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Corporate disclosure and credit market development

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ABSTRACT

The nexus between corporate disclosure and credit market development as well as whether the nexus is sensitive to the income classification of countries is not well delineated in the empirical literature. The objective of this paper is to interrogate these issues. In addressing these important issues, we rely on a panel of 122 countries and deploy a battery of econometric techniques. Generally, we find that corporate disclosure promotes credit market development. The results from the analysis of subsamples suggest that the effect of corporate disclosure on credit market development is sensitive to creditor rights protection and the income status of a country. In particular, there is evidence that the interaction between corporate disclosure and creditor rights protection significantly benefits the credit markets only in upper-middle-income countries.

1. Introduction

In this paper, we use data from 122 countries to answer two related questions. First, does corporate disclosure[1] significantly influence credit market development[2]? Second, does the effect of corporate disclosure on credit market development differ according to the income groups of countries? Given the known link between credit market development and economic growth, it is crucial to ask these questions because answers to them have the potential to shape economic policy.

The literature documents that the development of credit markets (banking sector) drives economic growth positively (Beck & Levine, 2004). One major obstacle to credit market development is information asymmetry. "A reduction in information asymmetry, and hence in the monitoring burden between agent and principal, is one of the aims of the regulation of financial reporting disclosure in active capital markets" (Marshall & Weetman, 2002, p.31). In credit markets, information asymmetry refers to an imbalance of information between the lender and the prospective borrower in which the latter uses their superior information to the detriment of the former. It creates adverse selection and moral hazard problems that drive credit risk with a possible financial crisis. Trombetta and Imperatore (2014) define financial crisis as "an interruption in the normal functioning of

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[1]We use corporate disclosure and corporate transparency interchangeably in this paper.

[2]We use financial development and credit market development interchangeably in this paper

financial markets." (p.207). According to Stiglitz and Weiss (1981), credit rationing may exist in competitive credit markets as a result of adverse selection emanating from the inability of lenders to adequately appraise the projects prospective borrowers present to them. Apart from credit rationing, insufficient information about clients in credit markets may usually compel lenders to charge sub-prime interest rates that have the potential of creating more loan defaults and delinquencies, leading to a financial crisis.

Institutional arrangements such as private credit bureaus, public credit registries, and legal regimes that protect creditors are known to mitigate the ills of information asymmetry in credit markets and, thus, support credit market development. Their effects on financial access, cost of finance and credit risk have attracted some considerable research albeit uncertain outcomes (Asongu, 2017; Behr & Sonnekalb, 2012; Djankov, McLiesh, & Shleifer, 2007; Doblas-Madrid & Minetti, 2013; Ghosh, 2019; Grajzl & Laptieva, 2016; Jappelli & Pagano, 2006, 2002; Kusi, Agbloyora, Ansah-Adub, & Gyeke-Dakoa, 2017; Nakamuraa & Roszbach, 2018; Nana, 2014). What remains unclear in the empirical literature is the effect of corporate disclosure on credit market development. To accelerate economic growth and development through the channeling of credit to the private sector, the question of whether the transparency of the sector in terms of provision of accurate and timely ownership as well as financial information accelerates or stymies credit market development is crucial. According to Healy and Palepu (2001), corporate transparency represents one of the fundamental indicators of good corporate governance. When the governance systems of firms ensure transparency, lenders are motivated to offer financial assistance to them, *ceteris paribus*. This is because information availability bites the information asymmetry between insiders and outsiders and enables investors to evaluate corporate performance (Cheung, Jiang, & Tan, 2010).

As far as we know, papers that have studied corporate disclosure have not considered its effect on credit market development. Recent ones have considered issues such as the impact of boardroom gender diversity on corporate sustainability disclosures (Zahid et al., 2019); corporate disclosure quality and institutional investors' holdings during market downturns (Cheng, Huang, & Luo, 2020); how firm size affects corporate social responsibility report disclosure (Ting, 2020); how the quantity of information in corporate disclosures affects the efficiency with which investors incorporate newly acquired information into stock prices (Chung, Hrazdil, Novak, & Suwanyangyuan, 2019); the effect of financial reporting and disclosure on corporate investment (Roychowdhury, Shroff, & Verdi, 2019); and how board gender diversity is associated with biodiversity disclosures of a firm (Haque & Jones, 2020). Consequently, we postulate that some knowledge lacuna exists as to the effect of corporate disclosure on credit market development. We attempt to illuminate this murky area of the empirical literature using country-level data from 122 countries.

The relevance of corporate disclosure to financial markets has attracted both policy and academic interest. In the United States of America, for example, the need for corporate disclosure received a significant boost in the passage of the Sarbanes-Oxley Act of 2002 and the Dodd-Frank Act of 2010. The understanding is that these legislations will create an environment that will produce sufficient public information needed to aid optimal capital allocation decisions. The underlying reasoning is that information influences the decision-making processes of individuals in households, businesses, and governments (Connelly, Certo, Ireland, & Reutzel, 2011). Financial reporting, for instance, carries benefits such as "better investment, credit, and similar resource

allocation decisions, which in turn result in more efficient functioning of the capital markets and lower costs of capital for the economy as a whole." (FASB Financial Accounting Series, 2006, p.35). In stock markets, better disclosure practices decrease information asymmetry. Such practices are characterized by reduced uncertainty, enhanced liquidity, and weakened impacts of crises (Cheng et al., 2020). Studies on the information-investment connection (e.g., Diamond & Verricchia, 1991; Easley & O'Hara, 2004) suggest that opaque firms are unattractive to uninformed investors due to their higher risk. Lawrence (2013) reports that individual investors commit more funds to firms with clear and concise financial disclosures.

The application of a bouquet of econometric analytical techniques to a panel dataset from 122 countries has produced some interesting results which show that corporate disclosure is associated with credit market development positively. It suggests that an improvement in the transparency of the corporate world translates into more access to credit. Further analysis through the segregation of the sample into income groups reveals that corporate disclosure significantly propels the development of credit markets in high-income, upper-middle-income and lower-middle-income countries. In contrast, corporate disclosure does not support credit market development in low-income countries. Besides, the various estimations implemented provide results suggesting that creditor rights protection weakens the effects of corporate disclosure on credit market development. We have explained this in terms of the liquidation bias hypothesis where in an effective legal regime that guarantees creditor rights, managers of transparent firms may show some signs of reluctance towards debt financing for fear of liquidation of their firms should default occur, which leads to a fall in credit market development.

The value addition of this study to the existing literature is three-fold. First, previous studies on disclosure (e.g., Chauhan & Kumar, 2018; Chen, Li, Hu, & Hu, 2019; Cheng et al., 2020; Goldstein & Yang, 2019; Haque & Jones, 2020; Rezaee & Tuo, 2017; Srairi, 2019; Ting, 2020; Tsai, Tu, & Hung, 2016) have not specifically tackled the effect of corporate disclosure on credit market development. We demonstrate from our data that corporate disclosure accelerates credit market development. Generally, we observe this outcome even when we disintegrate our data into income groups. Theoretically, these results uphold signaling theory and emphasize the point that increased firm transparency constitutes one of the channels for credit market development.

Second, we are unaware of any previous study that answers the question of whether the effect of corporate disclosure on credit market development differs according to income groups of countries. We show that credit markets in high-income, upper-middle-income countries and lower-middle-income countries are more likely to benefit from the increased transparency of firms significantly. For low-income countries, rising corporate disclosure is likely to trigger a drop in the volume of credit. We believe that these findings provide policy direction to the countries in these income groups. From the theoretical point of view, our results suggest that the positive effect of corporate disclosure on the financial markets of a country is sensitive to the income status of the country.

Third, the study demonstrates that in the presence of creditor rights protection, the positive effect of corporate disclosure plummets. It suggests that corporate disclosure and creditor rights protection are not complementary. For credit market development, this finding implies that a simultaneous pursuit of interventions aimed at achieving corporate transparency and a legal regime that protects the rights of creditors may not be necessary.

As we are not aware of any study that provides this outcome, we believe this finding provides some direction to policymakers in the study countries.

2. Literature review

2.1. Theoretical review

Credited to Spence (1973, 2002), signaling theory is about intentional communication of positive information to convey favorable organizational attributes (Connelly et al., 2011). It posits that information disclosed by corporate entities has a signaling effect. We deploy this theory to posit that corporate disclosure should drive credit market development positively. The reason is that the risk profiles of firms are more likely to improve as they become more transparent through disclosure of clear, concise, and timely ownership and financial information. This may facilitate their access to credit on favorable terms in three ways. First, if the disclosed information favorably projects the firm as low credit risk, it is likely to access credit at lower interest rates. Second, since lenders are likely to spend less in the entire credit underwriting process (prospecting, evaluation, monitoring, and recovery) when firms are transparent, they can adequately discriminate between credit applicants and accordingly charge fair interest rates. Thus, corporate disclosure should increase credit market development, *ceteris paribus*. Third, as the transparency of firms rises, creditors feel safe to supply more funds because they are armed with sufficient information that will enable them to enforce their rights should borrowers default.

However, corporate disclosure may not always be in the best interest of firms. The Hirshleifer (1971) effect articulates that disclosure may signify harmful consequences for economic agents in terms of risk-sharing opportunities. It occurs when the disclosed information is misconstrued by its users resulting in wrong conclusions. In other words, corporate disclosure may lead to a wrong interpretation of some specific information about a firm's financial conditions resulting in either a credit denial or payment of higher interest rates that encumbers credit applications. This reduces the volume of credit, holding other factors constant. Thus, corporate disclosure may undermine credit market development. In other words, corporate disclosure may drive credit market development negatively. Studies in the banking industry, such as Goldstein and Sapra (2013) and Bushman, Piotroski, and Smith (2004), suggest that disclosure may be counterproductive.

2.2. Review of related studies

The effect of corporate disclosure (financial, non-financial, voluntary, and non-voluntary) on some outcomes and features has received some attention in the empirical literature. Apart from the model of Tassel (2011) pointing to the elimination of competitive advantage when a bank discloses information about its loan clients, it also reveals that disclosure of information offers the disclosing bank the opportunity to raise external funds at a lower cost. It observes that the incentive to disclose information is negatively associated with a bank's capital ratio and positively correlates with the number of other competing banks that disclose information. Using a sample of 29 Islamic banks in five Gulf Cooperation Council countries over the period 2013–2016, Srairi (2019) shows that

an improvement in transparency significantly impacts banks' stability. Goldstein and Leitner (2018) study optimal disclosure policy of banks and conclude that corporate disclosure can hurt risk-sharing opportunities for banks, thus, confirming the Hirshleifer (1971) effect of information disclosure. Bose, Saha, Khan, and Islam (2017) investigate the relationship between financial inclusion disclosure and firm performance in Bangladeshi banks from 2009 to 2014 and find that the relationship is positive and moderated by market competition and government ownership.

Chauhan and Kumar (2018) use Bloomberg's score on the extent of a firm's Environmental, Social, and Governance disclosures to proxy non-financial disclosure and examine its effect on firm value with data from Indian firms. They observe that non-financial corporate disclosure exhibits positive firm valuation effects. They show that non-financial disclosure is more useful to stand-alone firms than business group firms. Plumlee, Brown, Hayes, and Marshall (2015) use listed firms from five US industries (oil & gas, chemical, food/beverage, pharmaceutical and electric utilities) from the years 2000 to 2005 to examine the connection between voluntary environmental disclosure and firm value. They show that voluntary disclosure quality is associated with firm value (i.e., cash flow and cost of equity components of firm value). Guay, Samuels, and Taylor (2016) examine whether managers use voluntary disclosure to mitigate the adverse effects of financial statement complexity on the information environment and report a robust positive link between financial statement complexity and voluntary disclosure. The paper suggests that firms use voluntary disclosure to abate the harmful effects of financial statement complexity on the information environment. Rezaee and Tuo (2017) find a two-directional link between non-financial disclosures and sustainability performance.

Chen et al. (2019) use data from China to interrogate the roles of quality of corporate disclosure and property rights in the allocation of different types of bank credit. They find that foreign banks and policy banks practice "financial discrimination". They also report that apart from local commercial banks, large state-owned commercial banks, national joint-stock banks, local city commercial banks, and rural commercial banks practicing financial discrimination, such institutions also offer significant "financial support" to non-state-owned enterprises. However, when enterprises violate corporate disclosure requirements, the local commercial banks, national joint-stock banks, local city commercial banks, and rural commercial banks overturn their credit decisions and start to exhibit a financial discrimination attitude towards non-state-owned enterprises. Allaya, Derouiche, and Muessig (2018) use data (2007–2013) from 440 French listed firms to investigate the effect of voluntary disclosure on corporate debt maturity and find that firms with higher voluntary disclosure record more long-maturity debt. In other words, as the voluntary disclosure of a listed firm improves, its chances of accessing long-term credit also improve.

Goldstein and Yang (2019) investigate the effect of corporate disclosure on real efficiency and observe that when disclosure relates to a variable a real decision-maker is interested in, disclosure negatively influences real efficiency. On the other hand, when disclosure concerns a variable that the real decision-maker is already informed about, it always improves price informativeness and real efficiency (Goldstein & Yang, 2019). Kim and Yasuda (2018) find that the introduction of mandatory business risk disclosure negatively impacts the total risk of a firm, implying that an improvement in mandatory business risk disclosure reduces a firm's cost of capital. Tsai et al. (2016) report that more

news coverage and negative news sentiment worsen credit risk and that an increase in the volume of risk factor disclosure in corporate filings is associated with higher credit risk for debt issuers.

Recent studies including Cheng et al. (2020); Haque and Jones (2020); Ting (2020); Roychowdhury et al. (2019); Zahid et al. (2019); Chung et al. (2019), and Susana and Gwendolyn (2017) have also considered corporate disclosure from diverse perspectives. Lacking from these studies is the effect of corporate disclosure on credit market development. This represents a gap which we seek to fill. Given the fact that previous studies on disclosure have primarily focused on firm-level data, apart from our study bridging this gap, the use of data from 122 countries across the globe gives us the unique opportunity to shape policy at both micro and macro levels.

3. Data, sample and model

We collect data (2013 to 2017) from the World Bank's World Development Indicators at (www.worldbank.org) and World Governance Indicators at http://info.worldbank.org/governance/wgi/index.asp. We collect regulatory quality data from the latter. The rest of the data have come from the former.

We use two criteria to build our sample. First, for inclusion in the sample, a country must have at least three-year domestic credit data in the study period. Second, the country must have at least three-year non-negative data on the primary explanatory variable (corporate disclosure) and the control variables used in the study. These selection criteria yield data from 122 countries. We argue the global representativeness of the sample on the ground that every region is represented. We provide details of these countries and their regions in Appendix A.

One main factor has informed our decision to focus on the 2013–2017 period. At the time of data collection, data on credit information sharing and creditor rights index, that are variables of interest in this study covered 2013 to 2017. The use of 2013–2017 data, in our view, offers a significant benefit of producing results that are isolated from the possible influence of the 2007–2009 global financial crisis.

3.1. The variables

The dependent variable is credit market development (Credit). It is measured by the credit to the private sector as a share of GDP. Measuring credit market development by credit to the private sector as a share of GDP is appropriate because it is in line with the empirical literature. Studies such as Adusei (2019), Adeleye, Osabuohien, Bowale, Matthew, and Oduntan (2018); Ang and Kumar (2014), and Do and Levchenko (2007) have used it to measure financial development.

The primary explanatory variable is corporate disclosure (CorpDiscl). We measure it by the extent of business disclosure index. The index captures the extent to which investors are protected through ownership and financial information disclosure. It takes into account the review and approval requirements for related-party transactions as well as internal, immediate, and periodic disclosure requirements for related party transactions. It ranges from 0 to 10 with higher values representing a higher disclosure. In line with signaling theory, we expect it to drive credit market development positively.

Nonperforming loans (NPLs) as a share of total gross loans of a country is one of the control variables in our model. The significance of nonperforming loans as a share of total gross loans in credit markets is documented in the empirical literature (Ghosh, 2019). Indeed, annual changes in nonperforming loans as a share of total gross loans are seen as "a warning indicator of banking system fragility" (Guérineau & Léon, 2019). We hypothesize the negative effect of nonperforming loans on credit market development in the sense that an increase in the incidence of nonperforming bank loans creates a burden on financial intermediaries, leading to a reduction in credit availability.

We include GDP per capita (Income) in the analysis to account for economic development. We expect it to drive credit market development positively. We anchor this expectation on the premise that, holding other factors constant, economic development fuels more economic and investment activities which provide opportunities for individuals and firms to seek more debt financing. We include trade openness measured by imports plus exports as a share of GDP in our model because an open economy through liberalization promotes lending via capital inflows, which is likely to boost credit availability, ceteris paribus. Hence, we expect a positive coefficient.

We use regulatory quality as an institutional control to account for regulatory checks and balances. The efficiency of regulatory bodies gives confidence and creates an enabling environment for financial intermediation which impacts positively on the volume of credit. Regulatory quality of a country is measured on a scale ranging from −2.5 to 2.5, with the higher positive values suggesting a better regulatory environment.

Studies on information asymmetry demonstrate the importance of credit information sharing in credit markets and banking system fragility (Asongu, 2017; Biswas, 2019; Djankov et al., 2007; Ghosh, 2019; Grajzl & Laptieva, 2016; Guérineau & Léon, 2019; Jappelli & Pagano, 2002; Nakamuraa & Roszbach, 2018; Nana, 2014). Credit information sharing is an index which measures "rules affecting the scope, accessibility, and quality of credit information available through public or private credit registries." It ranges from 0 to 8 with higher values indicating the availability of more credit information from either public or private bureaus to aid lending decisions. We expect it to influence credit market development positively.

Bank capital plays an essential role in financial intermediation. We account for it in this study by the bank capital to total assets ratio. We expect it to drive credit market development positively in the sense that an increase in the ratio lowers operating costs of banks (Belkhir, Naceur, Chami, & Samet, 2019) leading to more lending.

The credit markets in a given country are significantly determined by the extent of legal protection (La Porta, Lopez-de-silanes, Shleifer, & Vishny, 2002). Strong investor protection laws and their enforcement induce investors to increase fund availability because they feel protected against abuse of their funds. The theoretical literature posits that in the presence of strong investor protection laws and their enforcement, outside investors exhibit readiness to pay more for financial assets such as equity and debt. This is because they know that, with better legal protection, they will access a greater share of the firm's profits as interest or dividends (La Porta et al., 2002). The study controls for creditor rights protection (Rights) by the strength of legal rights index which ranges from 0 to 12. The index gauges the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders. Higher values of the index indicate that the laws are

better designed to promote access to credit. We, therefore, expect creditor rights protection to drive credit market development positively, ceteris paribus.

Apart from the above, we also explore whether creditor rights protection significantly moderates the relationship between corporate disclosure and credit market development. It is projected that corporate transparency in the presence of effective creditor rights protection laws should accelerate credit market development. The intuition is that in an environment where firms are transparent, creditors should not find it difficult to discriminate between credit applications due to information availability. And with the opportunity of seeking a judicial intervention to recover their funds in case of breach of credit contracts available, creditors will be willing to supply loanable funds. Consequently, it is expected that the interaction between corporate disclosure and creditor rights protection should propel the growth of the credit markets in the study countries, *ceteris paribus*.

Table 1 shows a summary of the variables, measurements, expected signs, and sources.

3.2. The model

To investigate the effect of corporate disclosure on credit market development and whether the effect differs significantly across income status of countries, we adapt the analytical framework of Adeleye and Eboagu (2019). It involves a two-part procedure such that in the first part, we analyze the full sample of 122 countries. In contrast, in the second part, we divide the full sample into four subsamples of income groups: high (45), upper-middle (38), lower-middle (28), and low (11) income countries. These procedures help us find answers to our research questions. Except for corporate disclosure (CorpDiscl), regulatory quality (Reg) and credit information sharing (Info), we log-transform all variables to control for outliers and establish elasticity relationships. With Credit as the dependent variable, and CorpDiscl as the main explanatory variable, equation [1] models the marginal impact of corporate disclosure on credit market development:

$$\ln Credit_{it} = \beta_0 + \gamma \ln Z'_{it} + \beta_1 CorpDiscl_{it} + d_t + e_{it}$$
$$e_{it} = (v_i + u_{it})$$

(1)

Table 1. Variables, expectations, and sources.

Variables	Measurements	Expected sign	Source
Credit market development	Credit to the private sector (% of GDP)	N/A	WDI
Corporate disclosure	Business extent of disclosure index (0 = less disclosure to 10 = more disclosure)	Positive	-do-
Nonperforming loans	Non-performing loans (% of GDP)	Negative	-do-
Income	GDP per capita (constant 2010 US$)	Positive	-do-
Trade openness	Trade (% of GDP)	Positive	-do-
Regulatory quality	Regulatory Quality (−2.5 weak; +2.5 strong)	Positive	WGI
Information sharing	Depth of credit information index (0 = low to 8 = high)	Positive	WDI
Bank capital	Bank capital to total assets ratio (% of GDP)	Positive	-do-
Creditor rights	The strength of legal rights index is the proxy for creditor rights, and it ranges between 0 to 12	Positive	-do-

Note: N/A: not applicable; WDI: World Development Indicators; WGI: World Governance Indicators
Source: Authors' compilation.

where e_{it} the composite error term; v_i represents individual-specific unobserved hetero-geneity that is time-invariant; u_{it} is the idiosyncratic error term that is independent and identically distributed (i.i.d); $lnCredit_{it}$ is the natural logarithm of credit market development proxied by credit to the private sector; Z'_{it} is the vector of baseline control variables (per capita GDP, non-performing loans, trade openness, regulatory quality, credit information sharing, bank capital to total assets ratio); $CorpDiscl_{it}$ is the main regressor; d_t indicates time-specific dummies controlling for variation of the dependent variable; i is the number of countries in sample $1, 2, \ldots, N$; t is the number of years $1, 2, \ldots, T$. **Equation [1]** tests the hypothesis that corporate disclosure impacts credit market development while controlling for other macroeconomic indicators. In essence, it evaluates the marginal impact of corporate disclosure on credit market development, holding other variables in the model constant. In line with the theoretical postulation of La Porta et al. (2002), we incorporate creditor's rights into Equation [1]. This variable is included to capture how fund providers react when laws empower them enforce their rights in the event of loan default. This relationship is as specified in Equation [2]:

$$\ln Credit_{it} = \beta_0 + \gamma \ln Z'_{it} + \beta_1 CorpDiscl_{it} + \beta_2 Rights_{it} + d_t + e_{it} \qquad (2)$$

Further, we hypothesize that creditor rights protection represents a channel through which corporate disclosure impacts credit market development. We test this hypothesis by adding the interaction of corporate disclosure with creditor's rights to Equation [2] which becomes:

$$\ln Credit_{it} = \beta_0 + \gamma \ln Z'_{it} + \beta_1 CorpDiscl_{it} + \beta_2 Rights_{it} + \beta_3 CorpDiscl * Rights_{it} + d_t$$
$$+ e_t$$

$$(3)$$

To answer the question of whether the effect of corporate disclosure on credit market development differs according to income groups, our sample is categorized into high, upper-middle, lower-middle and low-income countries and Equations [1] to [3] are augmented accordingly.

3.3. Estimation approach

In sequential order, we engage equations [1] to [3] by applying (1) the least-squares dummy variable, (2) fixed effects, and (3) random effects techniques for the full sample and across the four income groups. This empirical approach is employed to observe the consistency of the main regressor, *CorpDiscl*, on the dependent variable using different model specifications. From Torres-Reyna (2007) and Baum (2013), the least-squares dummy variable (LSDV) model provides a good way to understanding fixed effects. This technique allows the effect of *CorpDiscl* be mediated by the differences across cross-sectional units in the panel using dummy variables. Also, by adding the dummy for each cross-section, the pure impact of *CorpDiscl* is estimated having controlled for unobserved heterogeneity, v_i. In essence, each dummy absorbs the effects particular to each income group.[3] Although the

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[3]We use income groups rather than country dummies because the latter will require 122 dummy variables which will significantly weaken the efficiency of the estimator. Hence, four income group dummies are created which align with the objectives of this paper. The dummy for high-income countries is the base income group dummy variable.

LSDV technique assumes that the cross-sections have similar characteristics and errors are independent, we augment the procedure with the Driscoll and Kraay (1998) robust standard error-type technique, which accounts for cross-sectional dependence. It uses the ordinary least squares/weighted least squares[4] and fixed effects (within) regression and computes spatial correlation consistent (PSCC) standard errors for linear panel models. These estimators correct the standard errors of the coefficient estimates for possible dependence (Cameron & Trivedi, 2005; Hoechle, 2006).

However, if the respective individual-specific unobserved effects correlate with the regressors, when $E(v_i CorpDiscl_{it}, Z'_{it}) \neq 0$, and the errors also correlate over time, the LSDV becomes inconsistent, and Equation [1] yields biased estimates. This is because, if a possible correlation of regression errors across time is ignored, biased inferences will occur (Adeleye & Eboagu, 2019). Next, we deploy the random effects (RE) technique which may be suitable because some of the variables (corporate disclosure, regulatory quality, credit information sharing, creditor rights) in our models are either slowly changing or time-invariant. However, we need to assume that the time-invariant or slowly changing covariates in our RE model are not correlated with the unobserved individual-specific effects. If this assumption does not hold, the RE estimator produces inconsistent and biased estimates and the fixed effects (FE) model, which allows for dealing with possible unobserved heterogeneity in the data, then becomes suitable. To address the problem of causality and endogeneity, we use the first lag of explanatory variables instead of incorporating them contemporaneously in the models.

We further check the issue of endogeneity by converting our baseline model into a dynamic model and estimating it by the two-step system generalized method of moments (SYS-GMM) estimation technique. This estimation technique is credited to Arellano and Bover (1995) and Blundell and Bond (1998). It uses moment conditions (instruments) that do not correlate with the regressors in the adopted model. The use of many instruments results in high asymptotic efficiency. However, it may lead to high bias (Donald, Imbens, & Newey, 2009). Consequently, to prevent instrument proliferation, we implement the collapse technique (Adusei & Sarpong-Danquah, 2021). The reliability of the estimated results is tested by Hansen and Arellano-Bond autocorrelation statistics. The former statistic is used to test the validity of the instruments used whilst the latter is used to assess the serial correlation of the error term.

4. Results and discussions

This section sequentially details the various estimations carried out. It begins with the presentation and discussion of correlation analysis and descriptive statistics followed by econometric results which are in two parts: full sample (122 countries) and subsample (four income groups – high, upper-middle, lower-middle and low) analyses.

4.1. Correlation analysis and summary of statistics

The pairwise correlation matrix checks the presence or otherwise of multicollinearity problem in the data. We report the results in the upper panel of Table 2. The low

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[4]Weighted least squares

Table 2. Correlation analysis and summary statistics.

Variables	Nos.	1	2	3	4	5	6	7	8	9
Credit market devt.	1	1.000								
GDP per capita	2	0.702***	1.000							
Trade openness	3	0.0829	−0.0696	1.000						
Credit information	4	0.432***	0.394***	0.106*	1.000					
Regulatory quality	5	0.0933*	0.0624	−0.0884*	0.0104	1.000				
Non-performing loans	6	−0.329***	−0.339***	−0.408***	−0.359***	0.0340	1.000			
Bank capital to assets	7	−0.403***	−0.395***	0.0153	0.0151	−0.0369	0.184***	1.000		
Corporate disclosure	8	0.258***	0.193***	−0.130**	0.245***	0.0989*	0.0103	−0.0347	1.000	
Creditor rights	9	0.0444	−0.0286	−0.0567	0.143**	−0.0803	0.0419	0.191***	0.222***	1.000
Mean		60.14	15,680.49	25.14	5.18	0.23	7.34	10.53	5.66	5.38
Standard deviation		43.33	19,826.14	39.19	2.90	0.86	7.55	3.57	2.51	2.74
Minimum		3.59	255.37	−0.40	0.00	−1.70	0.21	3.41	0.00	0.00
Maximum		253.26	119,225.38	279.89	8.00	2.26	54.54	24.85	10.00	12.00

Notes: ***, **, *are statistically significant at the 1%, 5%, and 10% levels, respectively; t-statistics presented in () are homoscedasticity consistent and efficient; LSDV using the Driscoll and Kraay (1998) standard errors; estimations xtscc user-written routine in Stata16. Disclosure*rights = the interaction between corporate disclosure and credit rights.
Source: Authors' computations.

correlations between pairs of explanatory variables support the conclusion that multi-collinearity is not an issue in this study. Worthy of comment is the positive and statistically significant correlation between corporate disclosure and credit market development. It suggests that rising levels of corporate disclosure are associated with some improvement in credit market development. Similarly, except for nonperforming loans and bank capital, the control variables exhibit positive and statistically significant correlations with credit market development.

The lower panel of Table 2 shows the summary statistics of the variables. In all, it is observable that there are no outliers in the data because, for all the variables, there is no significant deviation from the mean. It suggests that our results may not be biased by the presence of outliers in the data.

4.2. Credit market and corporate disclosure: full sample

The results presented in Table 3 show the outcomes from three estimation techniques – LSDV, RE and FE. Columns [1], [4], [7] relate to Equation [1], columns [2], [5], [8] report estimations of equation [2] while columns [3], [6], [9] relate to Equation [3]. We explain all the results simultaneously. As discussed earlier, this approach is such that each technique serves as robustness to one another. The diagnostics reported under the results are useful. The R-squared which captures the variations in the dependent variable explained by the regressors ranges between 0.21 and 0.99. The F- and Wald statistics indicate that the regressors are jointly significant in explaining credit market development.

Across all model specifications and for the most part, corporate disclosure consistently exhibits a positive and statistically significant effect on credit market development. The implication is that an increase in corporate disclosure results in an improvement in the volume of credit. Holding other factors constant, a point increase in the corporate disclosure index of a country causes between 3% and 4% increase in credit market development at the 1% significance level, ceteris paribus. It strikes a chord with signaling theory, which generally predicts a positive link between corporate transparency and credit market development. Better disclosure practices lower information asymmetry, which reduces uncertainty and enhances liquidity and credit volume (Cheng et al., 2020). With increased disclosure, lenders can critically review loan applications, prune out potentially risky proposals and extend credit to those considered less risky with appreciable returns. In essence, the quantity of information in corporate disclosures influences the efficiency with which funders incorporate newly acquired information into credit evaluation (Chung et al., 2019). Investors rely on periodic disclosures from firms that may ultimately be beneficial for setting interest rates and credit volume (Bloxham, 2014). Overall, our findings align with previous studies (Leuz & Schrand, 2009; Vayanos, 2004), who argue that firms with better corporate disclosures are more attractive to investors due to greater transparency

For the control variables, the coefficient of income is positive and statistically significant at the 1% and 5% levels. On average, a percentage change in income is associated with between 0.24% and 0.32% increase in credit volume, ceteris paribus. Therefore, our prediction of a positive effect is supported. One possible explanation for this finding is that more income increases the marginal propensity to consume in an economy, holding other factors constant.

Table 3. Least-squares dummy variables, fixed effects, and random-effects results-full sample.

Variables	Least squares dummy variables			Fixed effects			Random effects		
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Constant	2.1411**	2.2016**	2.1689**	1.9076***	1.9621***	2.0167***	1.3720***	1.3640***	1.4028***
	(5.30)	(5.35)	(4.83)	(3.59)	(3.69)	(3.55)	(4.47)	(4.43)	(4.31)
GDP per capita	0.2429***	0.2367***	0.2384**	0.2596***	0.2534***	0.2504***	0.3217***	0.3226***	0.3222***
	(6.14)	(5.93)	(5.71)	(5.01)	(4.89)	(4.72)	(15.00)	(15.02)	(14.98)
Trade openness	0.0485***	0.0496***	0.0498***	0.0424***	0.0435***	0.0431***	0.0502***	0.0513***	0.0509***
	(16.55)	(22.16)	(20.30)	(3.14)	(3.22)	(3.19)	(3.78)	(3.86)	(3.81)
Non-performing loans	−0.0120	−0.0143	−0.0141	−0.0115	−0.0135	−0.0138	0.0002	−0.0008	−0.0007
	(−0.85)	(−1.08)	(−1.08)	(−0.39)	(−0.46)	(−0.47)	(0.01)	(−0.03)	(−0.03)
Bank capital to assets	−0.4068***	−0.4324***	−0.4319***	−0.4012***	−0.4276***	−0.4285***	−0.4350***	−0.4603***	−0.4610***
	(−28.58)	(−18.47)	(−17.79)	(−5.34)	(−5.64)	(−5.64)	(−5.80)	(−6.06)	(−6.06)
Regulatory quality	0.0540***	0.0610***	0.0616***	0.0480*	0.0544**	0.0534*	0.0464*	0.0521*	0.0507*
	(8.71)	(19.65)	(16.40)	(1.78)	(2.01)	(1.95)	(1.74)	(1.95)	(1.87)
Credit information	0.0450***	0.0424***	0.0424***	0.0405***	0.0381***	0.0380***	0.0503***	0.0484***	0.0483***
	(9.74)	(11.38)	(11.51)	(4.05)	(3.79)	(3.77)	(5.23)	(5.01)	(5.00)
Corporate disclosure	0.0382***	0.0340***	0.0366***	0.0380***	0.0338***	0.0291	0.0346***	0.0307***	0.0245
	(37.38)	(15.54)	(7.14)	(4.08)	(3.57)	(1.48)	(3.72)	(3.24)	(1.25)
Creditor rights		0.0198**	0.0224***		0.0191**	0.0144		0.0174**	0.0112
		(3.32)	(6.38)		(2.23)	(0.75)		(2.02)	(0.58)
Disclosure*rights			−0.0005			0.0009			0.0012
			(−0.78)			(0.27)			(0.37)
Low income	−0.4618**	−0.5019**	−0.4965**						
	(−3.47)	(−3.58)	(−3.41)						
Lower–middle income	−0.0648	−0.0832	−0.0782						
	(−0.77)	(−0.97)	(−0.86)						
Upper–middle income	−0.1006	−0.1111	−0.1090						
	(−1.36)	(−1.56)	(−1.49)						
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Obs.	423	422	422	524	523	523	524	523	523
R-squared	0.594	0.596	0.596	0.208	0.216	0.216	0.9867	0.9871	0.9875
F statistic	9211.595	14,644.008	636.929	12.172	11.639	10.730	708.17	708.32	707.25

Notes: ***, **, *are statistically significant at the 1%, 5%, and 10% levels, respectively; t-statistics presented in () are homoscedasticity consistent and efficient; LSDV using the Driscoll and Kraay (1998) standard errors with lag(3) specified as maximum lag in the autocorrelation structure; clustered standard errors by income groups for FE and RE techniques; estimations xtscc user-written routine in Stata16. Disclosure*rights = the interaction between corporate disclosure and credit rights.
Source: Authors' computations.

The multiplier effect of the rise in consumption on aggregate demand is likely to increase the productive capacities of firms which create the incentive to demand more credit. This leads to a rise in credit market development. Another explanation is that an improvement in income generally facilitates debt servicing, which incentivizes lenders to lend more.

Similarly, economic openness is positive and statistically significant at the 1% significance level. It suggests that, on average, credit increases by 0.04% to 0.05% if a percentage change in the degree of openness of an economy occurs, *ceteris paribus*. Holding other factors constant, when an economy is open to the rest of the world (as captured by economic openness), it opens up more trade opportunities for firms to expand production. The expansion in production may trigger more demand for credit, leading to an increase in lending activities in credit markets.

Nonperforming loans create a burden on the profit margin of financial intermediaries due to mandatory provision on nonperforming loans. This necessitates a reduction in credit volume (Klein, 2013). Consequently, we have predicted that non-performing loans should slow down credit market development. Contrary to this prediction, the coefficient of non-performing loans is statistically insignificant across the three estimation techniques. The implication is that our prediction is unsupported.

Bank capital exhibits a negative and statistically significant relation with credit market development at the 1% significance level. On average, a percentage change in bank capital causes between 40% and 44% reduction in credit market development, *ceteris paribus*. Another control variable that also exerts a positive and statistically significant effect on credit market development is regulatory quality. It explains between 0.0464 and 0.0616 variation in credit market development, holding other factors constant. Thus, our prediction of a positive effect is confirmed. Regulation injects sanity and curtails excesses in credit markets, resulting in their improvement, ceteris paribus.

Credit information sharing comes up as supporting credit market development. Holding other factors constant, a unit increase in a country's credit information sharing index causes between 4% and 5% increase in credit at the 1% significance level. This outcome aligns with the existing literature. Credit information sharing tackles information asymmetry (Ghosh, 2019) and frees up credit markets. In countries where credit information bureaus (public or private) work effectively, information sharing enables lenders to avoid borrowers with questionable credit histories as well as adequately price credit risk, which culminates in more credit.

The coefficient of creditor rights aligns with our expectation. It is positive across all models but statistically significant only in four out of six. It predicts between 0.01% and 0.02% variation in credit market development. This gives the indication that strong investor laws that uphold the rights of fund providers propel them to support the development of the credit market. However, the coefficient of the interaction term is statistically not significant.

Lastly, the negative coefficient of the dummy for low-income countries is the only statistically significant coefficient. It suggests that credit markets in low-income countries are less developed than those in high-income countries which accords with conventional wisdom.[5]

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[5]The intercept in each model of columns [1] to [3] represents the coefficient of the dummy variable for high-income countries.

4.3. Credit market and corporate disclosure: income groups

In this section, we interrogate the question of whether the effect of corporate disclosure on credit market development differs according to the income status of countries. To do this, we segregate the dataset into four income groups: high, upper-middle, lower-middle and low-income countries and perform new estimations the results of which we report in Tables 4, 5 and 6. Table 4 presents the results from the LSDV technique for all income groups. Table 5 displays results from FE and RE techniques for high- and upper–middle-income country subsamples, while Table 6 shows those from lower–middle and low-income country subsamples. For the LSDV results, each column represents estimations from Equations [1], [2], and [3] while those of FE and RE techniques are limited to estimations from equations [2] and [3]. For space, interpretation is limited to corporate disclosure, creditor rights and the interaction term.

Corporate disclosure displays a complex structure across the income groups. Under the LSDV technique displayed in Table 4, the coefficient exhibits mixed signs amidst varying statistical significance for high-, lower–middle- and low-income countries, but it is consistently positive and statistically significant in upper–middle-income countries. For the FE and RE techniques shown in Tables 5 and 6, the coefficient is steadily negative in upper–middle and lower–middle-income countries while its behavior is irregular in high- and low-income countries.

Excluding creditor's rights and the interaction term, we observe in Table 4 that the coefficient of corporate disclosure is positive and statistically significant for all but low-income countries. Consistent with findings from the full sample, a point increase in the corporate disclosure index of a country causes between 2% and 5% increase in credit market development, *ceteris paribus*. Generally, a negative coefficient as in upper–middle-income countries (FE model) suggests that its improvement slows down credit market development. Approximately, between 3% and 6% reduction in credit market development occurs in upper-middle-income countries when there is a point increase in the corporate disclosure index, ceteris paribus. The negative coefficient of corporate disclosure aligns with the Hirshleifer (1971) effect which articulates that disclosure may signify harmful consequences for economic agents. It occurs when the disclosed information is misconstrued by its users resulting in wrong conclusions. Disclosure may yield adverse outcomes if information overload impairs the capacities of investors and funders to process or synthesize information (O'Reilly, 1980; Simon, 1978). In other words, extensive disclosures can impair rather than enhance the efficiency of allocation of credit (Madhavan & Prescott, 1995).

From Table 4, the statistical significance of corporate disclosure diminishes with the inclusion of creditor's rights in all but upper–middle-income countries. Disclosure exerts disproportionate relevance with the inclusion of the interaction term across all the income groups, though with varying signs. This scenario allows for the computation of the total impact[6] of corporate disclosure on the credit market given creditor's rights. Largely, the overall impact is computed at the average, minimum and maximum values of creditor's rights.

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[6]Overall impact of corporate disclosure on credit market development in high-income countries is calculated as: $\partial\text{Credit}/\partial\text{CorpDisclosure} = -0.0308 + 0.0077\text{Rights}$; where Rights can be evaluated at the mean, lowest, or highest values.

Table 4. Least-squares dummy variables (income groups).

Variables	High income			Upper–middle income			Lower–middle income			Low income		
	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]	[21]
Constant	−0.1816	0.0192	0.4991	0.0000	0.0000	0.0000	0.1892	0.1122	0.2950	4.9301	0.0000	7.7249**
	(−0.60)	(0.05)	(1.42)	(.)	(.)	(.)	(0.33)	(0.31)	(0.73)	(2.00)	(.)	(3.54)
GDP per capita	0.4808***	0.4535***	0.4327***	−0.1321*	−0.1276*	−0.0679*	0.4373***	0.5116***	0.5182***	−0.4213	−0.3656	−0.4345
	(21.23)	(19.30)	(19.02)	(−3.02)	(−3.09)	(−2.88)	(4.68)	(8.63)	(7.65)	(−1.44)	(−0.74)	(−1.40)
Trade openness	0.0262***	0.0314***	0.0283***	0.0527***	0.0523***	0.0735***	0.1661***	0.1731***	0.1941***	−0.3269***	−0.2936*	0.0173
	(7.06)	(6.22)	(5.78)	(13.84)	(13.57)	(14.20)	(37.35)	(31.57)	(57.27)	(−13.94)	(−2.88)	(0.17)
Non-performing loans	0.1118***	0.1210***	0.1191***	−0.1284**	−0.1299**	−0.0765	−0.0102	−0.0529***	0.0239	−0.1585	−0.1550	−0.1791
	(15.23)	(10.93)	(11.34)	(−3.87)	(−4.04)	(−2.32)	(−0.36)	(−8.63)	(1.00)	(−1.43)	(−1.81)	(−2.06)
Bank capital to assets	−0.4625***	−0.4892***	−0.4999***	−0.2611***	−0.2648***	−0.2306***	−0.2563**	−0.5459***	−0.5206***	0.2470	0.2868	0.0057
	(−10.51)	(−8.67)	(−9.92)	(−9.25)	(−10.16)	(−21.24)	(−4.74)	(−14.84)	(−18.14)	(1.91)	(0.78)	(0.05)
Regulatory quality	0.1079***	0.0984***	0.1042***	−0.0239**	−0.0232**	−0.0041	−0.0144	0.0269**	−0.0180	0.0630	0.0444	0.0902***
	(6.74)	(6.32)	(6.93)	(−5.14)	(−5.02)	(−0.46)	(−1.80)	(3.36)	(−1.28)	(0.89)	(0.93)	(9.55)
Credit information	0.0400***	0.0296**	0.0353***	0.0324	0.0328	0.0431	0.0155*	−0.0054	−0.0105*	0.0703***	0.0763***	0.0381**
	(14.89)	(5.37)	(6.75)	(1.91)	(1.90)	(2.14)	(3.02)	(−1.02)	(−2.58)	(8.40)	(9.96)	(4.52)
Corporate disclosure	0.0187**	0.0127	−0.0308***	0.0571***	0.0561***	0.1399***	0.0216***	−0.0006	−0.1162**	0.0085	0.0133	−0.3335***
	(3.76)	(1.82)	(−7.65)	(12.64)	(13.42)	(20.77)	(8.90)	(−0.73)	(−4.49)	(0.39)	(0.43)	(−9.73)
Creditor rights	0.0436***	0.0436***	−0.0052		0.0032	0.0923***		0.0849***	0.0020		−0.0188	−0.3940**
	(5.89)	(5.89)	(−0.52)		(1.68)	(18.83)		(19.81)	(0.12)		(−0.48)	(−5.65)
Disclosure*rights			0.0077***			−0.0156***			0.0201**			0.0626***
			(11.69)			(−17.08)			(5.05)			(10.40)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Obs.	146	146	146	139	139	139	102	102	102	36	35	35
R-squared	0.390	0.420	0.423	0.268	0.269	0.311	0.517	0.633	0.679	0.829	0.831	0.885
F statistic	8406.017	4844.160	3933.562	1570.879	1136.740	1557.545	83.394	147.648	479.558	13.986	56.973	34.220

Notes: ***, **, *are statistically significant at the 1%, 5%, and 10% levels, respectively; t-statistics presented in ( ) are homoscedasticity consistent and efficient; LSDV using the Driscoll and Kraay (1998) standard errors; estimations *xtscc* user-written routine in Stata16. Disclosure*rights = the interaction between corporate disclosure and credit rights.
Source: Authors' computations.

Table 5. Fixed and random effects estimates, income groups (1).

Variables	HighInc, FE		HighInc, RE		Upper–middle Inc, FE		Upper–middle Inc, RE	
	[22]	[23]	[24]	[25]	[26]	[27]	[28]	[29]
Constant	14.0125***	14.2043***	8.4747***	9.5164***	6.3333***	6.3604***	5.7832***	5.7923***
	(13.45)	(13.44)	(8.43)	(9.10)	(7.87)	(8.01)	(7.35)	(7.48)
GDP per capita	−0.7888***	−0.7831***	−0.3767***	−0.4184***	−0.2865***	−0.3084***	−0.2161***	−0.2382***
	(−8.57)	(−8.50)	(−4.06)	(−4.55)	(−3.51)	(−3.80)	(−2.74)	(−3.05)
Trade openness	−0.8120***	−0.8118***	−0.1046**	−0.1203**	−0.0429	−0.0442	−0.0099	−0.0097
	(−6.34)	(−6.34)	(−2.20)	(−2.54)	(−1.02)	(−1.06)	(−0.32)	(−0.32)
Non-performing loans	0.0468*	0.0467*	0.0313	0.0361	−0.0584*	−0.0609*	−0.0590*	−0.0601*
	(1.97)	(1.97)	(1.15)	(1.35)	(−1.74)	(−1.83)	(−1.77)	(−1.84)
Bank capital to assets	−0.3081***	−0.2974***	−0.2846***	−0.2769***	0.1950*	0.1988*	0.0913	0.1002
	(−4.28)	(−4.09)	(−3.42)	(−3.40)	(1.85)	(1.92)	(0.92)	(1.02)
Regulatory quality	0.1670**	0.1708**	0.1295*	0.1282*	−0.1171	−0.1260	−0.1226*	−0.1273*
	(2.08)	(2.13)	(1.70)	(1.71)	(−1.35)	(−1.47)	(−1.76)	(−1.85)
Credit information	0.0315***	0.0305***	0.0222*	0.0209*	0.0219	0.0228	0.0202	0.0203
	(2.90)	(2.79)	(1.77)	(1.70)	(1.20)	(1.27)	(1.30)	(1.32)
Corporate disclosure	0.0040	−0.0739	0.0436	−0.1094*	−0.0579***	−0.0296	−0.0338**	−0.0045
	(0.13)	(−0.94)	(1.57)	(−1.75)	(−3.34)	(−1.36)	(−2.12)	(−0.22)
Creditor rights	−0.0232**	−0.0868	0.0105	−0.1095**	0.0051	0.0321**	0.0032	0.0328**
	(−2.03)	(−1.43)	(0.86)	(−2.40)	(0.68)	(2.17)	(0.42)	(2.19)
Disclosure*rights		0.0163		0.0287***		−0.0044**		−0.0049**
		(1.07)		(2.72)		(−2.11)		(−2.28)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Obs.	180	180	180	180	173	173	173	173
R-squared	0.503	0.508			0.248	0.275		
F statistic/Wald	10.898	10.158	46.86	56.99	3.415	3.582	30.35	3074

Notes: ***, **, *are statistically significant at the 1%, 5%, and 10% levels, respectively; *t*-statistics presented in () are homoscedasticity consistent and efficient; estimations from Stata16. Disclosure*rights = the interaction between corporate disclosure and credit rights.
Source: Authors' computations.

Table 6. Fixed and random effects estimates, income groups (2).

Variables	Lower–middle Inc, FE		Lower–middle Inc, RE		Low Inc, FE		Low Inc, RE	
	[30]	[31]	[32]	[33]	[34]	[35]	[36]	[37]
Constant	4.7938***	4.8525***	3.8760***	3.9770***	3.1333*	3.6426*	3.2318	9.2263***
	(6.05)	(6.06)	(5.17)	(5.26)	(1.75)	(1.77)	(1.54)	(4.23)
GDP per capita	−0.0586	−0.0605	0.0455	0.0416	−0.3164	−0.3451	−0.2543	−0.6517***
	(−0.59)	(−0.60)	(0.49)	(0.44)	(−1.44)	(−1.50)	(−1.07)	(−3.09)
Trade openness	0.0334	0.0347	0.0611***	0.0622***	0.1097	0.1149	−0.2336***	−0.0133
	(1.35)	(1.39)	(2.81)	(2.85)	(0.92)	(0.95)	(−3.01)	(−0.17)
Non-performing loans	−0.1104***	−0.1169***	−0.1167***	−0.1249***	0.1054	0.1000	−0.1047	−0.0718
	(−2.91)	(−2.95)	(−3.10)	(−3.23)	(1.30)	(1.20)	(−0.90)	(−0.77)
Bank capital to assets	−0.2767***	−0.2725***	−0.2790***	−0.2732***	0.2064	0.1974	0.4593	−0.2062
	(−3.21)	(−3.14)	(−3.33)	(−3.25)	(0.86)	(0.81)	(1.36)	(−0.66)
Regulatory quality	−0.0081	−0.0148	0.0019	−0.0071	−0.3383**	−0.3337**	0.0769	0.1018
	(−0.09)	(−0.17)	(0.03)	(−0.11)	(−2.25)	(−2.18)	(0.82)	(1.34)
Credit information	−0.0114*	−0.0116*	−0.0080	−0.0086	0.0153	0.0157	0.0717***	0.0478***
	(−1.77)	(−1.80)	(−1.22)	(−1.31)	(1.60)	(1.61)	(3.54)	(2.78)
Corporate disclosure	−0.0037	−0.0153	−0.0014	−0.0197	0.1505**	0.0837	0.0250	−0.3304***
	(−0.26)	(−0.63)	(−0.10)	(−0.82)	(2.25)	(0.58)	(1.20)	(−3.94)
Creditor rights	−0.0177**	−0.0259	−0.0074	−0.0207	−0.0534	−0.0977	−0.0235	−0.3558***
	(−2.03)	(−1.57)	(−0.86)	(−1.25)	(−1.66)	(−1.09)	(−0.71)	(−4.37)
Disclosure*rights		0.0020		0.0031		0.0106		0.0603***
		(0.58)		(0.93)		(0.53)		(4.32)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Obs.	125	125	125	125	45	45	45	45
R-squared	0.371	0.374			0.559	0.565		
F statistic/Wald	4.229	3.900	52.36	53.21	2.323	2.096	120.04	205.1

Notes: ***, **, *are statistically significant at the 1%, 5%, and 10% levels, respectively; *t*-statistics presented in () are homoscedasticity consistent and efficient; estimations from Stata16. Disclosure*rights = the interaction between corporate disclosure and credit rights.
Source: Authors' computations.

The significance of corporate disclosure in influencing credit market development is not evident in high-income countries. For the most part, it is negative and statistically significant in upper–middle-income countries.

We observe a negative and insignificant effect of corporate disclosure on credit market development in lower-middle-income countries in Table 6. It differs from what we observe in low-income countries where the effect is significant but disproportionate. Under the RE and FE columns, corporate disclosure exerts both positive and negative statistically significant effect on credit market development at the 1% and 5% significance levels. Approximately, corporate disclosure explains between 15% and 33% changes in credit market development in low-income countries, holding other factors constant. The implication is that corporate disclosure significantly predicts credit market development in low-income countries when creditor's rights protection is accounted for.

The results of the SYS-GMM analysis are reported in Table 7. It is evident that in the full sample, corporate disclosure drives credit markets positively which upholds the results in Table 3. In terms of income groups, it is only in low-income group that corporate disclosure drives credit markets positively.

The results in Tables 4–7 support the postulation that the effect of corporate disclosure on credit market development differs according to the income groups of countries which becomes more distinct with the incorporation of creditor's rights and the interaction term. Generally, the results in Tables 4–7 show that in the presence of creditor rights protection, corporate disclosure does not support credit market development except in the upper–middle-income and low-income countries where some weak positive effect is observed. The *"liquidation bias" hypothesis* is invoked to explain this outcome. Credited to Vig (2013) and Acharya, Amihud, and Litov (2011), the *'liquidation bias" hypothesis* posits that in an environment where the legal system is effective and potent, managers exhibit some reluctance to borrow more for fear of losing their jobs in an event of firms becoming bankrupt. Thus, managers of transparent firms operating in an effective creditor rights protection environment are reluctant to borrow more for fear of liquidation risk. As a result, credit markets plummet.

Apart from the results in Tables 4 to 7 assisting us to answer the second question raised in this study, they also help us to address two concerns: robustness of the effect of corporate disclosure on credit market development and the external validity of our results. First, the positive and significant effect of corporate disclosure on credit market development observed in high-, upper–middle-, lower–middle-income- and low-income countries[7] strengthens the result reported in Table 3 that corporate disclosure promotes credit market development. Second, in our view, the positive effect of corporate disclosure on credit market development across the four income groups establishes the external validity of the results observed in Table 3.

5. Conclusion

As far as we know, the empirical literature does not clearly manifest the effect of corporate disclosure on credit market development. The objective of this study is to illuminate this murky area of the empirical literature. In pursuing this objective, we

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[7]Relying substantially on the LSDV results in Table 4.

Table 7. System GMM results (full sample and income groups).

Variables	Full sample		High income		Upper–middle income		Lower–middle income		Low income	
	DomCredit	DomCredit	DomCredit	DomCredit	DomCredit	DomCredit	DomCredit	DomCredit	DomCredit	DomCredit
Domestic credit, lag	0.471*** (0.055)	0.416*** (0.081)	0.789*** (0.033)	0.590*** (0.128)	0.579*** (0.063)	0.514*** (0.182)	0.572*** (0.068)	0.607*** (0.086)	1.227** (0.479)	0.604*** (0.150)
GDP per capita	0.205*** (0.048)	0.308*** (0.092)	0.095 (0.120)	-0.362 (0.394)	0.195 (0.154)	0.182 (0.292)	0.322*** (0.102)	0.344*** (0.109)	0.084* (0.049)	-0.440* (0.255)
Trade openness	0.036** (0.014)	0.075 (0.067)	-0.008 (0.011)	-0.078* (0.046)	0.018 (0.023)	0.020 (0.041)	0.108*** (0.017)	0.094*** (0.021)	-0.165 (0.174)	-0.711** (0.304)
Non-performing loans	-0.012 (0.048)	0.027 (0.057)	-0.050 (0.034)	-0.161 (0.121)	-0.134** (0.057)	-0.189* (0.101)	0.010 (0.073)	-0.031 (0.084)	0.000 (0.000)	0.450 (0.274)
Bank capital to assets	-0.150* (0.079)	0.093 (0.308)	-0.034 (0.067)	0.541*** (0.193)	-0.151** (0.077)	-0.380** (0.161)	-0.021 (0.069)	0.128 (0.125)	-0.605 (0.406)	0.000 (0.000)
Regulatory quality	0.034 (0.029)	-0.001 (0.058)	0.044 (0.040)	0.067 (0.090)	0.040 (0.045)	0.057 (0.081)	-0.020 (0.030)	-0.023 (0.033)	0.200 (0.161)	0.000 (0.000)
Credit information	0.015 (0.010)	0.003 (0.018)	0.011 (0.013)	-0.032 (0.043)	0.000 (0.013)	0.011 (0.024)	-0.000 (0.008)	-0.014 (0.011)	-0.035 (0.024)	0.071** (0.035)
Corporate disclosure	0.015* (0.008)	-0.088 (0.127)	0.005 (0.014)	-0.140 (0.108)	0.003 (0.015)	-0.030 (0.066)	0.016 (0.017)	0.009 (0.029)	-0.006 (0.011)	0.361* (0.190)
Creditor rights	0.010 (0.025)	-0.106 (0.117)	-0.017 (0.013)	-0.110 (0.068)	0.058*** (0.016)	0.074 (0.073)	-0.007 (0.011)	-0.001 (0.027)	0.114** (0.057)	0.527* (0.270)
Disclosure*rights		0.021 (0.022)		0.029 (0.019)	(0.012)	0.003 (0.011)	(0.014)	0.001 (0.005)	(0.047)	-0.069* (0.035)
Constant	0.315 (0.487)	-0.452 (1.393)	0.080 (1.291)	5.313 (4.449)	0.110 (1.499)	1.028 (3.181)	-1.204 (0.991)	-1.685* (0.994)	0.000 (0.000)	0.000 (0.000)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	419	419	144	144	141	141	98	98	36	36
Instruments/groups	22/114	21/114	22/39	21/39	22/37	21/37	22/27	21/27	22/11	21/11
AR(2)	0.442	0.381	0.358	0.256	0.337	0.426	0.0114	0.0500	0.429	0.185
Hansen	0.0743	0.724	0.550	0.684	0.606	0.644	0.670	0.662	1	1

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

employ data from 122 countries and engage three estimation techniques. The various estimations performed in this study have yielded results that generally suggest that corporate disclosure drives credit market development positively. Subsample analysis in terms of income groups of the countries provides some interesting findings. Generally, without accounting for creditor rights protection and its interaction with corporate disclosure, corporate disclosure accelerates credit market development in high-income -, upper–middle- and lower–middle-income and shows no significant effect on the credit markets in low-income countries.[8] However, we observe a different outcome when creditor rights protection interacts with corporate disclosure: generally, corporate disclosure impairs credit market development in all income groups except in upper-middle-income countries where a positive and statistically significant effect is observed. The main policy implication of these results is that policy intervention either at the firm or national level that enhances the transparency of firms could have positive effects on the development of credit markets especially in high-income, upper-middle-income and lower-middle-income countries. It also implies that among the four income groups, it is in only in upper–middle-income countries that the simultaneous promotion of corporate disclosure and creditor rights protection will be beneficial to credit market development, *ceteris paribus.*

To the extent that corporate disclosure supports credit market development, policy interventions that promote corporate transparency represent one of the channels for facilitating the development of credit markets in the study countries. From the agency theory perspective, active credit markets benefit shareholders because debt financing is perceived as a layer in the monitoring scheme of shareholders to checkmate managerial excesses. Consequently, shareholders of corporate entities in the study countries interested in deploying debt financing as an additional mechanism should direct their activism at corporate disclosure. Pushing their firms to ensure transparency in their operations, which will fertilize access to credit markets when the need arises, constitutes one way of mitigating the agency conflict between them and their managers.

Theoretically, the reduction in the effect of corporate disclosure on credit market development when we control for creditor rights protection coupled with the observation that the interaction between corporate disclosure and creditor rights protection generally slows down credit markets in three income groups supports the conclusion that corporate disclosure and credit rights protection are not complementary. Therefore, it may not be necessary to target the two in the quest to promote the development of credit markets in the study countries save upper-middle-income countries. In our view, corporate disclosure alone may have the potency to influence credit markets positively.

While articulating the relevance of the findings of this study to the credit market literature, it is essential to invite future research to interrogate further the issues addressed in the paper to deepen the understanding of the effect of corporate disclosure on credit market development. Evidence from a different econometric approach using a larger sample size will be a step in the right direction. Besides, lack of consistency in the sign of the coefficient of the interaction between corporate disclosure and creditor rights protection requires that the question of the effect of the interaction between corporate disclosure and creditor rights protection on the

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[8]Relying on the LSDV results in 4a

development of credit markets remains open for further interrogation. Future research can take this up.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix A.

Countries, regions, and income groups.

S/N	Country	Region	Income group	S/N	Country	Region	Income group
1	Albania	ECA	Upper-Middle	62	Kosovo	ECA	Lower-Middle
2	Afghanistan	SA	Low	63	Kuwait	MENA	High
3	Algeria	MENA	Upper-Middle	64	Kyrgyzstan	ECA	Lower-Middle
4	Angola	SSA	Lower-Middle	65	Latvia	ECA	High
5	Antigua and Barbuda	LAC	High	66	Lebanon	MENA	Upper-Middle
6	Argentina	LAC	High	67	Lesotho	SSA	Lower-Middle
7	Armenia	ECA	Upper-Middle	68	Lithuania	ECA	High
8	Australia	EAP	High	69	Luxembourg	ECA	High

(*Continued*)

S/N	Country	Region	Income group	S/N	Country	Region	Income group
9	Austria	ECA	High	70	Madagascar	SSA	Low
10	Bangladesh	SA	Lower-Middle	71	Malawi	SSA	Low
11	Belarus	ECA	Upper-Middle	72	Malaysia	EAP	Upper-Middle
12	Belgium	ECA	High	73	Maldives	SA	Upper-Middle
13	Bhutan	SA	Lower-Middle	74	Malta	MENA	High
14	Bolivia	LAC	Lower-Middle	75	Mauritius	SSA	Upper-Middle
15	Bosnia and Herzegovina	ECA	Upper-Middle	76	Mexico	LAC	Upper-Middle
16	Botswana	SSA	Upper-Middle	77	Moldova	ECA	Lower-Middle
17	Brazil	LAC	Upper-Middle	78	N. Macedonia	ECA	Upper-Middle
18	Brunei	EAP	High	79	Namibia	SSA	Upper-Middle
19	Bulgaria	ECA	Upper-Middle	80	Netherlands	ECA	High
20	Burundi	SSA	Low	81	Nicaragua	LAC	Lower-Middle
21	Cameroon	SSA	Lower-Middle	82	Nigeria	SSA	Lower-Middle
22	Central Afr. Republic	SSA	Low	83	Norway	ECA	High
23	Chad	SSA	Low	84	Pakistan	SA	Lower-Middle
24	Chile	LAC	High	85	Panama	LAC	High
25	China	EAP	Upper-Middle	86	Papua New Guinea	EAP	Lower-Middle
26	Colombia	LAC	Upper-Middle	87	Paraguay	LAC	Upper-Middle
27	Costa Rica	LAC	Upper-Middle	88	Peru	LAC	Upper-Middle
28	Croatia	ECA	High	89	Philippines	EAP	Lower-Middle
29	Cyprus	ECA	High	90	Poland	ECA	High
30	Czech Republic	ECA	High	91	Portugal	ECA	High
31	Denmark	ECA	High	92	Romania	ECA	Upper-Middle
32	Djibouti	MENA	Lower-Middle	93	Russia	ECA	Upper-Middle
33	Dominica	LAC	Upper-Middle	94	Rwanda	SSA	Low
34	Dominican Republic	LAC	Upper-Middle	95	St. Kitts and Nevis	LAC	High
35	Ecuador	LAC	Upper-Middle	96	St. Lucia	LAC	Upper-Middle
36	El Salvador	LAC	Lower-Middle	97	St. Vincent and the Grenadines	LAC	Upper-Middle
37	Equatorial Guinea	SSA	Upper-Middle	98	Saudi Arabia	MENA	High
38	Estonia	ECA	High	99	Seychelles	SSA	High
39	Eswatini	SSA	Lower-Middle	100	Singapore	EAP	High
40	Fiji	EAP	Upper-Middle	101	Slovakia	ECA	High
41	Finland	ECA	High	102	Slovenia	ECA	High
42	France	ECA	High	103	Solomon Islands	EAP	Lower-Middle
43	Gabon	SSA	Upper-Middle	104	South Africa	SSA	Upper-Middle
44	Gambia	SSA	Low	105	South Korea	EAP	High
45	Georgia	ECA	Lower-Middle	106	Spain	ECA	High
46	Germany	ECA	High	107	Sri Lanka	SA	Lower-Middle
47	Ghana	SSA	Lower-Middle	108	Switzerland	ECA	High
48	Greece	ECA	High	109	Tanzania	SSA	Low
49	Grenada	SSA	Upper-Middle	110	Thailand	EAP	Upper-Middle
50	Guatemala	LAC	Upper-Middle	111	Tonga	EAP	Upper-Middle
51	Guinea	SSA	Low	112	Trinidad and Tobago	LAC	High
52	Honduras	LAC	Lower-Middle	113	Turkey	ECA	Upper-Middle
53	Hungary	ECA	High	114	United Arab Emirates	MENA	High
54	Iceland	ECA	High	115	Uganda	SSA	Low
55	India	SA	Lower-Middle	116	United Kingdom	ECA	High
56	Indonesia	EAP	Lower-Middle	117	Ukraine	ECA	Upper-Middle
57	Ireland	ECA	High	118	United States of America	NA	High
58	Israel	MENA	High	119	Uruguay	LAC	High
59	Italy	ECA	High	120	Vanuatu	EAP	Lower-Middle
60	Kazakhstan	ECA	Upper-Middle	121	Vietnam	EAP	Lower-Middle
61	Kenya	SSA	Lower-Middle	122	Zambia	SSA	Lower-Middle

Notes: EAP: Europe and the Asia Pacific; ECA: Europe and Central Asia; LAC: Latin America and the Caribbean; ME: the Middle East and North Africa; NA: North America; SA: South Asia; SSA: Sub-Saharan Africa
Source: Authors' Compilation