Shsh, Do Not Say Crisis! Role of Press Freedom on Bank Default Risk

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ABSTRACT

This study investigates the relationship between press freedom and bank default risk across countries, with particular attention to the role of institutional quality, financial development, and information transmission mechanisms. Using an unbalanced panel of 128 countries over the period 2000-2022, the paper applies dynamic panel data techniques to examine how press freedom affects banking stability, measured by the banking Z-score. To account for cross-country heterogeneity, countries are grouped by income level, geographic region, and resource dependence. In addition, a panel Blinder–Oaxaca decomposition is employed to identify the factors driving differences in average bank default risk across country groups, while a Threshold ARCH (TARCH) model is used to assess asymmetric responses of bank risk to positive and negative news. The results show that press freedom alone is not a consistent predictor of bank default risk across countries. Instead, its impact depends on the broader informational and institutional environment. In countries with higher education levels and greater internet penetration, increased press freedom is associated with higher bank default risk, indicating that more informed and digitally connected populations may react more strongly to financial news, amplifying herding behavior and bank fragility. Evidence from the TARCH model further suggests that bank default risk responds asymmetrically to news shocks, with negative news exerting a stronger effect than positive news. Overall, the findings underscore the importance of institutional context when evaluating the role of press freedom in financial stability.

Keywords: Bank Default Risk, Banking Z-score, Press Freedom, Dynamic Panel Data, Panel Blinder-Oaxaca Decomposition, Threshold ARCH (TARCH), and News-Response Function
JEL Classification: C23, G01, G2, G21 G33

1. INTRODUCTION

In their joint study, Roychoudhury and Lawson (2010) showed that economic policy and freedom impact not only sovereign debt risk but also economic performance. Sufian and Habibullah (2010) provided new empirical evidence on the new empirical evidence on the impact of economic freedom on banks' performance and determined that overall economic freedom and business freedom induce higher bank profitability as they imply higher freedom on business activities that banks can undertake. On the other hand, Zer (2015) found strong evidence in favor of the assumption that information disclosure yields alleviation of informational frictions and lead to a more efficient allocation of risk.

Hall et al. (2008) scrutinized factors affecting the efficiency of the banking industry in Hong-Kong through macroeconomic determinants and found out that terrorist attacks in America in 9/11 negatively affected the Hong Kong bank efficiency. It has also been voiced out that the smaller banks tend to be more efficient than the larger ones even though both former and latter can benefit from the economies of scale. More relevant study by Semenova (2012) introduced model for the deposit market with costly information on bank risks manifested that costly information signals indicates

that whether to pay for the information regarding changes in the riskiness of banking activities or not must be decided by the depositors. The author also signified that efficient bank run is the sole equilibrium even if the information cost is non-negative. In another study, Acharya and Naqvi (2012) touched upon a theory of bank liquidity and risk taking over the business cycle and defined that access to abundant liquidity brugeons risk-taking moral hazard at banks which, in turns, aggrevates excessive lending and asset price bubbles. Harris and Raviv (2014) discussed how to get banks to take less risk and disclose bad news in their joint study and suggested that when banks are in trouble, it would be optimal to allow equity payouts. By controlling for the banking-industry specific, macroeconomic and external factors, Ghosh (2016) evaluated the factors leading to the bank crisis and detected that greater banking sector globalization, higher bank profits, real GDP growth, economic development, and economic freedom deteriorates the bank crisis, whereas greater bank asset concentration, diversification, credit flows, real interest rates, inflation rates, M2-to-foreign exchange reserves and nominal exchange rate depreciations do exactly the opposite. On the other hand, Rachman et al. (2018) claimed that the preeminent cause of the financial and bank crisis stand to the rise in non-performing loans (NPLs) in the banks' asset portfolios.

Ornelas et al. (2022) studied how competition in the lending market affects spreads of bank loans in Brazil. The results suggested that there is a positive relationship between the cost of finance and market power measured in the Lerner index. Chen (2022) investigated the role of bank capital on bank interconnectedness and financial stability. His findings demonstrated that interconnectedness, so does financial integration, can deteriorate financial stability by underestimating risk, especially when the economy turns from boom to recession. Altunbas et al. (2022) investigated how market power affects banks' systemic risk during the crisis of 2007-2009 and determined that more market power before the crisis leads to higher systemic risk at the time of the crisis. González (2022) studied the role of macroprudential policies on bank competition and stability at international bank-level, whose results revealed that tightening in bank-oriented macroprudential positively affects bank competition and stability yet there are differences across policies. Based on a sample of 568 banks from 20 countries, Bilgin et al. (2021) questioned whether economic uncertainty affects the default risk of default risk of Islamic and conventional banks. Their findings suggested that even though the conventional banks are subject to the default risk triggered by economic uncertainty, there is no sufficient evidence to claim the same for the Islamic banks.

In the related literature concerning the role of media and information on bank stability, Zaremba et al. (2022) studied the role of news-based gauge of geopolitical risk on asset pricing in global emerging markets and found out that higher increase in geopolitical uncertainty the country has, higher chance it will have in terms of outperforming its opponents by up to 1% per month. Swem (2017) compared timing of information acquisition among institutional investors and sell-side analysts. The author determined that hedge funds are faster than analysts in terms of information acquisition. Becchetti and Manfredonia (2022) questioned how traditional and online media coverage affect the cost of borrowing. Their study manifested that negative media

attention expands bank loan costs. In their joint study, Kiss et al. (2022) argued that informational environment under the herding bias influences the emergence of bank runs which, in turns, affects the line formation. The outcome of the experimental study revealed that depositors who cannot observe the actions of others arrive early at the bank to withdraw their funds, while they would have preferred to keep their deposits in case they could have observed the actions of the others. Other than the herding bias, the authors defined that irrationality of depositors and loss aversion affect the depositor behavior. Ellis et al. (2022) found out that majority of the systemic risk measures focus on the individual financial institutions rather than on system stability. Agénor and Flamini (2022) investigated how the performance of alternative institutional mandates influences the macroeconomic and financial stability. The authors demonstrated that coordination leads to a substantial gain in stability. In their study, Islam et al. (2022) provided the first evidence on the relationship between firm-level political risk and distance-to-default, which suggested that there is a negative correlation between firm-level political risk and distance-to-default.

Only a few of the above-highlighted literature analyzed the role of press and media freedom on the probability of the bank default risk. The main gap in those studies is that almost none of them demonstrated how this effect tends to change once the region-specific so as governance indicators are controlled for. In the view of this, the Blinder-Oaxaca Decomposition has been used to define the differences in the mean values of the probability of the bank default risk across different country groups over 2002-2022 time interval. The estimation outcomes manifested that countries with more people having an access to the internet tend to have higher default risk. Additionally, Threshold ARCH model was implemented to observe whether the probability of the bank default risk is sensitive to good or bad news. Thus, the research questions of the study became as follows:

- How does the press freedom index affect the probability of the bank default risk given the financial freedom and education literacy across different country groups?
- Is the bank default risk more sensitive to good or bad news?

The rest of the paper is structures as Literature Review, Data Analysis, Methodology, Results, Discussion, Conclusion, References, and Appendixes.

2. LITERATURE REVIEW

This section of the study is devoted to the review of the prevailing literature concerning the bank crisis, bank runs, and bank default risk, which is classified into two parts. The first part provides detailed analysis of studies which questioned the role of media and press freedom on the bank default risks, whereas the second part focuses on the articles that scrutinized which factors trigger runs, crisis, and default in the banking system.

2.1. A Role of Media and Press Freedom on Bank Runs, Crisis, and Default Risks

A joint empirical study of Benov and Semenova (2021) investigated the role of media freedom on the bank runs where they claimed that

at the time of financial crisis, a depositor behavior is mainly shaped by the information environment created by media. In the view of this, it has been assumed that the efficiency and performance of the banks during financial turmoil depends on the volume of negative news in the economy. The authors found out that if there is no restriction on the flow of negative information, the probability of bank runs, and default risk will grow because of the sensitivity of depositors. The main empirical outcomes revealed that there is no direct effect of the change in the degree of media freedom on the behavioral strategies of the retail depositors during financial crisis. They also found out that restricting media freedom may improve market discipline as well as eliminate financial literacy effect from dilution.

In another study, Pyle et al. (2012) analyzed the behavior of depositors in Russia after financial crisis. The authors figured out that severe runs to Sberbank were observed in regions with higher degrees of media freedom and less educated population whose majority is young and lives closer to Moscow. They also defined that education plays a significant role on the differences in propensity to successfully withdraw deposits. Empirical study by Dergiades et al. (2014) questioned whether information released in social media channels such as Twitter, Facebook, and Google blogs, influence the financial markets. The results manifested that news on media had a strong predictive power for Greek debt crisis in addition to influencing German and Irish government bond yields. Based on a panel data analysis, Pal et al. (2011) identified that media freedom burgeons economic growth and development through domestic investment channel by making the government to act in the interest of people. It has been found out that free media promotes socio-political stability that later results in productive investment environment, favorable business climate.

Dim et al. (2022) developed a sovereign default risk index using natural language processing techniques. It has been defined that the countries with tighter fiscal constraints are more prone to the news-implied sovereign default risks. Dyck and Zingales (2002) discussed the role of media in corporate governance. The authors verified the significant role of the media on the companies' environmental policy and the amount of corporate resources they allocate to control for the shareholders.

2.2. Factors Leading to Bank Runs, Crisis, and Default Risks

In examining the relationship between default risk and efficiency in Islamic and conventional banks, Saeed and Izzeldin (2014) showed that the decrease in default risks is associated with the lower efficiency levels and there is strong evidence on the trade-off between efficiency and risk. Yu (2016) studied the effect of political factors on sovereign default and testified that political instability and sovereign default risk are positively correlated. The results of panel logit model demonstrated that countries with relatively younger political regime, higher political turnover, and lack of democratic political system confront with higher default risks. Chortareas et al. (2012) examined the dynamics between financial freedom and bank efficiency levels. The empirical outcomes of the data envelopment analysis revealed that higher the financial freedom in an economy, more efficient the banking system will be

due to the cost advantage. Furfine and Rosen (2009) asseverated that the mergers increase the default risk in the banking system even though they are found to improve the asset diversification. The authors claimed that aggressive managerial actions outperform strong risk-reducing asset diversification, which triggers higher default risk in the bank.

Kabir et al. (2021) investigated the role of carbon emission on the firm's default risk. The authors found significant evidence to verify the negative impact of the carbon emission on the distance-to-default risk of the firms. Kwaak and Wijnbergen (2014) analyzed financial fragility and sovereign default based on the DSGE model where they reflected that there is a less favorable impact of macroeconomic effects of bank recaps on the recovery after a financial crisis. Soedarmono et al. (2014) examined whether Asian banks are prone to the moral hazard issue after the financial crisis of 1997. It turned out that higher economic growth triggers higher risk taking and instability in the less competitive markets of Asia. Pascual et al. (2013) investigated the role of macroeconomic indicators on the bank risks in the case of commercial banks of EU. The estimation results revealed that capitalization, profitability, efficiency, and liquidity are negatively related to bank risk taking.

In analyzing factors which increase the bank debt, Navarro-Galera et al. (2017) defined that certain set of political indicators such as a low percentage of women councilors, a left-wing ideology and ideological alignment with the regional government are what increases the default risk of the government. Konishi and Yasuda (2004) examined the determinants of risk-taking at the commercial banks of Japan. Estimation results revealed that implementation of the capital adequacy requirement declines the bank-risk taking. It has also been found out that the relationship between stable shareholders' ownership and bank risk is non-linear. Boot et al. (1991) examined secure lending with moral hazard and private information. The results of the study demonstrated that higher collateral can be associated with either safer or riskier borrowers. They have also defined that borrower risk is endogenous. Anginer et al. (2017) studied association between the default risk of foreign bank subsidiaries and their parents during the global financial crisis and defined that there is highly statistically significant association. It turned out that subsidiaries with higher capital, retail deposit funding, and profitability ratios and that are more independent are less prone to the risk.

Kotiso (2018) scrutinized the factors triggering bank default risk in the Ethiopian Commercial banks. Based on the empirical analysis, it has been found out that leverage, operating inefficiency and loan growth have a positive statistically significant relationship with default risk. Kavussanos and Tsouknidis (2016) determined that risk appetite of borrowers and global shipping freight markets have a strong explanatory power in explaining default probabilities of bank loans. Godlewski (2004) investigated regulatory and institutional factors that he believed that contributes to the default risk. Estimation outcomes manifested that institutional and regulatory environment increases bank failure risks. Breig and Elsas (2009) questioned whether the impact of default risk on equity returns depends on the financial system in which they operate. Results of the asset price comparisons revealed that higher

default risk of the firm yields lower returns in the capital markets. Wang, Chiu, and Peña examined the role of the rollover risk on the risk of default in the bank financing based on the comprehensive database of the US. The main assumption of the study was that the dependence on the bank financing is the key driver behind the effect of rollover risk on the default risk for a firm. The results demonstrated that the effect of rollover risk on firm default is higher at the times of tighter credit market conditions.

Puspitasari et al. (2020) aimed at defining the risk for sustainable management of foreign exchange banks in the case of Indonesia. The estimation results manifested that the macroeconomic indicators are what affect the risk for sustainable management in the foreign exchange banks of Indonesia. Additionally, it has been defined that non-performing loan, credit quality, capital requirement, interest rate and inflation have also strong explanatory power in foreign exchange bank risk. In a separate study, Puspitasari et al. (2021) defined that risk management and capital adequacy requirements are needed to ensure that banks can resist against risks. Allen and Powell (2010) applied KMV/Merton structural methodology to investigate the default probabilities of the Australian banking system. It turned out that during the Global Financial Crisis, the Australian banking system encountered extreme deterioration in the market values of assets even though they performed well in credit ratings and capitalization compared to their global counterparts. Frühwirth and Sögner (2007) estimated default intensities for German bank and corporate bond prices and found out that level of the default-free term structure and liquidity proxies are the two main indicators affecting default intensity.

Switzer and Wang (2013) investigated the relationship between credit risks of banks and the corporate governance structures of these banks from the standpoint of creditors. The estimation results revealed that commercial banks with larger boards and older CFOs have lower credit risk levels. Vallascas and Hagendorff (2012) investigated the relationship between incentive mechanism behind CEO cash bonuses and bank risk taking. The study could not find strong evidence for providing risk-reducing effect when banks confront with weak regulation and financial distress. Bolton and Jeanne (2011) investigated contagious sovereign debt crises in financially integrated economies and defined that the banks efficiently diversify their holdings of sovereign debt with respect to the individual country's sovereign debt default under the financial integration. Chen and Du (2020) found out that higher informative disclosure leads to an improvement in ex-ante risk sharing. Another intriguing firm-level study conducted by Dang et al. (2019) discovered that firms which appear more often in the news with more positive news tone are more likely to move back to their target debt level (which is about how much borrowing vs equity they want to hold). The authors figured out that there are two main channels through which media coverage help firms in attaining this goal, which turned out to be information dissemination and monitoring effect. More news coverage as a form of information dissemination enables firm to remain more transparent, making the financing process easier and cheaper. Monitoring effect, on the other hand, results in early and timely notice of the poor financial decisions.

As can be perceived from the review of prevailing literature on the role of media and press freedom as well as factors triggering bank default risks, there is a very limited number of studies which have investigated the role of press freedom on bank default risk across country groups based on their income and development levels, availability of natural resources whose price volatility plays an indispensable role in resource-rich economies, and financial development indexes. The literature also bypasses whether this is good news or bad news that affect the bank default risk. These are the main gaps in the literature that is addressed by this empirical study based on panel data analysis which considers the following hypotheses as well.

- Countries with more press and media freedom have more volatility in the financial system
- Countries with more financial freedom are less likely to experience bank default risk
- The effect of financial literacy on the bank default risk is lower in high income economies, while the opposite is true for the lower income countries
- Bad news has a dominant effect on the probability of a bank default risk in comparison to the effect of good news for the low income economies, while the opposite is true for the high income countries.

3. DATA ANALYSIS

The data used for the study has a panel structure comprising to 128 countries that are being analyzed for 2002-2022-time interval. The countries are grouped based on the income levels, availability of natural resources, and geographical characteristics. In terms of income, they are grouped as upper income economies, lower income economies, middle income economies, advanced economies, developing economies, and emerging economies. For the resource richness, oil, natural gas, coal, copper, and iron countries are defined. As a matter of geographical characteristics, countries are grouped into North Europe, South Europe, Central Europe, Balkans, West Europe, Eastern Europe, Africa, Latin America, America, MENA, CIS, EEAC, and Asia Pacific.

During the global financial crisis (GFC), the failure of the large banks put the small banks into jeopardy, which is another way of saying that systemic risk emerged. Thus, financial institutions diversified, and, thus, ended up with a very similar portfolio. This is how they become interdependent at the time of financial crisis. Analyzing systemic risks through accounting data is the most desirable, however, it is not available for small banks and the data is rarely publicly available. Considering that data needed to calculate banking z-score is publicly available and the methodology is not sophisticated, it became widely used in academia as well. Thus, the dependent variable used for the bank default risk in this study is banking Z-score which is obtained from the Bankscope for all countries. Li et al. (2017) suggested that bank risks can also be measured through the ratio of non-performing loans to total assets. Banking Z-score is calculated based on the following equation such that higher the value of z-score is, greater the banking stability will be.

$$Z - score_{i,t} = \frac{ROA_{i,t} + \dfrac{Equity_{i,t}}{Assets_{i,t}}}{\sigma(ROA_{i,t})} \tag{1}$$

Independent variables, their definition, and methodology through which they have been collected are grouped as following.

3.1. Press and Media Freedom

The first variable proxied for the press and media freedom is World Press Freedom Index whose preliminary objective is to inspect press freedom journalists and media can enjoy in 180 countries. Calculated based on quantitative tally of abuses and qualitative analysis of the situation, the scores for world press freedom index ranges between 0 and 100 with 0 being the worst and 100 being the most desired outcome. The scores are classified into good (85-100 points), satisfactory (70-85 points), problematic (55-70 points), difficult (40-55 points), and very serious (0-40 points). Another variable to be proxied for media freedom is Freedom House Index for Media Freedom. Based on the evaluation of legal environment, political pressures, and economic factors, the countries with a score from 0 to 30 are defined as "free," from 31 to 60 are named as "partly free," and from 61 to 100 are identified as "not free."

3.2. Financial Development Indicators

Financial Development Indicators concerns how developed the financial markets and institutions are in terms of efficiency, depth, and access based on which sub-indices are named as financial institutions access index, financial institutions depth index, financial institutions efficiency index, financial markets access index, financial markets depth index, and financial markets efficiency index. Starting with the depth of the financial institutions, it concerns private sector credit to GDP, pension fund assets to GDP, mutual fund assets to GDP, and Insurance premiums, life and non-life to GDP indicators. Bank branches per 100,000 adults and ATMs per 100,000 adults are used as proxies for the financial institutions access. Financial institutions efficiency relies on the net interest margin, lending-deposits spread, non-interest income to total income, overhead costs to total assets, return on assets, and return on equity indicators. Coming to the financial markets depth, it depends on stock market capitalization to GDP, stocks traded to GDP, international debt securities of government to GDP, total debt securities of financial corporations to GDP, and total debt securities of nonfinancial corporations to GDP. Percent of market capitalization outside of top 10 largest companies and total number of issuers of debt are what determines financial markets access. Finally, stock market turnover ratio indicates financial markets efficiency.

3.3. Worldwide Governance Indicators (WGI)

Based on the views of numerous enterprises, citizens, and experts survey responses, WGI is measured for over 200 countries according to the six dimensions of the governance that are defined as voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption. Voice and accountability stands for the degree to which the citizens of a particular country are free to participate in selecting their government. It also signifies free media, freedom of expression, and freedom of association. Political Stability and Absence of Violence/Terrorism denotes likelihood of destabilizing government through politically-motivated violence and terrorism. Government effectiveness describes the degree by which public services are independent from political pressures. Regulatory quality captures an ability of the government to design policies to promote private sector enhancement. Rule of Law manifests an extent to which people have confidence in property rights, the police, and the courts. Finally, the Control of Corruption measures the degree by which the public power is developed for private gain so as petty and grand forms of corruption.

3.4. The Other Explanatory Variables

Government Integrity-systemic corruption of government institutions triggers the lack of government integrity that, in turns, increase economic cost as it deteriorates public trust and economic vitality. Government integrity is measured by averaging perceptions of corruption, risk of bribery, and control of corruption.

Financial Freedom Index-stands for the degree by which government can manipulate credit allocation, openness to foreign competition, and intervene in banks, and how much the government can regulate the financial services. The higher the value of index is, more efficient and independent the banks will be.

Education Index- is a component of Human Development Index provided by the United Nations Development Program and reflects educational attainment. Being a key component of well-being, education defines whether the country is developed, developing, and underdeveloped. An education index of a country is calculated based on the following formula in which EYS denotes expected years of schooling and MYS stands for the mean years of schooling.

$$EI = \frac{\dfrac{EYS}{18} + \dfrac{MYS}{15}}{2} \tag{2}$$

4. METHODOLOGY

This section of the study covers models selected for the panel data analysis where the estimation methods of Arellano-Bond, Blinder-Oaxaca Decomposition, and Threshold ARCH are discussed.

4.1. Arellano-Bond Dynamic Panel Data Analysis

This study refers to the Arellano-Bond Dynamic Panel Data analysis to study the role of press freedom on the bank default risks across different country groups that are defined based on the income levels, resource richness, and geographic characteristics. The dependent variables are Banking Z-score, Liquid Assets to Deposits Ratio, and the Ratio of Non-Performing Loans to Total Loans. The proxies for the media freedom are Press Freedom Index obtained from the World Bank and Freedom House Index for Media Freedom. Considering that the Press Freedom Index is defined by independent press, the Voice and Accountability is used as a proxy for the Press Freedom Index. As discussed in

Data section of this study, the net interest margin, lending-deposits spread, non-interest income to total income, overhead costs to total assets, return on assets, and return on equity are the indicators defining financial institutions efficiency. With this in mind, I used ROA, ROE, non-interest income to total income, and net interest margin as IVs for the financial institutions efficiency to eradicate a potential endogeneity problem. Thus, the regression equation becomes as follows in which $\sum FDI_{i,t}$ stands for the set of selected Financial Development Indicators that are Financial Development Index, Financial Institutions Depth Index, Financial Institutions Efficiency Index, Financial Markets Depth Index, Financial Markets Efficiency Index. $\sum WGI_{i,t}$ denotes the set of Worldwide Governance Indicators that are Government Effectiveness, Rule of Law, Regulatory Quality, Political Stability and Absence of Violence, and Control of Corruption. $\sum_{i,t}$ depicts the set of interaction terms to account for the nonlinearities.

$$Zscore_{i,t} = \alpha_0 + \alpha_1 PFI_{i,t} + \alpha_2 \sum FinDevInd_{i,t} + \alpha_3 \sum WGI_{i,t}$$
$$+\alpha_4 \bar{\pi}_{i,t} + \alpha_5 \bar{y}_{i,t} + \alpha_6 \log(IndUI)_{i,t} + \alpha_7 EducIndex_{i,t}$$
$$+\alpha_8 GIS_{i,t} + \alpha_9 FinFreed_{i,t} + \alpha_{10} \sum X_{i,t} + \varepsilon_{i,t}$$
(3)

The preliminary objective in including dummies it to manifest the estimation results of equation (3) for different countries that are grouped based on income levels, availability of natural resources, and geographical groups to see whether there are any differences in terms of the effect of press freedom on bank default risk across countries or not.

4.2. Blinder-Oaxaca Decomposition for Panel Data Analysis

To study for the factors leading to the differences in the role of press freedom on bank default risks across countries, the Blinder-Oaxaca Decomposition is applied based on the panel data analysis. The corresponding equation is formulated as follows where the first part is named "endowment effects," the second part is called "contribution of differences in coefficients," and the third part is defined as "interactions" which accounts for the simultaneous existence of the differences between endowments and coefficients.

$$R = [E(X_A)-E(X_B)]' (\beta_B) + E(X_B)' [\beta_A-\beta_B] + [E(X_A)-E(X_B)]' (\beta_A-\beta_B)$$
(4)

Thus, equations for two groups will be as given below:

$$Zscore_{i,t}^{G_1} = \alpha_0^{G_1} + \alpha_1^{G_1} PFI_{i,t}^{G_1} + \alpha_2^{G_1} \sum FinDevInd_{i,t}^{G_1}$$
$$+\alpha_3^{G_1} \sum WGI_{i,t}^{G_1} + \alpha_4^{G_1} \bar{\pi}_{i,t}^{G_1} + \alpha_5^{G_1} \bar{y}_{i,t}^{G_1}$$
$$+\alpha_6^{G_1} IndUsingInt_{i,t}^{G_1} + \alpha_7^{G_1} EducIndex_{i,t}^{G_1}$$
$$+\alpha_8^{G_1} GIS_{i,t}^{G_1} + \alpha_9^{G_1} FinFreed_{i,t}^{G_1}$$
$$+\alpha_{10}^{G_1} \sum X_{i,t}^{G_1} + \varepsilon_{i,t}^{G_1}$$
(5)

$$Zscore_{i,t}^{G_2} = \alpha_0^{G_2} + \alpha_1^{G_2} PFI_{i,t}^{G_2} + \alpha_2^{G_2} \sum FinDevInd_{i,t}^{G_2}$$
$$+\alpha_3^{G_2} \sum WGI_{i,t}^{G_2} + \alpha_4^{G_2} \bar{\pi}_{i,t}^{G_2} + \alpha_5^{G_2} \bar{y}_{i,t}^{G_2}$$
$$+\alpha_6^{G_2} IndUsingInt_{i,t}^{G_2} + \alpha_7^{G_2} EducIndex_{i,t}^{G_2}$$
$$+\alpha_8^{G_2} GIS_{i,t}^{G_2} + \alpha_9^{G_2} FinFreed_{i,t}^{G_2}$$
$$+\alpha_{10}^{G_2} \sum X_{i,t}^{G_2} + \varepsilon_{i,t}^{G_2}$$
(6)

4.3. Panel Threshold ARCH Model (TARCH)

The models introduced above can help to detect whether the press freedom has an effect on bank default risk for the whole sample and some clusters or not. To define which type of news, good or bad one, has a dominant effect, Threshold ARCH model has to be used. Being another generalization of the GARCH model, Threshold ARCH treats positive and negative news asymmetrically. The general demonstration of the TARCH model, which is also depicted in Figure 1, looks as follows:

$$\sigma_t^2 = \alpha_0 + \alpha_1 u_{t-1}^2 + \lambda d_{t-1} u_{t-1}^2 + \beta_1 \sigma_{t-1}^2$$
(7)

Where $d_{t-1} = \begin{cases} 1, if \ u_{t-1} > 0 \\ 0, if \ u_{t-1} \leq 0 \end{cases}$

Such that, $d_{t-1} = 1$ and $u_{t-1} > 0$, then $\frac{\delta\sigma_t^2}{\delta u_{t-1}^2} = \alpha_1 + \lambda$ => good news

$d_{t-1} = 0$ and $u_{t-1} \leq 0$, then $\frac{\delta\sigma_t^2}{\delta u_{t-1}^2} = \alpha_1$ => bad news

Glosten et al. (1993) and Zakoian (1994) introduced TARCH model to simulate "leverage effect" in financial markets whose variance equation looked like as follows where $\gamma_j D_{t-j} \varepsilon_{t-j}^2$ is the TARCH term, and when $\sum_{j=1}^{q} \gamma_j = 0$, there is an asymmetric effect, while there is no asymmetric effect if $\sum_{j=1}^{q} \gamma_j \neq 0$.

$$h_t = \sigma_t^2 = \alpha_0 + \sum_{i=1}^{p} \beta_i h_{t-i} + \sum_{j=1}^{q} (\alpha_j \varepsilon_{t-j}^2 + \gamma_j D_{t-j} \varepsilon_{t-j}^2)$$
(8)

Figure 1: News-response function
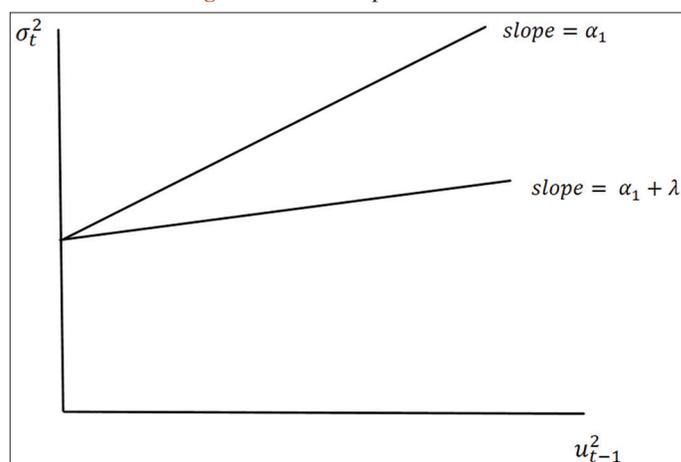
- $\sum_{j=1}^{q} \gamma_j > 0$ suggests positive asymmetric effect which implies that emergence of a bad news has a greater negative impact than that of good news
- $\sum_{j=1}^{q} \gamma_j < 0$ suggests negative asymmetric effect which implies that emergence of a good news has a larger shock
- $\varepsilon_{t-j} < 0 => D_{t-j} = 1$ which suggests that bad news has occurred
- $\varepsilon_{t-j} > 0 => D_{t-j} = 0$ which suggests that good news has occurred
- D_{t-j} depicts a dummy variable
- Good news has an α shock and bad news has an $\alpha + \gamma$ shock

With this in mind, the TARCH model of this study becomes the following:

$$Zscore_{i,t} = \alpha_0 + \alpha_1 \Delta PFI_{i,t} + \alpha_2 \Delta \log (IndUI)_{i,t} + \alpha_3 \Delta EducIndex_{i,t} + \alpha_4 \Delta Educindex_{i,t} \Delta PFI_{i,t} + \alpha_4 \Delta Educindex_{i,t} \Delta \log (IndUI)_{i,t} + \varepsilon_{i,t}$$
(9)

4.4. Robustness Test - Additional Dependent Variables
The following equations are used to study whether the results in equation (3) change as the dependent variable changes or not. In other words, the consistency of the signs as well as the magnitude of the estimated coefficients are tested by using the log of the Liquid Assets to Deposits Ratio and log of Non-performing Loans to Total Loans.

$$\log(LAD)_{i,t} = \alpha_0 + \alpha_1 PFI_{i,t} + \alpha_2 \sum FinDevInd_{i,t} + \alpha_3 \sum WGI_{i,t} + \alpha_4 \bar{\pi}_{i,t} + \alpha_5 \bar{y}_{i,t} + \alpha_6 IndUsingInt_{i,t} + \alpha_7 EducIndex_{i,t} + \alpha_8 GIS_{i,t} + \alpha_9 FinFreed_{i,t} + \alpha_{10} \sum X_{i,t} + \varepsilon_{i,t}$$
(10)

$$\log(NPTL)_{i,t} = \alpha_0 + \alpha_1 PFI_{i,t} + \alpha_2 \sum FinDevInd_{i,t} + \alpha_3 \sum WGI_{i,t} + \alpha_4 \bar{\pi}_{i,t} + \alpha_5 \bar{y}_{i,t} + \alpha_6 IndUsingInt_{i,t} + \alpha_7 EducIndex_{i,t} + \alpha_8 GIS_{i,t} + \alpha_9 FinFreed_{i,t} + \alpha_{10} \sum X_{i,t} + \varepsilon_{i,t}$$
(11)

5. RESULTS

5.1. Dynamic Panel Data Analysis
The estimation results of the random effect panel data analysis are demonstrated in Tables 1-5 for Full sample, America, Africa, Latin America, CIS, MENA, Asia Pacific, Central Asia, Northern Europe, Southern Europe, Eastern Europe, Western Europe, Central Europe, Balkans, Resource Rich Economies, Higher

Table 1: Random effects for full sample, North America, Latin America, and Africa

Variables	Full sample		North America		Latin America		Africa	
	Coefficients	Standard error	Coefficients	Standard error	Coefficients	Standard error	Coefficients	Standard error
$PFI_{i,t}$	−0.075***	0.020	−0.073	0.080	−0.241***	0.072	0.050	0.030
$FinDevInd_{i,t}$	0.003	0.004	8.69	7.14	2.54	2.53	−12.48**	4.96
$PSV_{i,t}$	−0.122	0.293	−5.97***	1.60	4.60***	0.646	0.90*	0.468
$GE_{i,t}$	−0.622	0.643	−9.42***	2.33	−8.74***	1.29	0.563	1.05
$RQ_{i,t}$	0.868	0.625	12.38***	2.35	8.91***	1.14	3.71***	1.10
$RL_{i,t}$	−1.40*	0.777	13.10***	2.34	1.84	1.43	−0.323	1.10
$CC_{i,t}$	0.560	0.649	−10.8***	1.80	−5.40***	1.30	0.678	0.980
$\bar{y}_{i,t}$	0.030*	0.016	0.381***	0.112	0.17**	0.075	0.094***	0.028
$\bar{\pi}_{i,t}$	−0.011***	0.004	0.0006	0.010	−0.007	0.005	−0.005	0.024
$\log (IndUI)_{i,t}$	1.73***	0.330	0.863	3.70	9.50***	2.21	−0.296	0.478
$EducIndex_{i,t}$	7.10**	3.50	−73.3***	15.6	−26.1***	9.30	−8.95	6.31
$GIS_{i,t}$	0.030	0.017	−0.010	0.071	0.064	0.050	0.020	0.024
$FinFreed_{i,t}$	0.050**	0.020	0.030	0.117	0.20**	0.071	−0.010	0.028
$EducIndex_{i,t} * \log (IndUI)_{i,t}$	−1.50***	0.546	14.90***	5.10	−5.43*	3.28	1.92*	1.04
$FinFreed_{i,t} * \log (IndUI)_{i,t}$	−0.011*	0.010	−0.10*	0.040	−0.10***	0.023	0.013	0.010
$EducIndex_{i,t} * PFI_{i,t}$	0.139***	0.021	0.040	0.105	0.356***	0.109	−0.091	0.10
α_0	5.42**	2.32	36.42***	11.40	15.05**	6.39	18.81***	3.32
N	1926		160		251		310	
R²-within	0.1391		0.2071		0.0776		0.3560	
R²-between	0.0040		0.8739		0.8774		0.0018	
R²-overall	0.0141		0.7301		0.6937		0.0041	
Wald X^2	282.99***		386.78***		529.84***		144.88***	
Probability of X^2	0.0000		0.0000		0.0000		0.0000	
σ_u	8.20		0		0		6.32	
σ_e	3.53		2.44		2.10		1.90	
ρ	0.84		0		0		0.91	

***P<0.01; **P<0.05; *P<0.1

Income Economies, Upper Middle-Income Economies, Lower Middle-Income Economies, and Lower Income Economies. The results of fisher-type unit-root test based on augmented dicky-fuller test can be found in Table A1.

Associated coefficients of the Press Freedom Index denoted by $PFI_{i,t}$ for country i and time t reveal that for the full sample in general, higher press freedom index declines the probability of bank default risk for the countries by approximately 0.075 points and the effect is highly statistically significant even though the magnitude is extremely small. It turns out that press freedom does not affect the probability of bank default risk on its own in the case of America and Africa, while it significantly deteriorates the default risk in Latin America. The coefficient suggests that Financial Development Index does not have a significant explanatory power for the full sample, yet it suggests that countries with higher financial development tend to have less bank default risk in Africa region.

Advancing to the effects of worldwide governance indicators (WGI), all of them except Rule of Law have a significant explanatory power for Latin America such that Government effectiveness and control of Corruption declines the default probability, whereas regulatory quality and political stability and absence of violence intensifies default risk for banks in the aforementioned region. It also turns out that Regulatory Quality increases default risk for Africa and America regions.

Coming to the selected macroeconomic indicators, higher GDP growth rate leads to higher bank default risk for Africa and Latin America, while it does not have a significant effect for the full sample and America. A negative coefficient of the inflation growth manifests that increase in prices declines the default risk by 0.011 for countries in the sample. The results also demonstrate that countries with higher financial freedom will have higher bank default risk in the sample and Latin America.

Estimated coefficient of the logarithmic transformation for Individuals Using Internet shows that 1% increase in the number of people having access to internet increases the default risk for full sample, America, and Latin America, while its effect is insignificant for Africa. This result was expected as countries in Africa region usually have limited access to the internet which suggests that press freedom cannot influence people. This can also be seen from the coefficients of the interaction terms. Additionally, countries with higher education index turn out to have higher default risk in the sample, while the opposite is true for the Latin American region.

Coefficient of the interaction terms between education and press freedom index manifest that in Latin America region, countries with higher education index will observe higher default risk as the press freedom expands, which is also true for the full sample. On the other hand, in countries with higher financial freedom, an increase in the number of people using internet will diminish the default risk and the same is true for the interaction between

Table 2: Random effects for CIS, MENA, Asia Pacific, and Central Asia

Variables	CIS		MENA		Asia Pacific		Central Asia	
	Coefficients	Standard error	Coefficients	Standard error	Coefficients	Standard error	Coefficients	Standard error
$PFI_{i,t}$	−0.422	0.310	0.010	0.174	−0.10	0.050	−0.510	0.861
$FinDevInd_{i,t}$	−3.14	3.60	2.11	10.70	−2.35	5.03	73.80***	23.62
$PSV_{i,t}$	1.50*	0.782	1.49	1.23	0.83	0.892	−3.69	2.70
$GE_{i,t}$	−2.50	1.94	4.79	3.92	−2.30	2.04	−2.25	6.56
$RQ_{i,t}$	8.43***	1.65	−0.501	3.87	−2.21	1.60	9.93	4.30
$RL_{i,t}$	−15.11***	2.40	−10.20**	4.38	−1.52	2.70	8.91	6.52
$CC_{i,t}$	12.60***	2.60	6.035	4.14	1.23	1.88	7.91	8.47
$\bar{y}_{i,t}$	−0.135**	0.070	0.010	0.070	−0.07	0.110	−0.434	0.276
$\bar{\pi}_{i,t}$	−0.044	0.039	0.060	0.18	0.10	0.072	0.230	0.171
$\log{(IndUI)}_{i,t}$	−7.33	4.52	10.00***	2.97	−0.75	0.934	40.85***	14.60
$EducIndex_{i,t}$	−107.5***	27.45	57.10***	21.06	−18.84*	11.25	−137.42*	76.45
$GIS_{i,t}$	−0.040	0.080	−0.261**	0.122	0.10*	0.052	−0.010	0.212
$FinFreed_{i,t}$	0.092	0.061	0.566***	0.186	0.071	0.050	−0.408**	0.171
$EducIndex_{i,t} * \log{(IndUI)}_{i,t}$	13.14**	6.50	−13.24**	5.80	7.49***	2.30	−55.30**	22.56
$FinFreed_{i,t} * \log{(IndUI)}_{i,t}$	−0.05***	0.020	−0.10*	0.052	−0.03**	0.013	0.10	0.10
$EducIndex_{i,t} * PFI_{i,t}$	0.627	0.430	0.028	0.282	0.12*	0.062	0.685	1.20
α_0	85.99***	20.10	−18.09	13.08	14.39**	6.36	127.12***	48.03
N	166		245		299		81	
R^2-within	0.1240		0.0044		0.3093		0.1286	
R^2-between	0.5957		0.3471		0.2194		0.8867	
R^2-overall	0.4252		0.1591		0.2002		0.7276	
Wald X^2	110.23***		43.12***		118.34***		170.97***	
Probability of X^2	0.0000		0.0000		0.0000		0.0000	
σ_u	0		0		5.34		0	
σ_e	1.66		4.12		3.51		2.72	
ρ	0		0		0.70		0	

***P<0.01; **P<0.05; *P<0.1

Table 3: Random effects for Northern, Southern, Eastern, and Western Europe

Variables	Northern Europe		Southern Europe		Eastern Europe		Western Europe	
	Coefficients	Standard error	Coefficients	Standard error	Coefficients	Standard error	Coefficients	Standard error
$PFI_{i,t}$	0.295	0.429	0.164	0.510	0.114	0.147	0.424	0.319
$FinDevInd_{i,t}$	46.60***	15.13	−41.32***	10.27	−1.02	2.64	4.94	13.24
$PSV_{i,t}$	−15.35***	5.66	1.11	2.80	3.00***	0.530	5.70**	2.82
$GE_{i,t}$	−26.59***	7.97	1.25	3.05	−0.261	1.55	3.90	4.40
$RQ_{i,t}$	18.32**	7.14	7.06*	3.77	1.03	1.85	3.04	5.97
$RL_{i,t}$	−46.98***	12.54	1.45	5.49	−7.41***	2.19	−21.4***	7.09
$CC_{i,t}$	2.80	8.81	−9.50**	3.78	6.77***	1.40	16.94***	5.45
$\bar{y}_{i,t}$	0.021	0.283	0.604**	0.234	0.080*	0.041	0.034	0.194
$\bar{\pi}_{i,t}$	−0.534	0.421	−0.881	0.589	−0.006	0.020	0.664	0.565
$\log(IndUI)_{i,t}$	291.40	234.81	74.68*	43.57	−28.32***	6.51	−49.73	67.30
$EducIndex_{i,t}$	1860.8	1153.5	391.92	259.81	−156.2***	26.60	−574.9	450.0
$GIS_{i,t}$	0.040	0.247	−0.023	0.145	−0.123***	0.042	−0.254	0.156
$FinFreed_{i,t}$	−1.59	2.86	0.340	0.860	−0.103	0.084	1.32	1.33
$EducIndex_{i,t} * \log(IndUI)_{i,t}$	−420.1	258.7	−93.80	66.14	38.46***	8.64	100.2	102.49
$FinFreed_{i,t} * \log(IndUI)_{i,t}$	0.380	0.644	−0.083	0.225	0.010	0.021	−0.320	0.319
$EducIndex_{i,t} * PFI_{i,t}$	−0.239	0.490	−0.294	0.683	−0.122	0.172	−0.351	0.378
α_0	−1189.9	1045.5	266.88	173.34	130.9***	19.90	354.3	297.5
N	102		64		15		101	
R^2-within	0.4168		0.3092		0.2824		0.3025	
R^2-between	0.9882		0.9999		0.9674		0.9895	
R^2-overall	0.7228		0.8868		0.8019		0.7583	
Wald X^2	221.59***		367.41***		392.62***		263.57***	
Probability of X^2	0.0000		0.0000		0.0000		0.0000	
σ_u	0		0		0		0	
σ_e	5.99		2.87		1.46		4.76	
ρ	0		0		0		0	

***P<0.01; **P<0.05; *P<0.1

education index and log of the number of people using internet.

Table 2 depicts the results for the same model where CIS, MENA, Asia Pacific, and Central Asia can be compared. It seems from the associated coefficient that the role of press freedom index on the bank default risk is not statistically significant for the CIS, MENA, Asia Pacific, and Central Asia, which is the same for the effect of Financial Development Index except for the Central Asian countries. World Governance Indicators have significant explanatory power for the bank default risk in the CIS region, whereas the bank default risk in MENA, Asia Pacific, and Central Asia is not affected by these indicators.

Countries, namely in MENA and Central Asia, with individual having more access to internet have higher bank default risk. The role of Education Index is statistically significant for the CIS and MENA where the effect on the bank default risk is negative and positive respectively. Countries with more financial freedom in Central Asia are defined to have more bank default risk, while the opposite is true for the MENA. Countries in CIS and Asia Pacific which have higher Education Index and number of people having access to internet suffer from higher bank default risk, while the opposite is observed in MENA and Central Asia. Interestingly, an interaction of financial freedom and individuals using internet declines the default risk in the CIS and Asia Pacific. Countries with higher Government Integrity Score will have lower bank default risk in the MENA region.

Table 3 depicts the results for four different regions of Europe, which is Northern, Southern, Eastern, and Western. The effect of Press Freedom Index is found to be insignificant to determine the bank default risk in those regions. In the Northern Europe, countries with higher Financial Development Index tend to have higher bank default risk, which is an opposite of what we found for Southern Europe. World Governance Indicators play a significant role for the bank default and all of them has a negative coefficient for the countries in Northern Europe. Only the Rule of Law, Control of Corruption, and Political Stability and Absence of Violence have significant effects for Eastern and Western Europe.

Surprisingly, higher Political Stability and Access of Violence increases the bank default risk for countries in Eastern and Western Europe. Additionally, it has been found out that countries with higher Education Index and people using internet will have higher default risk in the Eastern Europe even though higher Education Index and number of people using internet negatively affects the bank default risk in this region. Countries with higher Government Integrity Score are defined to have lower probability of bank default risk in Eastern Europe.

Table 4 manifests the results of the same model for high, upper-middle, lower-middle-, and low-income countries where it seems that higher press freedom declines the bank default risk for the upper and upper middle-income countries. Lower Middle-Income countries with higher Financial Development Indicator are found

Table 4: Random effects for high, upper-middle, lower-middle, and low-income economies

Variables	High-income economies		Upper middle-income economies		Lower middle-income economies		Low-income economies	
	Coefficients	Standard error	Coefficients	Standard error	Coefficients	Standard error	Coefficients	Standard error
$PFI_{i,t}$	−0.107**	0.050	−0.133***	0.058	−040	0.043	0.137*	0.075
$FinDevInd_{i,t}$	2.36	3.15	0.002	0.010	−12.8***	4.69	35.11***	10.41
$PSV_{i,t}$	−1.90**	0.80	−0.99*	0.514	1.14**	0.50	−0.424	0.839
$GE_{i,t}$	−1.59	1.25	−0.40	1.23	1.99	1.21	3.79	2.26
$RQ_{i,t}$	1.92	1.32	1.71	1.10	−12.78	1.11	6.40***	2.40
$RL_{i,t}$	−1.13	1.72	0.80	1.44	−1.38	1.42	−9.65***	2.22
$CC_{i,t}$	1.61	1.23	−2.10*	1.20	1.71	1.26	−0.316	1.71
$\bar{y}_{i,t}$	0.081*	0.050	0.012	0.018	−0.05	0.10	0.152**	0.100
$\bar{\pi}_{i,t}$	−0.030	0.070	−0.010	0.004	−0.030	0.034	0.284***	0.100
$\log (IndUI)_{i,t}$	4.40**	1.99	6.60***	1.60	0.704	0.676	−0.375	1.50
$EducIndex_{i,t}$	29.22**	11.57	23.34***	7.81	3.44	7.12	31.65***	8.40
$GIS_{i,t}$	−0.007	0.033	0.092***	0.033	0.02	0.035	0.029	0.057
$FinFreed_{i,t}$	0.227**	0.10	0.034	0.038	0.039	0.031	0.086	0.063
$EducIndex_{i,t} * \log (IndUI)_{i,t}$	−3.19*	1.88	−7.90***	2.25	−0.97	1.10	−0.245	3.84
$FinFreed_{i,t} * \log (IndUI)_{i,t}$	−0.060**	0.025	−0.014	0.011	0.013	0.009	0.031	0.023
$EducIndex_{i,t} * PFI_{i,t}$	0.20***	0.10	0.173**	0.086	0.081	0.10	−33*	0.182
α_0	−16.74*	9.01	−5.75	5.67	13.42***	4.51	−9.64*	5.35
N	731		590		481		153	
R^2-within	0.2320		0.1105		0.1742		0.1337	
R^2-between	0.0142		0.0206		0.0102		0.9000	
R^2-overall	0.0536		0.0004		0.0265		0.5503	
Wald X^2	200.33***		64.43***		88.15***		166.40***	
Probability of X^2	0.000		0.0000		0.0000		0.0000	
σ_u	8.03		10.90		7.23		0	
σ_e	3.84		3.27		3.35		1.91	
ρ	0.81		0.91		0.82		0	

***P<0.01; **P<0.05; *P<0.1

to have lower bank default risk, while the opposite is true for the low-income economies. World Governance Indicators mainly have insignificant effect on the probability of bank default risk for the High-Income, Upper Middle-Income and Lower-Middle Income countries such that it is only the Political Stability and Absence of Violence which has negative, negative, and positive effect in those countries respectively.

In higher-income, upper middle-income, and low-income economies, higher education index increases the probability of bank default risk, and this is only High-Income and Upper Middle-Income countries that have higher default risk due to higher number of people using internet. Higher inflation and economic growth are defined to result in higher bank default risk in the Low-Income economies, while their effect is insignificant for the other country groups. Upper Middle-Income economies with higher Government Integrity Score tend to have higher probability of the bank default risk. Countries of High and Upper Middle-Income economies with higher Education and Press Freedom Index have higher bank default risk, while the opposite is true for the effect of higher Education Index and number of people using internet in these country groups.

Table 5 demonstrates outcomes of the Random effects for the Central Europe, Balkans, and Resource-Rich Economies. The estimation results reveal that higher press freedom deteriorates bank stability in Balkans, while its effect is insignificant for the Resource Rich countries and Central Europe. Increase in Financial Development Index declines the probability of bank default risk in Central Europe and Balkans, while it does not have any significant effect for Resource Rich economies.

World Governance Indicators have a statistically significant explanatory power for the probability of bank default risk in Central Europe. In the case of Balkans, higher Education Index increases the probability of default risk so does the interaction with Press Freedom Index. Even though the higher Financial Freedom declines the probability of the bank default risk in Central Europe, its interaction with number of individuals using internet has a positive effect on the dependent variable.

In resource-rich economies, higher inflation growth increases the probability of the bank default risk, while GDP growth has insignificant effect. Additionally, resource rich countries with higher number of people using internet will have a higher risk for the bank default. The same is true for the effect of Government Integrity Score as the estimated coefficient is positive. Higher financial freedom is also found to increase the default risk of the banks in the resource rich economies. Coming to the effects of interaction terms, the associated coefficient of the financial freedom and number of people using internet reveal that resource rich countries with higher financial freedom and more people using internet will have lower bank default risk. However, resource rich economies with higher Education

Table 5: Random effects for Central Europe, Balkans, and resource rich economies

Variables	Central Europe		Balkans		Resource rich economies	
	Coefficients	Standard error	Coefficients	Standard error	Coefficients	Standard error
$PFI_{i,t}$	−0.20	0.273	0.30**	0.139	−0.100	0.043
$FinDevInd_{i,t}$	−32.1***	5.13	−17.1***	3.00	0.003	0.004
$PSV_{i,t}$	−4.30*	2.20	−1.30	1.40	−0.834	0.531
$GE_{i,t}$	9.18**	3.72	−3.39**	1.51	−0.507	1.24
$RQ_{i,t}$	6.83*	4.01	−2.87	1.94	−0.593	1.21
$RL_{i,t}$	11.15***	2.70	3.60*	1.95	−3.40**	1.65
$CC_{i,t}$	−1.48	2.78	−8.44***	2.23	2.10*	1.20
$\bar{y}_{i,t}$	−0.040	0.163	0.19*	0.100	0.030	0.020
$\bar{\pi}_{i,t}$	0.020	0.101	−0.181	0.132	0.101**	0.050
$\log(IndUI)_{i,t}$	22.05	33.82	−0.805	5.33	2.68***	0.804
$EducIndex_{i,t}$	−43.60	169.84	78.27**	37.72	3.70	6.58
$GIS_{i,t}$	−0.141	0.088	0.066	0.062	0.085***	0.031
$FinFreed_{i,t}$	0.786	0.570	−0.39***	0.142	0.12***	0.046
$EducIndex_{i,t} * \log(IndUI)_{i,t}$	4.55	39.96	−11.96	8.73	−0.31	1.30
$FinFreed_{i,t} * \log(IndUI)_{i,t}$	−0.223	0.140	0.15***	0.041	−0.03***	0.013
$EducIndex_{i,t} * PFI_{i,t}$	0.240	0.317	−0.40**	0.174	0.12**	0.053
α_0	−48.58	143.10	−18.44	22.53	−0.155	4.70
N	125		132		556	
R^2-within	0.1947		0.1228		0.1540	
R^2-between	0.9780		0.9175		0.0058	
R^2-overall	0.7225		0.8193		0.0247	
Wald X^2	281.14***		521.51***		90.99***	
Probability of X^2	0.0000		0.0000		0.0000	
σ_u	0		0		7.92	
σ_e	2.64		1.26		3.34	
ρ	0		0		0.85	

***P<0.01; **P<0.05; *P<0.1

Index and press freedom will experience higher probability of bank default risk.

Table 6 depicts the summary of the signs of coefficients for all independent variables across different country groups. The results demonstrate that the sign and significance of the effect of Press Freedom on the probability of bank default risk are not the same for different country groups. It turns out that Education index plays more significant role that Press Freedom Index does. Worldwide Governance Indicators (WGIs) carry statistically significant explanatory power for the probability of the bank default risk.

In general, the model manifests that an individual role of the press freedom is not significant enough on predicting the probability of the bank default risk as it more depends on how well-educated the people are so as how many of them have an access to the internet which indispensably affect whether those people are influence by the good and bad news or not.

5.2. Panel Blinder-Oaxaca Decomposition

Table 7 depicts the estimation results for Panel Blinder-Oaxaca Decomposition where it seems that the differences in the mean values of the Banking Z-score across Lower Income and Upper Middle-Income economies are highly statistically significant, while it cannot be said regarding Higher Income and Lower Middle-Income groups. In the case of the Lower Income-Economies, the great portion of the difference in mean values of the Z-score between this country group and the others is caused

by unobserved factors that are not controlled in the model due to the nonexistence of observations.

In other words, the main reason behind this statistically significant difference is discrimination caused by Press Freedom Index, Education Index, the number of people having access to internet, government effectiveness, regulatory quality, rule of law, Inflation growth, GDP growth, and Financial Freedom as their associated coefficients are statistically significant. In the case of low income-economies, those variables are financial development index, government effectiveness, regulatory quality, rule of law, Inflation growth, Government Integrity Score, and Financial Freedom which cause discrimination. For Upper Middle-Income economies, Financial Development Index, Regulatory Quality, and Control of Corruption triggers difference in the mean value of the Banking Z-score compared to the other three country groups. Finally, Press Freedom Index, Political Stability and Absence of Violence, Rule of Law, Control of Corruption, and inflation growth lead to the discrimination in the case of the Lower Middle-Income economies.

5.3. Threshold ARCH Model

Estimation results of Threshold ARCH models for the full sample are depicted in Table 8. In the Model 1, there is just one explanatory variable which is $\Delta PFI_{i,t}$ that is highly statistically significant with an associated negative coefficient. When the level and interactions of other explanatory variables, namely $\Delta\log(IndUI)_{i,t}$, $Educindex_{i,t}$, $\Delta Educindex_{i,t}$ $\Delta PFI_{i,t}$, and $\Delta Educindex_{i,t}$ $\Delta\log(IndUI)_{i,t}$, are added, the significance of the $\Delta PFI_{i,t}$ deteriorates. The second part of the Table 9 manifests ARMA

Table 6: Summary for the results of random effects

Variables	Full	Africa	NA	LA	CIS	MENA	AP	CA	NEur	SEur	EEur	WEur	HIE	UMIE	LMIE	LIE	CentEu	Balkans	RRE
PFI$_{i,t}$	–***	+		–***		+		+***	+	+	+		–**	–***	–	+	–	+***	–
FinDevInd$_{i,t}$	+	–***	+	+	–	+	–	–	+***	+***	–	+	+	+	–***	+***	–***	–***	+
PSV$_{i,t}$	–	+*	–***	+***	+*	+	+	–	+***	+	+***	+**	–**	–*	+***	–	+*	–**	–
GE$_{i,t}$	–	+	–***	–***	–	+	–	+	–***	+	+	+	–	–	+	–	+	–**	–
RQ$_{i,t}$	+*	+***	+***	+	+***	–*	–	+	+***	+*	+	+**	+	+	+***	+***	+**	+	–*
RL$_{i,t}$	–	–	–***	+	–***	+*	+	–	–***	+*	–***	–***	+	–*	–***	–**	+*	+**	–**
CC$_{i,t}$	+	+*	+***	–***	+***	+	+	–	+	–**	+***	+***	+	+	+	+	+*	–***	+*
$\bar{y}_{i,t}$	+	+***	+***	+*	–**	+	–	+	+	+**	+*	+	+	+	–	+	+*	+*	+
$\bar{\pi}_{i,t}$	–**	–	+	–	–	+	+	+	–	–	–	+	–	–	–	+**	+	–	+**
log (IndUI)$_{i,t}$	+***	–	+***	+***	–	+***	–*	+***	+***	+*	–***	–	+***	+***	–	–*	–	–*	+***
EducIndex$_{i,t}$	+**	+	–**	–***	–***	+***	+*	–*	+***	+	–***	–	+**	+***	–	+***	+**	+**	+
GIS$_{i,t}$	+*	+	–	+*	–	–**	+*	–	–***	+	–***	+	–	+*	+	+	+**	+***	+***
FinFreed$_{i,t}$	+**	–*	+***	+**	+**	+***	+***	+*	+	+	+***	+	+**	+	+	+	–**	–***	+***
EducIndex$_{i,t}$ * log (IndUI)$_{i,t}$	–***	+*	–*	–*	+**	–**	–*	–**	+	–*	+	+	–*	–***	+	+	–*	+***	–***
FinFreed$_{i,t}$ * log (IndUI)$_{i,t}$	–*	–	+	–***	–***	–*	–**	+	+	–**	+	–	–**	–	+	+	+***	+***	–***
EducIndex$_{i,t}$ * PFI$_{i,t}$	+***	+	+	+***	+	+	+*	+	–	–	–	+	+***	+***	+	–*	+	–**	+**

*** P<0.01; ** P<0.05; * P<0.1

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which is comprised of AR (1) and MA (1) whose estimated coefficients are statistically significant. Both AR (1) and MA (1) are predicting the level of the bank default risk.

Coming to the ARCH part of the Table 8, all of the demonstrated terms turn out to be significant here. This is another way of saying that if the TARCH part is ignored in the model, then ARCH and GARCH terms will be biased as the model will suffer from omitted variable bias problem. The coefficient of the ARCH term suggests that the proportion of the bank default risk that carries over to the next day is 0.30 at the time of bad news. In the good news day, this proportion amounts to the sum of 0.300 and 0.451 which add up to 0.751. Given that the associated coefficient of the TARCH term is positive and <1, it can be culminated that the bad news has a larger effect than that of good news and there is an asymmetry in the information. This can also be perceived from the Figure 2 part (a) for the Model 1 and part b for the Model 2 which depicts News-Response Function for the full sample. The red lines in part (a) and (b) stand for the good news which have a slope of 0.751 and 0.631 respectively for part (a) and part (b). Blue lines in part (a) and (b) signify bad news whose corresponding slopes amount to 0.300 and 0.094. In the case of Model 2, where the effects of Education Index, number of individuals using internet, and their interaction terms are controlled for, the slope of the bad news is flatter.

5.4. Robustness Tests

The results of the robustness test, for which the fixed effects, population average effects, and two-step dynamic panel data estimator are used, are depicted in Tables A2-4 of the Appendixes section of the study. The result of the Hausman test for Fixed-Random effects revealed that the latter one best fits the model and data being studied. In the case of Two-Step Dynamic Panel Data Estimation, it has been assumed that Press Freedom Index is endogenous and depends on the Voice and Accountability which was defined as an instrumental variable (IV) in the given model. Estimation results are provided in Table A4 where it seems that higher press freedom deteriorates the probability of the bank default risk for the Central Asia, Central Europe, Eastern Europe, and Higher Income Economies country groups and the effect is highly statistically significant. The opposite is true for the Western Europe and Lower Middle-Income economies as the associated coefficient of the Press Freedom Index is positive and highly statistically significant. The results of the Fixed Effect Estimators demonstrate that Central Asia, Central Europe, and Upper Middle-Income economies will observe decline the bank default risk in response to the increase in press freedom.

6. DISCUSSION

The study demonstrated two preeminent findings regarding the role of press freedom on the probability of the bank default risk. The first key evidence revealed the press freedom alone is not a reliable predictor of banking stability as its effect depends critically on institutional and informational environments. Another key finding of the study demonstrated that more educated and better-connected populations react more strongly to financial news, both good and bad, amplifying bank fragility rather than stabilizing it.

Table 7: Estimation results of Panel Blinder-Oaxaca decomposition

Variables	Higher income		Lower income		Upper middle-income		Lower middle-income	
	Coefficients	SE	Coefficients	SE	Coefficients	SE	Coefficients	SE
Group 1	15.13***	0.27	15.03***	0.226	14.41***	0.23	14.73***	0.24
Group 2	14.40***	0.34	12.78***	0.470	15.86***	0.43	15.21***	0.40
Difference	0.731*	0.43	2.24***	0.521	−1.45***	0.49	−0.479	0.47
Explained	−4.45***	0.57	−3.04***	0.570	1.99***	0.30	1.20***	0.35
$PFI_{i,t}$	0.36***	0.09	−0.28***	0.10	−0.11*	0.06	−0.28***	0.07
$FinDevInd_{i,t}$	0.11***	0.03	0.08***	0.02	−0.20***	0.06	0.11***	0.02
$PSV_{i,t}$	0.02	0.49	−0.12	0.42	−0.06	0.1	0.09	0.36
$GE_{i,t}$	6.02***	1.28	−4.73***	0.97	−1.69***	0.43	−3.88***	0.84
$RQ_{i,t}$	0.51	1.10	0.01	0.75	−0.46	0.30	0.18	0.84
$RL_{i,t}$	−5.31***	1.82	0.92	0.98	1.90***	0.73	0.67	1.04
$CC_{i,t}$	−1.12	1.43	1.67**	0.78	0.51	0.54	1.55	0.97
$\bar{y}_{i,t}$	0.12	0.17	0.0001	0.03	−0.04	0.05	−0.13	0.15
$\bar{\pi}_{i,t}$	−0.09*	0.051	0.04*	0.02	0.07	0.04	0.04*	0.02
$\log(IndUI)_{i,t}$	−1.93***	0.35	2.60***	0.58	−0.15**	0.07	1.79***	0.32
$EducIndex_{i,t}$	2.86***	0.48	−6.20***	0.72	0.20*	0.12	−2.51***	0.39
$GIS_{i,t}$	−5.48***	1.09	2.79***	0.62	1.93***	0.42	3.33***	0.73
$FinFreed_{i,t}$	−0.54	0.41	0.18	0.34	0.10	0.09	0.25	0.31
Unexplained	5.18***	0.677	5.30***	0.773	−3.44***	0.590	−1.68***	567
$PFI_{i,t}$	−2.29***	0.65	1.73*	0.97	0.94	0.86	2.66***	0.93
$FinDevInd_{i,t}$	−1.15	1.05	−1.54***	0.54	1.18**	0.59	−1.57*	0.87
$PSV_{i,t}$	0.94***	0.34	−0.43	1.00	0.05	0.20	1.29***	0.39
$GE_{i,t}$	−2.99**	1.48	6.46***	2.09	0.39	0.25	0.08	0.58
$RQ_{i,t}$	−2.92***	0.96	6.33***	1.46	0.69***	0.21	0.21	0.71
$RL_{i,t}$	3.68**	1.78	−10.34***	1.81	1.00*	0.54	3.90***	1.12
$CC_{i,t}$	−2.28	1.46	−1.28	1.31	−0.74**	0.32	−4.07***	0.90
$\bar{y}_{i,t}$	−1.00***	0.43	−0.47	0.41	0.89*	0.47	−0.16	0.69
$\bar{\pi}_{i,t}$	0.57***	0.21	−2.56***	0.49	−0.36*	0.19	1.62***	0.44
$\log(IndUI)_{i,t}$	−8.31***	2.14	0.77	0.65	2.70	2.16	−0.97	1.31
$EducIndex_{i,t}$	16.32***	4.76	−12.60***	1.87	1.20	3.34	4.21*	2.33
$GIS_{i,t}$	3.90	3.71	4.30**	1.66	−6.91*	3.57	0.29	2.39
$FinFreed_{i,t}$	4.44**	2.19	−2.86	2.28	0.93	2.16	−3.34*	1.99
Observations	1943		1943		1943		1943	
Observations in Group 1	1195		1790		1353		1462	
Observations in Group 2	748		153		590		481	

***P<0.01; **P<0.05; *P<0.1

Table 8: Estimation results of Panel Threshold GARCH model for full sample

Variables	Model 1		Model 2	
	Coefficients	Standard Errors	Coefficients	Standard Errors
$\Delta PFI_{i,t}$	−0.005***	0.001	0.009	0.011
$\Delta \log(IndUI)_{i,t}$			1.137***	0.519
$\Delta EducIndex_{i,t}$			7.959*	4.364
$\Delta EducIndex_{i,t}*\Delta PFI_{i,t}$			−0.017	0.014
$\Delta EducIndex_{i,t}*\Delta \log(IndUI)_{i,t}$			−3.190	0.811
Constant	0.153***	0.021	0.329***	0.056
ARMA				
AR (1)	0.940***	0.029	0.434***	0.120
MA (1)	−1.013***	0.018	−0.570***	0.111
ARCH				
ARCH	0.300***	0.031	0.094***	0.018
TARCH	0.451***	0.052	0.537***	0.049
GARCH	0.456***	0.013	0.545***	0.017
Constant	1.429***	0.051	1.236***	0.065
Observations	2,024		1873	
χ^2	14932.15***		120.81***	
Log−likelihood	−4741.553		−4279.965	
Distribution	Gaussian		Gaussian	

***P<0.01; **P<0.05; *P<0.1

Table 9: Descriptive statistics

Variable	Observations	Mean	Standard deviation	Min	Max	Abbreviation	Source of data	Unit of measure	In Model
Dependent variables									
Banking Z-score	2,200	15.029	9.458	−1.84	63.40	Z-score	Bankscope		Z-score
Liquid assets to deposits ratio	2,258	26.03	20.21	0.205	134.47	LAD	World Bank		LAD
Ratio of Non-performing loans to total gross loans	1,278	6.873	10.81	0.081	199.96	NPTL	World Bank		NPTL
Main explanatory variables									
Press freedom index	2,487	46.082	28.23	−10	142	PFI	World Bank	Index	PFI
Freedom house index for media freedom	1,810	3.70	0.64	2.10	4.57	FH_MF	IMF	Index	FH_MF
Financial development indicators (FDI)									
Financial development index	2,178	16.96	182.02	0	2019	FinDI	IMF	Index	FinDI
Financial institutions access index	2,178	0.40	0.30	0.004	1	FIAI	IMF	Index	FIAI
Financial institutions depth index	2,178	0.319	0.280	0	1	FIDI	IMF	Index	FIDI
Financial institutions efficiency index	2,178	0.522	0.216	0.015	0.98	FIEI	IMF	Index	FIEI
Financial institutions index	2,178	0.482	0.222	0.075	1	FII	IMF	Index	FII
Financial markets access index	2,178	0.311	0.286	0	1	FMAI	IMF	Index	FMAI
Financial markets depth index	2,178	0.284	0.306	0	1	FMDI	IMF	Index	FMDI
Financial markets efficiency index	2,178	1.46e+07	1.69e+08	0	2.42e+09	FMEI	IMF	Index	FMEI
Financial markets index	2,178	1.84e+07	3.28e+08	0	7.19e+09	FMI	IMF	Index	FMI
Other explanatory variables									
Financial literacy index						FLI		Index	FLI
Education index	2,169	0.658	0.18	0.124	0.943	Educindex	World Bank	Index	Educindex
Financial freedom	2,477	53.746	18.60	10	90	FinFreed	The Global Economy	Index	FinFreed
Government integrity score	2,352	44.89	22.65	0	100	GIS	World Bank	Index	GIS
Individuals using the internet (% of population)	2,236	42.20	31.18	0.0004	100	IndUsingInt	World Bank	Percentage	IndUsingInt
GDP Growth	2,536	3.42	6.92	−66.66	177.26	GDP_grwt	IMF WEO	Percentage	$\bar{y}_{i,t}$
Inflation growth	2,516	63205.03	2600510	−29278	1.30e+08	Infl_grwt	IMF WEO	Percentage	$\bar{\pi}_{i,t}$
Dummies									
North Europe	2,541	0.050	0.217	0	1	NEur	Author's estimations	Dummy	NEur
South Europe	2,541	0.033	0.179	0	1	SEur	Author's estimations	Dummy	SEur
East Europe	2,541	0.058	0.233	0	1	EEur	Author's estimations	Dummy	EEur
West Europe	2,541	0.050	0.217	0	1	WEur	Author's estimations	Dummy	WEur
Central Europe	2,541	0.058	0.233	0	1	CEur	Author's estimations	Dummy	CEur
Balkans	2,541	0.066	0.249	0	1	Balkans	Author's estimations	Dummy	Balkans
Africa	2,541	0.174	0.379	0	1	Africa	Author's estimations	Dummy	Africa
North America	2,541	0.149	0.356	0	1	NA	Author's estimations	Dummy	America
CIS	2,541	0.082	0.275	0	1	CIS	Author's estimations	Dummy	CIS
MENA	2,541	0.132	0.339	0	1	MENA	Author's estimations	Dummy	MENA

(Contd...)

Table 9: (*Continued*)

Variable	Observations	Mean	Standard deviation	Min	Max	Abbreviation	Source of data	Unit of measure	In Model
Latin America	2,541	0.124	0.330	0	1	LA	Author's estimations	Dummy	LA
Asia pacific	2,541	0.166	0.371	0	1	AP	Author's estimations	Dummy	AP
Central Asia	2,541	0.041	0.199	0	1	CA	Author's estimations	Dummy	CA
Higher income economies	2,541	0.363	0.481	0	1	UIE	Author's estimations	Dummy	UIE
Upper middle-income economies	2,541	0.306	0.460	0	1	LIE	Author's estimations	Dummy	LIE
Lower middle-income economies	2,541	0.256	0.437	0	1	MIE	Author's estimations	Dummy	MIE
Lower income economies	2,541	0.090	0.288	0	1	AE	Author's estimations	Dummy	AE
Resource rich economies						RRE	Author's estimations	Dummy	RRE
Worldwide governance indicators (WGI0)									
Voice and accountability*	2,281	0.003	1.003	−2.23	1.80	VA	World Bank	Index	VA
Government effectiveness	2,299	0.16	1.001	−2.31	2.44	GE	World Bank	Index	GE
Rule of law	2,299	0.07	1.029	−2.34	2.13	RL	World Bank	Index	RL
Regulatory quality	2,299	0.15	0.98	−2.36	2.26	RQ	World Bank	Index	RQ
Political stability and absence of violence	2,299	−0.08	0.96	−3.01	1.80	PSV	World Bank	Index	PSV
Control of corruption	2,299	0.07	1.055	−1.72	2.47	CC	World Bank	Index	CC

*Stands for the instrumental variables (IVs)

Figure 2: News-Response Function for Model 1 (a) and Model 2 (b) of the Full Sample
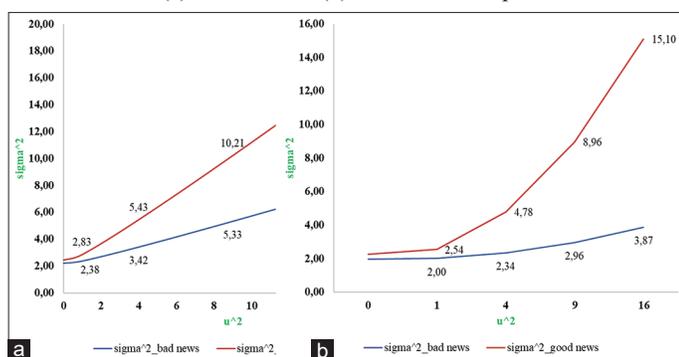
A central contribution of the study is the identification of education and digital connectivity as key amplification mechanisms through which press freedom influences bank fragility. The results indicate that more educated and better-connected populations respond more intensively to financial information, increasing the sensitivity of banking systems to news shocks. Rather than acting as a disciplining mechanism that stabilizes banks, information dissemination in such contexts may accelerate panic dynamics, herd behavior, and rapid reassessment of bank fundamentals.

Interestingly, Rule of Law shows mixed effects across regions while Regulatory Quality and Political Stability sometimes increase default risk, especially in Latin America, Eastern and Western Europe. Thus, it can be concluded that stronger institutions do not always stabilize banks if they coincide with stricter regulation, higher compliance costs, or political risk re-pricing. Macroeconomic fundamentals, by contrast, play a comparatively secondary role. The results indicate that traditional variables such as GDP growth and inflation are less influential in explaining bank fragility than informational and institutional factors. This finding underscores a shift in the determinants of banking stability away from purely cyclical macroeconomic conditions toward structural features related to information flows, governance, and public responsiveness.

The results of the Blinder-Oaxaca Decomposition suggested that differences in bank stability across income groups are statistically significant, especially between Lower Income and Upper Middle-Income economies. This result highlights the limitations of one-size-fits-all policy prescriptions and underscores the importance of country-specific institutional contexts.

Finally, the Threshold GARCH analysis provides strong evidence of asymmetric information effects. Bad news is shown to have a larger and more persistent impact on bank default risk than good news, confirming the presence of information asymmetry and nonlinear market responses. Moreover, these effects are more pronounced in societies with higher education levels and greater internet penetration, reinforcing the notion that information shocks are amplified where information transmission is faster and more widespread. Eventually, it has been determined that bank stability is not primarily determined by press freedom itself, but by how societies process information.

7. CONCLUDING REMARKS

Based on the banking Z-score which is calculated as a weighted average of the z-scores of a country's individual banks, this study

intended to scrutiny the role of press freedom as well as good and bad news on the probability of a bank default risk across 128 countries being clustered according to their income level and geographical position for 2002-2022-time interval.

The preeminent hypothesis of the study suggested that countries with more press and media freedom have more volatility in the financial system, for which there was no significant evidence to justify as the effect of the press freedom on different country groups had different signs of coefficients and significance levels. The second hypothesis of the study claimed that countries with more financial freedom are less likely to experience bank default risk, which has been verified by the study because the individual effect of the financial freedom on the bank default risk is defined to be positive and statistically significant for almost all country groups and this implies that banks with less government regulations are more likely to engage in riskier activities that increases the chance of default risk for the banking system as a whole. The third hypothesis asseverated that the effect of financial literacy on the bank default risk is lower in high income economies, while the opposite is true for the lower income countries. Finally, the last hypothesis was about the role of good and bad news on the bank default risk which postulated that bad news has a dominant effect on the probability of a bank default risk in comparison to the effect of good news for the low income economies, while the opposite is true for the high income countries. To test this hypothesis, the Threshold ARCH (TARCH) model was utilized and based on the coefficient of the TARCH term it was found out that there is a presence of an asymmetry in information, and thus, the bank default risk responds to the bad news more than it does to the good news.

Coming to the main finding of the study, the estimation outcomes of the Panel Data Blinder-Oaxaca Decomposition manifested that differences in the mean values of the Banking Z-score across Lower Income and Upper Middle-Income economies are highly statistically significant. Detailed investigation of the explained and unexplained effects showed that Press Freedom Index, Education Index, the number of people having access to internet are the factors triggering difference in the mean values of the banking Z-score. Outcomes obtained from the Threshold ARCH model provided significant evidence to verify that bad news has a larger effect on the probability of the bank default risk.

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APPENDICES

Table A1: Results of fisher-type unit-root test based on augmented dicky-fuller test

Variables	Number of panels	Average number of periods	Dicky-Fuller critical values				Lags	Result
			Inverse X^2	Inverse normal	Inverse Logit	Modified inverse X^2		
$\Delta Zscore_{i,t}$	121	17.17	2043.1***	−36.2***	−51.1***	81.9***	0	Reject H_0
$\Delta PFI_{i,t}$	121	19.54	1824.9***	−34.8***	−45.7***	71.9***	0	Reject H_0
$\Delta FinDevInd_{i,t}$	121	17.0	1952.1***	−34.7***	−49.3***	77.7***	0	Reject H_0
$\Delta PSV_{i,t}$	121	18.0	2597.1***	−41.8***	−65.0***	107.0***	0	Reject H_0
$\Delta GE_{i,t}$	121	18.0	2364.3***	−40.2***	−59.2***	96.5***	0	Reject H_0
$\Delta RQ_{i,t}$	121	18.0	2341.4***	−39.7***	−58.7***	95.4***	0	Reject H_0
$\Delta RL_{i,t}$	121	18.0	2050.5***	−36.4***	−51.3***	82.2***	0	Reject H_0
$\Delta CC_{i,t}$	121	18.0	2223.1***	−38.4***	−55.7***	90.05***	0	Reject H_0
$\Delta \bar{y}_{i,t}$	121	19.95	4529.2***	−60.7***	−113.6***	194.9***	0	Reject H_0
$\Delta \bar{\pi}_{i,t}$	121	20.0	3934.0***	−55.2***	−98.6***	167.8***	0	Reject H_0
$\Delta \log (IndUI)_{i,t}$	121	17.42	1528.5***	−26.0***	−37.6***	58.5***	0	Reject H_0
$\Delta EducIndex_{i,t}$	121	16.93	1409.8***	−26.4***	−34.4***	53.08***	0	Reject H_0
$\Delta GIS_{i,t}$	121	18.57	1909.6***	−35.2***	−48.0***	76.20***	0	Reject H_0
$\Delta FinFreed_{i,t}$	121	19.45	2296.9***	−40.0***	−62.7***	93.4***	0	Reject H_0

***$P<0.01$; **$P<0.05$; * $P<0.1$. H_0: All panels contain unit roots. H_a: At least one panel is stationary

Table A2: Summary for the results of fixed effects

Variables	Full	Africa	NA	AP	Balkans	CA	Ceur	CIS	Eeur	LA	MENA	Neur	Seur	Weur	HIE	LMIE	UMIE	LIE	RRE
$PFI_{i,t}$	-***	+*	-	-	+	-**	-***	-	-	-**	+	+	-	+*	-**	-	-**	+	-
$FinDevInd_{i,t}$	-	-***	+	+*	-***	+	+	+	+	+	-**	-*	-	+*	+	-***	-*	+***	-
$PSV_{i,t}$	-	+*	+	-	+	-	-	-	+	+	-***	-***	-	-	-**	+***	-**	+	-**
$GE_{i,t}$	-	+	+	-	+	+	-	+	+	+	+***	+*	+*	+	-	+*	-*	-	-
$RQ_{i,t}$	+**	+***	+**	-	-	+**	+**	+***	+***	+	-	-**	+*	+*	+*	-	+**	+***	+
$RL_{i,t}$	-*	-	+**	+	-**	-	-	-	-	+	-*	+	+	-	-	+	+*	-	-***
$CC_{i,t}$	+	+	-*	-	+	-	-*	+	+	-***	-	+	-	+***	+	+	-**	+	+
$\bar{y}_{i,t}$	+*	+***	+**	-	+	-**	-	-	+***	+	+	+	+*	+	+*	+	+	+	+
$\bar{\pi}_{i,t}$	-***	-	-	+	+*	+**	-	-	-*	-	+***	-	-	-	-	-	-**	+	+**
$\log (IndUI)_{i,t}$	+***	-	+*	-	+***	+*	+*	-***	-***	+	+	-	+	-***	+***	+	+***	+***	+***
$EducIndex_{i,t}$	+***	-	-	-**	+***	-**	+	-***	-***	+**	-***	+	+	-***	+***	+*	+***	-***	+
$GIS_{i,t}$	+	+	+	+**	-***	+*	-	+**	-*	-**	+***	+	-	+**	-	+	+**	+	+***
$FinFreed_{i,t}$	+**	-	-	+	-***	-	+	-	+***	-	+**	-	+	+***	+***	+	+	+	+***
$EducIndex_{i,t} * \log (IndUI)_{i,t}$	-***	+*	-	+***	-***	-	-	+***	+***	+	+**	-	-	+***	-**	-	-***	-	-
$FinFreed_{i,t} * \log (IndUI)_{i,t}$	-*	+	-	-***	-***	+*	-	-	+	+	-	-	-	-***	-**	+	-	+	-***
$EducIndex_{i,t} * PFI_{i,t}$	+***	-	+	+*	-	+***	+***	+	+	+	-	-	+	-***	+***	+	+**	+	+**

***P<0.01; **P<0.05; *P<0.1

Table A3: Summary for the results of population average effects

Variables	Full	Africa	NA	AP	CA	Ceur	CIS	Eeur	LA	MENA	Neur	Seur	Weur	HIE	LMIE	UMIE	LIE	RRE
$PFI_{i,t}$	-***	+	-	-	-**	-***	-	-	-***	+	+***	+***	+	-**	-	+*	+***	+
$FinDevInd_{i,t}$	+	-*	+	+	+**	+	+	-***	-***	+	+***	-***	+	-	-***	+	+***	-
$PSV_{i,t}$	-	+	-	+	-	-	+	+	+	+	-***	+	+**	-*	+**	+	+	-
$GE_{i,t}$	-	+	+	-	+*	-	-	+	+***	+***	-***	+	+	-	+*	+	-	-
$RQ_{i,t}$	+	+***	+*	-	+*	+**	+***	+**	+	-	+***	+*	+	+	-	+	+***	-*
$RL_{i,t}$	-*	-	+***	-	-	-	+**	+***	-**	-**	-*	+	-***	-	+	+	-	-*
$CC_{i,t}$	+	+	-**	+	-	+	-**	+	-	-	+	-***	+***	+	+	+	+	+
$\bar{y}_{i,t}$	+**	+***	+*	-	-	-	+**	+	+*	+*	+	+***	-	+*	-	-	+	+
$\bar{\pi}_{i,t}$	-**	-	-	+	+**	-	-**	-	+**	+**	-	-*	+***	-	+	-*	+**	+***
$\log (IndUI)_{i,t}$	+***	-	+*	-	+*	+*	-***	-***	+**	+	+*	+*	+	+*	+	+***	+*	+***
$EducIndex_{i,t}$	+**	-	-**	-*	+	+	-**	-*	+	-	+*	+*	+	+***	+	+***	-***	+**
$GIS_{i,t}$	+	+	+	+*	+	+	+	-*	-	+***	+	-	-**	-	+	+**	+	+**
$FinFreed_{i,t}$	+**	-	-	+*	+*	-	+**	+***	+**	+**	+	+	-	+*	-	+***	+	-**
$EducIndex_{i,t} * \log (IndUI)_{i,t}$	-**	+	-	+***	-	-	+**	+	-*	+	-*	-	-	-*	-	-***	-	-**
$FinFreed_{i,t} * \log (IndUI)_{i,t}$	-*	+	-	-**	-	-*	-	+	+	-	+	-	+	-*	+	-	+	-**
$EducIndex_{i,t} * PFI_{i,t}$	+***	-	+	+*	+***	-	+	+	+	+	+	-	+***	+***	+	+	-	+

***P<0.01; **P<0.05; *P<0.1

Table A4: Summary for the results of two‑step dynamic panel data estimator

Variables	Full	Africa	NA	AP	Balkans	CA	Ceur	CIS	Eeur	LA	MENA	Neur	Seur	Weur	HIE	LMIE	UMIE	LIE	RRE
$PFI_{i,t}$	−	−	+	+	−	−***	−***	−	−***	−*	+	+	−	+***	−***	+***	+	+	−
$FinDevInd_{i,t}$	+*	+	−	+	−***	+***	+	+**	+	−	−	−***	−	+	−	+	−	+***	+*
$PSV_{i,t}$	−*	+	−	−	+	+	−**	+	−	−	−***	−***	+	+	−***	+	+**	−	−
$GE_{i,t}$	−	−	+*	−***	+	+	−	+	+	+	+***	−	+	+	+	+	−	−	−**
$RQ_{i,t}$	+*	+*	+	−***	+	+**	+*	+**	+	+**	+*	−	+	+	+**	−	+***	+***	+
$RL_{i,t}$	−	+	+	+	−	+**	+	−	+	−**	−*	−*	−	−	−	−***	+	−	−
$CC_{i,t}$	−	+	−	−	+	−	−	−	+	+	+	−	+	+*	+*	−	+	+*	+**
$\bar{y}_{i,t}$	+***	+**	+	−	+	−	−	+	+***	+	+**	+	+	+*	+*	−	+	+*	+**
$\bar{\pi}_{i,t}$	+***	−	−	+	+	−	+	−***	−***	−	+	−	−	+	−**	−	−	+	+
$\log(IndUI)_{i,t}$	+***	+*	−***	−**	+***	−	+	−**	+	+***	+***	+	+	−*	−	−**	+	+***	+**
$EducIndex_{i,t}$	+***	−	−	−***	+***	−***	+	−***	+	+	+	+*	+	−*	+	−	+	−***	−
$GIS_{i,t}$	−**	+***	−	+	−	+*	−*	+	+	−	+***	+*	−	−	−***	+***	−	*	−
$FinFreed_{i,t}$	+**	+***	−	+***	+	−	+***	+	−	+*	+	−	+	+***	+***	+*	+***	+***	+***
$EducIndex_{i,t} * \log(IndUI)_{i,t}$	+**	+***	−	−***	+	+***	+***	+	+**	+	−	−	−	−**	+***	−***	+	+	+
$FinFreed_{i,t} * \log(IndUI)_{i,t}$	−***	−	+	−***	−***	−	−	+***	−	−	−	−	−	+**	+	+***	+	−	+*
$EducIndex_{i,t} * PFI_{i,t}$	+	−	+	+***	−*	+	−***	−***	+	−	−	+	−	−**	+	+	+	+*	−***

***P<0.01; **P<0.05; *P<0.1