.070
$Educ_{it}$	Merchandise trade as a share of GDP is the sum of merchandise exports and imports divided by the value of GDP (de Haan & Sturm, 2017; Gimet & Lagoarde-Segot, 2011; Hamori & Hashiguchi, 2012).	WDI	287	90.165	43.973	22.486	226.04
$Trade_{it}$	Net barter terms of trade index (2000 = 100) is calculated as the percentage ratio of the export unit value indexes to the import unit value indexes, measured relative to the base year 2000 (de Haan & Sturm, 2017).	WDI	287	112.147	29.014	73.519	226.081
$ToT_{it}$	Economic Globalization de facto (de Haan & Sturm, 2017).	KOF	287	66.041	14.902	33.302	92.053
$TrGld_{it}$	Economic Globalization de jure (de Haan & Sturm, 2017).	KOF	287	74.114	13.885	27.415	90.067
$EcoGld_{it}$	Social or Interpersonal Globalization de jure (de Haan & Sturm, 2017).	KOF	287	77.406	10.682	48.278	91.761
$SoGld_{it}$	Political Globalization de jure (de Haan & Sturm, 2017).	KOF	287	57.939	23.773	0.000	94.344
$PolGld_{it}$	Agriculture, value added (% of GDP) (de Haan & Sturm, 2017).	WDI	287	4.202	3.559	0.094	17.192
$Agr_{it}$	Industry, value added (% of GDP) (de Haan & Sturm, 2017).	WDI	287	27.261	9.189	13.682	73.469
$Indus_{it}$	Total natural resources rents (% of GDP) (de Haan & Sturm, 2017)	WDI	287	3.555	7.149	0.018	50.486
$Nat_{it}$	Ethnic polarization (relevant groups) (de Haan & Sturm, 2017)	EPR-ETH	287	0.418	0.301	0.000	0.983
$RQ_{it}$	Ethnic fractionalization (relevant groups) (Clarke et al., 2006; de Haan & Sturm, 2017; Jauch & Watzka, 2016)	EPR-ETH	287	0.359	0.375	0.000	1.991
$Frac_{it}$	Individuals using the Internet (% of the population)	WDI	287	64.775	21.159	7.500	97.298

EFW: Economic Freedom of the World, from Fraser Institute; EPR-ETH: ETH-Zürich Department of Humanities, Social and Political Sciences / Center for Comparative and International Studies; KOF: KOF Swiss Economic Institute; SWIID: Standardized World Income Inequality Database; WDI: World Development Indicators from the World Bank; WGI: Worldwide Governance Indicators from the World Bank.

Table A2  
Factorial analysis.

Variable	Factor1 Development	Factor2 Small Countries	Factor3 Government Size	Factor4 Exporting Countries	Factor5 Ethnic Tensions	Factor6 Gross Fixed Capital Formation	Uniqueness
$DomCred.GDP_{it}$	0.658	-0.263	0.229	-0.150	0.029	-0.017	0.422
$GDP_{pc_{it}}$	0.834	-0.111	0.206	0.005	-0.246	-0.090	0.181
$EFW_{it}$	0.535	0.410	-0.312	-0.061	-0.060	-0.122	0.426
$VA_{it}$	0.780	0.062	0.080	-0.264	-0.219	-0.225	0.213
$RL_{it}$	0.956	0.109	0.175	-0.081	-0.093	0.039	0.026
$RQ_{it}$	0.943	0.232	-0.053	-0.026	0.016	-0.017	0.052
$PV_{it}$	0.676	0.269	0.195	-0.043	-0.354	-0.117	0.291
$GE_{it}$	0.949	0.059	0.105	-0.115	-0.050	0.023	0.068
$Lifē_{it}$	0.704	-0.153	-0.354	-0.053	-0.027	-0.296	0.265
$CC_{it}$	0.923	0.048	0.232	-0.027	-0.145	0.051	0.067
$Internet_{it}$	0.846	0.129	0.025	-0.092	-0.075	-0.224	0.202
$Agr_{it}$	-0.613	-0.174	-0.270	-0.027	0.143	0.439	0.307
$TrGld_{it}$	0.730	0.458	-0.263	-0.028	0.095	-0.082	0.172
$SoGld_{it}$	0.805	0.305	-0.037	-0.058	-0.006	-0.322	0.150
$PolGld_{it}$	0.507	-0.237	0.097	-0.040	-0.024	-0.172	0.645
$EcoGld_{it}$	0.478	0.740	0.146	-0.165	-0.092	0.069	0.162
$Pop_{it}$	-0.127	-0.771	-0.223	-0.054	0.125	0.239	0.264
$Trade_{it}$	0.025	0.853	0.099	-0.079	-0.100	0.150	0.223

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Table A2 (continued)

Variable	Factor1 Development	Factor2 Small Countries	Factor3 Government Size	Factor4 Exporting Countries	Factor5 Ethnic Tensions	Factor6 Gross Fixed Capital Formation	Uniqueness
Gov <sub>it</sub>	0.179	0.261	0.802	-0.140	-0.206	-0.086	0.186
Educ <sub>it</sub>	0.2100	0.115	0.691	0.226	-0.070	-0.042	0.362
Nat <sub>it</sub>	-0.116	-0.066	0.107	0.886	0.095	0.124	0.162
ToT <sub>it</sub>	-0.089	-0.149	-0.152	0.653	0.163	-0.179	0.462
Indus <sub>it</sub>	-0.281	0.012	-0.147	0.616	-0.095	0.562	0.194
RQ <sub>it</sub>	-0.202	-0.084	-0.186	0.112	0.846	0.056	0.186
Frac <sub>it</sub>	-0.127	-0.161	-0.013	0.036	0.764	0.040	0.371
GFCF <sub>it</sub>	-0.070	0.042	-0.018	0.114	0.121	0.794	0.335

Rotation Varimax, KM = 0.8274.

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