



ISSN:
2655-6944

ELASTISITAS

<http://elastisitas.unram.ac.id>

Jurnal Ekonomi Pembangunan

Vol. 8, No. 1, Maret 2026

FINANCIAL SECTOR INTEGRATION AND CREDIT RISK IN DRIVING SECTORAL ECONOMIC PERFORMANCE: EVIDENCE FROM THE DUAL BANKING SYSTEM IN NORTH SUMATRA

Nuzulia¹, Hotsawadi², Roisatun Kasanah³

¹Sharia Economics Study Program, Faculty of Economics and Business, Mulawarman University

²Development Economics Study Program, Faculty of Economics and Business, Mulawarman University

³Islamic Economics Department, Faculty of Islamic Studies, Trunodjoyo University

Info Article

ABSTRACT

Keywords:

financial integration; Islamic banking; credit risk; sectoral output

This study examines the role of financial sector integration through conventional and Islamic banking in driving sectoral economic performance in North Sumatra Province. It analyzes the impact of credit expansion and financing risk, proxied by Non-Performing Loans (NPL) and Non-Performing Financing (NPF), on sectoral output within a dual banking system framework. This study employs panel data covering 21 economic sectors in North Sumatra and applies both static panel estimation methods (Fixed Effects Model and Random Effects Model) and dynamic panel approaches (System-GMM and First-Difference-GMM) to address heterogeneity and potential endogeneity issues. The results indicate that credit expansion has a positive and significant effect on sectoral output, suggesting that financial integration enhances regional productive capacity. In contrast, higher levels of NPL/NPF negatively affect sectoral performance, reflecting weakened intermediation due to deteriorating asset quality. Robustness tests confirm the consistency and validity of the estimation results across different model specifications. These findings highlight the importance of maintaining a balance between credit growth and prudent risk management to support sustainable regional economic development.

1. INTRODUCTION

Regional economic development in Indonesia continues to face structural challenges, particularly in enhancing the capacity of the real sector to achieve sustainable growth while reducing dependence on central government fiscal transfers. In this regard, the financial sector, especially banking, plays a pivotal role as a financial intermediary that mobilises funds and allocates them to productive economic activities. The effectiveness of banking intermediation is therefore a critical determinant in fostering sectoral output growth and increasing regional economic value added (Levine, 2005).

From a theoretical perspective, a well-integrated and efficient financial system contributes to economic growth through improved capital allocation, lower transaction costs, and enhanced risk management mechanisms (Levine & Demirgüç-

Kunt, 2008). In developing economies such as Indonesia, the banking sector assumes a more dominant role compared to capital markets in supporting real sector activities, given the relatively limited depth of financial markets (Rajan & Zingales, 1998). Consequently, the dynamics of credit disbursement and the quality of financing become essential variables in explaining sectoral economic performance, particularly at the regional level.

A growing body of empirical literature provides evidence that banking credit expansion has a positive and significant impact on economic growth, both at the aggregate and sectoral levels (Nkoro & Uko, 2022); (Imboden, 2005). Access to banking financing enables firms to expand production capacity, adopt technological innovations, and improve productivity (Arnone et

al., 2024); (Afsari et al., 2025); (Adegboye & Iweriebor, 2018). Moreover, financial sector integration has been found to strengthen the performance of economic sectors, particularly in regions where banking serves as the primary source of external financing (Wahyudi et al., 2025).

Notwithstanding these positive contributions, banking intermediation is inherently associated with financial risks. Elevated levels of Non-Performing Loans (NPL) in conventional banking and Non-Performing Financing (NPF) in Islamic banking indicate deteriorating asset quality, which can weaken the intermediation function and constrain the flow of credit to the real sector (Sufian, F., & Habibullah, 2012). Furthermore, increased financing risk may undermine the effectiveness of monetary and fiscal policy transmission mechanisms, thereby reducing their impact on economic activity (Ratib et al., 2025). This issue is particularly critical in developing economies, where the real sector is more vulnerable to macroeconomic shocks and financial instability.

Within Indonesia's dual banking system, the interaction between conventional and Islamic banking introduces additional analytical complexity. Islamic banking, which is based on profit-and-loss sharing principles and asset-backed financing, is theoretically expected to enhance financial stability and resilience. However, empirical evidence suggests that the Non-Performing Financing (NPF) ratio remains a key indicator of financing quality and risk exposure in Islamic banking operations (Elshani, 2025). Therefore, a comprehensive analysis of banking intermediation must consider not only the volume of credit disbursement but also the associated financing risks in both conventional and Islamic banking systems.

In addition, from a regional public finance perspective, the banking sector serves as an important transmission channel for fiscal policy and government liquidity into the real economy (Beck et al., 2014; Kazak et al., 2023). The placement of government funds and the implementation of liquidity expansion policies are expected to stimulate productive credit growth. However, the effectiveness of these policies is highly contingent upon the banking sector's capacity to allocate funds efficiently while maintaining financial stability. Inadequate risk management may lead to an increase in NPL and NPF ratios, thereby weakening the intermediation function and adversely affecting sectoral economic performance.

In the specific context of North Sumatra Province, which is characterised by a diverse economic structure encompassing manufacturing,

trade, agriculture, and services, the role of banking intermediation becomes increasingly crucial. Nevertheless, data from the (Financial Services Authority, 2024) indicate that regional credit expansion exhibits fluctuating trends, accompanied by variations in non-performing financing ratios. This condition suggests that the effectiveness of financial intermediation in supporting sectoral economic performance remains suboptimal.

Despite the extensive literature on financial development and economic growth, several important research gaps persist. First, the majority of existing studies focus on aggregate national-level analysis, with limited attention given to sectoral performance at the regional level. Second, empirical investigations that simultaneously examine credit expansion and financing risk proxied by NPL and NPF within the framework of a dual banking system remain relatively scarce. Third, the integration of banking intermediation into a regional public finance perspective has not been widely explored, particularly through the application of quantitative panel data approaches.

Accordingly, this study aims to analyse the impact of credit disbursement and financing risks (NPL and NPF) from both conventional and Islamic banking on sectoral output in North Sumatra Province. By employing a panel data approach, this study is expected to contribute to the literature on regional financial economics and Islamic finance, particularly in explaining how banking intermediation influences real sector performance within a dual banking system framework.

2. RESEARCH METHODS

This study uses a quantitative empirical approach to analyse the influence of banking intermediation on sectoral production performance in North Sumatra Province. The research examines how credit disbursement and financing risks in conventional and Islamic banking systems affect sectoral output. A quantitative approach was chosen to identify causal relationships between variables through panel-data-based econometric estimation.

This study uses panel data regression to analyse the influence of banking intermediation on sectoral production performance in North Sumatra Province. The panel model was chosen because it was able to combine the cross-sectional dimensions between sectors and the time series between years, resulting in more efficient estimation and the ability to control unobserved heterogeneity between sectors (Gujarati & Porter, 2013; Cheng, 2014; Baltagi, 1975). The selection between Fixed Effect (FE) and Random Effect (RE) is carried out through the

Hausman test to ensure the consistency of the model (Wooldridge, 2015).

Table 1. Research Variables

Variabel	Definition	Units	Source	References
Economic sector output based on sectoral GDP	The total value of the production of goods and services produced by each economic sector in the region.	Rupiah	BPS	Hamdaoui & Cancelo (2024); Karakaya et al., (2022); (Tarigan, 2015; 82); Sjafrizal, 2018)
Financing chaneled by banks to the real sector	Total credit or funds disbursed by banking institutions to productive sectors in the region.	Rupiah	OJK	Hamdaoui & Cancelo (2024); Karakaya et al., (2022)
The level of risk or quality of the credit disbursed	The ratio of non-performing loans to total loans indicates the level of health of bank credit disbursement.	Rupiah	OJK	Hamdaoui & Cancelo (2024); Karakaya et al., (2022)
The comparative advantage of a sector to the total economy,	The relative contribution of a sector to the total regional economy compared to the national (measured by Location Quotient).	Share (Per cent)	BPS	Wahyuni et al., (2024) and Yanti et al., (2013); (Tarigan, 2015; 82); Sjafrizal, 2018)

To address potential endogeneity arising from a two-way relationship between credit and sectoral output, this study also estimated a dynamic panel model using the Generalised Method of Moments (GMM). This approach allows the use of the dependent variable lag as an internal instrument, resulting in consistent and unbiased estimates (Areliano &

Boverb, 1995; Ahna & Schmidt, 1997). Thus, the combination of static and dynamic panel models provides a more robust analytical framework in evaluating the role of credit and financing risk on real sector performance at the regional level. The static panel model is formulated as follows:

$$Produksiit = ai + \beta_1 Kreditit + \beta_2 NPLFit + \beta_3 LQ + \mu_i + \lambda_t + \epsilon_{it} \dots \dots \dots (1)$$

To overcome the potential for endogeneity due to reverse causality between credit and sectoral output, this study also uses a dynamic panel model

based on the Generalised Method of Moments (GMM) as developed by (Areliano & Boverb, 1995). Dynamic models are formulated as:

$$Produksiit = ai + \beta_1 Produksiit - 1 + \beta_2 Kreditit + \beta_3 NPLFit + \beta_4 LQ + \mu_i + \lambda_t + \epsilon_{it} \dots \dots \dots (2)$$

The GMM approach allows the use of a dependent variable lag as an internal instrument to generate consistent estimates in dynamic panels. The instrument's validity was tested using the Hansen test and the Arellano-Bond autocorrelation test. The specifications of this model refer to the study Hamdaoui & Cancelo (2024) and Karakaya et al., (2022) examining the impact of banking integration on sectoral growth in several European countries and

the United States. The research shows that liquidity and financing transmission through the banking sector play a significant role in boosting the performance of the productive sector. With reference to this approach, models (1) and (2) are designed to test the role of credit and financing quality in influencing sectoral output in North Sumatra Province.

Table 2. List of Economic Sectors

No	Leading/Potential Sector	Code	Potential Impact (Multiplier Effect)	
			ΔOutput (Million Rp)	ΔNilai Tambah (PDRB) (Billion IDR)
1	Seasonal and Annual Plantations	I-03	340.15	IDR25,680.53
2	Large Trade and Retail, Not Cars and Motorcycles	I-33	1,939.07	IDR23.61
3	Food and Beverage Industry	I-13	1,162.78	IDR96.59
4	Metal Ore Mining	I-10	72.43	IDR0.03
5	Construction	I-31	1,929.45	IDR1.96
6	Base Metal Industry	I-22	381.26	IDR 1.40
7	Angkutan Darat	I-35	665.53	IDR 5.28
8	Real Estate	I-47	860.72	IDR0.71
9	Warehousing and Supporting Services for Transportation, Postal and Courier	I-39	285.80	IDR4.15
10	Electricity	I-28	1,048.72	IDR0.79

No	Leading/Potential Sector	Code	Potential Impact (Multiplier Effect)	
			ΔOutput (Million Rp)	ΔNilai Tambah (PDRB) (Billion IDR)
11	Farm	I-04	144.82	IDR12.90
12	Food and Drink Preparation	I-41	906.13	IDR0.05
13	Information and Communication Services	I-42	2,941.31	IDR 1.61
14	Air Freight	I-38	594.55	IDR0.79
15	Seasonal Horticultural Crop Farming, Annual Horticulture and More	I-02	77.05	IDR1.86
16	Rubber Industry, Rubber and Plastic Goods	I-20	707.10	IDR5.25
17	Agriculture Food Crops	I-01	72.37	IDR14.27
18	Financial Intermediary Services Other Than Central Banks	I-43	182,535.05	IDR180.87
19	Corporate Services	I-48	3,497.86	IDR1.72
20	Administration, Defense and Social Security Mandatory	I-49	441.37	IDR0.51
21	Forestry and Logging	I-06	152.45	IDR0.91
22	Total Leading Sektor	-	200,755.97	26,035.78
23	Total Economy	-	207,246.35	Rp401,062.11

Source: Processed Produce

Based on the model's specifications, this study empirically examines the influence of banking intermediation and financing quality on sectoral production performance in North Sumatra Province. The use of static and dynamic panel approaches allows for more robust estimation by accounting for sectoral heterogeneity and potential endogeneity between variables. Within this framework, the analysis is expected to provide more accurate empirical evidence on the banking sector's role in supporting the real sector's performance at the regional level.

This study utilizes panel data comprising 21 economic sectors in North Sumatra Province, categorized according to the Gross Regional Domestic Product (GRDP) classification published by the Central Bureau of Statistics (BPS). These sectors represent the cross-sectional units in the panel dataset.

3. RESULTS AND DISCUSSION

The Influence of Financial Sector Industrial Integration Through Banking on the Economy of Sumatra

The results of the estimation using the data panel model approach, namely the Fixed Effect Model (FEM), Random Effect Model (REM), and the System-GMM and First Difference-GMM (FD-GMM) dynamic approaches, are presented in the table below. In general, the results indicate that integrating the financial sector through banking plays an important role in promoting output growth in leading sectors in North Sumatra. This is evidenced by the analysis, which shows that in the static model, the credit variable has a positive effect on the output of the leading sector in North Sumatra.

This pattern remained consistent when tested using the GMM dynamic model, in which the credit coefficient remained positive and significant for the production or output of the leading sector in North Sumatra Province. The consistency of the direction and significance of the coefficient indicates that the relationship between financial sector integration through credit expansion and real sector performance is stable across data panel regression estimation methods.

More in-depth, based on the description above, the findings clarify that significantly increased access to credit can strengthen the production capacity of leading sectors in North Sumatra, with coefficient values of 0.071 (REM), 0.022 (SYS-GMM), and 0.0224 (FD-GMM), respectively. These findings indicate that a 1% increase in credit can increase the output of the leading sector by 0.02% to 0.07% in North Sumatra, depending on the model approach used. These findings are in line with a study conducted by Hamdaoui & Cancelo (2024) and Karakaya et al., (2022) examining the impact of banking integration on sectoral growth in Spain, France, Romania, and the United States. Both studies also consistently found that the integration of the banking sector plays an important role in transmitting liquidity and financing to productive sectors.

From another perspective, the analysis also found that the NPL/NPF variable negatively affected the performance and production of the leading and potential sectors in North Sumatra, as presented in the table above. The NPL/NPF variable has a negative and significant influence, with coefficients of 0.010 (SYS-GMM) and 0.0097 (FD-GMM), suggesting that an increase in non-performing loans

can suppress production growth in the leading sector. These findings strengthen the theory that increasing banking liquidity, aimed at encouraging credit expansion in productive or leading regional sectors, can potentially increase NPLs/NPFs is not balanced with high-quality credit assessment and adequate risk management, thereby reducing the quality of

banking assets. Thus, non-selective credit expansion amid loose liquidity conditions may lead to an increase in NPLs, especially in sectors with high income volatility or that depend on regional commodity prices (Purnamasari & Achyani, 2022; Zuhroh & Rofik, 2025).

Table 3. Results of Analysis of the Influence of Financial Sector Industry Integration on Sector Leading/Potential Output in North Sumatra

Variable	Production FEM	Production REM	Production SYS-GMM	Production FD-GMM
L1 Production.	-	-	1.026 (0.000)**	1.018 (0.000)**
Credit	0.067 (0.103)	0.071 (0.018)*	0.022 (0.016)*	0.0224 (0.072)*
NPL/NPF	-0.011 (0.371)	-0.010 (0.384)	-0.010 (0.048)*	-0.0097 (0.022)*
LQ	10.883 (0.338)	12.753 (0.000)**	0.623 (0.086)*	0.641 (0.340)
Constant	8.668 (0.000)**	8.496 (0.000)**	-0.297 (0.165)	-0.2258 (0.368)
R-Square	0.711	0.711	-	-
AR(1)	-	-	0.936	0.414
AR(2)	-	-	0.530	0.219
Sargan Test	-	-	0.803	0.781
Hansen Test	-	-	0.910	0.394

Source: Processed Produce

Description: **)Significant real level 1%, *)Significant real level 5% and 10%

The Location Quotient (LQ) variable also plays an important role in explaining sectoral output. The estimation results show that LQ has a positive and statistically significant effect in the Random Effects Model (REM), with a coefficient of 12.753 ($p < 0.01$). In the System-GMM model, LQ remains positive with a coefficient of 0.623 ($p < 0.10$), although its significance is weaker and not consistent across all specifications.

These findings indicate that sectors with stronger comparative advantages tend to generate higher output, reflecting better efficiency and concentration of economic activities. However, the variation across models suggests that the impact of LQ is influenced by dynamic factors and interacts with financial intermediation. In this context, sectors with higher LQ are more likely to utilize credit more effectively, thereby strengthening the role of financial integration in supporting regional economic performance.

Based on the above description, this finding confirms that integrating the financial sector through policies to increase banking liquidity must be followed by a productive, high-quality credit distribution strategy, especially to real sectors with high growth potential. Thus, the stability of the financial sector and the effectiveness of credit intermediation are key factors in accelerating the regional economy's transformation towards a more

efficient and competitive production structure, including in North Sumatra Province. The results of this study are in line with the findings Gambacorta et al., (2014), Diamond & Rajan (2005) and Berger & Sedunov (2017) which affirms that the development of a healthy and integrated financial sector plays an important role in accelerating economic growth by improving the efficiency of capital allocation and real-sector productivity. In addition, Ismail et al., (2024) and Beck et al., (2023) It also found that increased liquidity and effective credit disbursement can strengthen linkages between the financial and productive sectors at the regional level. Therefore, policies to increase financial integration in North Sumatra should focus not only on credit expansion but also on strengthening the quality of financing and risk management to support inclusive and sustainable economic growth.

Robustness Check

The robustness check was carried out to ensure the consistency and validity of the estimation results across the static panel (Fixed-Effects Model/FEM and Random-Effects Model/REM) and the dynamic panel (System-GMM and First-Difference-GMM). Based on the model selection test results, REM was deemed the most appropriate, with a Hausman p-value of 0.9566. These results strengthen the argument that variation between

entities by sector in North Sumatra is random and does not correlate with independent variables in the model, so the use of REM can provide a more representative estimate of regional economic phenomena (Baltagi, 1975).

Table 4. Panel Data Model Selection Results: Chow Test, Lagrangian Multiplier (LM) Test, Hausman Test

Test	Probability	Conclusion
Chow Test	0.0000**	FEM
LM Test	0.0000**	REM
Hausman Test	0.9566	REM

Source: Processed Produce

Description: **)Significant real level 1%, *)Significant real level 5% and 10%

Multicollinearity tests are performed to ensure that there is no strong linear relationship among the independent variables in the Random Effect Model (REM), as this can compromise the validity of the estimated results. Based on the test results, it was found that the Mean Variance Inflation Factor (VIF) value was 5.77 or below the general threshold of 10 (Gujarati & Porter, 2013). This also indicates that there is no problem of high correlation between independent variables in the model or estimation (Gujarati & Porter, 2013). For this reason, the results of this analysis also indicate that the model meets the assumptions of the Best Linear Unbiased Estimator (BLUE), in which each independent variable uniquely contributes to the variation in the dependent variable, without redundancy among the explanatory variables.

Table 5. Multicollinearity Test Results

Variabel	LIVE	1/LIVE
Credit	8.37	0.1194
NPL	6.83	0.1463
LQ	2.09	0.4787
Mean VIF	5.77	-

Source: Processed Produce

Description: **)Significant real level 1%, *)Significant real level 5% and 10%

Finally, this study applied the dynamic panel approach using System-GMM and First Difference-GMM to address potential endogeneity bias, unobserved heterogeneity, and autocorrelation prevalent in panel models with dynamic dependent variables. This approach is considered superior to static panel estimation because it produces efficient estimators even when explanatory variables and individual effects are correlated (Blundell & Bond, 2023). The diagnostic test results showed that all statistical criteria were met: the p-values for AR(1) and AR(2) were greater than 0.05, indicating the

absence of autocorrelation in the residuals. In contrast, the results of the Sargan and Hansen tests were not significant, indicating that the instruments used were valid and met the exogeneity assumptions. The consistency of these results reinforces the validity of the model that the relationship between financial sector industry integration, banking liquidity expansion, and the performance of leading sectors in North Sumatra is *robust* and empirically trustworthy. Studies by Roodman (2009) also found that System-GMM has proven effective in overcoming simultaneity bias and improving the accuracy of estimates in regional macroeconomic and financial research.

Table 6. Validity and Diagnostic Test Results of the System Generalised Method of Moments (GMM) Model

Test	SYS-GMM	FD-GMM	Conclusion
AR(1)	0.936	0.414	Model valid.
AR(2)	0.530	0.219	Model Valid
Sargan Test	0.803	0.781	Valid instruments.
Hansen Test	0.910	0.394	Model reliable.

Source: Processed Produce

Description: **)Significant real level 1%, *)Significant real level 5% and 10%

Financial Sector Integration and Credit Risk within the Dual Banking System in North Sumatra

The empirical findings of this study reinforce the literature on the finance growth nexus, which states that the deepening and integration of the financial sector plays an important role in driving real sector growth through improved capital allocation efficiency (Levine et al., 2000); (Beck et al., 2023). The positive coefficient of the credit variable indicates that the expansion of banking intermediation in North Sumatra increases the production capacity of the leading sector. These results are consistent with (Rajan & Zingales, 1998) which confirms that sectors that rely more on external financing will grow faster in regions with more developed financial systems.

However, the study also shows that credit risk, as reflected in the NPL and NPF ratios, negatively impacts sectoral performance. These findings are in line with banking intermediation theory, which emphasises that deterioration in asset quality can suppress banks' ability to distribute productive credit (Diamond & Rajan, 2005). The increase in non-performing loans has the potential to encourage tightening financing, increase funding

costs, and reduce real sector expansion capacity (Arhinful et al., 2025); (Hor & Lim, 2025); (Daoud & Kammoun, 2025); (Niswatin & Santoso, 2025). Thus, the integration of the financial sector is determined not only by the volume of interchange but also by the stability and quality of financing.

In Indonesia, a country with a dual banking system, this dynamic is becoming increasingly complex. Conventional banks and Islamic banks operate in parallel within a single national financial system but differ in contractual characteristics, risk-sharing mechanisms, and funding structures. Study (Ratib et al., 2025) It shows that Islamic banks tend to have a different risk profile than conventional banks, especially in periods of economic stress. (Malfiandri et al., 2025); (Mahmoud et al., 2025) It also found that the stability of the dual banking system is greatly influenced by the balance between the two types of institutions.

Therefore, the integration of the financial sector in North Sumatra represents the aggregation of interactions between the two banking systems. The expansion of credit and financing by both conventional and Islamic banks simultaneously encourages real-sector activities. However, increased credit risk in both NPL and NPF can weaken the effectiveness of financial transmission on sectoral performance. These findings show that the relationship between financial sector integration and sectoral economic performance is conditional on the quality of risk management in the dual banking system. Overall, this study extends the empirical literature on the role of financial sector integration in dual banking systems at the subnational level. Evidence from North Sumatra Province shows that financial integration can drive sectoral economic performance. However, its sustainability is highly dependent on the stability and quality of banking assets.

4. CONCLUSION

This study aims to analyze the roles of financial sector integration and credit risk in enhancing sectoral economic performance in North Sumatra Province within the context of the dual banking system. Using the static panel data regression approaches (FEM and REM) and the dynamic panel data approaches (System-GMM and FD-GMM), the empirical results show that credit expansion has a positive and significant effect on the output of the leading sector. These findings indicate that improving banking intermediation through conventional bank loans and Islamic bank financing strengthens regional sectoral production capacity.

However, this study also found that credit risk, measured by the ratio of Non-Performing Loans (NPL) and Non-Performing Financing (NPF), negatively affects sectoral performance and becomes significant after controlling for production dynamics and endogeneity using the GMM approach. These results show that the relationship between financial sector integration and economic performance is conditional on the quality of banking assets. In other words, the expansion of intermediation that is not balanced by adequate risk management can weaken the effectiveness of financial sector transmissions to the real sector.

In the context of Indonesia's dual banking system, these findings confirm that regional financial integration reflects the aggregation of interactions between conventional and Islamic banks in financing the productive sector. Therefore, the performance of the sectoral economy in North Sumatra is not only determined by the depth of intermediation, but also by the stability and quality of financing in the banking system.

Overall, this study provides empirical evidence that financial sector integration drives sectoral economic performance at the subnational level. However, the sustainability of its impact is highly dependent on credit risk control. These findings enrich the literature on the relationship between financial sector integration, credit risk, and sectoral economic performance in developing countries with dual banking systems, such as Indonesia.

DAFTAR PUSTAKA

- Adegboye, A. C., & Iweriebor, S. (2018). Does Access to Finance Enhance SME Innovation and Productivity in Nigeria? Evidence from the World Bank Enterprise Survey. *African Development Review*, 30(4), 449–461. <https://doi.org/https://doi.org/10.1111/1467-8268.12351>
- Afsari, S. D., Nafi, M. Z., & Hasbi. (2025). The Role of Financial Innovation in Increasing Access to Economic Services in the Community. *Maslahah: Journal of Sharia Management and Economics*, 3(3), 72–90. <https://doi.org/https://doi.org/10.59059/maslahah.v3i3.2419>
- Ahna, S. C., & Schmidt, P. (1997). Efficient estimation of dynamic panel data models: Alternative assumptions and simplified estimation. *Journal of Econometrics*, 76(2), 309–321. [https://doi.org/https://doi.org/10.1016/0304-4076\(95\)01793-3](https://doi.org/https://doi.org/10.1016/0304-4076(95)01793-3)
-

- Areliano, M., & Boverb, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, 68(August 1990), 29–51. [https://doi.org/https://doi.org/10.1016/0304-4076\(94\)01642-D](https://doi.org/https://doi.org/10.1016/0304-4076(94)01642-D)
- Arhinful, R., Mensah, L., Gyamfi, B. A., & Obeng, H. A. (2025). The Impact of Non-Performing Loans on Bank Growth : The Moderating Roles of Bank Size and Capital Adequacy. *International Journal of Financing Studies*, 13(165), 1–23. <https://doi.org/https://doi.org/10.3390/ijfs13030165>
- Arnone, M., Costantiello, A., & Leogrande, A. (2024). Banking Credit and Innovation Technology : a Global Perspective. *Business, Economics and Management*, 0–21. <https://doi.org/10.20944/preprints202411.1948.v1>
- Baltagi, B. H. (1975). Econometric Analysis of Panel Data: Third edition. In *Department of Economics and The Center for Policy Research, Syracuse University, Syracuse, USA* (Vol. 5, Issue 7). <https://doi.org/10.3109/00498257509056115>
- Beck, T., Büyükkarabacak, B., Rioja, F. K., & Valev, N. T. (2014). Who gets the credit? Moreover, does it matter? Household vs. firm lending across countries. *B.E. Journal of Macroeconomics*, 12(1). <https://doi.org/10.1515/1935-1690.2262>
- Beck, T., Döttling, R., Lambert, T., & van Dijk, M. (2023). Liquidity creation, investment, and growth. In *Journal of Economic Growth* (Vol. 28, Issue 2). Springer US. <https://doi.org/10.1007/s10887-022-09217-1>
- Berger, A. N., & Udell, J. (2014). Bank liquidity creation and real economic output. *Journal of Banking and Finance*, 81, 1–19. <https://doi.org/10.1016/j.jbankfin.2017.04.005>
- Blundell, R., & Bond, S. (2023). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 78(1), 1–10. <https://doi.org/https://doi.org/10.1016/j.jeconom.2023.01.020>
- Cheng, H. (2014). *Analysis of Panel Data, 3rd edition*. Cambridge, University Press.
- Daoud, Y., & Kammoun, A. (2025). The Effect of Capital Regulation Measures and Non-Performing Financing on Islamic Banks ' Performance : Evidence from the Post-Crisis Era. *International Journal of Economics and Business Administration*, XIII(4), 206–226.
- Diamond, D. W., & Rajan, R. G. (2005). Liquidity Risk, Liquidity Creation and Financial Fragility: A Theory of Banking. *SSRN Electronic Journal*, 476. <https://doi.org/10.2139/ssrn.112473>
- Elshani, A. N. (2025). Impact of Non-Performing Loans on Deposits and Financial Stability : An Empirical Analysis in Developing European Countries. *Journal of Risk Analysis and Crisis Response*, 15(3), 622–639. <https://doi.org/https://doi.org/10.54560/jracr.v15i3.679>
- Gambacorta, L., Yang, J., & Tsatsaronis, K. (2014). Financial Structure and Growth. *BIS Quarterly Review*, 17(4), 1–37. https://www.bis.org/publ/qrtrpdf/r_qt1403e.htm
- Gujarati, D. ., & Porter, D. C. (2013). Single-equation regression models. In *Introductory Econometrics: A Practical Approach*.
- Hamdaoui, H. E., & Cancelo, M. (2024). The Influence of the Banking Sector on Economic Growth and Commodity Prices : A Panel Data Analysis of Spain , France , and Romania. *Commodities*, 3, 168–181. <https://doi.org/https://doi.org/10.3390/commodities3020011>
- Hor, B., & Lim, S. (2025). The Impact of Non-Performing Loans on Credit Growth of Commercial Banks in Cambodia. *Journal of Risk and Financial Management*, 18(635). <https://doi.org/https://doi.org/10.3390/jrfm18110635>
- Imboden, K. (2005). Building inclusive financial sectors: the road to growth and poverty reduction. *Journal of International Affairs*, 58(2), 65–86. <https://www.jstor.org/stable/24358266>
- Ismail, I., Bacha, O. I., & Mantai, M. M. (2024). Impact of Liquidity Creation on Real Economic Output: Evidence From Full-Fledged Islamic Banks and Hybrid Conventional Banks. *Journal of Islamic Monetary Economics and Finance*, 10(2), 397–426. <https://doi.org/10.21098/jimf.v10i2.2147>
- Karakaya, N., Michalski, T. K., & Ors, E. (2022). Banking integration and growth : Role of banks ' previous industry exposure. *Journal of Financial Intermediation*, 49(2), 1–20. <https://doi.org/10.1016/j.jfi.2021.100944>
- Kazak, H., Uluyol, B., Akcan, A. T., & İyibildiren, M. (2023). The impacts of conventional and Islamic banking sectors on real sector growth: Evidence from time-varying causality analysis

- for Turkiye. *Borsa Istanbul Review*, 23, S15–S29. <https://doi.org/10.1016/j.bir.2023.09.004>
- Levine, R. (2005). *FINANCE AND GROWTH: THEORY AND EVIDENCE* (Vol. 1, Issue 05). Handbook of Economic Growth. [https://doi.org/10.1016/S1574-0684\(05\)01012-9](https://doi.org/10.1016/S1574-0684(05)01012-9)
- Levine, R., & Demirgüç-Kunt, A. (2008). *Finance, Financial Sector Policies, and Long-Run Growth*. World Bank Publications.
- Levine, R., Loayza, N., & Beck, T. (2000). Financial Intermediation and Growth: Causality and Causes. *Journal of Monetary Economics*, 46(1), 31–77. [https://doi.org/https://doi.org/10.1016/S0304-3932\(00\)00017-9](https://doi.org/https://doi.org/10.1016/S0304-3932(00)00017-9)
- Mahmoud, M. M., Izlin, M., & Obiyathulla, I. B. (2025). Impact of dual banking system liquidity creation on economic activity. *Economic Change and Restructuring*, 58(3), 1–25. <https://doi.org/10.1007/s10644-025-09872-5>
- Malfiandri, Zulkan, & Radimin. (2025). Measuring the stability of the national financial system: an analysis of the impact of the dual banking system in Indonesia. *Journal of Accounting, Finance, Taxation and Corporate Governance*, 2(4), 1141–1150.
- Niswatin, & Santoso, I. R. (2025). “Factors affecting non-performing finance in Islamic banking in Indonesia’s agricultural sector. *Banks and Bank Systems*, 20(1), 323–333. [https://doi.org/10.21511/bbs.20\(1\).2025.26](https://doi.org/10.21511/bbs.20(1).2025.26)
- Nkoro, E., & Uko, A. K. (2022). Foreign direct investment and inclusive growth: the role of the financial sector development. *International Journal of Economic Sciences*, XI(2), 144–162. <https://doi.org/10.52950/ES.2022.11.2.008>
- Financial Services Authority (FSA). (2024). *INDONESIAN BANKING SURVEILLANCE REPORT TW IV 2024*.
- Purnamasari, D., & Achyani, F. (2022). Analysis of the Effect of Credit Expansion, Operational Efficiency Rate, Lending Interest Rate, NPL of the Previous Period and Capital Adequacy Ratio (CAR) on Non-Performing Loans Based on the Generalized Method of Moment. *Quantitative Economics and Management Studies*, 3(2), 256–264. <https://doi.org/https://doi.org/10.35877/454RI.qems919>
- Rajan, R. G., & Zingales, L. (1998). Financial Dependence and Growth. *American Economic Review*, 88(3), 559–586.
- Ratib, S., Aledeimat, M., & Bein, M. A. (2025). Does Uncertainty Affect the Banks’ Non-Performing Loans/Non-Performing Finance in the MENA Region? A Comparison Study Between Conventional and Islamic Banks in the MENA Regions. *Sage Journals*, March, 1–22. <https://doi.org/10.1177/21582440251320239>
- Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal*, 9(1), 86–136. <https://doi.org/https://doi.org/10.1177/1536867X0900900106>
- Sinha, J. K. (2025). Strategic Investment and Inclusive Growth in India: Unpacking the Interlinkages between Capital Formation and Employment Generation. *Journal of Behavioral Economics and Policy*, 01(01), 1–19. <https://doi.org/https://doi.org/10.55121/jbep.v1i1.535>
- Sjafrizal. (2018). *Regional economics: Theory and application*. Bad-ass Media.
- Sufian, F., & Habibullah, M. S. (2012). Developments in the efficiency of the Malaysian banking sector: The impacts of financial disruptions and exchange rate regimes. *Progress in Development Studies*, 12(1), 19–46.
- Tarigan, R. (2015). *Regional Economics: Theory and Application*. PT Bumi Aksar.
- Wahyudi, H., Lestari, W. R., Said, U. Bin, Leny, S. M., & Awaluddin, I. (2025). Dynamics of Growth and Stability in the Islamic Financial Services Industry on ECA, GCC, MENA, SSA, and EAP. *International Journal of Economics and Financial Issues*, 15(3), 448–456. <https://doi.org/https://doi.org/10.32479/ijefi.19200>
- Wahyuni, S., Siregar, H., Rustiadi, E., & Pravitasari, A. E. (2024). Analysis of The Leading Sector for Regional Development: A Case Study of Batam, Bintan, and Karimun (BBK), Riau Islands Province, Indonesia Analysis of The Leading Sector for Regional Development: A Case Study of Batam, Bintan, and Karimun (BBK). *BHUMI: Journal of Agrarian and Land*, 10(1), 17–35. <https://doi.org/10.31292/bhumi.v10i1.792>
- Wooldridge, J. M. (2015). *Econometric Analysis of Cross Section and Panel Data*.
- Yanti, T. S., Rohaeni, O., & Astuti, F. (2013). Analysis of Leading Industries of the City of Bandung. *Industrial Research Workshop and National Seminar*, 4, 59–64. <https://doi.org/https://doi.org/10.35313/irwns.v4i0.362>

Zuhroh, I., & Rofik, M. (2025). BALANCING CAUTION AND EXPANSION : THE NON-PERFORMING LOANS THRESHOLD FOR THE CREDIT-GROWTH NEXUS. *Journal of Indonesian Economy and Business*, 40(2), 296–312.
<https://doi.org/https://doi.org/10.22146/jieb.v40i2.8017>