



Research article

Examining the nexus between governance and financial inclusion in the Nordic-Baltic region: Bank stability as a moderator

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ABSTRACT

To attain sustainable development, a pertinent question that needs to be answered is whether good governance leads to financial inclusion (FI) and whether bank stability matters. This study examines how financial stability modulates the link between governance and FI in the Nordic-Baltic region between 2004 and 2021. Using a mixed effect model, we observed a positive causal relationship between governance and FI and bank stability modulate this causality. These findings are robust to alternative assumptions and model specifications. Interestingly, we found that good governance helps foster economic growth and social equality. The study further highlights the need for digital financial education to overcome the phobia of digital products as a priority policy agenda. Overall, this finding supports arguments in the literature that for FI to be sustainable, inequality should be low as income levels and well-being increase.

1. Introduction

For nations to remain attractive for business and foster the well-being of all, institutions charged with the duty of implementing laws need to be efficient in the discharge of their duties. However, a pending question in the literature on governance and sustainable development is whether well-functioning institutions lead to an all-inclusive financial ecosystem [1,2]. There is a growing consensus among scholars and practitioners that for any of the Sustainable Development Goals (SDGs) to be achieved, local and global systems must be effective and accountable in safeguarding the interest of all stakeholders [3–5]. To this end, good governance is a catalyst for building confidence between stakeholders in the credit creation circle.

Governance is regarded as a norm that guides interactions within a society. Since the 1980s, the term “governance” has become popular in different academic disciplines. From an economic perspective, institutional quality plays an important role in a country’s economic performance [6] while governance plays an important role in fostering an inclusive society [7,8]. On the flip side, poor institutions will repel economic growth. For example, Anderson and Marcouiller [9] observed that bad governance led to a fall in export volumes and Levine [10] argued that the principal cause of the 2008 global financial crisis is owed to failure in the governance of financial institutions. Despite the growing interest in systemic governance, there has been little examination of how systemic governance affects financial inclusion (FI). FI is geared towards creating an enabling environment where individuals who are

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financially excluded can cost-effectively raise funds to invest in socioeconomic activities [8,11]. Following the 2035 deadline for the attainment of the SDGs, an inclusive financial system has become a policy priority in many countries. Consequently, banks are engines of growth that need to be stable to fulfill their task of re-distributing funds to productive uses. This narrative is consistent with the growing stream of literature that emphasizes that good governance can enhance bank stability ([1].

Despite the growing literature in this field, the consideration of financial stability as a policy dimension through which institutional efficiency at the national level fosters FI remains unexploited. The motivation for evaluating this triangular relationship is built on the premise that financial stability is fundamental for economic empowerment (which is closely linked to FI) as most transactions in the formal economy are done through the formal financial system, thus, any instability on their part will inhibit their ability to drive FI. Moreover, studies have reported that bank stability compliments FI, particularly in countries with inefficient institutions [12] while others observed the modulating effect of bank stability on the efficiency of some banks in Europe [13]. Besides, when financial intermediaries become unstable, they limit the distribution of funds to several sectors of the economy thus, exacerbating financial exclusion.

From the foregoing, it can be deduced that any instability on the part of financial institutions can influence the extent to which these institutions discharge their responsibility anchored on the institutional quality of the environment in which they operate. This is because financial instability reduces the opportunity of providing financial resources to various sectors of the economy. Thus, evaluating how bank stability interacts with governance to promote FI is of immense policy and economic importance for inclusive financial development and growth. Specifically, considering the moderating, independent, and outcome variables, provides policy-makers with more policy insights into how policies designed to promote good governance can lead to financial inclusiveness, anchored on financial stability.

The Nordic-Baltic region has experienced increased financial integration, market exchanges, and the emergence of large financial conglomerates in recent decades. Countries within this region have differentially developed financial systems, with those in the Nordic countries being well advanced, with high levels of bank intermediation [14,15]. Nevertheless, like in other parts of the world, this region is mostly dominated by a few large cross-border financial institutions. This natural phenomenon necessitated the creation of financial stability regulatory authorities with the aim of ensuring stability within the sector. However, a pertinent question that remains unanswered in the empirical literature is whether good governance fosters financial inclusiveness in this region. Hence, this study sets out to investigate how bank stability modulates the nexus between governance and FI in the Nordic-Baltic region. To test this hypothesis, we use publicly available data from the World Governance Indicators (WGI), World Development Indicators (WDI) of the World Bank, and the Financial Access Survey (FAS) by the International Monetary Fund (IMF). The regression analysis controls for various socioeconomic, technological, and banking factors.

This study makes some contributions to the financial development literature on governance and FI as follows: (i) While scholars have generally employed governance as a control variable in their analyses [3,5,7], this project employs the governance index as the main dependent variable to evaluate its effect on FI. This analysis will serve as a reminder to institutions charged with the implementation of laws to be proactive in the execution of their responsibilities, especially in creating an inclusive financial ecosystem. (ii) Most of the studies on governance in the Nordic-Baltic region generally focused on marine management [16–19]; crises management [20]; and economic development [21]. (iii) Studies that investigate financial development around Europe and elsewhere generally focused on the nexus of financial development and energy use [22,23], the relationship between bank stability and FI [12,24], and banking supervision and bank stability [25–27]. Also, most of these studies focused on prudential governance and not institutional governance. In addition, Malik et al. [1] who investigated the relationship between governance, financial stability, and FI in selected Asian countries examined just the mediation effect of FI on the governance-financial stability nexus. This is an indication that more remains to be unrevealed about governance and FI within the Nordic-Baltic region. In this light, conducting a regional analysis is of top interest for the member countries, given their common economic policy perspectives which is that of stirring sustainable development. Thus, this study provides policy measures that must be considered for an inclusive financial ecosystem to be sustained which is pivotal for sustainable development. Specifically, we highlight drivers of financial exclusion within the sample region following empirical evidence and make recommendations on how to alleviate these concerns. In this light, financial literacy and digital penetration need to be enhanced in the mission of strengthening FI. This study is relevant to both national and financial regulators, as it serves as a stark reminder that governance and strategies to foster FI must continue to evolve from being democratic tools for branding to becoming actual goals.

2. Study positioning and hypothesis development

From a business perspective, governance and an inclusive financial system are pivotal. This is because good governance helps in building trust and fostering growth while FI allows easy access to affordable finance. However, bank instability may result in financial exclusion. For example, Carbó et al. [28] advanced financial liberalization and fierce competition among banks as a possible cause of financial exclusion in Europe. This practice led to the popularization of strategies such as credit scoring that principally benefited the rich. Another constraint is information friction which further widens the gap between the privileged rich and the poor. It is against this backdrop that FI hopes to provide easy access to affordable finance to allow individuals to invest in socio-economic activities. This notwithstanding, empirical literature suggests that financial exclusion declines when the governing institutions are proactive and accountable [29]. Elsewhere, Barth et al. [3] demonstrated institutional quality has a positive impact on bank efficiency in creating credit. It has also been shown that the protection of legal rights, political stability, and control of corruption fosters FI [7,30,31].

On the nexus between FI and governance, the conclusions are varied. On the one hand, some scholars observed quality governance proxy by rule of law, control of corruption and regulatory quality have a positive causality with financial inclusion [32,33]. Yet others

observe a negative relationship between these variables. Specifically, political instability was found to impair financial inclusion in the MENA region [34]. On the other hand, some studies found an inverse relationship whereby when the quality of governance was low the efficiency of the financial sector improved [2,35]. Additionally, another line of thought focused on how national institutions promote access to finance for some vulnerable groups. Taking the case of women entrepreneurs in South Africa, it was observed that governance has no sizable effect on women's financial inclusion [36]. Despite the varied conclusions, there are arguments suggesting that every country needs a quality regulatory environment that fosters the rights of all thus, creating an inclusive ecosystem [37]. In other words, good governance should promote financial inclusion since good governance is pivotal for development, particularly the financial sector which is the engine of economic growth [38]. Given the benefits of FI to various stakeholders, it could be argued that the region that upholds quality governance enables banks to discharge their duties more effectively thereby making it more financially inclusive [25,39]. From the foregoing discussion, this paper presents the following hypothesis.

H1. A casual positive relationship exists between good governance and FI

In the wake of the global financial crisis, regulators have focused on examining what caused the crisis and what regulatory adjustments can improve the stability of financial institutions to withstand shocks. There has been substantial documentation on how banking regulation and supervision affect the stability of banks [26]. The outcome of these studies can be summarized under two broad concepts. The first is the “public interest view” which posits that the purpose of banking regulation and monitoring is to advance the stability of banks for the interest of all stakeholders. The second is the “private interest view” which is built on the premise that regulations foster the interest of a privileged group, not the broader public, thus obstructing bank efficiency [40]. Given the hybrid effect monitoring has on bank stability, it could be said that banks' stability can either hinder or promote FI. Accordingly, studies have reported the moderation and complementary effect of bank stability on FI [12,41]. In addition, recent studies show that financial stability moderates the negative effects of financial regulation on financial inclusion and competitiveness in the SADC and SAARC regions [42]. Despite the growing debate on financial stability, a detailed study on whether the interaction of bank stability and good governance will promote, or hinder FI is limited. The few existing studies on bank stability focus on the effect of bank stability and bank regulation [43,44] or bank stability on financial inclusion/bank efficiency [12,24]. It is important to note that these studies do not test the moderation effect of bank stability. In addition, we are unaware of any empirical study applied to samples from the Nordic-Baltic countries. Hence, understanding how bank stability interacts with governance and FI is a relevant subject not just for policymakers but to a wide array of stakeholders who benefit from the credit creation process. To this end, the second hypothesis is stated as:

H2. Bank stability modulates the relationship between good governance and FI.

3. Methodology

3.1. Sample selection and data source

The sample consists of 8 countries (Estonia, Latvia, Lithuania, Sweden, Norway, Finland, Denmark, and Iceland) in the Nordic-Baltic region for a period spanning eighteen years (2004–2021). A mixed-effect regression model with robust standard errors clustered at the country level was used to evaluate the effect of governance on FI as well as the moderator role of bank stability. The test variables for this project were selected based on data availability. The principal source of data is the World Bank database. To measure governance, the World Governance Indicators (WGI) were used. The data for FI is drawn from the Financial Access Survey (FAS) database of the IMF and reconciled against data from the International Financial Statistics (IFS) database for consistency and completeness. Information on the moderator and confounders used in adjusting the regression model is extracted from FAS and the World Development Indicators (WDI). To address the issue of missing data, the unconditional mean imputation method, as suggested by Ref. [45] was employed. All variables are defined in the supplementary information (SI, Table S1).

3.2. Definition of variables

3.2.1. Outcome variable

FI is measured using a multidimensional index of financial inclusion (*IFI*) following [46]. This index is structured to capture information on access to banking services, availability of these services, and use of banking services. Accessibility (*ACC*) is measured as the number of bank accounts per 1000 adults in the population, Availability (*AVA*) is calculated as the number of bank branches and ATMs per 100,000 people, and Use (*USE*) is measured as the proportion of bank credit plus deposits to the private sector in GDP. This measure was chosen because it allows for comparison between countries (SI, Text S1 for the estimation technique, Eqs. S1 and S2).

3.2.2. Explanatory variable

The explanatory variable is Governance (*Gov*) which is an indicator variable with six dimensions (i.e., voice and accountability (*VA*), control of corruption (*CC*), rule of law (*RL*), government effectiveness (*GE*), political stability and absence of violence (*PSV*), and regulation quality (*RQ*) with scores ranging from −2.5 to 2.5 in and standard normal units and 0 (lowest) to 100 (highest) in percentile rank terms. For this analysis, the absolute scores (−2.5 to 2.5) were used. To derive the governance index (*Gov-index*), first, we employ factor analysis. This method helps minimize the multicollinearity bias given the high correlation between the individual governance variables. According to Tabachnick et al. [45], in running a Principal Component Analysis (PCA), the number of observations must be above fifty. The measure of sampling adequacy (MSA), which displays the adequacy of the Kaiser-Meyer-Olkin (KMO) has a threshold

value of 0.5, and the probability associated with Bartlett's test of sphericity is expected to be significant at 1 %. All the above conditions have been adequately fulfilled with a sample size of 143 observations, a KMO value of 0.911, and a P-value of 0.00 (SI, Table S2). After deriving the weight for each variable using factor analysis the weights interacted with the absolute value of the individual governance variables. Finally, we calculated the composite sum for governance based on the six individual governance variables. This yielded a *Gov_Index*, which we used as our explanatory variable. In addition, an alternative measure was estimated by taking the absolute sum of the six governance variables. We ran the regression using the result from both approaches and did not observe any significant difference. Thus, we report only the result of the former estimate.

3.2.3. Moderator

Earlier studies have established that bank stability complements and moderates FI [12,41]. This study posits that the interaction of Governance and bank stability will modulate the effect of governance on FI. Also given that banks as an engine of growth can only carry out their outreach activities when they are stable, understanding how their stability advances/impedes FI cannot be overemphasized. Therefore, we employ the bank z-score (*Zscore*) as a proxy for financial stability which is in line with extant literature [12,26,27,41].

3.2.4. Covariate

Motivated by prior studies [7,41,47]; a set of credible time-varying confounders of the relationship between governance and FI over time are identified and included in the regression model. The selected variables include the Gross Domestic Product per capita growth rate (*IL*) labor force participation rate (*LFPR*), the ratio of bank capital and reserves to total assets (*CAR*), and the ratio of nonperforming loans (*NPL*). Given the rapid evolution in technology and its direct impact on FI as established in prior studies [48–51], and its complementary effect on governance through data sharing [52,53] failing to capture technology may lead to omitted variable bias. Thus, we include mobile subscriptions (*MS*) per 100 people as a control variable. We also control the well-being of people within a country using the Human Development Index (*HDI*). This is motivated by evidence in extant literature that suggests developed economies have stronger institutions and more inclusive financial systems [47]. Furthermore, we controlled for the literacy rate as empirical evidence suggests literacy is one of the household characteristics necessary for achieving FI [54,55].

3.3. Regression model

To evaluate the causal link between governance and FI, this study employed a linear mixed-effect model. This model is most appropriate for our analysis as it considers variations in time explained by explanatory variables (fixed effects) and country variations not explained by independent variables of interest (random effects) [41]. In other words, the model controls for the confounding effect of time-invariant variables omitted from the regression model, alleviates the hitches associated with unobserved heterogeneity [56] and improves the reliability of the estimated coefficient [57]. The model can explain variations in the interest variable across countries and time. Accordingly, a mixed effect model should be employed when the variation between the sample observations is not too different from each other and the explanatory variables should not have a correlation above 0.9 to Ref. [45]. To confirm the variability assumption, we use the independent sample T-statistics. The result is presented on Table S4. The findings suggest the variation between the two regions (Baltic and Nordic) is not too much. Concerning multicollinearity we employed the Pearson correlation (see, Table S5) which also revealed multicollinearity is not a serious concern. Thus, T-statistics and correlations analysis empirically lend support to the use of a mixed effect model.

The general linear mixed effect model (Eq. S3) has been specified in SI Text S2. From the baseline model (SI, Text S2, Eq. S4), the general form of the regression equation (Eq. 1) can be obtained. Also, Eq. (2) was used to capture the moderator effect of bank stability.

$$FI_{j,t} = \alpha_0 + \alpha_1 X_{j,i} + \alpha_2 W_{j,i} + \alpha_3 V_{j,i} + u_{0j} + u_{1j} X_{j,i} + u_{2j} W_{j,i} + u_{3j} V_{j,i} + \epsilon_{j,t} \quad (1)$$

$$FI_{j,t} = \alpha_0 + \alpha_1 X_{j,i} + \alpha_2 W_{j,i} + \alpha_3 V_{j,i} + \alpha_4 (X_{j,i} * V_{j,i}) + u_{0j} + u_{1j} X_{j,i} + u_{2j} W_{j,i} + u_{3j} V_{j,i} + u_4 (X_{j,i} * V_{j,i}) + \epsilon_{j,t} \quad (2)$$

Where, $FI_{j,t}$ denotes the dependent variable for country j at the time i , $X_{1,i}$ is the explanatory variable, α_1 , α_2 and so on are the parameters to be estimated from the data, $W_{j,i}$ represents the control variables, $V_{j,i}$ is the moderator variable, $X_{j,i} * V_{j,i}$ in Eq. (2) is the interaction term and $\epsilon_{j,t}$ is the residual error term.

4. Result and discussion

4.1. Descriptive statistics

The summary statistics for the various measures of FI used in our analysis of the Nordic-Baltic countries are presented in Table S3. The sample has a total of 143 bank-year observations from 2004 to 2021. The Baltic region represents 37 % (53) of our sample size while the Nordic region represents 63 % (90). It was observed that the Nordic region demonstrates more financial inclusiveness compared to the Baltic region. For example, the mean number of account holders for the sample period stands at 3163 (50 %) slightly above the regional average of 2563 (40 %). Overall, the Nordic region had better performance in driving inclusion concerning access, and use of banking services as well as the number of bank branches while the Baltic region demonstrated more availability of financial services regarding ATMs. The Nordic-Baltic region is generally financially inclusive and keeps experiencing steady growth concerning access to financial services [58].

The descriptive statistics of the regression variables are presented in Table S4. The main explanatory variable Governance (*Gov-index*) has a mean value of 7.83 and a standard deviation of 2.38, ranging from 3.18 (minimum) to 10.76 (maximum). FI in this region is relatively high, ranging between 0.62 and 0.94. Overall, the standard deviation between the sample countries is small relative to its mean, indicating that no significant difference is found between the countries concerning the level of financial inclusiveness and governance. However, concerning the control variables, there appears to be minimal variation between the countries and this variation is addressed by running the regression using a mixed effect model that accounts for within and between-country variation across periods. More specifically, the Baltic countries have faster growth in GDP per capita, literacy rate, mobile subscribers, and high rates of non-performing loans. The Nordic countries, on the other hand, demonstrated a higher capital-asset ratio and labor force participation.

To minimize the effects of multicollinearity in the sample, Pearson correlation coefficients were calculated between the dependent and explanatory variables as well as the control variables (Table S5). Following. Multicollinearity exists when the correlation between two explanatory variables exceeds 0.9 [45]. The result reveals that *Gov-index* is positive and significantly correlated with *IFI*. Also, a significant correlation exists between most of the control variables and the dependent variable, which strengthens their relevance to our estimation model. Finally, the highest correlation coefficient on the covariate is between *HDI* and *NPL* (0.614), which is marginally below 0.9, hence, multicollinearity does not appear to be a serious concern.

4.2. The impact of governance on financial inclusion

To evaluate the relationship between Governance and FI, first, in column 1 of Table 1, the explanatory variables (*Gov-index*) are regressed on *IFI* and the result provides evidence of a positive causal relationship between governance and FI. In column 2, the control variables were added to the model and the coefficient of the *Gov-index* remains positive and statistically significant at less than 1 %. Indicating when institutions are effective in the discharge of their duties then the drive to build a financially inclusive society will yield the expected result. Economically, the estimated coefficient for governance indicates that a one-standard-deviation rise in the efficiency of institutions leads to an increase in FI on average by 6.42 % ($0.0203 \times 2.386 / 0.754$). these findings are largely in line with the hypothesis that for any of the SDGs to be attained then the institutions that must be efficient in the implementation of policies [3–5]. Specifically, our results corroborate scholarly evidence pointing to the fact that institutional efficiency has a positive impact on FI [8, 37,59,60]. However, it is contrary to studies that reported an inverse relationship between governance and FI [1,2] as well as those which observed no sizable effect of the quality of governance on FI for women in South Africa [36]. The conclusions arrived here do offer support for our hypothesis 1; that quality governance has a positive causal effect on FI for the Nordic-Baltic region. We associate this outcome with the philosophy that institutions are not monotonic but are constantly changing themselves to serve the needs of all mankind. Within the Nordic-Baltic region, what good governance means has evolved from being a democratic ‘tool’ to becoming a ‘goal’ by itself [61,62]. Thus, these institutions must continue to improve themselves to serve the needs of all since good governance is

Table 1
Good governance and financial inclusion.

Variables	No controls (1)	with controls (2)	CC (3)	GE (4)	PSV (5)	RQ (6)	RL (7)	VA (8)
<i>Gov-index</i>	0.117*** [<0.01]	0.221*** [<0.01]	0.064*** [<0.01]	0.078*** [<0.01]	0.024** [0.05]	0.051** [0.03]	0.115*** [<0.01]	0.145*** [<0.01]
<i>Zscore</i>		0.012* [0.08]	−0.024 [0.74]	0.043 [0.53]	−0.029* [0.08]	−0.017 [0.84]	0.052* [0.09]	−0.044 [0.57]
<i>NPL</i>		0.132*** [<0.01]	0.032*** [<0.01]	0.034*** [<0.01]	0.013 [0.22]	0.019* [0.07]	0.028*** [<0.01]	0.183** [0.02]
<i>CAR</i>		−0.131* [0.07]	−0.121* [0.07]	−0.155 [0.18]	−0.153 [0.18]	−0.218* [0.06]	−0.152 [0.17]	−0.243** [0.04]
<i>IL</i>		0.184 [0.23]	0.087 [0.22]	0.096 [0.18]	0.095 [0.19]	0.181 [0.25]	0.117* [0.09]	0.092 [0.20]
<i>LFPR</i>		0.161*** [<0.01]	0.055*** [<0.01]	0.065*** [<0.01]	0.062*** [<0.01]	0.036*** [<0.01]	0.058*** [<0.01]	0.165*** [<0.01]
<i>Literacy</i>		0.0396* [0.07]	0.049 [0.57]	0.019* [0.06]	−0.047 [0.93]	0.082 [0.86]	0.032 [0.94]	−0.021* [0.06]
<i>HDI</i>		−0.872*** [<0.01]	−0.784*** [<0.01]	−0.611*** [<0.01]	−0.947*** [<0.01]	−1.015*** [<0.01]	−1.041*** [<0.01]	−0.751*** [<0.01]
<i>MS</i>		−0.024** [0.03]	−0.023 [0.34]	−0.033** [0.05]	0.046 [0.97]	−0.091 [0.72]	−0.021* [0.07]	−0.084 [0.74]
<i>Intercept</i>	0.014*** [<0.01]	0.955*** [<0.01]	1.004*** [<0.01]	0.787*** [<0.01]	1.254*** [<0.01]	1.213*** [<0.01]	1.171*** [<0.01]	0.894*** [<0.01]
<i>No of observations</i>	143	143	143	143	143	143	143	143
<i>Wald test chi²</i>	8.414	7.885	7.852	7.562	8.066	8.021	8.008	7.819
<i>P_value</i>	[<0.01]	[<0.01]	[<0.01]	[<0.01]	[<0.01]	[<0.01]	[<0.01]	[<0.01]

Notes: This table reports the results of regressing the financial inclusion index (IFI) on good governance (*Gov_Index*) in Column 1 and Columns 2–8, including covariates from 2004 to 2021. Column 1 and 2 uses the overall *Gov_Index* while Columns 3–8 report the results of the regression of financial inclusion on the individual dimensions of good governance: control of corruption (CC), government efficiency (GE), political stability (PSV), regulatory quality (RQ), rule of law (RL), and voice & accountability (VA). All coefficient estimates are adjusted using heteroskedasticity to obtain robust standard errors. P-values of ***<1 %, **<5 %, and *<10 % are reported in parentheses.

a starting point for creating a financially inclusive society.

To continue, we also test if the individual dimension of governance impacts financial inclusion differently. Some studies found that the rule of law has a positive impact on FI [33]. Concurrently, in addition to the rule of law, regulatory quality and control of corruption have also been found to have a positive impact on FI [63]. Conversely, political instability was reported to hurt FI in the MENA region [34]. To this end, it is important to also understand whether this variation exists in the case of the Nordic-Baltic region. Therefore, we extend our analysis by investigating the relationship between the individual governance dimensions and FI. Specifically, we looked at the following six indicators: control of corruption (CC), government efficiency (GE), political stability (PSV), regulatory quality (RQ), rule of law (RL), and voice & accountability (VA). Our empirical motivation is to deduce whether certain indicators are more important than others in affecting FI. The regression results are presented in Columns 3–8 of Table 1. The coefficients of our test variables on all columns are positive and statistically significant with the dependent variable. This implies control of corruption, government efficiency, political stability, regulatory quality, rule of law, and voice of accountability independently are necessary tools to foster FI in this jurisdiction. This result is largely in line with the findings of Santagata et al. [21] who observed that countries like Estonia, Latvia, and Lithuania rank high in economic prosperity and good governance among the ex-Soviet Union countries. Elsewhere, it has been reported that Norway, Sweden, and Denmark use good governance as a criterion when deciding how to disburse aid to needy countries [61]. Concurrently, Law et al. [64] posit that economic growth and the quality of a country's institutions are pivotal in the credit market. In essence, the results are largely in line with the argument that every country needs to maintain high-quality governance to spur a financially inclusive ecosystem where more people have access to and use financial services [37]. In addition, it corroborates earlier findings that observed a positive causality between indicators such as rule of law, regulatory quality, and control of corruption with FI in some Asian countries [33] and Sub-Saharan Africa [63].

To better isolate the effect of good governance on FI, a host of country-specific control variables are added to the baseline model (Column 2, Table 1), and we observe mixed effects across these variables. The minimum capital ratio (CAR), which is a measure of bank solvency, is negative and statistically significant. Indicating that increasing minimum capital requirements for banks will inhibit their ability to create credit. This is because financial institutions may raise lending rates, cut interest on deposits, or increase service charges, which in turn will undermine access to and use of financial services by the unbanked for whom FI goals are meant to serve [41]. Non-performing loans (NPL) have a positive impact on FI. The NPL result is consistent with the widely held view in the literature that NPLs result from extending credit to low-income groups, which enhances FI [47]. Also, the labor force participation rate (LFPR) is positive and significant at 1 % which suggests as more people become economically empowered, then FI increases. This is especially the case when payments for salary go through the formal financial sector. We further observe literacy rate and income level (IL) are positive but not significant. On the other hand, mobile subscription (MS) and the human development index (HDI) are negative and significant suggesting that when digital penetration and the well-being of people are low, FI dwindles.

Table 2
The moderator effect of bank stability.

Variables	No controls (1)	with controls (2)	CC (3)	GE (4)	PSV (5)	RQ (6)	RL (7)	VA (8)
<i>Gov-index</i>	0.088* [0.06]	0.132*** [<0.01]	0.098*** [<0.01]	0.134*** [<0.01]	0.067* [0.08]	0.067** [0.03]	0.132*** [<0.01]	0.229*** [<0.01]
<i>Gov*Zscore</i>	-0.164** [0.02]	-0.015*** [<0.01]	-0.052*** [0.01]	-0.072*** [<0.01]	-0.077*** [<0.01]	-0.019** [0.03]	-0.021** [0.04]	-0.081* [0.07]
<i>Zscore</i>	0.056** [0.03]	0.014*** [<0.01]	0.011*** [0.01]	0.012*** [<0.01]	0.071*** [0.01]	0.031 [0.47]	0.037 [0.40]	0.092* [0.08]
<i>NPL</i>		0.045*** [<0.01]	0.041*** [<0.01]	0.038*** [<0.01]	0.017* [0.09]	0.021* [0.06]	0.031*** [<0.01]	0.029*** [0.01]
<i>CAR</i>		-0.024** [0.04]	-0.025** [0.03]	-0.021* [0.08]	-0.013 [0.26]	-0.022* [0.06]	-0.017 [0.14]	-0.025** [0.03]
<i>IL</i>		0.023* [0.07]	0.028 [0.70]	0.041 [0.55]	0.028 [0.71]	0.066 [0.37]	0.011 [0.13]	0.065* [0.07]
<i>LFPR</i>		0.057*** [<0.01]	0.051*** [<0.01]	0.052*** [<0.01]	0.067*** [<0.01]	0.063*** [<0.01]	0.057*** [<0.01]	0.063*** [<0.01]
<i>Literacy</i>		0.011 [0.70]	0.018*** [<0.01]	-0.011 [0.79]	-0.053 [0.35]	0.021 [0.67]	0.022 [0.96]	0.029*** [0.01]
<i>HDI</i>		-0.874*** [<0.01]	-0.743*** [<0.01]	-0.66*** [<0.01]	-0.946*** [<0.01]	-1.073*** [<0.01]	-1.035*** [<0.01]	-0.775*** [<0.01]
<i>MS</i>		-0.049** [0.05]	-0.044* [0.09]	-0.064*** [0.01]	-0.036 [0.18]	-0.06 [0.81]	-0.026 [0.28]	-0.023 [0.37]
<i>Intercept</i>	0.704*** [<0.01]	0.954*** [<0.01]	1.009*** [<0.01]	0.934*** [<0.01]	1.271*** [<0.01]	1.208*** [<0.01]	1.151*** [<0.01]	0.848*** [<0.01]
<i>No of observations</i>	143	143	143	143	143	143	143	143
<i>Wald test chi²</i>	8.348	7.948	7.898	7.665	8.031	8.021	8.014	7.975
<i>P_value</i>	[<0.01]	[<0.01]	[<0.01]	[<0.01]	[<0.01]	[<0.01]	[<0.01]	[<0.01]

Notes: This table reports the regression result of the moderator effect of bank stability on financial inclusion and good governance. Columns 1 and 2 use the overall Gov_Index while Columns 3–8 report the results of the regression of financial inclusion on the individual dimensions of good governance: Gov*Zscore captures the moderator effect. All coefficient estimates are adjusted using heteroskedasticity to obtain robust standard errors. P-values of ***<1 %, **<5 %, and *<10 % are reported in parentheses.

4.3. The moderation effect of bank stability

In the financial development literature, studies have found mixed results regarding the effects of bank efficiencies. On the one hand, FI is believed to increase bank stability as banks can gather adequate cheap retail deposits from a large customer base [12] and harm financial stability owing to less rigid scrutiny on lending on the other hand [65]. Similarly, studies have highlighted how good governance enhances financial stability by providing access to financial services [37]. From the foregoing, financial stability has a connection with both FI and good governance. Thus, in this section, we test the moderation effect of financial stability on the FI-governance nexus. To do this, we interact the bank-Zscore with the *Gov-index* to form the moderation variable (*Gov*Zscore*). The motivation is to ascertain whether financial stability will strengthen the causality between FI and good governance.

The results presented in Table 2 Columns 1 and 2 revealed that bank stability captured by bank-Zscore moderates the relationship between governance and FI since the interaction term is negative and statistically significant at 5 % while the coefficient of *Gov-index* and *Zscore* is positive and significant. Furthermore, in Columns 3–8 the coefficient of the individual governance variables is statistically the same as in Table 1 and the interaction term was negative and significant. The result corroborates the finding that bank stability proxy by Zscore moderates the effect of bank regulation on FI in the case of the SADC and SAARC regions during the study period 2005–2018 [42]. An indication that bank stability moderates both national and financial governance in fostering a financially inclusive ecosystem in most regions across the world. To this end, when governance becomes static, bank instability will spur policymakers to be pragmatic in the discharge of their duties, especially within the financial market. Concurrently, studies have indicated that the cause of the 2008 financial crisis was partly due to excessive financing and oversight of the supervisory authorities [65]. By the same token, media reports suggest that the recent bank crisis in the USA is owing to regulatory oversight. It could also be said that bank stability serves as a reminder to institutions charged with the implementation of strategies that foster development and FI that they need to evolve with time to address various shocks that may destabilize the economy. In this regard, Kaufmann et al. [66] argue that ‘due to the intrinsically unobservable nature of the “true” level of governance in a country, any empirical measure of governance is just an imperfect proxy for the broader dimensions of governance that it reflects’. In order words, there is no room for complacency in governance since it is a broad and complicated concept. Therefore, inter-alia, the policymakers of the Nordic-Baltic region must be pragmatic in the discharge of their duties by creating an enabling environment for banks to strive and serve the financial needs of all especially those formally under-served by the formal financial sector. Thus, bank stability moderates the effect of governance and FI within this jurisdiction.

4.4. Robustness test

In this section, we performed a series of sensitivity tests to examine whether our core evidence in Table 2 (column 2); that bank stability moderates the good governance–FI relationship is robust to alternative assumptions, model specifications, and endogeneity.

Table 3
Alternative assumptions and model specification.

Variables	ACC (1)	USE (2)	AVA (3)	A FI (4)
<i>Gov-index</i>	−0.025*** [0.01]	0.077*** [<0.01]	0.044*** [<0.01]	142.1* [0.08]
<i>Gov*Zscore</i>	0.013* [0.08]	−0.043*** [<0.01]	−0.014*** [0.01]	−2.489* [0.06]
<i>Zscore</i>	−0.014* [0.08]	0.042*** [<0.01]	0.014*** [<0.01]	48.79* [0.09]
<i>NPL</i>	0.021 [0.26]	0.061*** [<0.01]	0.051*** [<0.01]	−1.803* [0.09]
<i>CAR</i>	−0.062*** [<0.01]	−0.024 [0.91]	−0.052 [0.62]	1.177* [0.09]
<i>IL</i>	0.052*** [<0.01]	−0.039*** [<0.01]	−0.092 [0.16]	−19.14** [0.02]
<i>LFPR</i>	0.022 [0.25]	0.064*** [<0.01]	0.011*** [<0.01]	22.29 [0.27]
<i>Literacy</i>	−0.017** [0.02]	0.083 [0.22]	0.013*** [<0.01]	3.898 [0.19]
<i>HDI</i>	1.069*** [<0.01]	−1.358*** [<0.01]	−3.291*** [<0.01]	−2898 [0.29]
<i>MS</i>	−0.013*** [<0.01]	−0.033 [0.38]	0.039 [0.12]	9.417*** [<0.01]
<i>Intercept</i>	0.607*** [<0.01]	0.226 [0.31]	1.848*** [<0.01]	−15.16 [0.49]
<i>No of Observations</i>	143	143	143	143
<i>Wald test chi²</i>	8.017	8.118	8.107	8.056
<i>P_value</i>	[<0.01]	[<0.01]	[<0.01]	[<0.01]

Notes: This table presents the results from regressing individual dimensions of financial inclusion (Columns 1–3) and an alternative estimate of financial inclusion (Column 4) on the governance index and controls over the period 2004–2018. All coefficient estimates are adjusted using heteroskedasticity to obtain robust standard errors. P-values of ***<1 %, **<5 %, and *<10 % are reported in parentheses.

Generally, the results from these sensitivity tests reported in Tables 3 and 4 are not statistically different from those of the baseline analysis.

4.4.1. Alternative assumption

From the baseline regression, we specify the dependent variable as *IFI* which is a multi-dimensional index for FI. Thus, in Table 3 columns 1–3, we test if our main finding in Table 2 is sensitive to using the individual dimensions of *IFI*. To do this, we repeated the baseline model (column 2 Table 2) by replacing the dependent variable *IFI* with the individual dimensions of *IFI* (*ACC*, *USE*, and *AVA*). We find that the coefficients of *ACC* and *Gov*Zscore* in column 1 are negative and positive, respectively, and statistically significant. Suggesting that bad governance deters people from owning an account, however, bank stability moderates this effect. In columns 2 and 3, the coefficients for *USE* and *AVA* are positive and statistically significant at 1 % while the interaction term is negative and significant at 1 %. These results reinforce our argument that bank stability modulates the up/downside of governance and FI.

4.4.2. Change in model specification

To alleviate concerns that our initial measure of FI is driving our result, in Column 4 of Table 3 we estimated an alternative measure of FI by taking the average of the absolute values of the individual dimensions of FI. We find that the coefficient on both A FI and the interaction term *Gov*Zscore* are positively and negatively significant at 10 % and 5 %, respectively. This reinforces our initial conclusions reached in our primary findings in Table 2 Column 2 that as the quality of governance improves, a financially inclusive ecosystem strives. In addition, bank Zscore has been widely employed as a measure of bank stability. This measure is presumed to be the most reliable measure of capturing banks' ability to withstand shock [67]. However, the financial access survey (FAS) presents some other stability measures. Concurrently recent studies posit that the use of alternative measures such as the proportion of bank credit to bank deposit is an indication of bank risk. Thus, consistent with prior studies we introduce this variable as an alternative measure of bank stability [1,68]. To test the moderation of bank credit to bank deposit (*BCD*) we replicate the model presented in Table 2 Eq. (2) by placing *Zscore* with *BCD*. The results are presented in Table S6.

The following findings were observed. First in Columns 1 and 2, where the explanatory variable is the gov-index, the estimated coefficient is negative and significant at 1 % and 10 % respectively. Turning to the individual governance dimensions, similar signs were observed in Columns 3 to 6 but only statistically significant in Columns 5 and 6. Conversely, Columns 7 and 8 had positive coefficients but were insignificant. In essence, the inclusion of *BCD* as a covariate and moderator into our model changed the causality between governance and FI to be negative which differs from the main findings presented in Table 2. Nevertheless, the conclusion is parallel, when governance increases FI increases and a decline in the quality of governance hurts FI. This can be likened to the argument that a negative sign of the coefficient of governance does not imply governance is not important but rather a reminder of the need to uphold quality governance for the good of all stakeholders [1,68]. Interestingly, the interaction term (*Gov*BCD*) is positively significant (Columns 1–6) an indication that this variable modulates the negative impact of governance on FI. To this end, it can be deduced that Bank stability captured in this study by bank Zscore and *BCD* both moderate the effect of governance on FI. Specifically, when the quality of governance is low, the early indicator of probable risk that banks may not be viable to supply credit is the bank

Table 4
Endogeneity test.

Variables	Heckman test		2SLS	
	1st Stage (1)	2nd Stage (2)	1st Stage (3)	2nd Stage (4)
<i>Gov-index</i>	0.739*** [<0.01]	0.025*** [<0.01]		
<i>Inverse Mills</i>		0.170*** [<0.01]		
<i>LR</i>			−0.016*** [0.01]	
<i>Pop_D</i>			0.028*** [<0.01]	
<i>#Gov#</i>				0.035*** [<0.01]
<i>Gov*Zscore</i>		−0.017*** [<0.01]		−0.033*** [<0.01]
<i>F-Statistics</i>			84.14*** [<0.01]	
<i>Intercept</i>	11.90*** [<0.01]	0.765*** [<0.01]	−17.83*** [<0.01]	0.745*** [<0.01]
<i>No of Observations</i>	143	143	143	143
<i>Wald test chi²/AdjR²</i>	51.53	8.118	0.855	7.998
<i>P_value</i>	[<0.01]	[<0.00]	–	[<0.01]
<i>Controls</i>	Yes	Yes	Yes	Yes

Notes: This table examines the robustness of the results in Table 2 Column 2 to endogeneity and self-selection bias. First, in Columns 1 and 2 a Heckman two-stage model is employed. The dependent variable in Column 1 is 'crises. Columns 3 and 4 report the results of the first and second stages of a 2SLS regression estimated using the instrumental variable (legal right (*LR*) and population density (*Pop_D*)). All coefficient estimates are adjusted using heteroskedasticity to obtain robust standard errors. P-values of ***<1 %, **<5 %, and *<10 % are reported in parentheses.

credit-to-deposit ratio. Whereas, when the quality of governance is good, the stability indicator to watch is the bank Zscore for governance to be beneficial for financial inclusion.

4.4.3. Endogeneity concerns

In our baseline regression analysis, we employed a mixed effect model which accounts for variation between and within countries over time and alleviates the omitted variable bias. Since the model alleviates but does not eliminate the endogeneity problem, consistent with prior studies [5,7,69], we employ the Heckman two-stage approach, and instrumental variable (IV) analysis to assert our findings are not being influenced by endogeneity.

4.4.3.1. Heckman two-stage approach. To deal with the self-selection bias, a Heckman two-stage approach is employed. Studies have cited excess financing and regulatory oversight as one of the main causes of the global financial crisis in 2008 [65,70]. This indicates crisis may alter the effect of governance on FI and failing to account for such shocks may alter the interpretation of our result. Therefore, will employ a dummy variable ‘crisis’ to which one is allocated for any year in which a country experiences a financial crisis and zero if otherwise. Accordingly, the first stage of the Heckman model is a Probit model with ‘Crisis’ as the dependent variable. Next, we include the Inverse Mills ratio derived from the first stage as a control variable in the second stage. In Column 1 of Table 4, we observe that most of the country characteristics are significantly correlated with the outcome variable (Crisis). In Column 2, the inverse Mills ratio is positive and statistically significant at 1 %. More importantly, the coefficients on the Gov-Index and the interaction term are positive/negatively significant at 1 % indicating that our core result still holds after addressing the variable selection bias.

4.4.3.2. Instrumental variable (IV) analysis. To further alleviate the endogeneity concern, we construct instruments for governance and use the Two-stage least square (2SLS) approach to correct for the potential endogeneity. Prior studies have identified legal rights as a tool that aligns the interests of borrowers and lenders [5]. Accordingly, prior studies found that a quality legal environment enables banks to be pragmatic in the provision of credit [71]. Thus, we postulate that legal right has a direct link with governance in driving FI. Also, the literature suggests that the location where people live does determine the extent to which they can use financial services [72]. To this end, population density is included as our second IV. Table 4 (Columns 3 and 4) summarizes the results of 2SLS regression. In the first stage of the regression, the explanatory variable governance is regressed on legal rights (LR) and population density (Pop_D). Then, a new explanatory variable, #Gov#, is estimated using the coefficients obtained from the first-stage regression, which was used to run the second-stage regression. Column 3 of Table 4 shows the results from the first stage of the 2SLS model, which reveals that LR and Pop_D negatively/positively predict governance. Similar significant results have been reported in prior studies by Ref. [5] while studying the effect of bank regulation on FI and [7] while investigating the relationship between trust and FI. Also, the F-statistics is greater than 10, indicating that the selected instruments are relevant in our analysis following the criteria laid down by Ref. [73].

Table 5
The socioeconomic implications of good governance.

Variables	GINI (1)	Ln_FDI (2)	GDP_G (3)
Gov-index	0.038*** [0.01]	0.183 [0.25]	0.142** [0.02]
Gov*Zscore	−0.017* [0.08]	−0.022 [0.13]	−0.076** [0.03]
Zscore	0.013** [0.08]	0.197 [0.16]	0.065** [0.05]
NPL	0.019 [0.43]	−0.042 [0.88]	−0.026** [0.02]
CAR	0.013* [0.06]	−0.049 [0.13]	−0.048 [0.71]
IL	0.073 [0.66]	0.055*** [0.01]	0.995*** [<0.01]
LFPR	0.082** [0.03]	0.089** [0.02]	0.081*** [<0.01]
Literacy	0.015 [0.15]	0.012 [0.93]	−0.011** [0.02]
HDI	0.125 [0.81]	−9.575 [0.13]	9.242*** [<0.01]
MS	0.018*** [<0.01]	−0.053 [0.43]	−0.029 [0.26]
Intercept	−0.657* [0.09]	3.441 [0.41]	−11.68*** [<0.01]
No of Observations	143	143	143
Wald test χ^2	8.126	7.132	6.979
P-value	[<0.01]	[<0.01]	[<0.01]

Notes: This table reports the socio-economic implications of good governance. the GINI coefficient, foreign direct investment inflows (Ln_FDI), and the annual growth rate of GDP (GDP_G) are the dependent variables in Columns 1–3 respectively. coefficient estimates are adjusted using heteroskedasticity to obtain robust standard errors. P-values of ***<1 %, **<5 %, and *<10 % are reported in parentheses.

Column 4 presents the second-stage results of the 2SLS model. The coefficients of *#Gov#* and *Gov*Zscore* remain similar to the regression result in Table 2, Column 2. Overall, the additional tests in Tables 3 and 4 are consistent with the baseline model in Column 2 Table 2. Thus, it is unlikely concerns about endogeneity are driving the core results.

4.5. The socio-economic implications of good governance

In this section, we analyze how the positive impact of governance on FI contributes to socioeconomic development in the region. Specifically, we consider economic growth as the annual growth rate in GDP (GDP_G), equality captured by the GINI coefficient, and foreign direct investment net inflows (FDI). We expect governance to have a positive relationship with these variables. This is because FI is only sustainable when economies prosper and inequality declines [47]. In Table 5, we observed that the coefficient on *Gov_Index* and the interaction term are significantly positive/negative in Columns 1 and 3 which indicates that good governance promotes economic growth and equality within this jurisdiction. Similar conclusions were reached in cross-country analysis [74]. Collectively the finding is consistent with the hypothesis that in countries with higher economic globalization, good governance has a positive and significant effect on economic growth [75]. On the contrary, it differs from earlier findings which found no correlation between economic growth and good governance in some ex-Soviet countries among which are Estonia, Latvia, and Lithuania [21]. The authors however noted that correlation does not represent causality and further test is required. Conversely, we did not however find any evidence to conclude that good governance helps attract FDI in this region and bank stability does not appear to modulate this outcome.

5. Conclusion and policy implications

Good governance has been proposed as a necessary tool for sustainable development. However, an open question is; does good governance lead to an all-inclusive society? Motivated by this question, this paper sets out to evaluate the connection between governance and FI for 8 countries in the Nordic-Baltic region between 2004 and 2021 using a mixed-effect panel regression model. Our analysis produced some insightful implications. First, looking at the individual dimensions of FI (accessibility, use, and availability), we observed that the Nordic countries had better performance concerning access and usage of banking services. The Baltic countries on the other hand demonstrated more availability of financial services such as the vast presence of ATMs.

Next, we found evidence to validate our hypothesis that good governance has a positive impact on FI, which supports the philosophy that, for any of the SDGs to be attained, institutions that are effective and accountable must be in place. Furthermore, we observe that all the individual dimensions of governance had a statistically positive effect on FI. Indicating the necessity of continuous improvement in institutional quality to minimize involuntary financial exclusion. The study further introduced a moderator variable and observed that bank stability (*Zscore*) serves as a reminder that governing institutions must be flexible in addressing shocks as they try to prevent financial exclusion. The results regarding the relationship between FI and the control variables further indicate that bank solvency and growth in labor force participation are pivotal in driving FI in the Nordic-Baltic region.

These findings contribute to the debate on whether good governance leads to an all-inclusive financial society by showing that a causal relationship exists between governance and FI and that bank stability modulates the up/downside of governance in influencing FI within the sample jurisdiction. Also, the finding confirms the linear and inverse theory of the governance-FI relationship. To this end, while the penetration dimension supports the inverse relationship hypothesis, the usage and availability dimension lends support to the linear relationship philosophy.

Based on the empirical evidence, we offer the following thoughts for policy consideration. First, FI is a product of both economic prosperity and equality. We observed that the HDI within this region loads negatively with FI indicating that when the welfare of the people is not attended to, they will remain financially excluded. Thus, the policymakers of this region must consider the need for enhancing equality and the well-being of the citizens' top of their agenda since it is the starting point for creating an inclusive financial ecosystem. This is because evidence from more developed nations suggests that financial exclusion is a subset of a broader problem 'social exclusion' where the lower income group as well as migrants and the aged are excluded in the social sphere [76]. Moreover, migrants due to their status even when they own accounts, do not have full access to financial services. Thus, it is important to facilitate not just access to finance but encourage the use of formal financial services which will also contribute to revenue generation for the state.

Also, there is a need to drive digital FI within the region. Our findings revealed that the coefficient on literacy is positive but insignificant while mobile subscription is negative and significant. Therefore, administrators within this region can work with telecommunication providers to develop cost-effective digital products such as mobile money platforms that do not require the use of the Internet to advance FI in areas where formal financial services have not been established. In addition, to build trust and encourage more people to use digital platforms for financial transactions, there is a need for financial education to overcome the phobia of digitalization. To do this the adoption of digital services could be done segmentally. That is some pilot zones should be identified and policies that mandate locals to use mobile payment for daily activities such as payment for public transportation or airtime be implemented and communicated to the locals in a manner and language they can easily understand. Such an approach would increase the use of digital financial services to expand segmented financial inclusion within this region.

While this paper has taken steps to address issues of endogeneity, and rank regions per their performance in the different dimensions of FI, however, we did not rank the regions regarding governance quality. This is because Kaufmann et al. [66] indicated that the WGI only partially represents what governance is all about, therefore ranking countries based on this index does not reflect the actual level of governance. Given that this study employed a mixed effect model in its analysis, it will be interesting if future

researchers can employ other models in testing this relationship. In addition, this work can be extended by evaluating this topic for each country. We hope that such an analysis will provide clarity on which countries consider FI and governance as important policy agendas.

Data availability statement

The data is available upon request.

CRediT authorship contribution statement

Enyang Besong Susan: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Agbortarh Besong Matilda:** Writing – review & editing, Visualization, Validation, Methodology, Investigation, Formal analysis, Data curation. **Manases Mbengwor Natu:** Writing – review & editing, Visualization, Validation, Methodology, Investigation, Formal analysis, Data curation.

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 A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.heliyon.2024.e34227>.

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