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Research article

Rethinking Domestic Debt: Implications for Indonesia's Financial Sector

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A B S T R A C T

Financial development performance can be affected by using domestic debt to address the public sector financing deficit, especially in countries like Indonesia where the financial sector is highly dependent on one subsector while others are still in their infancy. This study investigates Indonesia's financial development as affected by domestic public debt using secondary time series data from 2010Q1 to 2020Q3. The study employs Principal Component Analysis and Ordinary Least Squares regression models. The findings show that increasing domestic public debt has a positive and significant impact on financial development in Indonesia. Furthermore, it is revealed that domestic public debt positively and significantly affects financial activity and financial size but has a negative and significant impact on financial efficiency. Therefore, the government should consider reducing securitized debt instruments, especially those issued to the banking system, as this may hinder financial development in the long run.

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1. INTRODUCTION

The financial sector is a key sector that significantly influences the dynamics of development, especially utilizing its ability to act as an intermediary and provide capital to drive economic expansion Naceur et al., 2014; and Greenwood, et al., 2013). The financial sector is crucial and essential for financing investment and development needs (Gheeraert, 2014; and Giuliano & Ruiz-Arranz, 2009). Essentially, every economic activity requires the role of the financial sector, ranging from banking activities to activities in the capital market (Coşkun et al., 2017; and Coşkun et al., 2017). The financial sector has the power to raise society's savings rates and credit availability, which will boost investment and promote economic growth (Zagha, et al., 2006; Nyankomo & Stephen, 2015; and Brunnermeier, 2023). The robustness of the financial sector is also a critical requirement for minimizing economic pressure during crises (Degl'Innocenti et al., 2018; and Hardy & Sever, 2021).

Schumpeter was the first to highlight the significance of the financial sector's role, arguing that a well-functioning financial system can promote technological innovation by allocating resources from the unproductive to the productive sectors in an efficient manner (King & Levine, 1993). Subsequently, more and more studies discussed the important role of the financial sector which was then developed into financial development for a country's economy. Goldsmith (1969) explains that the evolution of domestic financial markets will increase the efficiency of capital accumulation or in other words, financial development is in line with investment efficiency. The argument is reinforced by findings in studies by Čihák & Demirgüç-Kunt (2013); Marconi & Upper (2017); Popov (2018); Phan et al. (2019); and Millah & Wibowo (2021). The studies by McKinnon (1973); Shaw (1973);

Akyüz (1993); Odhiambo (2010); Nwadiubu et al. (2014); Orji et al. (2015); and Jafarov et al. (2019) in their study explained the importance of financial liberalization in encouraging increased domestic savings and investment through increased capital productivity. Future rates of technological advancement, capital accumulation, and economic growth can all be predicted by financial development (Levine, 1998; Blejer & Sagari (1988); and Villanueva, 2022).

However, Lucas (1988); Pinshi (2020); Phan et al. (2019); and Hamdaoui & Cancelo (2024) suggest that the influence of the financial sector on growth is overemphasized. There is no proof that a rise in foreign deposit-derived financing brought about by greater financial integration results in a "growth bonus." Put differently, the degree of self-financing remains unchanged despite heightened financial market integration (Aizenman et al., 2007; Mudrovna, 2016). Stiglitz (2000); Gründler (2015); Popov (2018); and Gou & Huang (2018) state that financial development has a negative and significant effect on economic growth because it can trigger a financial crisis. Negative financial impacts occur mainly in countries with weak financial systems (Mankiw, 2009; Loayza & Rancière, 2005; and Abbas et al., 2022). The number of studies highlighting financial development has shown how interesting the topic of financial development is.

Financial development consists of components (1) market size and liquidity; (2) access to financial services; and (3) the ability of institutions to provide financial services at low cost and with sustainable income, and the level of capital market activity (Svirydzenka, 2016; Gupta & Mahakud, 2019; Cavallaro & Villani, 2021; Tyson, 2021; Lompo, 2024; Capasso et al., 2022; and Caporale et al., 2022). Financial development consists of financial instruments, markets, and intermediaries being able to lessen the effects of incomplete information, lax enforcement, and transaction costs associated with financial activity—though these effects are not always eliminated. Levine (1998, 2005); and Svirydzenka (2016), define financial development more broadly by focusing on what is meant by the actual financial system. Defining financial development solely in terms of the financial system's ability to address market imperfections results in an overly narrow perspective, failing to adequately capture the financial system's broader role in supporting the overall economy.

Correspondingly, traditional macroeconomic issues including public and private debt issues, unstable exchange rates, and unsustainable fiscal policies were also brought on by the financial sector liberalization that started in many developing nations in the late 1980s and early 1990s. (Dularif, 2010; and Filho & Terra, 2022). Furthermore, crises frequently arise when the quickly expanding financial industry is exposed to forernal and external economic unrest. These oscillations can happen, for instance, when the financial sector expands more quickly than the real sector. This can lead to severe instability or even a recession, as the world economy went through for nearly ten years. Therefore, for a country's financial sector to grow and remain resilient to shocks from the crisis without creating new ones, it must either follow the growth of the real sector or be built upon a foundation of strong economic fundamentals. Financial development is one way that these efforts are carried out.

Restructuring the financial markets and banking system to optimize the flow of capital to economic activity, resource distribution, and risk diversification are examples of financial development. Conversely, an immature and vulnerable financial system can reduce capital flows to economic activity reinforce financial repression, and encourage speculation (Khalfaoui, 2015; Beck et al., 2015; and Jafarov et al., 2019). An appropriate legal and institutional framework, a robust and efficient banking and financial system, and a stable macroeconomic climate are necessary for optimizing the relationship between the conditions of the economic and financial sectors.

Although the role and success of the financial sector in supporting and accelerating economic growth varies over time and across countries, the need for an effective and efficient financial sector is undeniable. Financial development has an important role as it can contribute to economic development through capital accumulation and directing the aggregate flow of funds into productive investment financing (Von Hagen & Zhang, 2014; and Ibrahim & Alagidede, 2018). An effective, sophisticated, and well-managed financial sector will be a huge national success. A sound financial development system will increase efficiency in financial sector-related policy expenditures, promote resource allocation, and ultimately economic growth (Estrada et al., 2010; Hassan et al., 2011; Phan et al. 2019; and Abbas et al., 2022). Robust financial markets and establishments will

stimulate savings and direct them toward profitable ventures (Ahmed, 2016; and Steinert et al., 2018).

The largest portion of Indonesia's financial sector revenue comes from the financial intermediary services subsector. Eighty percent of the financial system is made up of banking institutions, which dominate the financial sector. Consequently, banks are essential because they are the main sources of funding for the economy as well as for development projects. Conversely, certain sectors of the financial industry continue to be relatively undeveloped. This study draws attention to a critical problem with the growing reliance on domestic funding, a trend fueled by the Indonesian government's ongoing budget deficit. The growing national debt highlights the government's continuous financial difficulties. Due to the short-term nature of international loans and the volatility of capital flows, which can lead to financial crises, this reliance on domestic debt is seen as safer than international debt despite the risks (Neanidis, 2019). The "vicious circle," in which financial crises brought on by foreign debt are frequently resolved by obtaining new, frequently unfavorable, debt, is an ongoing challenge.

The safe asset and lazy bank viewpoints are the two pillars of this study. Kumhof & Tanner (2005); Sagdic et al., (2021); Kapaya (2020); Haikal et al. (2021); Nguyen et al. (2023); and Dieng & Sene (2024) assert that liquid government debt guarantees can facilitate financial development. The role of public debt in financial development is considered as the safest asset in the financial system, so it becomes a benchmark that facilitates the development of the private sector bond market, which is very important for financial development. Furthermore, public debt management by the government is seen to facilitate the intermediation function in a financial system dominated by a bank-based system if the legal system and institutional infrastructure are still weak (Levine, 2002). Meanwhile, the 'lazy bank' perspective aligns with the study of Hauner (2008, 2009); Haikal et al. (2021); Frömel et al. (2023); and Constantine (2024), which suggests that a larger share of bank credit allocated to the public sector may pose a risk to the pace of financial development. Hauner (2008) further demonstrated that domestic public debt adversely affects financial deepening. Additionally, while increased public debt holdings may boost bank profitability, they can also result in a decline in the efficiency of credit sources.

As a developing country that is actively seeking economic expansion, Indonesia regularly faces budget deficits. Debt securities, primarily purchased by foreign creditors, are frequently issued to offset these deficits. Nonetheless, since domestic creditors are crucial to the success of development initiatives, it is equally vital to take them into account as a source of funding for these budget deficits. The key to achieving sustainable development is effectively allocating and employing a nation's resources for constructive endeavors. Given the critical role of financial development in a country's overall development and the increasing trend of domestic public debt in Indonesia, it is essential to understand how this debt influences financial development. The Indonesian economy is currently in a phase of active development, making it crucial to assess the dynamics of domestic public debt. Despite its significance, studies exploring the relationship between domestic public debt and financial development is sparse. If this relationship is clearly understood, the government can implement more precise and effective policies to meet development goals and ensure financial system stability. Therefore, this study primarily investigates the impact of domestic public debt on financial development in Indonesia. This study aims to explore the influence of domestic public debt on Indonesia's financial development. The systematics in this study consists of four sessions, where in the second session we present the research method, third session we present the results and discussion, and finally, and finally we present the conclusions from the research results.

2. RESEARCH METHODS

2.1. Data

This study employs time series data as secondary data. Included in this study are 33 provinces in Indonesia. This time frame, however, spans from the first quarter of 2010 through the third quarter of 2020. The information was obtained from the World Bank (WB), the International

Monetary Fund (IMF), the Central Bank of Indonesia (BI), and the Indonesia Stock Exchange (IDX). Ten variables, as indicated in Table 1, are among the data used in this investigation.

Table 1. Data Definitions and Sources

Variables	Definition	Source
FINAGG	Finance-aggregate, the result of principal component calculation of FINACT, FINSIZE, and FINEFF	IDX, BI, IMF
FINACT	Finance activity, obtained from natural logarithm (total value traded*private sector credit ratio)	IDX, BI
FINSIZE	Finance size, obtained from natural logarithm (market capitalization ratio*private sector credit ratio)	IDX, BI
FINEFF	Finance efficiency, obtained from natural logarithm (turnover ratio/net interest rate differential)	IDX, IMF
DDR	Public sector domestic debt to GDP ratio (%)	BI
TOR	Turnover ratio, derived from the quotient of traded value to market capitalization value (%)	IDX
NIM	Net interest rate differential, loan and savings rate differential (%)	IMF
INF	Inflation is the difference between the consumer price index (CPI) of the current quarter and the CPI of the same quarter of the previous year CPI divided by the current quarter (%)	IMF

2.2. Principal Component Analysis

Principal Component Analysis (PCA) is a statistical technique useful for compressing the core information of multivariate data sets (many variables) to produce high-dimensional data, based on dependencies between variables. The result of compressing several variables is then represented in a new, lower-dimensional variable that does not lose too much information (Jolliffe & Cadima 2016). The purpose of PCA is to reduce the dimension of the data set (sample) by forming a new variable that is smaller than the original set of variables but still represents most of the information from all the original variables. The variable information in question is the variation present in the sample, which is given by the correlation between the original variables. The new variable formed is called a principal component (PC).

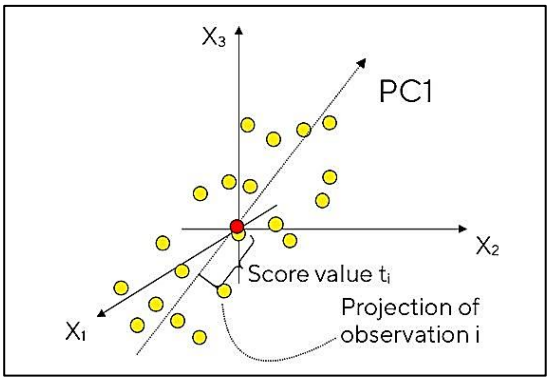

Figure 1. Concept of Principal Component Analysis
Source: www.sartorius.com

Figure 1 reports that Principal Component Analysis (PCA) aims to reduce the dimensionality of three sub-indicators, namely finance-activity (X_1), finance-size (X_2), and finance-efficiency (X_3) to form one principle component (PC_1) which is referred to as finance-aggregate and represents financial development. The first component generated from the PCA calculation can represent the three sub-indicators because it can explain the largest part of the diversity contained by the standardized data set. The other PCA-derived components explain an increasingly smaller proportion of the diversity until all the diversity of the data is explained.

Figure 2 reports that graphically, the first component of the PCA calculation can represent the most diversity of the sub-indicators. This means that the first component of the PCA results contains the most information from the sub-indicators. The first component of the PCA results represents the maximum direction of data variation.

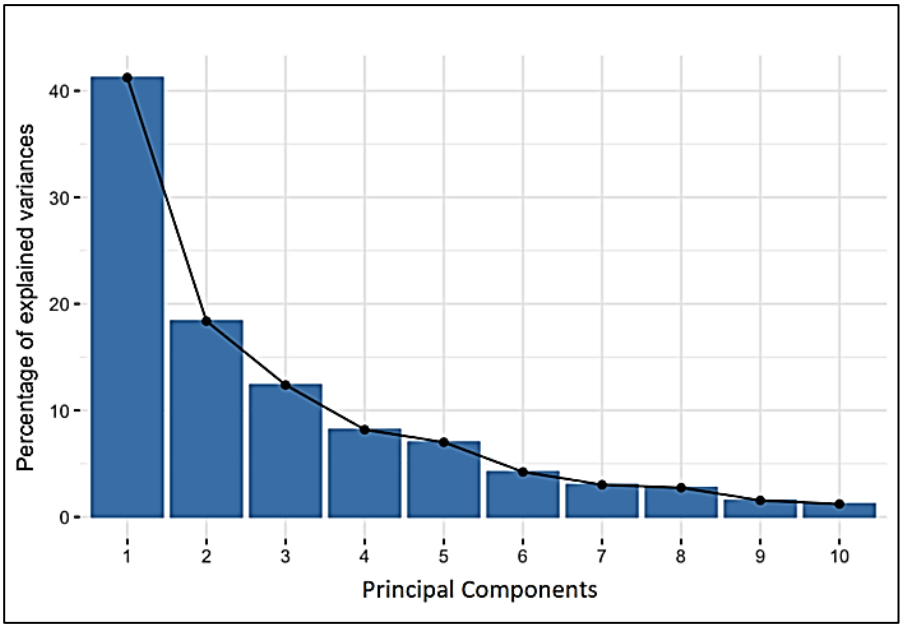

Figure 2. Proportion of Diversity Explained by Principal Component
Source: www.sartorius.com

The greater the variation captured by PC means the greater the dispersion of data in the resulting component and the more information it contains. In PCA calculations, the correlation that occurs between the original data variables (sub-indicators) can be used as an initial justification to determine whether there is a relationship between sub-indicators so that it is more likely that the resulting PC can better represent the information from the sub-indicators. In PCA calculations, the amount of diversity represented by the PC is indicated by the eigenvalue and eigenvector.

2.3. Model Specification

This research model is based on research published in the study of Altayligil & Akkay (2013). The relationship between Indonesia's domestic public debt and financial development from 2010Q1 to 2020Q3 is examined using two simple calculations. An indicator of financial development is obtained through the first calculation, and an indicator of historical domestic public debt is obtained through the second calculation. The foundation of financial development is a computation known as Finance-aggregate, which consists of three sub-indicators and indicates the extent to which the financial system can deliver financial services. The first indicator, the Finance-activity ratio, is calculated by taking the logarithm of the product of the private sector credit ratio and the total traded value ratio. The second indicator is Finance-size derived from the logarithm of the product of the market capitalization ratio and the private sector credit ratio. The final metric is Finance-efficiency, which can be calculated by dividing the interest rate margin by the logarithm of the turnover ratio. An indicator of financial development will be the Finance-aggregate, the final calculation that combines the results of the first three calculations. The first main component of finance activity, size, and efficiency is Finance-aggregate. The higher the value of the four computations, the more financial development will rise.

The general model used in this study is formed from the variable functions of the domestic public debt ratio, turnover ratio, net interest rate, and inflation. The dependent variable in this study is Finance-aggregate as an indicator of financial development that has been explained previously. Furthermore, three modelings were conducted with the same independent variables paired with different dependent variables Finance-activity, Finance-size, and Finance-efficiency. The three sub-

indicators that make up the Finance-aggregate are modeled to determine which dependent variable is more influenced by the same independent variables. The model in this study is as follows:

$$FINAGG_t = \alpha_1 + \beta_1 DDR_t + \beta_2 TOR_t + \beta_3 NIM_t + \beta_4 INF_t + \varepsilon_{1t} \quad (1)$$

$$FINACT_t = \alpha_6 + \beta_5 DDR_t + \beta_6 TOR_t + \beta_7 NIM_t + \beta_8 INF_t + \varepsilon_{2t} \quad (2)$$

$$FINSIZE_t = \alpha_{11} + \beta_9 DDR_t + \beta_{10} TOR_t + \beta_{11} NIM_t + \beta_{12} INF_t + \varepsilon_{3t} \quad (3)$$

$$FINEFF_t = \alpha_{16} + \beta_{13} DDR_t + \beta_{14} TOR_t + \beta_{15} NIM_t + \beta_{16} INF_t + \varepsilon_{4t} \quad (4)$$

where the intercept is denoted as $\alpha_1, \alpha_6, \alpha_{11}$, and α_{16}, represents the constant term in the model; The coefficients β_n (where n = 1, 2, 3, 4, …16) are used to quantify the influence of each independent variable within the equation; $\mathrm{DDR_t}$ indicates the domestic public debt ratio, measured as a percentage, which reflects the extent of public debt within the domestic economy; $\mathrm{TOR_t}$ is the turnover ratio percentage, serves as a measure of market liquidity; $\mathrm{NIM_t}$ stands for the net interest rate margin and is expressed as a percentage, indicating the difference between interest income generated and interest paid; $\mathrm{INF_t}$ represents the inflation rate, also expressed as a percentage, which captures the rate at which prices for goods and services rise. Additionally, the study includes composite variables such as $\mathrm{FINAGG_t}$ (Finance-aggregate); $\mathrm{FINACT_t}$ (Finance-activity); $\mathrm{FINSIZE_t}$ (Finance-size); and $\mathrm{FINEFF_t}$ (Finance-efficiency), each representing different facets of financial performance and structure. The error term is denoted ε_t, accounts for the variability in the model not explained by the independent variables. Finally, the time under study is denoted by *t*; covering from the first quarter of 2010 to the third quarter of 2020.

3. RESULTS AND DISCUSSION

3.1. Domestic Public Debt and Financial Development

Debt issued by the government is mainly for two reasons. These are to support expansionary monetary policy or to meet budget deficits (Leibfritz et al., 1994; Forcerrada, 2005; Pamungkas, 2016; and Bonam et al., 2024). Budget deficits in public sector financing can occur due to low revenue levels and a large informal sector that makes direct and indirect tax collection difficult (Easterly et al., 1994; Altayligil & Akkay, 2013; and Alenoghena et al., 2022). In Indonesia itself, these two issues are also problems faced from time to time. Indonesia has consistently confronted an increasing budget deficit over the past decade. This trend is evident from the recurrent pattern of actual government revenues falling short of actual expenditures. The most significant deficits occurred during the 2020 and 2021 periods as the COVID-19 pandemic disrupted the global economy, adversely affecting Indonesia's economic landscape. In 2020, the deficit peaked at 9.9% of GDP, driven by a 15% decline in state revenues while state spending rose by 16%.

Indonesia continues to contribute very little to state revenue from taxes, especially central taxes like income tax (PPh) and value-added tax (PPN), because of persistent taxation issues. In 2019, there were only 1.69 million registered informal MSME taxpayers in Indonesia, even though there were 59.2 million informal MSMEs there, or 98.75% of the nation's total of 60.01 million business units. The issue of government securities (SBN), including Government Debt Securities (SUN) and Government Sharia Securities (SBSN), is a potential solution to the financing gap caused by the substantial informal sector and insufficient state revenues. Funding for these securities comes from both domestic and international sources. The shortfall in financing, stemming from inadequate revenue levels and the substantial size of the informal sector, has ultimately been addressed through the issuance of government securities (SBN), which include state debt securities (SUN) and sharia state securities (SBSN). These securities are sourced from both domestic and international funding avenues. The Indonesian government persists in funding the deficit to stabilize the economy, utilizing debt as a countercyclical measure during periods of economic slowdown (Indrawati et al., 2024).

Government debt aimed at funding public needs has been steadily increasing, as seen in Figure 3, with an average quarterly growth rate of 3.76%. Rising contributions from both domestic and

foreign funding sources have supported this increase, growing at quarterly rates of 2.81% and 3.76%, respectively. Most of the funding for the public sector comes from domestic debt. An average of 60% of public sector debt has been financed through domestic channels (domestic public debt) over the forty-three observation periods that run from the first quarter of 2010 to the third quarter of 2020. The private sector's funding options have been reduced as a result of the increase in domestic debt financing for the public sector.

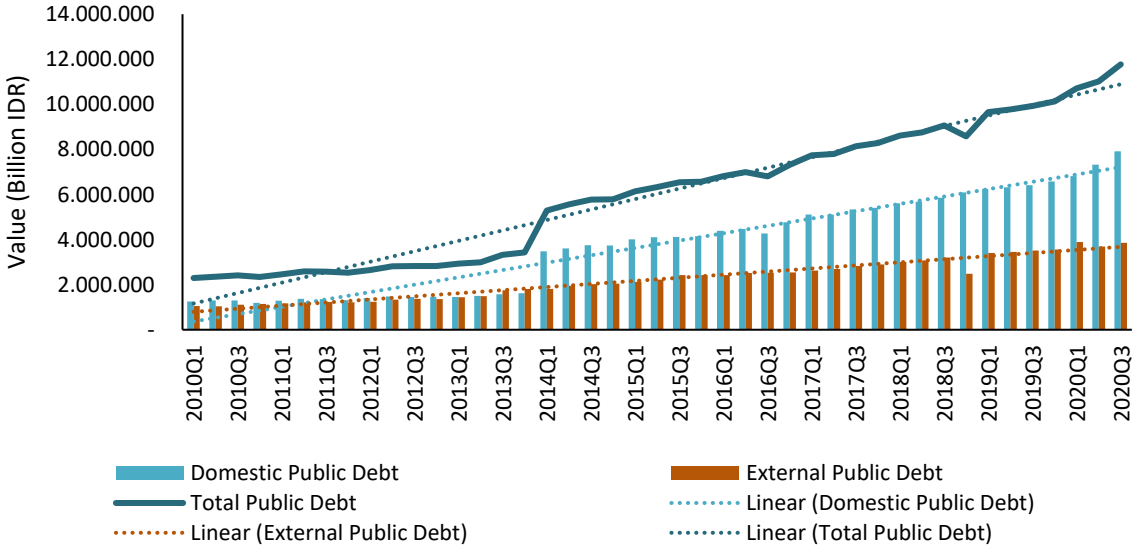

Figure 3. The Importance of Indonesia's External and Domestic Debt, 2010Q1-2020Q3

The main function of banks and other financial institutions is to serve as middlemen, transferring funds from entities with surpluses to those with deficits, guaranteeing the efficient and successful distribution of resources. This trend is important because it affects this function. Furthermore, since the risk factors linked to public sector debt may increase Indonesia's economic vulnerability and result in financial consequences that impact not only the government but also the larger economy, it is imperative that this debt be managed (Viphindrartin et al., 2021; Siregar, 2021; and Cassimon et al., 2011)

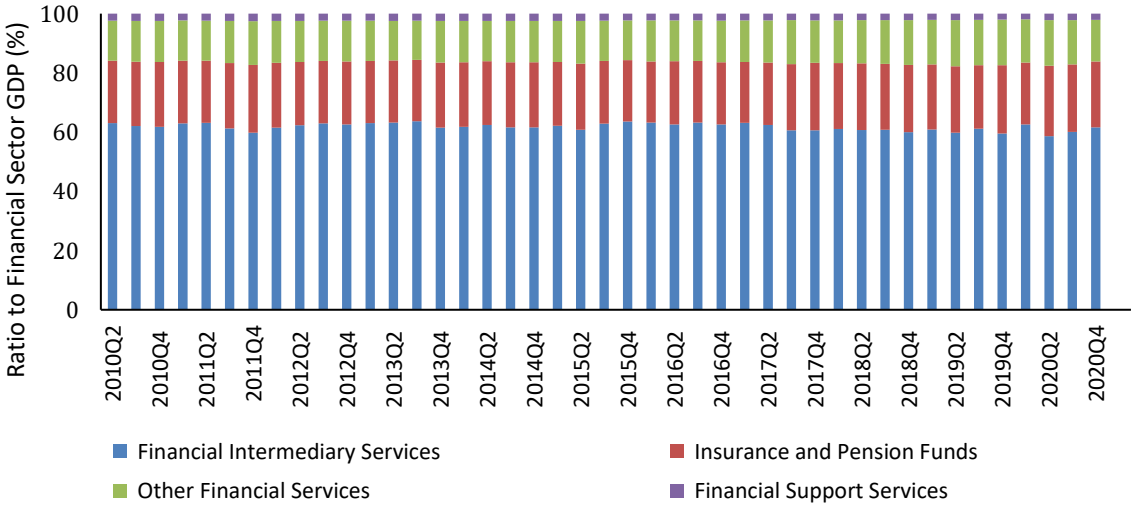

Figure 4. The Ratio of Financial Services Sector Real GDP, 2010Q1-2020Q4

This vulnerability is especially noteworthy given that the financial industry's dominant sector in Indonesia is still the financial intermediary services sub-sector, which primarily consists of banking.

As depicted in Figure 4, this subsector has consistently comprised approximately 61.81% of total financial sector revenue over the past eleven years. In comparison, other financial subsectors are relatively underdeveloped, with the insurance and pension fund subsector being the second most significant, contributing an average of 21.71%. The other financial services subsector added 14.17%, while the financial support services subsector contributed the least, at only 2.31% to the GDP of the financial services sector during the same period. This underscores the dependency of development and economic financing on banks and highlights the sector's susceptibility to impacts on financial development in Indonesia.

Indonesia's financial development, which is presently in the financial deepening phase, is still vulnerable to economic shocks. The financial development index in Indonesia tends to be stagnant at approximately 0.37, placing the country fifth among ten ASEAN nations—significantly trailing behind neighboring Singapore and Thailand, which hold the first and second positions in ASEAN with indexes of 0.75 and 0.74, respectively. In 2018, Singapore and Thailand were also ranked 13th and 14th globally. This stagnation is partly attributed to the low average size of Indonesia's financial institution index, which from 2000 to 2018 was only 0.33—below the average index levels of the Asia Pacific region, all countries, and emerging markets, each averaging around 0.40 during the same period. This situation is likely due to the concentration of financial activities within the banking sector.

The conventional perspective suggests that public debt may positively influence economic growth by stimulating aggregate demand, which in turn raises national output in the short term. Nonetheless, over the long term, this positive impact may become negative due to the crowding-out effect on capital, consequently diminishing national output (Glaeser & Gottlieb, 2008). Furthermore, Woo & Kumar (2010) argue that public debt can adversely affect economic growth as it leads to higher long-term interest rates, future tax distortions, increased inflation, and heightened uncertainty concerning prospects and policy.

3.2. Data Stationarity test

A stationarity test is necessary to ascertain whether the variables are stationary before performing regression analysis with time series data. The resulting estimation might be a spurious regression if the data is not stationary.

Table 2. Correlation between the Three Sub-indicators Forming the Financial Aggregate

Variables	t-Statistic	Prob.*	Conclusion
FINAGG	-2.3589	0.0194	Stationary
FINACT	-2.5352	0.1146	Non-stationary
Δ(FINACT)	-6.5504	0.0000	Stationary
FINSIZE	1.2191	0.9406	Non-stationary
Δ (FINSIZE)	-6.3387	0.0000	Stationary
FINEFF	-0.4055	0.5315	Non-stationary
Δ(FINEFF)	-8.5954	0.0000	Stationary
DDR	-3.1395	0.1245	Non-stationary
Δ(DDR)	-4.2161	0.0003	Stationary
TOR	-3.6762	0.0484	Stationary
NIM	-3.2939	0.0958	Stationary
INF	-4.9489	0.0041	Stationary

*MacKinnon (1996) one-sided p-values

The data is initially tested at the level, and if it is not stationary, the test proceeds to the first difference. When the test shows that, for all variables, the ADF value is greater than the MacKinnon value, it indicates that all variables are stationary, and the analysis can proceed to the cointegration test stage. Table 2 reports that all variables used in the study are stationary at the data level, except for FINACT, FINSIZE, and DDR, which are stationary at the first difference.

3.3. Principal Component Analysis for Financial Development in Indonesia

The Finance-aggregate variables that will represent financial development in this study are created using PCA methods. PCA is performed to simplify the data dimension of the three subsectors that form FINAGG, namely FINACT, FINSIZE, and FINEFF without losing much original information from the original data. The principal component, also known as the FINAGG, is the outcome of the PCA computation of the three sub-indicators. The results of the PCA calculation of the three sub-indicators over the forty-three observation periods (2010Q1-2020Q3) are as follows.

Table 3. Correlation between the Three Sub-indicators Forming the Financial Aggregate

Correlation	FINACT	FINSIZE	FINEFF
FINACT	1.0000	-	-
FINSIZE	0.9028	1.0000	-
FINEFF	0.5787	0.2712	1.0000

A linear relationship between the observed variables is indicated by correlation. Table 3 indicates that the sub-indicators that will be utilized in the PCA calculation have a positive correlation with one another. The FINSIZE and FINACT sub-indicators have the highest closeness of 0.9028. While the lowest relationship closeness is owned by the FINEFF and FINSIZE sub-indicators with a value of 0.2712. The positive correlation shows that there is a unidirectional relationship between the sub-indicators which indicates that if there is an increase in the value of one of the sub-indicators, the value of the other sub-indicators will also increase. The correlation between sub-indicators can be an initial justification before PCA calculation. Furthermore, the PCA was conducted with the following results.

Table 4. The Eigenvalue of Principle Component Analysis (PCA)

Component	Eigenvalue	Difference	Proportion	Cumulative
COMP1	2.2076	1.4509	0.7359	0.7359
COMP2	0.7566	0.7208	0.2522	0.9881
COMP3	0.0358		0.0119	1.0000
Principal components (eigenvectors)				
Variables	**Comp1**	**Comp2**	**Comp3**	**Unexplained**
FINACT	0.6629	-0.1170	-0.7395	0
FINSIZE	0.5971	-0.5134	0.6164	0
FINEFF	0.4518	0.8501	0.2705	0

The eigenvalue in PCA shows how much diversity of the original variables can be explained by the components formed. Based on Table 4, it is known that the eigenvalue of the first component can explain 73.59% of the diversity of the original variables. Furthermore, the second and third components can explain 25.22% and 1.19% of the diversity of the original variables, respectively. Thus, the index number (FINAGG indicator) formed from the first component in the PCA calculation of the three sub-indicators can explain 73.59% of the diversity of the original variables. Furthermore, the correlation between the variables of the PCA calculation results and the forming sub-indicators was checked.

Table 5. The Correlation between Principal Components and Sub-indicators from FINAGG

Correlation	FINAGG	FINACT	FINSIZE	FINEFF
FINAGG	1.0000	-	-	-
FINACT	0.9849	1.0000	-	-
FINSIZE	0.8871	0.9028	1.0000	-
FINEFF	0.6712	0.5787	0.2712	1.0000

Table 5 reports that the positive correlation between the principal component from FINAGG and the three sub-indicators is above 0.5. This can be interpreted as the relationship between the

principal component from FINAGG and the three sub-indicators is extremely powerful, so it can be said that the FINAGG variable can represent FINACT, FINSIZE, and FINEFF well.

3.4. Estimation Results

To explain the effect of domestic public debt on financial development in Indonesia, a regression analysis model will be formed between the domestic public debt/GDP ratio, and the principal component score of FINAGG. In the regression model, several other independent variables will be added, namely: turnover ratio, net interest rate differential, and inflation. A comparison of the influence of these independent variables on FINACT, FINSIZE, and FINEFF will also be explained to see the magnitude of the influence of each independent variable on the three indicators forming the FINAGG (financial development). Before observing the OLS estimation results on the model, classical assumption testing will first be carried out to ensure that the model estimation results are appropriate and able to explain the dependent variable properly. The classical assumption tests carried out include the Jarque-Bera test, the White test, and the Serial LM test. The results of the residual diagnostic test are presented in Table 6.

Based on the results of classical assumption testing in Table 1, it is known that the four models to be explained in the study have met the classical assumptions. The variables used in OLS modeling are normally distributed because the Jarque-Bera coefficient value is greater than the real level of 0.005 for the four models. The p-value of the four models is also greater than the real level of 0.05 so it can be concluded that the regression model is free from heteroscedasticity problems (the model is homoscedastic). Finally, the Durbin-Watson test results, have also shown that the model is free from autocorrelation problems because the autocorrelation problems found have been overcome by using the HAC (Newey-West) covariance method in OLS modeling. After the four models are confirmed to meet the classical assumptions and are BLUE (Best Linear Unbiased Estimator), interpretation and conclusions are drawn from the OLS regression results. The results of the OLS regression estimation are as follows.

Table 6. The Result of Model Estimation

Variables	Dependent Variables			
	Model 1 (FINAGG)	**Model 2 (FINACT)**	**Model 3 (FINSIZE)**	**Model 4 (FINEFF)**
Constants	1.9278	-0.2519	3.1400***	-3.8546***
	(2.0672)	(0.5988)	(0.5925)	(0.0629)
DDR	0.7967**	0.2419**	0.2504**	-0.0283**
	(0.3689)	(0.1069)	(0.1057)	(0.0112)
TOR	2.460***	4.2564*	-7.2869*	11.9254***
	(7.7518)	(2.2452)	(2.2216)	(0.2357)
NIM	-1.054***	-0.1478*	-0.1371*	-0.2346***
	(0.2718)	(0.0787)	(0.0779)	(0.0083)
INF	-5.0599	-1.1039	-0.9388	-0.6074**
	(9.2639)	(2.7122)	(2.6836)	(0.2847)
R^2	0.8225	0.7029	0.7905	0.9806
F-Stat	44.0148***	22.4790***	35.8408***	55.7507***
Diagnostic test				
Jarque-Bera	1.9860	1.7780	1.5951	1.7780
White	0.0507	0.0287	0.0165	0.2207
Serial LM	0.1030	0.1403	0.1041	0.1656

Notes: Numbers in parentheses indicate standard error; ***), **), *) are significant at 1%, 5%, 10%.

Based on the OLS estimation results presented in Table 6, models 2 and 4 show the lowest and highest goodness of fit values, with values of 0.7029 and 0.9806, respectively. The goodness of fit indicates the extent to which the independent variables within the model account for the variability of the dependent variables. Specifically, the R^2 values imply that the independent variables in models 2 and 4 explain 70,29% and 98,06% of the variability in the dependent variables (FINACT and FINEFF), respectively. The DDR variable has a positive sign and significant effect on all dependent

variables of the study, except for FINEFF. According to the estimation results of the four model equations. Similarly, all dependent variables—except for FINSIZE—are positively affected by the TOR variable. On the other hand, we find all dependent variables in the study are negatively affected by the INF and NIM variables.

3.5. Discussion

The highest effect of the DDR variable is found in the model with dependent variable FINAGG, which shows how much financial development in Indonesia, while the least effect is found in the model with the dependent variable finance-efficiency. The positive effect of domestic public debt on financial development is in line with the findings of Kumhof & Tanner (2005); Claessens et al. (2007), and Forslund et al. (2011) which emphasize that liquid government debt guarantees can facilitate financial development. The role of public debt in financial development is considered as the safest asset in the financial system, so it becomes a benchmark that facilitates the development of the private sector bond market, which is very important for financial development. Furthermore, public debt management by the government is seen to facilitate the intermediation function in a financial system dominated by a bank-based system if the legal system and institutional infrastructure are still weak, as is the case in Indonesia. This is also found in Kutivadze (2011) which states that there is a positive relationship between public debt and financial development. Burger & Warmock (2006) also found that domestic public debt positively and significantly affects the size of the financial market which then becomes a proxy for financial development. Effective debt management policies are essential for maintaining fiscal sustainability as well as macroeconomic and financial stability. In this context, such policies can help lower borrowing costs and financial risks, influence investors' perceptions of country risk, and foster financial development (Missale, 1999; Montiel, 2005; Das et al., 2010; Melecky, 2012; Berensmann et al., 2015; Cassimon et al., 2011; and Forslund, 2011).

Meanwhile, the negative effect of DDR on FINEFF is in line with the findings of Hauner (2008) who found that the greater the allocation of financing made by banks to meet domestic public debt, the greater the profit generated, but the efficiency will be lower due to banks tend to choose short-term portfolio allocations that increase vulnerability because banks and their institutional investors will be encouraged to absorb more domestic public debt. Hauner (2009) then referred to this as 'the lazy bank' phenomenon, which further explained that an increase in the share of bank loans absorbed by the public sector would in turn slow down financial development. When the government issues more securities, banks tend to shift their portfolios to less risky investments at the expense of increasing credit to the private sector which is seen as one of the main indices of financial development (Janda & Kravtson (2017). Mbulawa (2015); Ismihan & Ozkan (2012). Aliero et al. (2019); and Mun & Ismail (2015) also found that an increase in domestic public debt will negatively affect financial efficiency due to the possibility of financial crowding out where government loans through excessive banking system bonds replace private loans in the banking sector portfolio and ultimately reduce or even eliminate the financial intermediation function owned by the bank itself.

The TOR variable has a positive effect on FINAGG, FINACT, and FINEFF and a negative effect on FINSIZE. The highest effect of the TOR variable is found in the model with the FINAGG variable, while the least effect is in the model with the dependent variable FINACT, which shows how much activity occurs in the financial system. The positive effect of TOR on financial development is in line with the findings of Demirgüç-Kunt & Levine (1995) who explained that the high turnover ratio can be interpreted as low transaction costs in the financial market. The higher the turnover ratio, the higher the activity and efficiency of the financial market, and the higher the level of financial development. Meanwhile, the turnover ratio that has a negative impact on finance size is explained by Demirgüç-Kunt & Levine (1995) who state that the turnover ratio shows the total value of financial markets traded against the size of the economy (GDP). In other words, a financial market that is small but has a high level of liquidity will have a high trading ratio value while the ratio of the total value traded to its GDP will be small. This study also found that the NIM variable negatively affects FINAGG, FINACT, FINSIZE, and FINEFF. The highest effect is shown in financial development. These

results are in line with Keynesian theory which states that interest rates are the price (cost) of investment, so interest rates will negatively affect financial development as well as the three sub-indicators (Dutt & Skott, 2006).

Furthermore, we found that the INF variable negatively affects financial aggregate, finance activity, finance size, and finance efficiency. The highest effect is shown on financial development. The negative effect of inflation is explained by Woo & Kumar (2010) who state that high domestic public debt will lead to high long-run interest rates, distortion of future taxation, inflation, and uncertainty about economic prospects and policies so that it negatively affects financial development. Many researchers demonstrate that rising inflation exerts a significantly negative impact on the performance of the financial sector (Boyd & Smith, 1998; Hung, 2003; Guo & Huang, 2018; Khan et al., 2006; Tinoco-Zermeño et al., 2018; Bilalli et al., 2023; and Bilalli & Sadiku, 2024), which, in turn, affects the economic output of countries. Additionally, the effects of inflation permeate various channels, impacting lending and borrowing activities, asset values, investment decisions, and the overall health of financial institutions.

Huybens & Smith (1999) found that rising inflation negatively affects credit market frictions which in turn negatively affects the performance of the financial sector (both the banking sector and equity markets) and its real activities in the long run. An increase in inflation lowers the real rate of return not only on money but also on assets in general so credit market frictions decrease. As a result, credit creation by finance activity declines, resource allocation becomes less efficient, and intermediary activity is reduced with adverse implications for the capital market. Such a reduction in capital formation negatively affects long-term economic performance and equity market activity, where capital ownership claims are traded (Boyd & Smith, 1998; and Huybens & Smith, 1999).

4. CONCLUSIONS

The conclusion of this study is that increases in domestic public debt have a positive impact on Indonesia's financial development, according to the results of OLS regression across the four models that were presented. These results are in line with the original theory that was proposed at the beginning of this study. The analysis also shows that domestic public debt has a negative impact on financial efficiency even though it has a positive effect on financial activity and financial size. According to these results, government debt that is liquid can promote financial growth. The development of private sector bond markets, another essential element of financial development, is largely dependent on public debt, which acts as a haven asset in the financial system. The intermediate function in a bank-dominated financial system is also thought to be facilitated by public debt management, particularly in cases where the institutional and legal framework is weak. For fiscal sustainability, macroeconomic stability, and financial stability to be guaranteed, an efficient debt management strategy is necessary. Such policies can influence investor perceptions of the country's risk; lower borrowing costs and financial risks; and promote financial development in this context. The measures about addressing the budget deficit through domestic sources should be reevaluated by policymakers. One viable policy option is to restructure the informal sector to increase its contribution to state revenue. In addition, the government ought to continuously implement tax reforms to raise the tax revenue ratio. The government should also reconsider expanding fiscal expansion and reroute the money to productive spending. Increased spending could lead to higher revenues, which would improve overall fiscal health. This is known as the "snowball effect."

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