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Sectoral base and role of banking credit on growth: Evidence from Indonesia

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Abstract

This study investigates the nexus of bank credit and economic growth in Indonesia, reveals the sectoral base by individual intercept, and asses too much financing through the financial deepening ratio. Exploring data from 14 sectoral economics in the 2011-2020 annual period and tackling the research objectives by applying panel regression of the fix effect model, the result shows that bank credit drives economic growth; six sectors had positive intercepted, and the rest were negative. Meanwhile, the financial deepening coefficient indicates too much financing phenomenon; therefore, elective bank credit needs to escalate

Keywords: Bank credit; sectoral economic; growth; financial deepening; credit efficiency

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1. Introduction

Discussions about the importance of an established financial system and its intermediary role in promoting economic development have dominated the literature over the past few decades (Bayoumi & Melander, 2021; Beck et al., 2007; Marc et al., 1970; Sanaphanh & Sethapramote, 2021). King & Levine (1993), who sampled 77 countries, showed that the growth of the financial sector not only follows economic growth but also drives and leads growth itself. Rousseau & Wachtel (2002) found robust evidence through panel data regression of 84 countries from 1960 to 1995 that financial depth and resilience positively impact economic growth. The literature also highlights credit as a leading financial instrument for driving growth (Bui, 2020; Ivanovic, 2016; Liang, 2016). The distribution of productive credit, both as working capital and investment, fuels production factors, increases production scale, creates more jobs, and ultimately generates additional aggregate supply and demand (Malik et al., 2021; Sipahutar, 2016). Scholars have shown interest in the credit-growth nexus through various approaches and models, including a sectoral perspective. Sectoral analyses conducted in several countries worldwide can be found in the research by Akpansung & Babalola (2011), Alzyadat (2021), and Ananzeh (2016).

However, studies specifically examining sectoral growth relationships in Indonesia are limited; one comprehensive study was conducted by the Financial Services Authority (2015), but it did not reveal the sectoral base. Investigating the sectoral base is crucial because assuming each bank credit has the same effect on the economy, a heterogeneous sectoral base will yield different aggregate outputs and elasticities. Additionally, this study adopts the approach of Arcand et al. (2015), Samargandi et al. (2015), Soedarmono et al. (2017), and Zhu et al. (2020), which utilize the financial deepening ratio as an indicator of the phenomenon of excessive financing.

This study contributes to the literature on the credit-growth nexus from a sectoral perspective, investigates the phenomenon of excessive financing, and provides empirical evidence regarding the linkage between the sectoral base, GDP share, and credit proportion. From a policymaker's point of view, the study can serve as a reference for alternative strategies to optimize growth potential through various policies, ranging from fiscal measures to inclusive monetary policy.

The paper is organized as follows: the second part presents the research method, including the model construction and data; the fourth part discusses the results; and the final part concludes the study

2. Method

Financial Deepening

We use the bank credit to GDP nominal ratio as a proxy for financial deepening (φ), as formulated in equation (1); the use of this ratio follows Arcand et al. (2015), Samargandi et al. (2015), Soedarmono et al. (2017), and Zhu et al. (2020), which applies the financial deepening as an indicator to evaluate too much financing phenomenon.

$$\varphi_t = \frac{C_t}{Y_t} \quad (1)$$

Data

Economic growth and bank credit are classified into 14 main sectors; this classification results from the elaboration of data released by the Central Statistics Agency as a source of GDP and the financial services authority as the official provider of data on banking credit in Indonesia. The details of the 14 sectors show in Table 1. Barro (2013), Rousseau & Wachtel (2002), and Thanh (2015), this study involves the inflation variable as the first control variable. There is a possibility that a high inflation regime will lead to inefficient credit due to increased production costs and decreased purchasing power. Hereinafter, due to the findings of growth sensitivity to exchange rate volatility, especially in the manufacturing sector Financial Services Authority (2015) and several other studies that place the exchange rate as one of the control variables of credit-growth nexus (Barguellil et al., 2018; Handayani & Oktavia, 2018; Karahan, 2020), the exchange rate is also added as the second control variable. Theoretically, for commodity-exporting countries such as Indonesia, the rupiah depreciation can be a positive catalyst for export acceleration, impacting increasing growth. However, because Indonesia still relies on imports, especially for industrial needs, fluctuations can negatively affect it. Unlike (Akpansung & Babalola, 2011), which involves the interest rate variable as one of the explanatory variables, this study follows the IS curve theory, where the level of bank credit already represents the interest rate.

Table 1. Classification of economic sectors

Sector	Sector	Members of sector
1	Agriculture	Agriculture, forestry, and fisheries
2	Mining	Mining and quarrying sector
3	Manufacturing	Manufacturing
4	Energy	Procurement of electricity, gas, water, garbage, waste and recycling
5	Construction	Construction
6	Trade	Wholesale and Retail Trade; Car and Motorcycle Repair
7	Food	food and beverage accommodation
8	Transportation and Communication	Transportation and Warehousing, Information and Communication
9	Finance	Financial and insurance services
10	Real estate	Real estate and corporate services
11	Government administration	Government Administration, Defense and Mandatory Social Security
12	Education	Education services
13	Health	Health Services and Social Activities
14	Other services	Other services

This study uses annual data for the period 2011-2020. Sectoral data of real GDP as a proxy for economic growth obtained from Central Statistics Agency; sectoral bank credit data from financial services authority; data of inflation and the rupiah exchange rate against the USD are obtained from the Bank of Indonesia's report and taken in

December. Meanwhile, the financial deepening ratio is obtained by dividing the credit by GDP in the same year follows equation (1).

Econometric model

Refer to one of the study's objectives is to reveal different characteristics of fundamental gowth in each sector and consider the panel data availability. Theoretically, at least two models can be used: panel data regression using the Fix effect least square dummy variable (LSDV) method or the Fix Effect Model (FEM), which follows equation (2), and the random effect model (REM) such as equation (3). Because the available data are short panel data, the observation period is smaller than the number of cross-sections, it is possible estimating using FEM and REM has a significant difference; in REM, the intercept formed is a random cross-sectional component, while in FEM, we assume that the component is fixed.

$$Y_t = \delta_h + \sum_{i=j=1}^{m} \beta_i x_{j,t} + u_{j,t} \quad (2)$$

$$Y_t = \delta + \sum_{i=j=1}^{m} \beta_i x_{j,t} + w_{j,t} \quad (3)$$

Notes: i represents the coefficient of exogenous variable j, t and h represent times of t and sector of h, respectively; $\delta_h = \delta + \varepsilon_h$ and $w_{j,t} = \varepsilon_h + u_{j,t}$, $\varepsilon_i \sim N(0, \sigma_\varepsilon^2)$

We conducted the Hausman test to select the best model, with the null hypothesis assuming that the FEM and REM estimators have no difference. When the null hypothesis is rejected, there is a possibility that the random effect is correlated with one or more of the independent variables. In this case, FEM is better and vice versa. When FEM is selected, the next step is to test the classical assumptions, including multicollinearity and heteroscedasticity. At the same time, if the best model obtained is REM, normality and multicollinearity tests are carried out. When the formed model does not pass one or all of the assumptions test, an elimination of exogenous variables indicated to cause the problem will be carried out. After the best model is obtained, the analysis stage is continued by calculating the intercept of each sector. A positive intercept indicates that the sector has a higher average growth rate and can interpret as having mature economic fundamentals and vice versa. Sectors with a negative intercept may have credit saturation due to an excessively high credit to GDP ratio or low natural inelasticity in credit conversion to growth. Refer to Equations (2)-(3); considering the construction of the research model and data type, the models in this study followed equation (4) for FEM and equation (5) for REM.

$$\ln Y_t = \delta_s + \beta_2 \ln credit_t + \beta_3 fd_t + \beta_4 \ln er_t + \beta_5 inf_t + u_{s,t} \quad (4)$$

$$\ln Y_t = \delta + \beta_2 \ln credit_t + \beta_3 fd_t + \beta_4 \ln er_t + \beta_5 inf_t + w_{j,t} \quad (5)$$

Notes: credit, fd, er, and inf respectively are represented bank credit, the financial deepening, exchange rate, and inflation.

Table 2. Regression Results of FEM and REM

Dependent Variable: GDP real (growth)				
Independent Var.	**Specification**			
	Model 1		**Model 2**	
Method	**Fix effect**	**Random effect**	**Fix effect**	**Random effect**
Independent Var.				
Bank Credit	0.110*	0.173*	0.157*	0.224*
Fin. Deep.	-0.181*	-0.273*	-0.189**	-0.298*
Exc. Rate	0.560*	0.457*	0.530*	0.418*
Inflation	-0.018*	-0.017*		
C	6.563*	6.830*	6.225*	6.540*
Adjusted R-squared	0.993	0.715	0.991	0.660
F-statistic (Prob.)	1220.567 (0.000)	88.309 (0.000)	1012.379 (0.000)	91.110 (0.000)
Mean dependent Var.	12.985	0.837	12.985	0.947
S.D dependent Var.	0.920	0.163	0.920	0.166
Hausman Test				
Chi-Sq. Statistic	49.326		43.433	
Prob.	0.000		0.000	
Selected Model	Panel Least Square (Fix effect)		Panel Least Square (Fix effect)	

Notes: ***, **, * indicate significance level at 10%, 5% and 1%, respectively

3. Empirical Result

By running the analysis through panel data regression, we find that the FEM is the best model in Model 1. Still, there are heteroscedasticity symptoms that are indicated by the correlation between the inflation variable and residuals, so there is a possibility that the model is not efficient. Therefore, we construct Model 2 by eliminating the inflation variable. As well as model 1, the regression results from model 2 show that the FEM is the best model than REM; the conclusion is based on the p-value of the Hausman test, which is less than 0.05, as seen in Table 2. As a further matter, based on Table 3, the model is free from heteroscedasticity, which is indicated by the absence of correlation between residues and exogenous variables. Model 2 is free from multicollinearity, as shown in Table 4. The F-statistic shows that model 2 is simultaneously significant and the R-squared and Adjusted R-squared values are close to 1; the exogenous variables can explain well the endogenous variables. Hence, model 2 can be considered reliable for forecasting and inferential interpretation.

Table 3. Heteroscedasticity

Dependent Variable: Abs(resid)	**Specification: Panel Least Square (Fix effect)**	
Independent Var.	**Model 1**	**Model 2**
Bank Credit	-0.004	-0.005
Fin. Deep.	-0.007	0.005
Exc. Rate	-0.023	-0.023
Inflation	-0.006*	
C	0.363	0.350
F-statistic (Prob)	4.189 (0.003)	1.448 (0.231)

Notes: ***, **, * indicate significance level at 10%, 5% and 1%, respectively

Table 4. Multicollinearity

	GDP	Bank Credit	Fin. Deep.	Inflation	Exc. Rate
GDP	1.000				
Bank Credit	0.677	1.000			
Fin. Deep.	-0.230	0.450	1.000		
Inflation	-0.082	-0.111	-0.089	1.000	
Exc. Rate	0.136	0.239	0.149	-0.258	1.000

As seen in Table 2, this research supports various theoretical and empirical literature that declares that bank credit is an engine of growth (Ivanovic, 2016; King & Levine, 1993; Liang, 2016; Rousseau & Wachtel, 2002). Although credit positively impacts economic growth, we find that eight of the 14 sectors classified have negative intercept values (see Fig. 1). Because the intercept is the expected average value of the endogenous variable when all exogenous variables are equal to zero, the diversity of sectoral intercept values represents each sector's heterogenous fundamentals of economic development. Although the marginal value of credit conversion to growth is the same for each sector, a larger sectoral intercept will generate a higher aggregate output and elasticity. Thus, when the negative intercept value of the sector can be reduced, and the positive intercept can be enlarged, it will cumulatively increase the national economic growth. Kreamer (2019) found that an exclusive reliance on monetary policy to stabilize the economy generally results in inefficient sectoral volatility. Therefore, an inclusive monetary policy is also needed apart from sectoral-based fiscal policy.

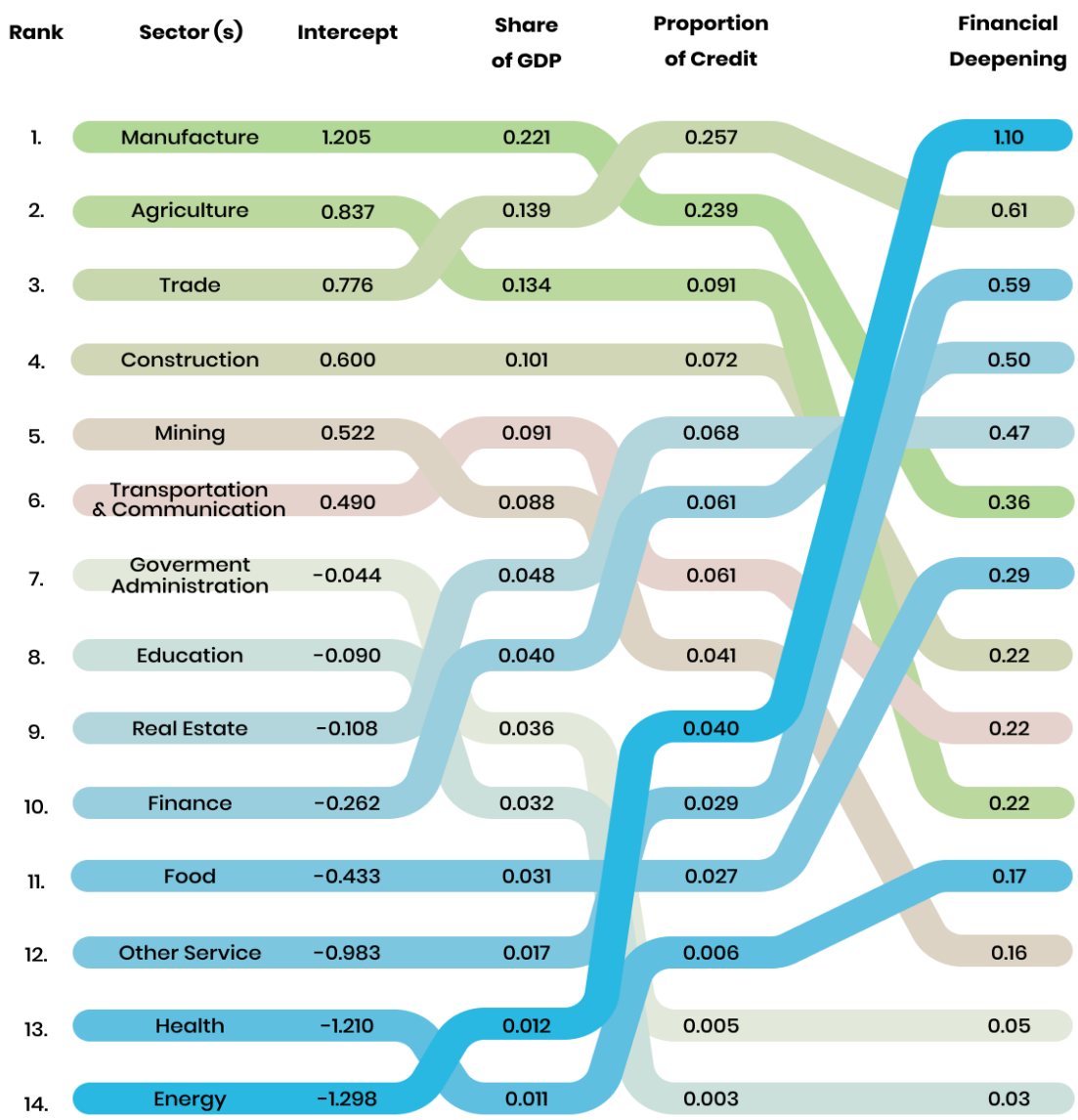

Figure 1. Sectoral intercept, the average share of GDP, the average proportion of credit, and the average financial deepening ratio for each sector in 2011-2020.

The energy sector has the lowest intercept value. Moreover, according to the financial deepening ratio, this sector is the least efficient in turning credit into growth. Nevertheless, the energy supply is the backbone of other sectors, and the certainty of energy supply takes precedence over the calculation of investment returns. Besides, the energy sector is run by state-owned firms. As an implication, we find no evidence that the problem of low credit conversion to growth is caused by collateral issues or tight monetary policy, such as finding conducted by Bosi et al. (2016); Motta (2020); and Nanziri & Wamalwa (2021). However, the low conversion rate is solely based on the sectoral characteristic and government policy of the sector concerned, which may tend to be inelastic in responding to credit; conditions in Nigeria also show that the oil and gas sector tends to inhibit growth (Akpansung & Babalola, 2011). The sectors that also

receive our notable highlights are agriculture; this sector holds the second-largest intercept under manufacturing. On another side, the agricultural sector is one of the four leading sectors of credit recipients and GDP contributors. This finding indicates that Indonesia is on the right line to optimizing its agricultural and marine potential. In comparison, studies from KSA (Alzyadat, 2021) and Pakistan (Iftikhar et al., 2020) show that banking credit in the agricultural sector cannot encourage growth.

The financial deepening variable regression results have consistent arrows in both model 1 and model 2, which are significantly negative (See Table 4); In general, there is an indication of too much financing during the observation period. Also, in Fig. 1, we can see that three of the four sectors with the largest sectoral intercept are not included in the top four sectors with the highest financial deepening ratio. Meanwhile, suppose we address the financial deepening threshold of 39%, as advocated by Soedarmono et al. (2017). In that case, the big four of sectoral intercept outside Trade still have room to increase the amount of credit absorption. Conversely, most sectors with negative intercepts other than education, Transportation & Communication have a higher financial deepening. Our finding also found that the four sectors with the largest sectoral intercepts are listed on the top four shares of GDP and the proportion of credit disbursement.

The exchange rate has a significant positive coefficient; this indicates that during the observation period, the weakening of the rupiah was still within reasonable limits; not only did it not disrupt the economy, but statistically, the weakening of the rupiah was still driving growth. An overly weak exchange rate will almost certainly boost commodities exports from Indonesia, which will support the agriculture sector, but it will damage the manufacturing sector, whose majority of components still rely on exports (Barguellil et al., 2018; Karahan, 2020; Zuhroh et al., 2021). In addition, the exchange rate stability is the main issue; exchange rate volatility will increase uncertainty and cause additional costs for firms in risk management, especially related to financing in foreign currencies; this will undoubtedly suppress the pace of business expansion.

4. Conclusions

Based on the constructed models, it is evident that bank credit has a significant impact on growth. The coefficient of financial deepening is found to be negatively significant, indicating the presence of the phenomenon of excessive financing. This result reinforces the need for selective credit allocation in Indonesia to optimize growth. One strategy that can be employed is the provision of more targeted credit, particularly to sectors with high financial deepening, while also expanding bank credit to sectors with higher sectoral intercepts. Additionally, considering the heterogeneity of the intercept across industries, we argue that government intervention to strengthen the lower sectoral base in each sector should be implemented in conjunction with an inclusive monetary policy.

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Authors' Contributions: All authors contributed equally to the conception and design of the study

5. References

Akpansung, A. O., & Babalola, S. J. (2011). Banking sector credit and economic growth in Nigeria: An empirical investigation. *CBN Journal of Applied Statistics*, *02*(2). https://doi.org/ 10.1.1.431.6929

Alzyadat, J. A. (2021). Sectoral Banking Credit Facilities and Non-Oil Economic Growth in Saudi Arabia: Application of the Autoregressive Distributed Lag (ARDL). Journal of Asian Finance, Economics and Business, 8(2). https://doi.org/10.13106/jafeb.2021.vol8.no2.0809

Ananzeh, I. E. N. (2016). Relationship between Bank Credit and Economic Growth: Evidence from Jordan. International Journal of Financial Research, 7(2). https://doi.org/10.5430/ijfr.v7n2p53

Arcand, J. L., Berkes, E., & Panizza, U. (2015). Too much finance? Journal of Economic Growth, 20(2). https://doi.org/10.1007/s10887-015-9115-2

Barguellil, A., Ben-Salha, O., & Zmami, M. (2018). Exchange rate volatility and economic growth. Journal of Economic Integration, 33(2). https://doi.org/10.11130/jei.2018.33.2.1302

Barro, R. J. (2013). Inflation and economic growth. Annals of Economics and Finance, 14(1). https://doi.org/10.1086/259360

Bayoumi, T., & Melander, O. (2021). Credit Matters: Empirical Evidence on U.S. Macro-Financial Linkages. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.1160059

Beck, T., Demirgüç-Kunt, A., & Levine, R. (2007). Finance, inequality and the poor. Journal of Economic Growth, 12(1). https://doi.org/10.1007/s10887-007-9010-6

Bosi, S., Ismael, M., & Venditti, A. (2016). Collateral and growth cycles with heterogeneous agents. Journal of Macroeconomics, 48, 327–350. https://doi.org/10.1016/j.jmacro.2016.04.007

Bui, T. N. (2020). Domestic Credit and Economic Growth in Asean Countries : A Nonlinear Approach. International Transaction Journal of Engineering , Management , & Applied Sciences & Technologies, 11(2), 1–9.

Financial Services Authority. (2015). Potensi Pertumbuhan Ekonomi ditinjau dari Penyaluran Kredit Perbankan Kepada Sektor Prioritas Ekonomi Pemerintah. https://www.ojk.go.id/id/berita-dan-kegiatan/publikasi/Default.aspx

Handayani, W., & Oktavia, S. (2018). Effect of Rupiah Exchange Rate, GDP Growth, and Dow Jones Index on Composite Stock Price Index in Indonesia Stock Exchange. Journal of Accounting and Strategic Finance, 1(01). https://doi.org/10.33005/jasf.v1i01.24

Iftikhar, F., Majeed, S., & Syed, D. (2020). Modeling the Relationship between Banking Sector Credit and Economic Growth: A Sectoral Analysis for Pakistan. Journal of Economic Cooperation and Development, 41(1).

Ivanovic, M. (2016). Determinants of credit growth: The case of Montenegro. Journal of Central Banking Theory and Practice, 5(2). https://doi.org/10.1515/jcbtp-2016-0013

Karahan, Ö. (2020). Influence of Exchange Rate on the Economic Growth in the Turkish Economy. Financial Assets and Investing, 11(1). https://doi.org/10.5817/fai2020-1-2

King, R. G., & Levine, R. (1993). Finance and growth: schumpeter might be right. Quarterly Journal of Economics, 108(3). https://doi.org/10.2307/2118406

Kreamer, J. (2019). Sectoral Heterogeneity and Monetary Policy. Forthcoming in American Economic Journal: Macroeconomics.

Liang, Y. (2016). Inside Shadow Banking in China: Credit Driven Growth vs. Financial Stability. Journal of Economic Issues, 50(2). https://doi.org/10.1080/00213624.2016.1179046

Malik, N., Suliswanto, M. S. W., & Rofik, M. (2021). The unemployment rate amid the COVID-19 pandemic: Propose the best practices policy to maintain labor market stability. Jurnal Ilmu Sosial Dan Ilmu Politik, 25(1). https://doi.org/10.22146/JSP.56450

Marc, M. saint, Goldsmith, R., & Marc, M. saint. (1970). Financial Structure and Development. Revue Économique, 21(3). https://doi.org/10.2307/3499896

Motta, V. (2020). Lack of access to external finance and SME labor productivity: does project quality matter? Small Business Economics, 54(1). https://doi.org/10.1007/s11187-018-0082-9

Nanziri, L. E., & Wamalwa, P. S. (2021). Finance for SMEs and its effect on growth and inequality: evidence from South Africa. Transnational Corporations Review, 13(4). https://doi.org/10.1080/19186444.2021.1925044

Rousseau, P. L., & Wachtel, P. (2002). Inflation thresholds and the finance-growth nexus. Journal of International Money and Finance, 21(6). https://doi.org/10.1016/S0261-5606(02)00022-0

Samargandi, N., Fidrmuc, J., & Ghosh, S. (2015). Is the Relationship Between Financial Development and Economic Growth Monotonic? Evidence from a Sample of Middle-Income Countries. World Development, 68(1). https://doi.org/10.1016/j.worlddev.2014.11.010

Sanaphanh, V., & Sethapramote, Y. (2021). Financial development and economic growth in asia. ABAC Journal, 41(2). https://doi.org/10.2139/ssrn.3832920

Sipahutar, M. A. (2016). Effects of Credit on Economic Growth, Unemployment and Poverty. Jurnal Ekonomi Pembangunan: Kajian Masalah Ekonomi Dan Pembangunan, 17(1). https://doi.org/10.23917/jep.v17i1.1651

Soedarmono, W., Hasan, I., & Arsyad, N. (2017). Non-linearity in the finance-growth nexus: Evidence from Indonesia. International Economics, 150. https://doi.org/10.1016/j.inteco.2016.11.003

Thanh, S. D. (2015). Threshold effects of inflation on growth in the ASEAN-5 countries: A Panel Smooth Transition Regression approach. Journal of Economics, Finance and Administrative Science, 20(38). https://doi.org/10.1016/j.jefas.2015.01.003

Zhu, X., Asimakopoulos, S., & Kim, J. (2020). Financial development and innovation-led growth: Is too much finance better? Journal of International Money and Finance, 100. https://doi.org/10.1016/j.jimonfin.2019.102083

Zuhroh, I., Rofik, M., & Echchabi, A. (2021). Banking stock price movement and macroeconomic indicators: k-means clustering approach. Cogent Business and Management, 8(1). https://doi.org/10.1080/23311975.2021.1980247