Volume 13 (2), 2024

SIGNIFIKAN
Jurnal Ilmu Ekonomi

Signifikan is published by the Faculty of Economics and Business UIN Syarif Hidayatullah Jakarta. Focused on Economics studies and published twice a year. Being accredited in the second tier (Sinta S2) by Ministry of Education, Culture, Research & Technology No. 177/E/KPT/2024 (Valid from Vol. 12(2), 2023 until Vol. 17(1), 2028) renewal of the certificate number 85/M/KPT/2020. Currently, this journal is indexed by Dimensions, Crossref, Ulrich Periodical Database, Google Scholar, Sinta, Garuda Dikti, and Moraref, etc.

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Contents

Signifikan: Jurnal Ilmu Ekonomi
Volume 13(2), 2024: 217 - 230
P-ISSN: 2087-2046; E-ISSN: 2476-9223
https://doi.org/10.15408/sjie.v13i2.42285

The Link Between Financial Development and Poverty: A Spatial Analysis of Indonesia

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JEL Classification:
C31
G21
I32
O18

Received: 07 November 2024

Revised: 02 December 2024

Accepted: 09 December 2024

Available online: December 2024

ABSTRACT

Research Originality: This research is original in its examination of the spatial influence of financial development on poverty in Indonesia.

Research Objectives: This study investigates the impact of financial development on poverty reduction in Indonesia.

Research Methods: This study employs a spatial econometric approach, analyzing data from 2016 to 2021. Key variables include credit-to-GDP ratio, third-party funding-to-GDP ratio, government spending, the human development index, and deposits-to-GDP ratio.

Empirical Results: The findings reveal significant spatial dependence in poverty across Indonesian regions. The credit-to-GDP ratio did not significantly reduce poverty, whereas the third-party funding-to-GDP ratio showed a positive and significant effect on poverty reduction. Government spending, the human development index, and the deposits-to-GDP ratio contributed to poverty alleviation.

Implications: These results suggest that Indonesia's financial sector development has not effectively reduced poverty. Policymakers should focus on targeted financial reforms, regional coordination, and improving socio-economic factors to enhance poverty reduction efforts.

Keywords:

spatial econometrics; financial development; poverty; regional interdependence

How to Cite:

Saputro, N., Nugroho, L.I., Pamungkas, P., & Pramusinta, E. D. (2024). The Link Between Financial Development and Poverty: A Spatial Analysis of Indonesia. *Signifikan: Jurnal Ilmu Ekonomi*, *13*(2), 217-230. https://doi.org/10.15408/sjie.v13i2.42285.

INTRODUCTION

Poverty has been a social issue of concern throughout history, particularly in developing countries (Daimon, 1998; Liu & Xu, 2016). In the effort to alleviate poverty, Indonesia has made remarkable strides since the post-monetary crisis of 1998, with a decline from 24.2% in 1998 to 9.57% in 2022. However, Nugroho et al. (2021) have noted that poverty reduction efforts have slowed in recent years, with an average decrease of 0.31% per year from 2015 to 2019, compared to 0.8% from 2008 to 2015. Moreover, Indonesia is relatively vulnerable to poverty, with 22.4% of its population living in poverty or at risk of it (World Bank, 2022). The country is susceptible to various shocks such as economic crises, health crises, inflation, and natural disasters (Dartanto, 2022; Fitriadi et al., 2022; Skoufias et al., 2012; Suryahadi et al., 2012), making poverty alleviation a critical priority for the government (Olivia et al., 2020; Sparrow et al., 2020).

Numerous recent studies have attempted to identify the underlying factors in poverty alleviation (Deng et al., 2020; Fahad et al., 2022; Y. Liu & Xu, 2016; Su et al., 2021). Some literature highlights the importance of financial development in reducing poverty in developing countries (Appiah-Otoo et al., 2022; Beck et al., 2007; Cepparulo et al., 2017; Zhu et al., 2021). Financial development can enhance the chances of poor people accessing finance by addressing financial market failures, such as information asymmetry and high borrowing costs for borrowers (Jalilian & Kirkpatrick, 2002). It also enables the poor to start micro-enterprises using savings or loans, improving access to financial services, increasing employment opportunities, and ultimately reducing poverty (Appiah-Otoo et al., 2022).

In their study in Egypt, Abosedra et al. (2016) found that poverty could be reduced through the development of the financial sector, mainly when domestic credit for the private sector was used as a measure. This finding confirmed the direct impact of financial sector development in providing better access to financial services such as credit and insurance for people experiencing poverty in Egypt. The study also showed the indirect impact of financial sector development on poverty reduction through economic growth. However, this was only evident when M2 was used to measure financial sector development, and infant mortality per capita was used to measure poverty. These findings are consistent with studies by Uddin et al (2014) in Bangladesh, Sehrawat & Giri (2016) in India. Several researchers have shown that a sound financial development system can reduce poverty (Erlando et al., 2020; Kaidi et al., 2019; Sehrawat & Giri, 2016). Using data from 44 Sub-Saharan African countries from 2010-2019, (Acheampong et al., 2021) found that financial development significantly reduces poverty for both men and women. These findings are consistent with those of (Akhter & Daly, 2009; Odhiambo, 2009, 2010; Rewilak, 2017; Uddin et al., 2014).

Although previous literature has helped improve our understanding of the relationship between financial development and poverty reduction (Beck et al., 2007; Donou-Adonsou & Sylwester, 2016; Erlando et al., 2020), most of the existing literature on financial development and poverty reduction does not consider the role of spatial interdependence, particularly in the context of Indonesia. Studies by Jalilian and Kirkpatrick (2005) and

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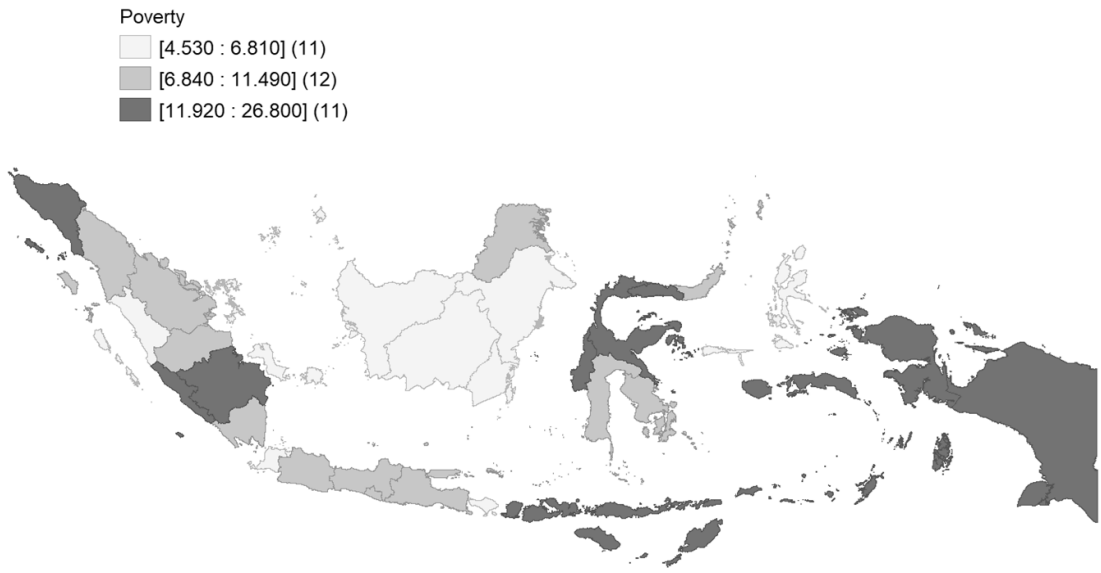
Kiendrebeogo and Minea (2016) emphasize the potential for spatial spillover effects but do not explicitly address these in their empirical models. In addition, while significant progress has been made in understanding the direct effects of financial development, research on its spatial dynamics and interactions across regions remains scarce. This study aims to fill these gaps by analyzing the spatial influence of financial development on poverty in Indonesia using a spatial panel data econometric model. Unlike previous research, which primarily focuses on direct impacts, this study incorporates spatial interdependence to re-examine how financial development in one region influences poverty in neighboring regions. The novelty of this research lies in its focus on spatial spillover effects and its application to Indonesia, a country characterized by significant regional disparities.

METHODS

This study covers 34 provinces in Indonesia, as seen in Figure 1. Most Indonesians still live below poverty (Tohari et al., 2019). There are many areas with high poverty rates, especially in eastern Indonesia, which includes Papua, West Papua, Maluku, East Nusa Tenggara, West Nusa Tenggara, Central Sulawesi, West Sulawesi, as well as two areas in western Indonesia, namely South Sumatra, and Aceh. Meanwhile, areas with moderate poverty rates are mostly located in western Indonesia, including North Sumatra, Jambi, Riau, Lampung, North Kalimantan, West Java, Central Java, Yogyakarta, East Java, and three areas in eastern Indonesia, namely Southeast Sulawesi, North Sulawesi, and South Sulawesi. Similarly, areas with low poverty rates are mostly located in western Indonesia. The geographical condition, high diversity, population size, and many other factors pose significant challenges in alleviating poverty in Indonesia (Nugroho et al., 2021).

Figure 1. Poverty Rate of Indonesia, 2021



Source: author's calculation

The secondary data was used in this study. The panel data consists of 34 provinces in Indonesia for 6 years (2016-2021). The data was obtained from various sources, such as the Central Bureau of Statistics (BPS) and the Central Bank of Indonesia (BI). The data obtained from these institutions are dominant because they are extensive and relatively consistent every year. As for the variables used in this study, the dependent variable is poverty, measured using the poverty rate (Honohan, 2004; Kiendrebeogo & Minea, 2016), which is defined as the proportion of the population living below the poverty line. For the independent variables, financial development is proxied by the proportion of credit to Gross Regional Domestic Product (GRDP) and the proportion of third-party funds to GRDP (Acheampong, 2019; Akhter & Daly, 2009; Cepparulo et al., 2017). Following previous studies, other variables used to control the poverty variable are economic growth, proxied by GRDP per capita, government expenditure, proxied by the ratio of total government expenditure to GRDP, and the human development index (Anderson et al., 2018; Cepparulo et al., 2017; Erlando et al., 2020). Table 1 presents the more detailed information about the operational variables.

Table 1. Operational Variables

Variables	Definitions	Measurements	Sources	References
Poverty	Proportion of the population living below the poverty line	Poverty rate (%)	BPS	(Honohan, 2004; Kiendrebeogo & Minea, 2016)
Credit-to-GRDP Ratio	Volume of credit extended to the economy relative to the gross regional domestic product (GRDP)	Total credit/ GRDP	BI/BPS	(Acheampong, 2019; Akhter & Daly, 2009; Cepparulo et al., 2017)
Third-Party Funds-to-GRDP Ratio	Total deposits held by financial institutions relative to GRDP	Total third-party funds / GRDP	BI/BPS	(Acheampong, 2019; Akhter & Daly, 2009; Cepparulo et al., 2017)
Economic Growth	Indicator of economic performance and its potential to reduce poverty	GRDP per capita	BPS	(Anderson et al., 2018; Cepparulo et al., 2017; Erlando et al., 2020)
Government Expenditure	Fiscal policy efforts aimed at poverty alleviation	Total government expenditure/ GRDP	BPS	(Anderson et al., 2018; Cepparulo et al., 2017; Erlando et al., 2020)
Human Development Index (HDI)	Composite measure of education, health, and income dimensions	Index	BPS	(Anderson et al., 2018; Cepparulo et al., 2017; Erlando et al., 2020)

In traditional econometric theory, it is assumed that there is no difference between regions within the same space, so this theory does not consider the correlation between neighboring regions (Wang & Guan, 2017). This assumption contradicts reality, especially in regional studies, where each area has an uneven or heterogeneous distribution of

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resources. A spatial autocorrelation test can be used to analyze the dependence between spatial observation units. If the distribution of observations in neighboring areas is similar, then positive spatial autocorrelation occurs. Otherwise, negative spatial autocorrelation occurs. There are several techniques for measuring spatial interactions to overcome autocorrelation; we use Moran's I coefficient (Moran, 1950), one of the commonly used measures of spatial autocorrelation. The Moran's I index is defined as follows:

$$Moran'sI = \frac{\sum_{i=1,j=1}^{n} W_{ij}(Y_i-\bar{Y})(Y_j-\bar{Y})}{S^2 \sum_{i=1,j=1}^{n} W_{ij}} \quad (1)$$

which:

$$S^2 = \frac{1}{n}\sum_{i=1}^{n} (Y_i - \bar{Y})^2, \bar{Y} = \frac{1}{n}\sum_{i=1}^{n} Y_i \quad (2)$$

Tobler's First Law of Geography states that everything on the geographic surface is related to everything else and that things close together are more related than far apart things (Tobler, 1970). As one of the capital factors, financial development can flow through neighboring regional capital markets (Zhu et al., 2021). This fact means that financial development can create an interaction effect among regions. Thus, the impact of financial development on poverty reduction can have a spatial spillover effect. Traditional econometric models do not consider spatial factors, which can result in less accurate estimation results (Tang et al., 2023). Therefore, this study uses spatial econometric models as an analytical tool.

The Spatial Autoregressive (SAR) model and the Spatial Error (SEM) model are the most used among the various spatial measurement models commonly used. The SAR model is suitable for controlling spatial impacts on the dependent variable when evaluating the influence of poverty levels in one region on surrounding areas (W. Liu et al., 2023). Mathematically, it can be formulated as follows:

$$poverty_{it} = \alpha_i + \rho W poverty_{it} + X_{it}\theta + \varepsilon_{it} \quad (3)$$

where $poverty_{it}$ represents the poverty rate of the province, W is the spatial weighting matrix, ρ is the spatial autoregressive coefficient, X_{it} is independent variables, θ is the coefficient of the independent variable, and ε_{it} is the random error.

The SEM model is used when there is spatial interaction between error terms (Zhu et al., 2021), and can be formulated as follows:

$$poverty_{it} = \alpha_i + X_{it}\theta + \mu_{it}, \ \mu_{it} = \beta W \mu_{it} + \varepsilon_{it} \quad (4)$$

where $poverty_{it}$ represents the poverty rate of the province, W is the spatial weighting matrix, β is the spatial autoregressive coefficient, X_{it} is independent variables, θ is the coefficient of the independent variable, and ε_{it} is the random error.

RESULT AND DISCUSSION

Table 2 presents the summary statistics of the variables used in the model. The average poverty rate is 10.73, with a standard deviation 5.61, indicating moderate variability among provinces. The minimum poverty rate is 3.42, reflecting relatively low levels in some regions, while the maximum is 28.4, highlighting significant poverty in others. Economic growth, measured by the natural log of GRDP (lnGRDP), averages 11.94 with a standard deviation of 1.14. This result suggests that economic performance is moderately concentrated, from 9.978 to 14.434, indicating disparities in provincial economic output. Government expenditure averages 5.26, with a standard deviation of 3.13, reflecting considerable variability in fiscal spending among provinces. The minimum expenditure of 1.752 suggests limited fiscal resources in some areas, while the maximum of 18.785 indicates substantial investments in others. The Human Development Index (HDI) averages 70.46, with a standard deviation 4.03. The lowest score is 58.05, indicating challenges in health, education, and income dimensions in some provinces, while the highest score, 81.11, reflects better human development in more advanced regions. As measured by the credit-to-GRDP ratio, financial development has an average of 43.69 and a standard deviation of 16.51. This result reveals significant differences in credit penetration across provinces, ranging from 14.353 to 98.416. Similarly, the third-party fund-to-GRDP ratio averages 36.55, with a high standard deviation of 25.29, indicating substantial disparities in financial sector activity. The minimum ratio is 14.065, while the maximum reaches 193.593, suggesting that some provinces have a highly developed financial sector.

Table 2. Summary Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
Poverty	204	10.731	5.608	3.42	28.4
lnGRDP	204	11.937	1.142	9.978	14.434
Government Expenditure	204	5.261	3.126	1.752	18.785
HDI	204	70.463	4.025	58.05	81.11
Credit-to-GRDP	204	43.687	16.51	14.353	98.416
Third-party Fund to GRDP	204	36.55	25.29	14.065	193.593

We estimated the value of Moran's I for the poverty level for each year from 2016 to 2021 to explore the spatial dependence of poverty in Indonesia. The determination and weighting of the neighbors we used are based on Vidyattama (2013), which accounts for Indonesia's geographical condition as an archipelago. Neighbor weighting was not suitable for implementation in this study as it did not encompass the boundaries set by the sea. In the neighbor method, spatial weighting matrices are binary code, with 1 indicating a shared boundary and 0 indicating none. Indonesia consists of eight main islands separated by the sea; thus, several provinces do not have neighbors. Based on

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this consideration, we followed Miranti (2021), use of the inverse distance matrix, which allows all provinces to have at least one neighbor. The results of Moran's I test (see Table 3) reveal the presence of significant spatial autocorrelation in poverty levels across Indonesia from 2016 to 2021. Moran's I values range from 0.071 to 0.082, indicating a positive spatial autocorrelation, where regions with similar poverty levels are geographically clustered. The positive values suggest that provinces with high poverty rates are likely to be surrounded by other provinces with high poverty rates. Similarly, provinces with low poverty rates tend to cluster together. The corresponding p-values for all years are statistically significant at the 1% level, confirming that the observed spatial clustering is not due to random chance. The highest Moran's I value is observed in 2019 (0.082), indicating the most substantial spatial dependency during the study period, while the lowest value is seen in 2021 (0.071), showing a slight decrease in spatial autocorrelation. These results highlight the importance of accounting for spatial dependencies when analyzing poverty in Indonesia. The clustering patterns suggest that poverty reduction strategies must consider regional spillovers and neighboring effects, as the conditions in one province can influence the outcomes in adjacent provinces. The persistence of significant spatial autocorrelation over time underscores the need for coordinated and regionally integrated policies to address poverty effectively.

Table 3. Moran's I Test Result

Year	Moran'I	P-Value
2016	0.073132882	0.00235***
2017	0.076772832	0.00165***
2018	0.077627387	0.00149***
2019	0.082056315	0.00099***
2020	0.071923422	0.00246***
2021	0.071162269	0.00241***

Note: *** significant at 1%

It is necessary to determine the appropriate model specification to describe the data used and to build a spatial econometric model for analyzing the effects of financial development on poverty. We used the Lagrange Multiplier (LM) test to determine whether the non-spatial model could be rejected. Lagrange Multiplier Lag (LM-lag) and Lagrange Multiplier Error (LM-err) tests are insignificant. In that case, a traditional panel model is selected, but a spatial econometric model is used if either test is significant. Furthermore, a Hausman test is conducted to choose between fixed or random effect models. The results supported the use of a fixed effect model. We used the spatial econometric model with fixed effects based on the results of the LM-Lag and LM-err tests and the Hausman test.

Table 4. Results of LM-Lag and LM-err Tests

LM-Lag	18.843**
LM-err	24.866**

Note: ** significant at 5%

Table 3 shows the estimation results between the OLS model and the SAR and SEM spatial econometric models. In the OLS model, government expenditure and the Human Development Index (HDI) are significant predictors of poverty reduction. Specifically, a 1-unit increase in government expenditure (as a percentage of GRDP) is associated with a 0.1395 percentage point reduction in poverty. In comparison, a 1-unit increase in HDI leads to a 0.4596 percentage point decrease in poverty. However, other variables, such as the natural logarithm of GRDP (lnGRDP) and the credit-to-GRDP ratio, are not statistically significant, indicating that economic output and credit availability alone do not directly influence poverty levels. Interestingly, the third-party fund-to-GRDP ratio shows a positive and significant relationship with poverty, suggesting that higher deposit levels may not necessarily translate into poverty reduction due to inequitable access to financial resources or inefficient allocation of funds.

Tabel 3. The Results of OLS and Spatial Econometric Estimations

	OLS(FE)	SAR	SEM
lnGRDP	-1.4083157	-0.6088132	-0.8329531
Government Expenditure	-0.1394570**	-0.1374133***	-0.1387082 ***
HDI	-0.4596451***	-0.5597664***	-0.3338076 ***
Credit to GRDP	0.0095947	0.0113853	0.0096009
Third-party Fund to GRDP	0.0484688***	0.0388622***	0.0429658 ***
F-Statistic	31.9746		
R-Square	0.49211		
ρ		0.58893***	
λ			0.39045***
Log-L		-342.6468	-92.27562

Note:*** significant at 1%, ** significant at 5%, * significant at 10%

The spatial econometric models—Spatial Autoregressive (SAR) and Spatial Error Model (SEM)—refine these findings by accounting for spatial dependencies. Both models confirm that government expenditure and HDI are significant and negatively associated with poverty. The coefficients for government expenditure are -0.1374 in the SAR model and -0.1387 in the SEM model, while the HDI coefficients are -0.5598 and -0.3338, respectively. These results highlight human development's and government spending's

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critical role in reducing poverty, even after accounting for spatial interactions. The SAR model's spatial lag coefficient (ρ) is 0.5889, and the spatial error coefficient (λ) in the SEM model is 0.3905, both significant at the 1% level. This result indicates strong spatial dependence, where the poverty levels influence poverty in one province in neighboring provinces. Such spatial spillover effects suggest that regional dynamics and interactions are essential to poverty outcomes.

Notably, the credit-to-GRDP ratio remains insignificant in all models, implying that credit availability has not had a meaningful impact on poverty reduction during the study period. Meanwhile, the positive and significant association between third-party funds and poverty persists across the spatial models, albeit with slightly reduced coefficients compared to the OLS model. This counterintuitive finding suggests that deposits may be concentrated among wealthier individuals or regions, limiting their poverty-reducing potential. It also raises questions about the inclusiveness and accessibility of financial systems in addressing poverty.

The phenomenon of financial sector development that has been unable to reduce poverty can occur due to several factors—first, the uneven distribution of access and benefits. Although the financial sector is growing, not everyone has equal access. Thus, the circulation of funds in the financial sector is only among people with access to substantial capital, and credit flows are not used for community economic development, such as improving SMEs and increasing the productivity of other communities. If this continues, the poverty rate may be difficult to decrease.

Second is the topography factor. Indonesia's geography and topology affect the development of the existing financial sector and poverty. As an archipelagic country with thousands of islands, Indonesia faces challenges in developing adequate infrastructure and inter-island communication. This result can hinder the growth of the financial sector in remote and hard-to-reach areas, so people in these regions have limited access to financial services and opportunities to improve their welfare. The topography of Indonesia, especially areas with mountains, valleys, and oceans, will make it difficult to access financial access. Most of Indonesia's areas are in the valleys and slopes of mountains, such as Papua Province, where 63 percent of all villages are located in valleys and mountain slopes; West Sulawesi Province, which is 51.67 percent; and East Nusa Tenggara Province, which is 51.16 percent. Meanwhile, the Maluku Province is an archipelago consisting of small islands with a sea area of 92.4 percent and 7.6 percent of land (Nanga et al., 2018).

Third is the infrastructure factor. Adequate infrastructure is essential in developing the financial sector and reducing poverty. From transportation infrastructure, road availability will facilitate accessibility and mobility of people in accessing financial services. However, there is still an infrastructure gap between provinces in Indonesia. Using the 2018 Indonesian Central Bureau of Statistics Village Potential Survey data, Nanga et al. (2018) found isolation and limited access to transportation infrastructure in Papua, West Papua, Maluku, and East Nusa Tenggara provinces.

Regarding telecommunications, Papua and West Papua provinces experience limitations compared to other regions. Eighty-five percent of villages are dominated by people who already use mobile phones (HP). However, in Papua Province, only about 19 percent of villages have residents who use mobile phones. The condition in West Papua Province is quite good, but its achievement is only 46 percent. Furthermore, only 10 percent of villages in Papua Province have 4G/LTE/3G/H/H+ signals.

The fourth factor is economic instability. Financial development accompanied by economic instability can also have a negative impact on poverty reduction efforts. Economic instability can lead to fluctuations in inflation rates, exchange rates, or financial crises, negatively affecting communities vulnerable to poverty. During this study, there was instability in Indonesia due to the COVID-19 pandemic. In the context of the COVID-19 pandemic, unequal distribution of its economic impact can worsen poverty. Some groups, such as informal workers and workers in other informal sectors, may experience significant income reductions or even lose their livelihoods due to the pandemic. This condition can significantly increase poverty rates and social inequality (Gibson & Olivia, 2020; Olivia et al., 2020; Suryahadi et al., 2020).

CONCLUSION

Indonesia has a strong spatial dependence on poverty rates from 2016 to 2021. This condition can be seen from the significantly positive Moran's I index values at the 1% level for each observed year. The results highlight the critical role of government expenditure and human development in reducing poverty. Increased government spending and improvements in the Human Development Index (HDI) are consistently associated with lower poverty rates, underscoring the importance of social services, education, and healthcare investments. However, economic output per capita (lnGRDP) and credit-to-GRDP ratios do not directly impact poverty reduction, suggesting that financial development alone may not be sufficient to alleviate poverty. Interestingly, the third-party fund-to-GRDP ratio positively correlates with poverty, indicating that financial resources, such as deposits, may not effectively alleviate poverty.

The Indonesian government needs to enhance the development of a more inclusive and sustainable financial sector. This condition can be achieved by optimizing the collection of third-party funds and their use to improve the community's welfare, especially for those still living in poverty. Additionally, spatial poverty mapping and targeted interventions are needed to address the strong spatial dependence on poverty rates in Indonesia.

ACKNOWLEDGEMENT

This research is funded by the Research Group Grant scheme by LPPM Universitas Sebelas Maret under the contract number 194.2/UN27.22/PT.01.03/2024

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https://doi.org/10.15408/sjie.v13i2.42285

Signifikan: Jurnal Ilmu Ekonomi
Volume 13(2), 2024: 231 - 246
P-ISSN: 2087-2046; E-ISSN: 2476-9223
https://doi.org/10.15408/sjie.v13i2.42285

Human Development To Democracy: An Impact Analysis of Poverty and Income Inequality In Indonesia

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JEL Classification:
C33
D72
Z13
Z18

Received: 13 November 2024

Revised: 16 December 2024

Accepted: 21 December 2024

Available online: December 2024

ABSTRACT

Research Originality: The research looks at the relationship and impact of welfare indicators on the implementation of democracy in Indonesia. Previous research concentrated on the impact of democracy implementation.

Research Objectives: This study aims to examine the role of public welfare variables in improving the implementation of democracy in Indonesia.

Research Methods: The study used panel data with a multiple regression approach from 34 provinces from 2009 to 2023 with the Fix Effect Model (FEM) category.

Empirical Results: The research findings show that the public welfare variable has a significant effect on the democracy index in Indonesia both partially and simultaneously, and only the human development index and the democracy index are linearly related. It was found that the human development index variable is an intermediary variable influencing the relationship between income inequality and the democracy index.

Implications: To increase people's understanding of democracy, the government can lower the poverty depth index because there is no intermediate variable between the two variables.

Keywords:

poverty; income inequality; human development; democracy

How to Cite:

Fadly, F & Chandra, A. (2024). Human Development To Democracy: An Impact Analysis of Poverty and Income Inequality In Indonesia. *Signifikan: Jurnal Ilmu Ekonomi*, *13*(2), 231-246. https://doi.org/10.15408/sjie.v13i2.42378.

INTRODUCTION

Democracy in Indonesia has been practiced since the nation's founder declared independence (Latif, 2018). This can be seen in the founding figures, who made decisions based on consensus both in forming the foundation of the state and in implementing Indonesian state governance (Nurdin, 2016). Therefore, it can be said that the Indonesian state has practiced democracy since its inception (Aspinall & Mietzner, 2019).

Furthermore, the succession of leadership in Indonesia after independence was carried out through general elections (PEMILU), where the first election was held in 1955 through a multiparty system and was attended by 48 parties. The decisive mechanism in elections is citizens electing representatives to run the wheels of the Indonesian government (Silalahi & Tampubolon, 2021). The form of democracy in Indonesia has evolved according to the needs of the Indonesian state. Indonesia has implemented guided democracy in the practice of democracy produced by reform (Ahmad & Fadillah, 2021).

When the first election was held, most of the Indonesian population was uneducated citizens and only gained independence after approximately 3.5 centuries of colonization by many countries such as Portugal, the Netherlands, and Japan (OECD & Asian Development Bank, 2015). However, elections can run conductively and produce leadership that runs the government following the rules and regulations that have been agreed upon.

After the reform event in 1998, the democratic system in Indonesia changed, which is reflected in the mechanism for implementing elections (Horowitz, 2013). For approximately 3 decades, the parties participating in the election were limited to 3 parties in the New Order era and changed back to 48 in 1999 (Hara, 2001). In the 2004 election until now, the electoral system has changed gradually. Where the Indonesian people directly elect the presidential election, regional head election, and parliamentarian election. It can be said that public involvement in the democratic process in Indonesia plays a significant role in every general election.

Data released by Freedom House states that Indonesia has a declining democracy index. In 2019, it was given a score of 62 points, but it dropped to 53 points in 2023 (Kompas, 2024). Freedom House, sourced from Without Borders, released that Indonesia's democracy index fell from 63.23 points in 2019 to 54.83 points one year before the 2023 election (Kompas, 2024). Globally, according to the Economist Intelligence Unit (EIU), Indonesia's democracy index is ranked 52nd with a score of 6.71 in 2022 (Lemhamnas, 2022). Meanwhile, the category of democratic achievements in Indonesia, according to the EIU, is limited democracy (LEMHANAS, 2022). What is meant by limited democracy is to run the democratic system as a whole but not yet the category of hybrid and authoritarian regimes. Meanwhile, Indonesia's position in 2023 decreased to 56th out of 197 countries with an IDI score of 6.53 (Media Indonesia, 2024). For more clarity on Indonesia's decline in the democracy index, see Figure 1. From Figure 1, it can be seen that there is a downward trend in the Indonesian democracy index released by the EIU. So that overall from 2015 to 2023, there was a downward trend in the democracy index in Indonesia, according to the EIU.

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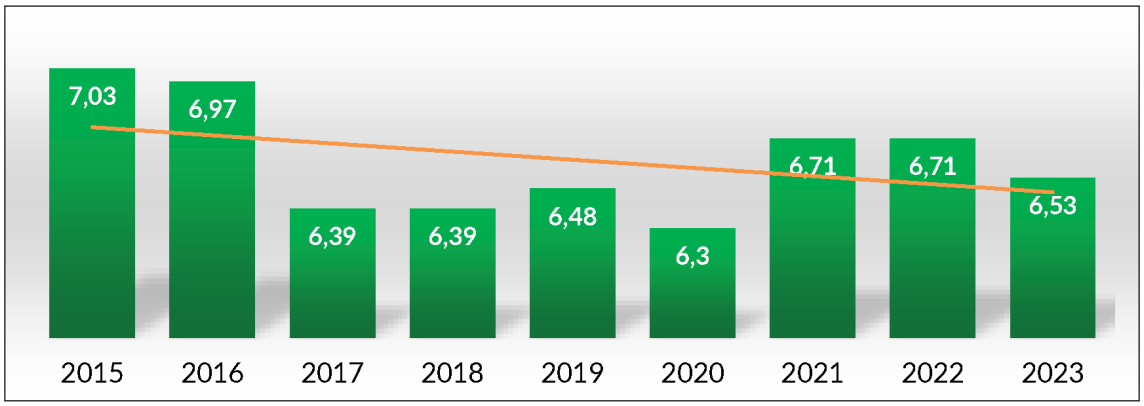
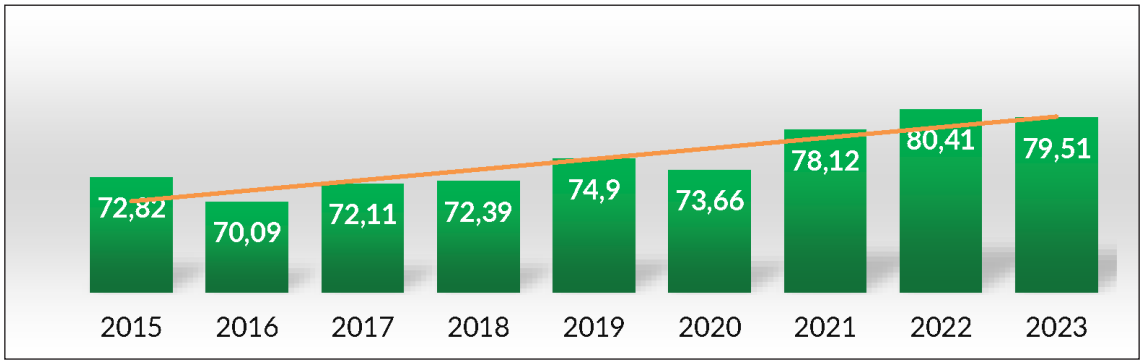
Figure 1. Indonesia's Democracy Index According to the Economist Intelligence Unit (EIU) for the Period 2015 – 2023



Source: Katadata (2023); Media Indonesia (2024)

The difference occurred in the Indonesian democracy index released by the Central Bureau of Statistics Indonesia (BPS). The release of BPS Indonesia in the same period shows a positive trend. For more details, see chart 2. The similarity between Figure 1 and Figure 2 occurs in 2023, which shows a decline in the democracy index. The decline in Indonesia's democracy index occurred before the 2024 elections. The factors that affect the rise and fall of the democracy index, according to the Indonesian statistics agency, are freedom of expression, gender equality, and judicial and legislative performance (BPS, 2024). Meanwhile, according to Iversen & Soskice (2019), The economic sector greatly influences democracy, and one of them is the community's poverty level. If the poverty rate increases, it will reduce the value of democracy in general (Brady & Bostic, 2015; Michener, 2018).

Figure 2. Indonesia's democracy index based on institution for statistics of Indonesia (BPS) for period 2015 – 2023.

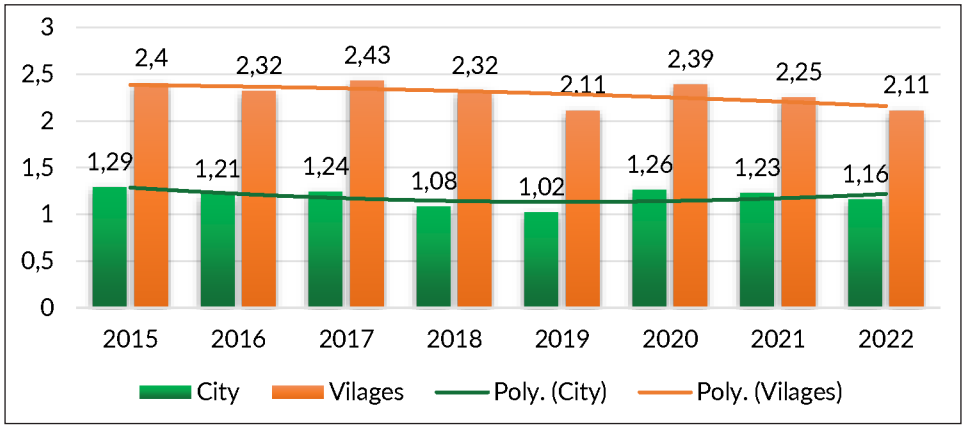


Source: Katadata (2024)

Therefore, poverty can impact social friction, leading to physical clashes between citizens, such as the Arab Spring event, which began with the increasing number of poor people coupled with the poor implementation of democracy, resulting in riots in the Middle East region (Kompas, 2012). For this reason, the Indonesian government must

be careful in looking at the impact of poverty so that the Arab Spring event does not occur in Indonesia. The condition of poverty in Indonesia can be seen from the poverty depth index in Indonesia in Figure 3.

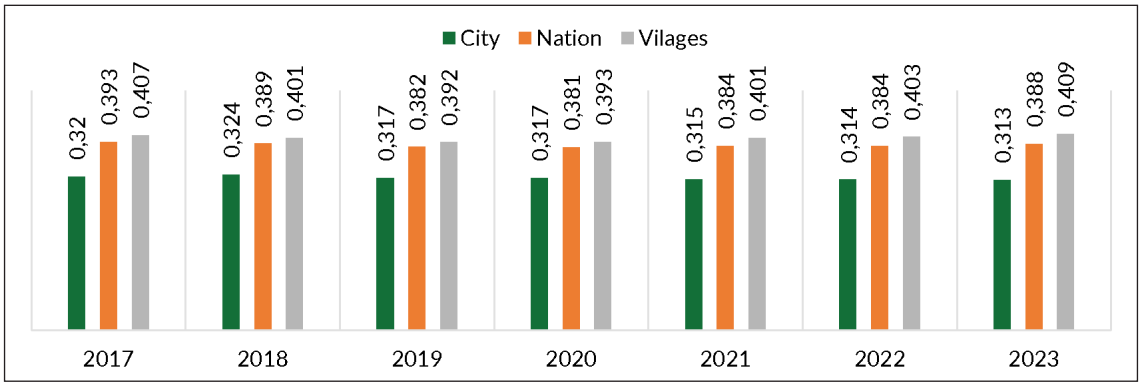
Figure 3. Comparison of Urban and Rural Poverty Depth For The Period 2015 - 2022



Source: BPS (2024)

Figure 3 shows that the poverty depth index in urban areas has been trending upward from 2019 to 2022. Meanwhile, it has been trending downward in rural areas. The value of the poverty depth index in rural areas is more significant than in rural areas in Indonesia; overall, both rural and urban areas fluctuated in the value of the poverty depth index in Indonesia from 2015 to 2022.

Figure 4. Gini Ratio Index for Urban, Rural and National Period 2017 - 2023



Source: Katadata (2024a)

In addition to poverty, another factor that can affect democracy is income inequality. According to Dahl (2023), inequality in society, both socially and economically, can have an impact on the implementation of democracy in society. If income inequality increases, it will change the condition of democracy in society (Anyanwu et al., 2016). As reported by the SMRU Research Institute, inequality in society, especially in terms of income, can have a negative impact on the implementation of democracy in Indonesia, it

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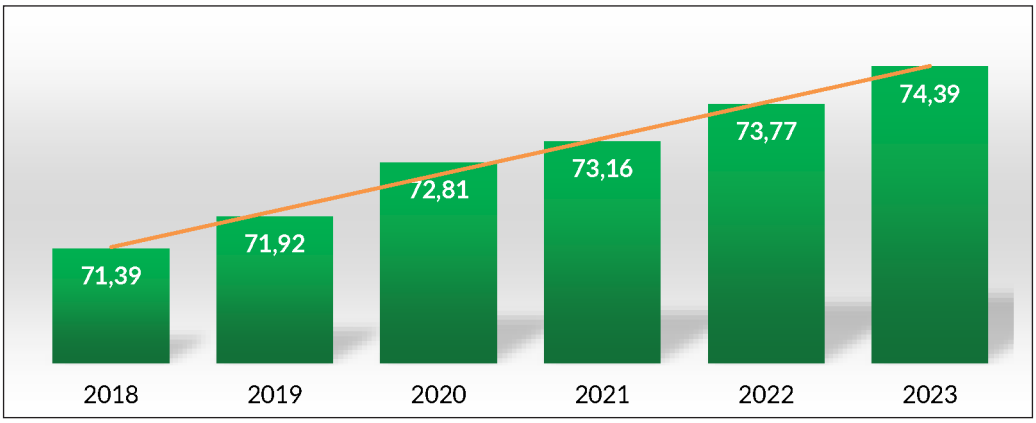
can trigger rebellion and government delegitimization (Tadjoeddin et al., 2017). Income inequality can be reflected by the Gini ratio index, which in 2017 reached a value of 0.41 (Tadjoeddin et al., 2017). A clear explanation of the condition of income inequality of the Indonesian people is shown in Figure 4.

Figure 4 shows that rural areas have a higher Gini ratio index value compared to urban and national areas. From 2020 to 2023, the Gini ratio index on a national scale has increased. Similarly, in rural areas, the Gini ratio index tends to increase from 2020 to 2023. Meanwhile, urban areas experienced a decrease in the Gini ratio index from 2020 to 2023. Furthermore, the factor that can affect democracy is human development (Hansen & Reich, 2015). According to Gidron & Hall (2017), democracy can develop depending on the quality of its people, which is reflected in the Human Development Index (HDI). From 2018 to 2023, Indonesia's HDI has increased for more details, as shown in Figure 5.

Figure 5. Indonesia Human Development Index for the period 2018 - 2023



Source: Katadata, 2024b

According to Egharevba et al. (2016), modern human civilization aims to implement justice reflected in good state governance, such as reducing poverty, creating income equality, and improving human development where the implementation of the democratic system can reflect the good or bad state governance (Karlson, 2018). This result is the opposite of what happened in Indonesia. Where in general, the poverty depth index and income inequality decreased, thereby increasing Indonesia's human development. However, according to a report from the EIU, Indonesia's democracy index has decreased.

The research conducted by the researcher entitled Democracy is still limited to the impact caused by the implementation of democracy. Research from Graham and Svolik (2020) still discusses the impact of the implementation of democracy in terms of social community and interest in entering the world of politics, which impacts people's welfare. Furthermore, research conducted by Ahmed et al. (2022) is also limited to the impact caused by the implementation of democracy, both seen from economic growth,

energy consumption, and environmental conservation. As for the research related to the good or bad causes of the implementation of democracy linked to welfare variables, no one has yet researched poverty, income inequality, and human development. Therefore, researchers are interested in researching the impact of factors that affect welfare on the implementation of democracy, especially in Indonesia.

METHOD

The research uses secondary data from time series obtained from BPS. The period of the time series data observed was from 2009 to 2023. This research involved all 34 provinces in Indonesia. So, it can be explained that the research uses panel data. For more details, please see Table 1.

Table 1. Research Variables.

	Variable	Data Used	Period	Data Source
1	Poverty	Provincial level poverty depth index in Indonesia	2009 – 2023	BPS Indonesia
2	Income Inequality	Gini index ratio at provincial level in Indonesia	2009 – 2023	BPS Indonesia
3	Human Development	Provincial level human development index in Indonesia	2009 – 2023	BPS Indonesia
4	Democracy	Provincial level democracy index in Indonesia	2009 – 2023	BPS Indonesia

Source: Author Development (2024)

The research uses quantitative methods to analyze research results, whereas the multiple regression calculation method with panel data is used to explain the results. With the research multiple regression equation, namely:

Equation 1.

$$f\left(\sum_{n=504}^{34}(\text{Human Development})\right) = a + \sum_{n=504}^{34}(\text{poverty}).\beta 1 + + e\ \sum_{n=504}^{34}(\text{inequality}).\beta 2$$

Equation 2.

$$f\left(\sum_{n=504}^{34}(\text{democracy})\right) = a_0 + \sum_{n=504}^{34}(\text{poverty}).\beta 1 + + \quad \sum_{n=504}^{34}(\text{inequality}).\beta 2 \sum_{n=504}^{34}(\text{human development}).\beta 3 + e$$

Next, the equation's results will be carried out with a Sauber test, which functions to see the mediating/intervening variable (Z), namely the human development index contained in each independent variable, namely poverty and inequality, against the dependent variable in the form of democracy. The Sobel test is meant to test the mediating variables in the path analysis built on the empirical model. The formula for the Sobel test is that if the Sobel test value is greater than the t table, then there is an intervening variable, and vice versa. If the Sobel test value is smaller than the t table, then no intervening variable exists. The use of intervening variables using panel data has been

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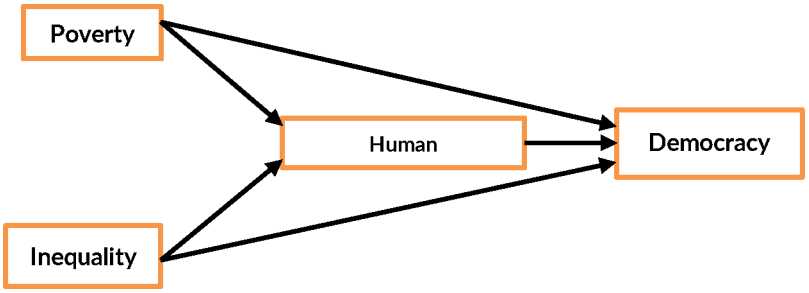
carried out by researchers who focus on economic studies (Celebi & Hönig, 2019); (Ramelli & Wagner, 2020). To make it clearer, the formula can be seen below.

$$Sobel\ test: (Z) = \frac{\alpha\ x\ b}{\sqrt{(b^2SE_a^2)\ + (a^2SE_b^2)}}$$

The human development index is used as an intervening variable because the quality of the population in a country can affect the quality of the democracy run by that country (Hansen & Reich, 2015). Where if the quality of society in a country increases as reflected through human development, it will have an impact on improving the quality of democracy and vice versa; if there is a decrease in the quality of human development, it will result in a decrease in the quality of democracy (Broome & Quirk, 2015; Gidron & Hall, 2017; Hansen & Reich, 2015). According to Hickel (2020), human development depends on the income people have collected in their environment. Where the greater the income difference owned by fellow citizens will impact on decreasing the quality of human development and vice versa; if the income difference between communities is smaller, it will be able to increase the human development index (Aiyar & Ebeke, 2020; Hickel, 2020; Osher et al., 2020).

Furthermore, Gumede (2021) conveyed that the problem of poverty comes from the inability of the population due to poverty and income inequality, which impacts low human development and the poor quality of the ruling government or democracy. For more details, the research model can be seen in Figure 6.

Figure 6. Empirical model



Source: Adopted from Acemoglu et al., (2015), Gründler & Krieger, (2016), Trum (2018), Broome & Quirk, (2015), Gidron & Hall, (2017), Hansen & Reich, (2015), Lerner, (2018), Osher et al., (2020), Wilkinson, (2022), Aiyar & Ebeke, (2020); Hickel, (2020), Osher et al., (2020).

In multiple regression using panel data, it is necessary to test the best model between the common effect model (CEM), fixed effect model (FEM) and random effect model (REM). Next, tests were carried out, including the Chow, Hausman, and Lagrange Multiplier Test. Furthermore, according to Baltagi (2005), heterogeneity in panel data can be controlled and minimize the collinearity relationship between variables so that the model test does not need to be done and can be used directly (Baltagi, 2005)

RESULT AND DISCUSSION

Research using panel data is tested to obtain appropriate equations for Poverty and Income Inequality in Human Development. For more clarity, see Table 2. The multiple regression equation model used in the research is FEM. This result is based on testing each model using the Chow test, Hausmant test, and Lagrange multiplier test approaches. Where from these three tests, it was found that FEM was selected based on the Chow test and Hausman test. Meanwhile, REM is only selected in the Lagrange multiplier test.

Table 2. Result of fit model from equation using variable poverty and inequality on human development

Test Type	Probability (α=0.05)	Decision
Chow Test	Cross-section F (0,000)	Ha: Fixed Effect Model
Hausman Test	Cross-section R (0,000)	Ha: Fixed Effect Model
Lagrange Multiplier Test	Breusch-Pagan (0,000)	Ha: *Random Effect Model*

Source: Author Finding (2024)

Table 3 shows that income inequality, with a negative correlation, significantly influences human development. If income inequality increases, the quality of human development in Indonesia will be reduced. Meanwhile, the poverty variable has no significant effect on human development. Together, poverty and income inequality significantly affect human development, with a contribution of 76.74% and 23.26% influenced by other variables not included in the research.

Table 3. Regression Results with FEM on Human Development

Variables	Coefficient	Probability (0.05)	Description
Poverty	0,2380	Prob. (0,2630)	not significant
Inequality	-50,5844	Prob. (0,0000)	**significant**
Constanta	88,0540	-	-
F-Statistic	44.1114	Prob. (0,0000)	**significant**
R-squared	0,7674	-	-

Source: Author finding (2024)

Next, we will look at the details of the provinces in the multiple regression equation using the FEM approach. The details of the provinces that have a strong and weak influence in influencing human development simultaneously from the variables of poverty and income inequality are shown in Table 4. Table 4 shows that the province with the most significant positive influence is DKI Jakarta Province, followed by DI Yogyakarta. Meanwhile, the province with the greatest negative influence is Papua, followed by East Nusa Tenggara. An equality test was carried out for the poverty, income inequality, and human development variables to select the most appropriate type of equation. The model-type test results can be seen in Table 5.

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Table 4. Influence on Human Development

Province (1)	Effect (2)	Province (1)	Effect (2)
Aceh	-1,1408	West Nusa Tenggara	-3,0146
North Sumatra	-0,3016	East Nusa Tenggara	-6,1861
West Sumatra	0,1397	West Kalimantan	-3,8160
Riau	1,6138	Central Kalimantan	-0,7284
Jambi	-0,8601	South Kalimantan	-0,7618
South Sumatra	-0,6725	East Kalimantan	4,1438
Bengkulu	-00979	North Kalimantan	-2,5174
Lampung	-2,0774	North Sulawesi	3,3451
Bangka Belitung Islands	-2,8675	Central Sulawesi	-1,8436
Riau Islands	4,1763	South Sulawesi	2,5923
Jakarta	11,6543	Southeast Sulawesi	1,2873
West Java	2,7111	Gorontalo	-0,1010
Central Java	0,7865	West Sulawesi	-4,8034
Yogyakarta	10,8332	Maluku	-2,4926
East Java	0,9778	North Maluku	-4,6107
Banten	2,5618	West Papua	-4,8610
Bali	4,7812	Papua	-8,8566

Source: Author finding, 2024

From the results of Table 5, it can be seen that the more appropriate equation to use is FEM, where the results of the Chow test and the Hausmant test chose FEM. Meanwhile, the results of the Lagrange Multiplier test showed REM. Therefore, the most appropriate multiple regression equation that uses panel data is FEM because 2 test types select it out of 3 test types performed. The results of the multiple regression equation with the FEM type can be seen in table 6.

Table 5. Result of Fit Model From Equation using variable Poverty, Inequality and Human Development on Democracy

Test Type	Probability (0.05)	Decision
Chow Test	Cross-section F (0,000)	Ha: Fixed Effect Model
Hausman Test	Cross-section R (0,000)	Ha: Fixed Effect Model
Lagrange Multiplier Test	Breusch-Pagan (0,000)	Ha: Random Effect Model

Source: Author finding (2024)

From Table 6, it can be seen that independent variables consisting of poverty, income inequality, and human development significantly influence democracy. The variables of poverty and income inequality have a negative relationship. This result means that if there is an increase in poverty and income inequality, the quality of democracy will decrease. On the other hand, if the poverty rate decreases and income inequality decreases, then

the quality of democracy will increase. At the same time, the variables of poverty, income inequality, and human development have a significant effect on the democracy index, with the contribution of all independent variables to the dependent variables in this study of 62.8% and 37.2% influenced by other variables that were not observed in this study.

Table 6. Regression Results with Fixed Effect Model on Democracy

Variables	Coefficient	Probability (α=5%)	Description
Poverty	-3,3005	Prob. (0,0000)	Significant
Inequality	-21,4928	Prob. (0,0423)	Significant
Human Development	0,8804	Prob. (0,0000	Significant
Constanta	24,4378	-	
F-Statistic	21,9006	-	Significant
R-squared	0,6280	-	

Source: Author finding (2024)

Next, we look at the details of the multiple regression equation using FEM. Provinces with a strong and weak influence democracy simultaneously from poverty, income inequality, and human development. For further clarity, see table 7. Table 7 shows that the province with the most significant positive impact is Papua province, followed by East Nusa Tenggara province. The province with the highest negative impact and correlation is West Sumatra province, followed by North Sumatra province.

Table 7. Influence on Democracy

Province (1)	Effect (2)	Province (1)	Effect (2)
Aceh	1,6722	West Nusa Tenggara	2,3868
North Sumatra	-9,5579	East Nusa Tenggara	16,0055
West Sumatra	-12,1296	West Kalimantan	3,9653
Riau	-4,4257	Central Kalimantan	-2,4320
Jambi	-4,9187	South Kalimantan	-3,0803
South Sumatra	4,226	East Kalimantan	-4,6830
Bengkulu	1,5156	North Kalimantan	3,4576
Lampung	-0,8018	North Sulawesi	0,5617
Bangka Belitung Islands	-3,3269	Central Sulawesi	3,6071
Riau Islands	-,2952	South Sulawesi	-4,4389
Jakarta	-2,2583	Southeast Sulawesi	-4,1935
West Java	-5,8751	Gorontalo	8,9507
Central Java	-1,0643	West Sulawesi	2,3990
Yogyakarta	-3,0123	Maluku	6,3824
East Java	-2,8924	North Maluku	-4,9183
Banten	-4,6385	West Papua	9,2895
Bali	-1,9086	Papua	17,4941

Source: Author finding (2024)

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From the research chart in Figure 6, it can be seen that one variable acts as an intermediary, namely the human development variable. Therefore, the Sobel test is necessary to see the role of human development variables as intervention variables in the poverty-to-democracy variable and the income inequality-to-democracy variable. The test results can be seen in Table 8. Table 8 found that poverty reflected in the poverty depth index did not have a barrier variable to affect democracy with a negative correlation. If there is an increase in the poverty depth index, then the democracy index will decrease without any human development variables that hinder it. Moreover, a decrease in the poverty depth index will increase the human development index and is not hindered by human development variables.

Table 8. Testing Human Development Variables as an Intervening Variable

Path	Sobel Test Value	T Table Value	Decision
Poverty>Democracy	1,13	1,96	H0: There is no intervening variable
Inequality>Democracy	7,31	1,96	Ha: There is an intervening variable

Source: Author finding (2024)

In the income inequality variable, if there is an increase in the Gini ratio index, it will not necessarily decrease the democracy index in Indonesia. This condition is because there are human development variables that are barriers. Therefore, a significant influence of the negative correlation of income inequality with democracy will always be hindered by the influence of human development on democracy so that the influence of income inequality on democracy depends on the influence of human development variables on the democracy index, which becomes a connecting variable between the two variables. According to Sugiono (2019), if there is an intervention variable, the relationship between the independent variable and the dependent variable cannot be clearly defined because intermediate factors inhibit the relationship.

The results of this study follow what Sarkodie and Adams (2020) conveyed, that income inequality in the community can interfere with the success of human resource development carried out by the government. Rodionov et al. (2018) explain that the factor of income inequality towards human development has an important role in generating economic growth that will impact improving the community's quality of life.

One of the influences on the quality of human development in a nation is the poverty experienced by citizens (Lerner, 2018; Osher et al., 2020). According to Wilkinson (2022), the impact of poverty experienced by the community has an impact on the decline in the quality of human development. Therefore, the improvement or decline in the quality of society in a country depends on the number of poor people (Gründler & Krieger, 2016; Lerner, 2018; Osher et al., 2020; Wilkinson, 2022).

Fosu (2017) explained that low-income countries have a high risk of poverty and income inequality, which affects human development and community welfare as reflected in economic growth. Furthermore, according to Haseeb et al. (2022), economic growth

through globalization mechanisms, namely foreign investment and domestic investment, can increase the gap between low-income people and the investor group. The impact can be a decrease in the human development index because many people lose the right to a source of income, a healthy environment, and open economic access. Moyo et al. (2022) explained that income inequality in the community impacts social capital for human development, such as education. The greater the income inequality in the community, the lower the quality of schools that most people can access (Moyo et al., 2022). Therefore, the role of the government is very important in developing human resources, as reflected in the human development index (Fadly & Edward, 2023).

According to Cantor & Lewis (2016), welfare is a determinant of good or bad democracy because welfare can provide quality education, quality health facilities, and infrastructure and increase population income to the community. So, community welfare really influences the quality of democracy (Iversen & Soskice, 2019). However, many developing countries hinder the improvement of the quality of democracy, which aims to hinder the welfare of their people because it is only to maintain the regime's power (Akacem, 2021).

Meanwhile, human development has a linear influence on the implementation of democracy (Ghosh, 2016; Saha & Zhang, 2017; Gerring et al., 2021). However, factors in human development such as poverty, income inequality, and human development in socialist countries do not have a major impact on democracy because the implementation of the state is autocratic. Furthermore, democracy in poor countries is poorly implemented because those in power commit many corruption crimes. To cover up corruption crimes in poor countries, the rulers deliberately worsen democracy (Jetter et al., 2015).

The quality of the population in a country can affect the quality of the democracy in that country (Hansen & Reich, 2015). Where if the quality of society in a country increases as reflected through human development, it will have an impact on improving the quality of democracy and vice versa; if there is a decrease in the quality of human development, it will result in a decrease in the quality of democracy (Broome & Quirk, 2015; Gidron & Hall, 2017; Hansen & Reich, 2015). In Indonesia, the poverty variable directly and significantly affects the quality of democracy without any intervening variables. Suppose the problem of poverty, especially in the poverty depth index, is not reduced by the government and other related parties. In that case, it will be the most influential cause of the decline in democratic practices in Indonesia, which is reflected in the democracy index. According to (Jameaba, 2021) The best way to reduce the poverty depth index is to increase people's income through the creation of formal jobs so that they can raise the income class of the lower middle class to the middle class so that there is an improvement in the quality of life.

Income inequality is one of the factors that can affect a country's democracy (Acemoglu et al., 2015). According to Acemoglu et al. (2015), if democracy experiences a decline or increase in a country, this cannot be separated from the role of income inequality in society. Therefore, it can be explained that if income inequality decreases in society, it will improve the quality of democracy, and vice versa; if income inequality increases in society, it will reduce the quality of democracy (Acemoglu et al., 2015; Gründler

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& Krieger, 2016; Trum, 2018). However, in Indonesia, there are intervening variables among these relationships, namely human development variables, so the interpretation of relationships becomes unclear or undefined.

CONCLUSIONS

This study found that the income inequality factor in Indonesian society, which has a significant effect on non-linear correlation to the implementation of democracy in Indonesia, has an intervention variable, namely the variation of human development. This results in income inequality factors not being able to directly affect the implementation and quality of democracy in Indonesia because they must be associated with the quality of human resources, which is an intervention variable. In addition, the correlation between income inequality and the quality of human resources is the opposite of the correlation with the implementation and quality of democracy in Indonesia. The poverty factor does not have intervention variables, so it can directly and significantly affect the implementation of democracy in Indonesia. So, it can be explained that the poverty factor in the community will have a tangible impact on the implementation of democracy in Indonesia.

From the results of this study, we recommend to related parties such as the government, in this case, both the central government and local governments, to carry out programs that can lift people regardless of poverty, including opening investment opportunities and new economic zones so that they can absorb labor. Furthermore, the government and related parties make regulations related to investment, where the job security absorbed from investment for jobs at the middle and basic levels must be given to Indonesian citizens so that they can reduce unemployment and multiply the community with an upper-middle income bracket. Furthermore, the government does not always provide social assistance as a short-term solution to the problem of poverty. However, it seeks to encourage and make people aware that becoming farmers and utilizing unproductive lands will provide more significant benefits in generating income with the guarantee of long-term land management provided by the government and help access capital in banks. It is hoped that the government will provide equal access to technological information so that all investors and information related to opportunities to increase income can be affordable. Furthermore, the Indonesian people are expected to be able to maintain ideal democratic practices without being affected by the poverty or vulnerable conditions they are currently facing. This policy aims to maintain the ideal of realizing the welfare of the Indonesian people through a democratic system that is good in its implementation and quality.

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https://doi.org/10.15408/sjie.v13i2.42378

Signifikan: Jurnal Ilmu Ekonomi
Volume 13(2), 2024: 247 - 258
P-ISSN: 2087-2046; E-ISSN: 2476-9223
https://doi.org/10.15408/sjie.v13i2.40800

Welfare Tendency Probability: A Study on Poor Households in Indonesia

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JEL Classification:
C49
O11
Q01
R58

Received: 08 August 2024

Revised: 12 November 2024

Accepted: 15 November 2024

Available online: December 2024

ABSTRACT

Research Originality: Poverty is an important issue in the discussion of economic development. The problem of household poverty in Indonesia should also be analyzed in microeconomic settings.

Research Objectives: This study uses data from the Indonesian Family Life Survey (IFLS) surveys in 2007 and 2014 to determine the trends in household characteristics (social, economic, and demographic) and their influence on the level of welfare of poor households, the share of household spending inequality, and poverty alleviation strategies through a household-based policy approach in Indonesia.

Research Methods: Meanwhile, the research method used is Multinomial Logistic Regression.

Empirical Results: The results of the study found that the education level of the head of the household, place of residence, and household size contributed to the value of the opportunity of the household welfare position in each category. Meanwhile, Javanese have the highest level of inequality in terms of ethnic expenditure distribution and the lowest in terms of welfare.

Implications: This study implies that the condition of the head of the family dramatically influences welfare at the household level.

Keywords:
multinomial logistic regression; poverty; welfare; ethnic; household economics

How to Cite:
Rahmawati, L., Cahyono, H., Azhar, N. A. M., Othman, N., Shakil, N. S. M., & Arisetyawan, K. (2024). Welfare Tendency Probability: A Study on Poor Households in Indonesia. *Signifikan: Jurnal Ilmu Ekonomi*, *13*(2), 247-258. https://doi.org/10.15408/sjie.v13i2.40800.

INTRODUCTION

In the context of the household budget, well-being is often tied to the breadwinner's salary and discretionary spending. The basic premise is that welfare is proportional to the breadwinner's income. From a look at what people are spending their money on, it is clear that welfare is on par with poverty levels for families. Welfare is an important part of the economy, both macro and micro. In the context of the family economy, welfare is frequently linked to the amount of income earned by the family's head and the amount of money spent. The simple hypothesis is that the higher the income of the family head, the higher the level of welfare. The level of welfare is identical to family poverty, which can be seen from the consumption side of the household.

Anisa et al. (2020) define income as a series of perceived events or psychic experiences resulting from consuming goods or services. In this sense, a person's income is the total flow of services yielded to her from her property while she acquires goods and services that benefit her using money. Every durable good may be considered capital that yields income flows, and the Fisherian concept of income can serve as a basis for inter-personal comparisons.

Data on poverty in Indonesia show that in September 2021, there were 26.50 million poor people, down from 1.04 million in March 2021 and 1.05 million in September 2020. The percentage of urban poor fell from 7.89 percent in March 2021 to 7.60 percent in September 2021. The data distinguish regional poverty from poverty in urban areas and poverty at the macro level. Many studies examine the determinants of macro variables that cause poverty at the macro level.

This study will differ from other studies on poverty because it will look at the micro level, in this case, households in Indonesia. It aims to see the other side of poverty, which is complex. The welfare of low-income families will later be seen as the determinant contributing to household consumption or expenditure on the micro level. Many micro variables used in this study include economic, regional, demographic, social, ethnic, and technological variables.

When viewed regionally based on data from the Central Statistics Agency, Papua is the first poorest province in Indonesia with a percentage of 27.38 %, followed by West Papua with 21.82%. East Nusa Tenggara (Nusa Tenggara Timur/ NTT) occupies the third position with 20.44 %, followed by Maluku with 16.30 %. If viewed from the data, it only displays data on poverty levels at the provincial level. The data only provides a macro picture of how poverty conditions differ across provinces, with no information on the micro components of these conditions. In these proportions, micro components such as ethnicity are not visible. Accordingly, the behavior of households with different ethnicities will also be fascinating to see, not to mention when viewed from the perspective of households' access to and use of technology.

The role of the head of the family will have an impact not only on the income earned by the family but also on the family's decision to spend on consumption. Families are faced with several alternative consumption choices that they must make. Under certain

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conditions, low-income families will be faced with several alternative consumption choices that they must make. Families with children usually prioritize spending on their children's needs. The increase in the expenditures of low-income families is exciting and deserves to be studied in more depth. For example, the expenditure of a low-income family of Javanese ethnicity will differ from that of a low-income family of Minang ethnicity. The complexity of the analysis is different if the study only looks at the province's location.

Furthermore, it was explained that the existing condition of poverty in Indonesia in September 2021 was 9.71 %, which decreased by 0.48 % from September 2020. Meanwhile, the number of poor people in September 2021 was 26.50 million, 1.04 million compared with March 2021 and down 1.05 million from September 2020. When viewed more specifically, the percentage of urban poor people in March 2021 was 7.89 %, down to 7.60 % in September 2021. While the percentage of the rural poor in March 2021 was 13.10 %, it dropped to 12.53 % in September 2021. In terms of numbers, the number of poor people in urban areas in September 2021 decreased by 0.32 million people as compared to March 2021 (from 12.18 million people in March 2021 to 11.86 million people in September 2021). Meanwhile, in the same period, the number of rural poor people fell by 0.73 million (from 15.37 million in March 2021 to 14.64 million in September 2021).

Furthermore, the position of the poverty line in September 2021 was recorded at IDR 486,168/per capita/month with a composition of the Food Poverty Line of IDR 360,000 (74.05 percent) and the Non-Food Poverty Line of IDR 126,161 (25.95 percent). As of September 2021, the average poor household in Indonesia has 4.50 household members. Thus, the average poverty line per poor household is IDR 2,187,756/poor household/month. The results of the poverty line data above are not far from the data used in this study, namely using the Indonesian Family Life Survey (IFLS) - 5 of 2014. This IFLS data is longitudinal household data, collected once every seven years, with the number of sample households surveyed. IFLS numbered 15,900, and the number of individuals was 50,000. The IFLS survey began in 1993 as a baseline, continued in 1997, 2000, 2007, and finally in 2014, which covered 24 provinces in Indonesia except for the eastern part of Indonesia.

This study will also include information on education, age, partner status, and other variable structures. The problem formulation in this study is based on this phenomenon. It includes the following questions. First, how do the trends in household characteristics (social, economic, and demographic) affect the welfare level of poor households in Indonesia? Second, what is the share of inequality in household spending in Indonesia? Third, what is Indonesia's poverty alleviation strategy through a household-based policy approach?

METHODS

This study uses secondary longitudinal data derived from the 2014 Indonesia Family Live Survey (IFLS) data, also known as SAKERTI (Survey of Aspects of Indonesian Household Life), to estimate population and micro-demographic data indicators. IFLS is

a longitudinal survey conducted by various collaborative research institutions every seven years. For IFLS 2014, a survey was conducted by the RAND Corporation to look at the socio-economic conditions of households in Indonesia, with the sample representing about 83% of the country's population and comprising more than 30,000 people living in 13 of Indonesia's 27 provinces. One of the advantages of using IFLS is that the combination of questions from books 1-5 can be used as household variables. The detailed questions regarding household welfare from the perspective of expenditure and income are very detailed.

In each wave of the survey period for IFLS, rand.org retains as many respondents as possible who were interviewed in the previous period, so the recontact rate of the interviewed subjects is very high. The level of data owned by IFLS consists of individuals, households, and communities/groups of people. The reason for still using IFLS 5 2014 data today is that it is still very relevant, and data for the next IFLS 6 period is still unavailable. In addition, IFLS data is a high-value non-RCT data widely used for microdata analysis.

The method used in this study is primarily descriptive statistical analysis that explains the demographic, economic, and spatial characteristics of household welfare. However, regression analysis using multinomial logits is used to test household welfare. Multinomial logarithms are used to test the probability of respondents or individuals achieving prosperity as a dependent variable, where Y = 1 for very low welfare, Y = 2 for moderate welfare, and Y = 3 for high welfare. Vectors of some individual household characteristics are used as independent variables, including whether the individual lives in an urban area, the gender of the head of the household, whether the individual works in the agricultural/industrial/service sector (occupation), whether the education of the head of the household; whether ethnicity affects households; whether individuals have access to technology; and the number of household members (as well as several other characteristic variables). A more complete list can be seen in the list of variables used in this study (see Table 1).

The Multinomial Logistics Regression Analysis model in general is as follows:

$$P(WELFARE) = b_0 + b_1SEX + b_2URBAN + b_3EDU + b_4JAVA + b_5SUNDA + b_6BALI + b_7BATAK + b_8MINANG + b_9BETAWI + b_{10}CHINESE + b_{11}NUMHM + b_{12}WAGES + b_{13}TECH + b_{14}DEBT + b_{15}HEALTH + b_{16}AGRI + b_{17}INDUST + b_{18}SERV + b_{19}MAR + e_i$$

Note:

P(WELFARE) = probability of welfare expenditure
SEX = Sex of the Head of the Household
URBAN = place of residence
EDU = Education
JAVA = Javanese ethnic
SUNDA = Sundanese ethnic
BATAK = Batak ethnic
MINANG = Minang ethnic

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BETAWI = Betawi ethnic
CHINESE = Chinese ethnic
NUMHM = Number of household members
WAGES = Wages
TECH = Technological Access
DEBT = Debt
HEALTH = Health program
AGRI = Agriculture Sector
INDUST = Industrial Sector
SERV = Service Sector
MAR = Marital Status

Table 1. Definition of Operational Variables

No	Variable Type	Variable Name	Variable Symbol	Variable Properties	Measurement Scale
1	Dependent Variable	probability of welfare expenditure	P(WELFARE)	Categorical Variables	1 = very low 2 = medium 3 = high
2	Independent Variable	Sex of the Head of the Household	SEX	Categorical Variables	1 = Man 0 = Woman
		Place of residence	URBAN	Categorical Variables	1 = urban 0 = rural
		Education	EDU	Categorical Variables	Head of household's Years of schooling
		Javanese ethnic	JAVA	Categorical Variables	1 = Javanese 0 = non Javanese
		Sundanese ethnic	SUNDA	Categorical Variables	1 = Sundanese 0 = non Sundanese
		Balinese ethnic	BALI	Categorical Variables	1 = Balinese 0 = non Balinese
		Batak ethnic	BATAK	Categorical Variables	1 = Banjarese 0 = non Banjarese
		Minang ethnic	MINANG	Categorical Variables	1 = Sasak 0 = non Sasak
		Betawi ethnic	BETAWI	Categorical Variables	1 = Bugis 0 = non Bugis
		Chinese ethnic	CHINESE	Categorical Variables	1 = Chinese 0 = non-Chinese
		Number of Household Members	NUMHM	Numerical Variables	Based on the number in the household member
		Wages	WAGES	Numerical Variables	Total Wages
		Technological Access	TECH	Categorical Variables	1 = Households have the ability to access technology 0 = Households don't have the ability to access technology

No	Variable Type	Variable Name	Variable Symbol	Variable Properties	Measurement Scale
		Debt	DEBT	Categorical Variables	1 = Households have the Debt 0 = Households don't have the Debt
		Health program	HEALTH	Categorical Variables	1 = Households participating in the Government Health Program 0 = The Households is not a participant in the Government Health Program
		Agriculture Sector	AGRI	Categorical Variables	1 = Agriculture Sector 0 = non Agriculture Sector
		Industrial Sector	INDUST	Categorical Variables	1 = Industrial Sector 0 = non Industrial Sector
		Service Sector	SERV	Categorical Variables	1 = Service Sector 0 = non Service Sector
		Marital Status	MAR	Categorical Variables	1 = married 0 = not married

Source: IFLS 5

RESULTS AND DISCUSSION

Demographic characteristics of household welfare. Table 2 compares the education level of the head of the household. In total, the education level of the female head of household is higher than that of the male head. It is exciting to see the cross-tabulation of the education category with the gender of the head of the household. Interestingly, more women are pursuing education than men at all levels. The cross-tabulation of welfare categories and gender of the household head (Table 3) reveals interesting contrasts between groups in our sample and supports our decision to separate groups based on welfare level with the head of the household (father or mother).

Table 2. Category of Education of the Head of the Household (Viewed by Sex of the Head of the Household)

Category of Education	Sex of the Head of the Household		
	Female	Male	Total
1. No school (0)	1229	1027	2256
2. Elementary School/Equivalent (1 - 6 years old)	5419	4836	10255
3. Junior High School - Senior High School (7 - 12 years old)	9411	8081	17492
4. Higher Education (> 12)	2244	2033	4277
Total	**18303**	**15977**	**34280**

Source: IFLS 5 (2022)

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https://doi.org/10.15408/sjie.v13i2.40800

Table 3. Household Welfare in View of Sex of Head of Household

Category of Education	Sex of the Head of the Household		
	Female	Male	Total
1. very low welfare	17.26	82.74	100
2. medium welfare	18.98	81.02	100
3. high welfare	18.06	81.94	100
Total	**18.12**	**81.88**	**100**

Source: IFLS 5 (2022)

We use a multinomial logit model to examine the distribution of household welfare levels (not well off, moderately well off, and well off). Household welfare status is classified into three categories based on total household expenditure: low 40%, medium 40%, and high 20% (Effendi, 2015; World Bank, 2017). The explanatory variables (covariates) are as follows: First, a set of ethnic statuses for households (Javanese, Sundanese, Balinese, Minang, Betawi, Batak, and Chinese); Second, a set of categories for the individual household's work, namely, the agricultural sector, the industrial sector, the service sector, and earned income); Third, a set of information about the head of the household, such as his or her gender, marital status, and number of years of schooling; Fourth, a set of household residence locations; and; Fifth, one set relating to access to technology, participation in health programs, and participation in savings and loans.

Table 4. Summary Statistic for Main Variables across Welfare

Independent Variable	Welfare					
	Very Low		Medium		High	
	Mean	SD	Mean	SD	Mean	SD
MAR	0.488	0.499	0.480	0.499	0.476	0.499
SEX	0.463	0.498	0.473	0.499	0.466	0.498
URBAN	0,499	0.500	0.636	0.481	0.736	0.440
EDU	8.955	4.212	8.998	4.184	8.690	4.229
JAVA	0.262	0.439	0.271	0.444	0.254	0.435
SUNDA	0.240	0.427	0.218	0.413	0.206	0.404
BALI	0.001	0.028	0.001	0.025	0.001	0.025
MINANG	0.074	0.262	0.111	0.314	0.148	-0.356
BETAWI	0.104	0.306	0.089	0.285	0.071	0.257
BATAK	0.071	0.257	0.078	0.268	0.083	0.276
CHINESE	0.005	0.074	0.005	0.076	0.003	0.063
NUMHM	3.068	1.560	3.902	1.772	4.412	1.884
WAGES	17.250	1.138	17.290	1.152	17.261	1.174
AGRI	0.166	0.372	0.147	0.354	0.142	0.349
SERV	0.288	0.453	0.326	0.468	0.359	0.479
INDUST	0.047	0.212	0.051	0.222	0.054	0.227
TECH	0.360	0.480	0.355	0.478	0.348	0.476
DEBT	0.274	0.446	0.280	0.449	0.278	0.448
HEALTH	0.114	0.318	0.114	0.318	0.115	0.319

Source: Analysis results (2022)

We have reported the marginal effect for each explanatory variable in the multinomial logit model because the raw regressions are not directly informative or comparable in welfare categories. Marginal effects indicate the difference in the probability of each variable being found in one of the categories of household welfare status relative to the following individual references: gender of the head of household, marital status of the head of household, number of household members, level of household income, ethnicity affecting households, the domestic work sector, access to technology, enrollment in loans, and enrollment in health programs.

Table 5. Results of Marginal Effect Calculations on Household Welfare Levels

Independent Variable	Welfare					
	Very Low		Medium		High	
	M.E	p-value	M.E	p-value	M.E	p-value
MAR	-0.000	0.933	0.001	0.933	-0.001	0.892
SEX	-0.004	0.489	0.007	0.489	-0.003	0.926
URBAN	-0.177	0.000***	0.068	0.000***	0.108	0.000***
EDU	0.002	0.235	0.001	0.235	-0.003	0.000***
JAVA	-0.002	0.530	0.012	0.530	-0.010	0.487
SUNDA	0.026	0.094*	-0.010	0.094	-0.015	0.034**
BALI	-2.747	0.980	1.947	0.980	0.799	0.980
MINANG	-0.109	0.000***	0.044	0.000***	0.065	0.000***
BETAWI	0.308	0.258	0.002	0.258	-0.033	0.008***
BATAK	-0.318	0.124	0.016	0.124	0.015	0.095*
CHINESE	0.030	0.816	0.014	0.816	-0.044	0.363
NUMHM	-0.081	0.000***	0.038	0.000***	0.042	0.000***
WAGES	-0.010	0.007***	0.007	0.007***	0.002	0.037**
AGRI	0.029	0.035**	-0.019	0.035**	-0.010	0.071*
SERV	-0.022	0.080*	0.008	0.080*	0.013	0.022**
INDUST	-0.001	0.989	-0.003	0.989	0.005	0.771
TECH	0.010	0.443	-0.001	0.443	-0.008	0.146
DEBT	-0.002	0.682	0.005	0.682	-0.002	0.888
HEALTH	0.021	0.101	-0.017	0.101	-0.003	0.293

Source: STATA 13 analysis results (*** p<.01, ** p<.05, * p<.1)

Table 5 reports the results of the multinomial logit model for the entire sample in the IFLS unit test. This result supports the argument that households living in urban areas are less likely to prosper than those in rural areas. The moderately prosperous category with a p-value below five percent has a positive influence. The marginal effect value is 0.068, meaning households living in urban areas tend to be 6.8% more prosperous than rural areas. Meanwhile, for the prosperous category, the marginal effect value is 0.108, which means that households living in urban areas have a 10.8% chance of being more prosperous than those in rural areas. Seeing the marginal effect value that is so large

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for households living in urban areas, urban areas may still be the main attraction for households to achieve their welfare. This picture can be seen from spending in urban areas, which is higher than in rural areas, underlining a rough picture of the level of welfare of urban residents, who are better off than rural residents.

Another result of demographic characteristics is the education level of the head of the household. The value shown by the education variable of the head of the household is not significant in the less prosperous and moderately prosperous categories. However, the coefficient value of the prosperous category is negative, indicating that the higher the education level of the head of the household, the lower the chance of achieving prosperity. This result could be because the employment market is not ready to accept household heads who graduate without competence following the world of work. In addition, this phenomenon occurs because people with low education are ready to accept any job offered with inconsistent salaries, especially when working in the informal sector. Supposedly, the education level of the head of the household can prove that poverty will decrease with an increase in the education level of the head of the household. The results of this study are in line with the research of Akerele and Adewuyi (2010), which states that poverty is higher among household heads with upper-middle education. This opinion also matches Bilenkisi et al. (2015), who found that heads of households who graduate at the high school level tend to have a lower probability of achieving prosperity. Djamaluddin (2017) state that total number of household member and asset ownership is the main factor that lowers the poverty rate.

The following demographic characteristic variable is the number of household members. The analysis results show that the number of household members is significant in all categories. The finding is that households with more family members will have a lower marginal effect of 8.1% on achieving poverty. In contrast, in the prosperous category, households with more members will have a more significant marginal effect of 4.2% on achieving prosperity. The explanation of the research results above is in line with Spalkova and Spalek (2013), namely households that tend to choose a more significant number of household members because they will have a higher total income so total consumption expenditure for households will increase and welfare will increase. These results are consistent with the research by Davis et al. (1983), who concluded that household income and household size had a significant positive impact on household consumption expenditure.

Improvements in the standard of living of households can be seen in the primary employment sector. In this study, only three sectors were mentioned, namely the agricultural sector, the industrial sector, and the service sector. The results of the research carried out in the three categories show that the industrial sector is not significant in all categories, while the other two sectors, namely, agriculture and services, obtain significant results in all categories. The service sector has a 2.2% lower chance of being unprosperous than the agricultural and industrial sectors. The sector with the least prosperous opportunity is the agricultural sector, at 2.9%. This fact is supported because households move from jobs in the agricultural to non-agricultural sectors. Economic factors influence this fact.

The research results from Tocco and Davidova (2012) explained that households switch jobs from the agricultural sector to other sectors due to individual, household, agricultural,

financial, location, and labor market characteristics. However, the agricultural sector offers the most significant opportunity for prosperity, with 7.1% more opportunities than the service sector, which offers only 2.2%. Sinurat et al. (2020) found that the agricultural sector significantly affects welfare status. However, several variables in the agricultural sub-sector are not statistically significant.

Further analysis of the influence of ethnicity on household welfare, Levinson and Christensen (2003) provides input on the nomenclature of 300 ethnic groups in Indonesia. Villages and local communities are the social basis of all these groups, although each group has a different language, culture, and history. The largest ethnic group is the Javanese (33 percent of the total), most of whom live on the island of Java and some outside Java. According to the IFLS, the largest ethnic groups are Sundanese, Batak, Minang, and Betawi. Even though the definition of an ethnic group can be debated, this study is limited by the information already available in the IFLS questionnaire, which is predominant in the household.

Dincer and Hotard (2011) explain that cultural identification (ethnicity) and economic inequality are not related in a linear connection. On the contrary, they prove that there is an inverse U-relationship (quadratic) between Ethnic Fractalization (ERFe) and expenditure inequality in 58 countries in Africa, Asia, and Latin America. That is the more diverse the ethnic groups in an area, the more unequal the welfare of the people.

In the results of the analysis, there are unique findings that explain that the ethnic group that has a lower chance of experiencing poverty is the Sundanese ethnicity. In comparison, the ethnic group with a greater chance of achieving prosperity is the Minang ethnicity. The Sundanese ethnic group has the opportunity to achieve the welfare of 2.6%, and the other ethnic minority group has the opportunity to achieve the welfare of 6.5% are more likely to achieve poverty. This result is because most people recognize the Minangkabau as skilled nomads. This fact can be seen from the number of successful Minang people in their overseas areas. Pioneering from small businesses to survive the brunt of the natives in the place where he lives. For ethnic people and adherents of the Minangkabau matrilineal culture, migrating will affect one's social status in the family, among relatives, and in society. This cultural phenomenon is one of the motivating factors for someone to migrate).

Many Minang people migrate by leaving their homeland and settling in other places that provide a decent life (Akmal & Nurwianti, 2009). Even more unique, the livelihood of wage laborers is not popular with the Minang people because they have low prestige. In addition, Minang people who migrate do not have to have a high school diploma to be able to apply for a job (Rahmah, 2011). With the ability to trade, Padang restaurants are one type of business usually occupied because they already know how to make it.

As previously stated, the greater the ethnic and cultural diversity, the closer it will be to unequal welfare. Therefore, in this case, the inequality in the distribution of expenses issued by ethnic groups is the largest in the Javanese, with a percentage value of 26% of the bottom 40 percent of the group. The second is the Sundanese ethnic group, with a percentage of 24% of the lowest 40%, so the Javanese ethnic group of households has the lowest level of welfare. When examined more closely, the agricultural sector is responsible for 54.12 percent of the poverty or inequality between households in the Javanese ethnic group.

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https://doi.org/10.15408/sjie.v13i2.40800

Seeing results like the above means that there must be policy incentives for the work sector that is engaged in by these ethnic groups, especially jobs that contribute to high inequality. Based on these results, the agricultural sector contributes the most to the welfare of the Javanese. Regarding this, the policy incentives to overcome it are in the agricultural sector by cutting the harvest distribution chain, providing smooth distribution access, facilitating the distribution of capital, and providing assistance and added value, namely selling crops already packaged (which is one of them), by utilizing the BUMDES institution for this management. Then, households working in the agricultural sector get good value-added, and agriculture's selling price is improving.

Meanwhile, the Sundanese with jobs in the service sector also fall into the category of the lowest 40 percent group. The implementation that must be carried out to stimulate the sector so that ethnic groups in these jobs can improve their welfare is by providing more incentives to the service sector regarding regulations and subsidies if needed. In addition, households must be able to access information because it is believed that households with access to information will develop. Suppose the service sector is closely related to the financial sub-sector. In that case, this can be done by providing incentives to financial institutions that develop inclusive finance in the hope that the number of people who can access financial institutions will ultimately increase welfare, while the most prosperous Javanese are those who have jobs in the service sector with a percentage of 54.77 percent. For the Sundanese, households included in the lowest 40 percent employment group are in the service sector, with a percentage of 36.7 percent. The service sector accounts for 17.6 percent of the group that enters the 20 percent club.

CONCLUSIONS

The finding from this research indicates that three household characteristics variables, namely, the education level of the head of the household (basic education), place of residence, and household size, contribute to the opportunity value of the position of household welfare in each welfare category. The resulting inequality in the distribution of ethnic spending is most significant among the Javanese, with a rate of 26% against the lowest 40%. The second is ethnic Sundanese, who comprise at least 40% to 24% of the group. Thus, the welfare of the Javanese household group is at its lowest level. If we look closely, the agricultural sector, which accounts for 54.12% of the GDP, contributes to the poverty and welfare of Javanese households.

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https://doi.org/10.15408/sjie.v13i2.40800

Signifikan: Jurnal Ilmu Ekonomi
Volume 13(2), 2024: 258 - 272
P-ISSN: 2087-2046; E-ISSN: 2476-9223
https://doi.org/10.15408/sjie.v13i2.38046

Technology Transfer of Rural Entrepreneurship Digitization to Regional Economic Growth

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JEL Classification:
O14
O47
P25

Received: 14 March 2024

Revised: 29 September 2024

Accepted: 15 November 2024

Available online: December 2024

ABSTRACT

Research Originality*:* The digital technology transfer in rural entrepreneurship is a knowledge-based solidarity socio-economic (SSE) innovation that drives regional economic growth and reduces inequality.

Research Objectives: This study aims to analyze the role of digitalization technology transfer in entrepreneurship on regional economic growth, inequality mitigation, and other related resource factors.

Research Methods: The study approach model used a mixed methods design through exploratory and explanatory stages. The data were analyzed quantitatively descriptively with the standard multiple regression tool. The operational variables were measured using the Gini ratio index.

Empirical Results: The results showed that digitalization technology transfer encourages regional economic growth. However, the positive role created has not reduced the negative impact and inequality. This inequality could be mitigated by the innovation of the community's social solidarity economic system (SSE). There are indications of the potential of local community wisdom to strengthen informal institutions in society.

Implications: Utilizing the community's potential and the SSE model could provide added value for the community's welfare.

Keywords:

digitization technology transfer; rural entrepreneurship; regional economic growth; inequality.

Prasetyo, P. E. (2024). Technology Transfer of Rural Entrepreneurship Digitization to Regional Economic Growth. *Signifikan: Jurnal Ilmu Ekonomi*, *13*(2), 259 – 272. https://doi.org/10.15408/sjie.v13i2.38046

INTRODUCTION

Technology transfer or transformation of entrepreneurship digitalization is increasingly important in changing local traditional techniques. It has become a priority scale for regional and global development policies (World Bank, 2022; Tokar et al., 2022). Digital technology makes industrial boundaries easily penetrable (Szalavetz, 2022). Although technology transfer to digitize rural entrepreneurship creates new job opportunities and drives economic growth, it also creates inequality (Ferrari et al., 2022). Digital transformation impacts social inequality and economic competitiveness. Empirical research found a negative impact on the use of social media (such as Instagram) on all determinants of the psychological well-being of young people in Korea (Song, 2023). Therefore, incentive policies are needed to increase community capacity. The digitization technology revolution has created fear and uncertainty due to threats to unemployment and inequality (Yusuf, 2021). Subsequently, previous studies recommended examining policy tools that stabilize the economy during uncertainty.

The inequality problem has increased in various countries, including the European Union. It has not been overcome by conservative and social-democratic economic traditions (Wildowicz-Szumarska, 2022). Previous studies found empirical and theoretical evidence that country-specificity causes inequality (Kot & Paradowski, 2022). In Asia-Pacific, digital and technology divides have increased diversity of inequality because each country has different technology investments and policy support (Akhtar, 2018). Market-led growth alone cannot provide a community with a more prosperous and sustainable future (Akhtar, 2018). Therefore, inefficient markets and an increase in leisure time increase inequality (Boppart, 2021). Although contemporary digital technology has been fascinating, inequality continues to increase (Qureshi, 2021). Economic inequality affects individual decisions to engage in entrepreneurial activities (Xie et al., 2022).

This study aimed to explain various opportunities and challenges and avoid the risk trap of uncertainty through social innovation. In rural areas, social innovation is not about regime changes. It is about developing different social innovations in pluralism to benefit the community (Slee & Polman, 2021). The current digitization revolution is unavoidable and should be faced wisely. When family business actors do not follow the digitization process, they become incompetent and lose their competitive position (Turuk, 2019). Therefore, this problem should be analyzed because it provides new challenges for institutional policy authorities and independent innovation for other rural family entrepreneurship.

This study builds on previous literature that used an exploratory sequential and qualitative descriptive mixed methods design (Prasetyo & Setyadharma, 2022). The previous qualitative descriptive analysis explored and identified key determinants in digitizing rural entrepreneurship technology. Furthermore, the qualitative phase was used in this study to build the quantitative phase. A systematic literature review approach is needed to strengthen the analysis and increase the data validity and reliability. Previous research only explained the relationship between digitalization and economic growth. The

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novelty of this manuscript not only explains the importance of digitalization in driving regional economic growth and causes inequality in rural areas.

The first part of this manuscript explains the urgency of digitization technology transfer because of its potential unwanted, invisible, and unknown impacts. The impacts become apparent only after the digital technology is examined and implemented (Pansera et al., 2019). This argument is getting stronger and more interesting because the significant regional entrepreneurship gap should be considered an important problem for regional policy (Rogalska, 2018). The second part explained the need for new institutional studies on various determinants regarding entrepreneurship digitization, technology transfer, and increasing productivity in encouraging economic growth (Zhang et al., 2022; Purohit & Purohit, 2021). Furthermore, the discussion results, conclusions, and recommendations were presented in the last section.

Human capital has become the most competitive and unique resource in developing a modern digital regional economy (Prasetyo, 2020). It plays an important role in this digitalization technology transformation (Zaborovskaia et al., 2020). Digital technology transfer has encouraged entrepreneurship and contributed to new business economic opportunities by creating new markets and reducing barriers for new entrants (World Bank, 2022). ICT training should shift toward critical social and cultural practices that encourage community participation in cultural life and official institutions to close the digital human capital gap. It turned out that prosperity is strongly impacted by the population's education (Simovicova & Urbancikova, 2022; Paul, 2022).

Entrepreneurship digital technology transfer in rural areas increases regional development's economic growth and innovation potential (Branauskas & Raisiene, 2022). Digital transformation has profound policy implications for entrepreneurial innovation (Mukesh, 2022). Rapid technological advances and increased digitalization technology in rural areas have facilitated the development of modern agricultural processes (Purohit & Purohit, 2021). However, digital entrepreneurial economic activity development depends on using digital technology by individuals, communities, and governments (Turuk, 2019). This condition necessitates future studies in various interdisciplinary fields to better understand the digital entrepreneurship domain and encourage the achievement of the SDGs.

Established economists such as Adam Smith and Schum-peter have emphasized that human capital and institutional factors are the two most important determinants of economic growth (Prasetyo & Kistanti, 2020). The role of human capital and institutions drives entrepreneurial competitiveness, quality, and sustainable economic growth. Other studies found that human and social capital, institutional quality, and entrepreneurship drive economic growth and sustainable competitiveness (Mthanti & Ojah, 2018). Therefore, human capital and institutional factors measure established traditional entrepreneurial technology in promoting economic growth and sustainable competitiveness (Prasetyo et al., 2021). The industrial revolution and the increasingly widespread digitization of technology transfer have caused a decline in human capital accumulation, institutions, inequality, and fear (Qureshi, 2021).

The economy built through digitization technology transfer has provided a new impetus for sustainable economic development, inequality, and fear (Branauskas & Raisiene, 2022). The digital transition process has demonstrated an enormous capacity to develop and implement sustainable solutions. According to previous studies, digital technology transfer in rural areas could have positive and negative impacts (Morris et al., 2022). The positive impact could still be maximized to reduce the negative impact (Ferrari et al., 2022).

In institutional theory, social capital strongly impacts the relationship between institutions and entrepreneurship. The theory shows that informal and formal institutions are important in reducing moral hazards in reward-based crowdfunding (Lin & Pursiainen, 2022). Formal institutions could build informal institutions when regulatory changes strengthen entrepreneurs and reduce social capital (Lin & Pursiainen, 2022). Since formal institutions are often ineffective, informal institutions could be an adequate substitute for economic transactions in low-income communities (Prasetyo et al., 2022; Danquah & Sen, 2022). The informal institutions cover community norms such as religious, social, cultural, economic, political, and security that control individual behavior in socioeconomic transactions. Furthermore, transformational and social capital and resilience are relevant informal institutions for leadership (Urbano et al., 2021).

This study examined how digitization technology transfer in rural entrepreneurship could drive regional economic growth while increasing inequality. The urgency of this study is how to mitigate the resulting negative impacts. The topic question was the effect of entrepreneurial digitization technology transfer on human and institutional factors and traditional technology in rural areas. Nambisan et al. (2019) recommended that future study themes should explain the implications. Therefore, this study could serve as important information and policy implications for mitigating the negative impacts and driving regional economic growth.

This study aimed to complement the socioeconomic innovation theory of capitalism from Schumpeter and Karl Mark. The theory of the capitalist socioeconomic system has more monetary dimensions through the corporate social responsibility model. Moreover, the model of capitalist society's social and economic evolution system is a competitive social innovation process between large companies (Yay & Yay, 2022). The slight difference between the two lies only in the value theory and analysis of social class. However, the capitalist system model cannot reduce inequality in a humanistic and just manner. This study implies that new theoretical models based on social innovation, such as the SSE system model, are needed to mitigate the negative impacts of digitization technology and global climate change.

Explicitly, this article uses a new approach of SSE as a novelty of a more humanistic innovation approach in overcoming the gap. This SSE approach tends to combine economic and social approaches. As a social intra-entrepreneurship innovation, the previous theory has a good concept regarding the scope of human business (Carvalho, 2022). The penalty is because capitalism is more materialistic in the socioeconomic system model. The SSE system model formed from community social awareness is more humanistic and oriented

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toward balancing socioeconomic life for the common good. It is more gender-just, more feasible, and sustainable. The model aims to achieve shared socioeconomic welfare in society in a humanistic, decent, and more just manner. In line with previous studies, the SSE system model could be a new solution to mitigate inequality and encourage the achievement of the SDGs (Joel & Nel, 2021).

METHODS

This study used a two-stage mixed methods design approach. The early stages were more exploratory sequential mixed methods design (Prasetyo & Setyadharma, 2022) using qualitative and quantitative empirical data sources. An exploratory sequential mixed methods design was used to explore, integrate, and synergize data sources. It helped examine absorption problems in the digitalization technology transfer in dynamic and complex rural areas (Fetters & Tajima, 2022). The data used in this qualitative analysis were collected using a sample survey of 57 respondents comprising family entrepreneurship actors (Prasetyo & Setyadharma, 2022).

Furthermore, this information source was used to reinforce quantitative analysis in the second stage. A representative sample of 125 respondents was taken by simple random sampling. Appropriate to the exploratory design, qualitative data were used as purposive and snowball sampling techniques for further exploration. However, this exploratory design focused on core variables of rural entrepreneurship digitization and inequality.

$$IGx = 1 - \sum_{i=1}^{n} f_i \ (Y_i - Y_{i-1})$$

Table 1. Diagnostic Variables in Research

Variable	Operational Description
Regional Economic Growth (GRE)	GRE is the level ratio of the output growth and productivity of individuals and families on society's total productivity and output growth
Human Capital (HC)	HC is the ratio of education, solidarity, attitude, ability, aspiration, and individual and family entrepreneurial spirit compared to the total community.
Local Institutions (LI)	This LI regards technology transfer and social innovation. LI is the ratio of the complex capture capabilities of formal and informal institutions to the community business environment that applies technology transfer and innovation to develop new products and markets.
Local Traditional Technology (LTT)	LTT is a non-computerized local traditional way or work culture. It is the ecosystem ratio of the governance activities, capital, culture, support services, infrastructure, talent, basic services, and other creativity inherent in individuals and families without using the internet tools in their entrepreneurial business activities.
Entrepreneurial Digitization Technology (EDT)	EDT is the ratio of entrepreneurial business activities based on computer technology and internet networks to the level of readiness; digital infrastructure, digital platforms, digital enable, and digital safeguards.

Source: abstracted by researcher

The second stage used a descriptive and quantitative explanatory design approach. However, quantitative descriptive methods were used with standard multiple correlation regression models appropriate to the main problems and objectives. The operational definition of variables followed the limitations of Giones and Brem (2017).

Table 1 shows the operational definitions of variables. All quantitative variables in Table 1 were measured using the general formulation of the Gini index ratio. The minimum and maximum ratio index values are 0.00 and 1.00, respectively. Therefore, the IGx symbol is the ratio index value of the variables measured.

The entrepreneurial technology variable is a well-established basic concept in the academic world (Giones & Brem, 2017). Giones and Brem (2017) distinguished local and digital technology entrepreneurship from digital entrepreneurship or economy. Digital entrepreneurial technology is the most important element of the transition to a digital economy. It is a crucial factor driving the acceleration of regional development (Prasetyo et al., 2022). In contrast, entrepreneurship digitization means applying digital technology transfer. The role and function of technology transfer in rural entrepreneurship is a conceptualization between digital and local entrepreneurship technology (Giones & Brem, 2017). According to Schumpeter's theory, digital entrepreneurship technology is the transfer of digital technology or digital transformation. It results from the evolution of socioeconomic entrepreneurial innovation (Prasetyo et al., 2022). Furthermore, the purpose of quantitative analysis was explained using multiple linear correlation regression models as a standard form of OLS as follows:

$$REG_x = \alpha_0 + \alpha_1.HC_x + \alpha_2.LI_x + \alpha_3.ELT_x + \varepsilon_1 \quad (1)$$

$$REG_x = \beta_0 + \beta_1.HC_x + \beta_2.LI_x + \beta_3.EDT_x + \varepsilon_2 \quad (2)$$

$$REG_x = \pi_0 + \pi_1.HC_x + \pi_2.LI_x + \pi_3.ELT_x + \pi_3.EDT_x + \varepsilon_3 \quad (3)$$

The model 1 equation shows the contribution of human capital (HC), related local institutions (LI), and local entrepreneurial technology (ELT) to regional economic growth (REG). Equation model 2 describes a new model of digital technology transfer. It shows the contribution of human capital (HC), local institutions (LI), and entrepreneurial digitalization technology (EDT) to regional economic growth (REG). Model 3 is a complete combination model showing the contribution of human capital, local institutions, local entrepreneurial technology, and digitalization technology to regional economic growth. In this study, the technology dimension of local entrepreneurship is the traditional entrepreneurship technology. Regional economic growth was measured as a proxy for the output growth of the sample entrepreneurs.

RESULTS AND DISCUSSION

This study aimed to explain the importance of socioeconomic policies and human capital in supporting economic digitalization amid the Industrial Revolution and mitigate the resulting negative impacts. Human capital quality is fundamental to developing a contemporary and sustainable global society. It is the key feature of the measurement

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dimension of human resources in society's socioeconomic development. Human capital quality helps derive other main factors that trigger positive and negative changes. Furthermore, the important role of digital human capital in the socioeconomic system in the digitization era could reveal other important potentials.

Digitization technology in rural areas changes institutions by encouraging entrepreneurship and regional economic growth. At the beginning of digitalization technology entering the village, institutional changes encouraged new entrepreneurial opportunities and regional economic growth. Digital technology changes develop faster than institutional responses. Therefore, institutional capacity cannot respond to the pressures of these changes in assisting the community's economic transactions and mitigating regional inequalities. This study used limited data to explain institutional strategies in responding to these changes, ensuring their role is less effective in economic transactions. It only obtained limited information when formal institutions felt comfortable and lazy following the fast and dynamic changes. Therefore, the less effective role of formal institutions is replaced by informal institutions. This phenomenon may be similar to a cocoon-based institutional flexibility strategy and the temporary role of cocoon institutions (Wu et al., 2021).

The results in Table 2 show that the role of human capital in models 1, 2, and 3 provides the first positive and most considerable significant value of standardized coefficients. This result means that human capital is the first and most significant contribution to encouraging regional economic growth with traditional or digital technology transfer. Although the role is slightly smaller than institutional factors in model 2, there is no significant difference between the two factors. Furthermore, the role of formal institutions decreases in model 3, the most important model in this study. It means that the role of formal institutions is not effective. Previous studies suggested that informal institutions could substitute the often absent and less effective formal institutions in the economic transactions of low-income communities (Danquah & Sen, 2022). Therefore, the GESI's role in community economic transactions through social and financial culture and other local potentials is the primary social innovation embryo of informal institutions as a substitute for formal institutions.

The increasing role of institutions in model 2 is only temporary. In model 3, the role of institutional factor contribution decreases. The role of human capital contribution is positive, significant, and extensive. The increasing role of these institutional factors was temporary and driven more by the response to political and institutional compliance to government policies given during the COVID-19 pandemic. Previous qualitative studies found a sense of comfort and institutional reluctance to adapt to digital technology's dynamic and fast development (Prasetyo & Setyadharma, 2022). They are more comfortable with things that happened before than following the dynamic digitization revolution that changes quickly. However, analyzing a community's economic evolution is impossible without including organizational, institutional, and social change (Yay & Yay, 2022).

Table 2. Results on the Role of Technology Digitization Transfer on Regional Economic Growth

Model		Unstandardized Coefficients		Standardized Coefficients	t-stat	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.004	.040		.105	.917		
	HC	.476	.077	.461	6.161	.000	.462	2.162
	ELT	.263	.074	.283	3.538	.001	.405	2.468
	LI	.241	.124	.189	1.944	.054	.274	3.652
2	(Constant)	.056	.038		1.486	.140		
	HC	.463	.079	.449	5.859	.000	.461	2.168
	EDT	.144	.054	.167	2.639	.009	.677	1.477
	LI	.651	.109	.511	5.964	.000	.368	2.716
3	(Constant)	.006	.037		.153	.878		
	HC	.461	.073	.447	6.328	.000	.461	2.168
	LI	.346	.119	.271	2.893	.005	.261	3.830
	ELT	.345	.073	.372	4.742	.000	.374	2.674
	EDT	.212	.052	.247	4.069	.000	.625	1.601

Dependent Variable: regional economic growth (REG).

Source: processed by the researcher

In Table 2, the results in model 1 could be considered standard and generally accepted (Prasetyo & Kristanti, 2020; Prasetyo et al., 2021, 2022). This study focused more on models 2 and 3. In model 2, the role of digital technology transfer in rural areas is positive. This result means that digital technology transfer could significantly encourage regional economic growth proxied by the output growth of the sample entrepreneurship actors. However, the role of digitization technology transfer is the smallest compared to human capital, institutions, and traditional technology. The small contributing factor is theoretically reasonable as digital technology enters society.

The quantitative study strengthens the previous finding that digital technology transfer could increase job opportunities in rural areas and encourage regional economic growth. However, it has only increased family productivity without improving total community productivity in its entrepreneurial efforts. This condition implies that the subsequent impact would increase income inequality in the sample rural areas. Although the positive impact of digital technology could still be increased, it cannot reduce the negative impact. Therefore, the results contradict the previous studies that state that the positive impact of digitization could reduce the negative impact (Ferrari et al., 2022). The main results of this research further emphasize the need for collective awareness integrated with institutional systems and community entrepreneurship to encourage economic growth and mitigate inequality.

The decreasing role of formal institutions causes the community's socioeconomic inequality. However, this inequality has created a collective and positive awareness for individuals and community groups to participate in making decisions and forming new informal institutions. This study supports the logical statement that economic inequality

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affects individual decisions in entrepreneurial activities (Xie et al., 2022). Furthermore, the finding is supported by model 3, where the contribution of digital technology factors is the smallest. The role of institutional factors is also weakening compared to the previous contribution in model 2.

The role of social capital is weaker in families that benefit from absorbing digitization technology. The family's increasing productivity and weakening social capital reduce total average productivity and increase income inequality. These phenomena lead to new social innovation embryos supporting the community's lives. The results support previous studies that the weak family social capital causes the loss of another family's entrepreneurial wealth (de Groot et al., 2022). The qualitative inductive analysis found that family social capital was built by adopting digitization technology. It was built on the monetary dimension of managing family businesses, making them socially object to sharing. However, a social finance culture has emerged as a positive driver and a solution to living together in the community's economic transactions.

This study also captured positive indications of social innovation from the role of gender equity and social inclusion (GESI). It is challenging to conduct studies on social finance in the future. GESI plays a positive social-financial role in strengthening the local community's social capital. The indications of social innovation are seen in the behavioral pattern of economic entrepreneurship transactions and are less reflected in conventional entrepreneurship. However, the results cannot explain the actual pattern of GESI behavior in shaping social finance to manage and maintain SSE relationships. This study captured the framework for the positive role of GESI in SSE in the community. It could be the phenomenon of social innovation from the framework considered to explain the effect of entrepreneurial theory on emancipatory practice or emancipated social imagination (Laine & Kibler, 2022). Therefore, the results strengthen the relationship between the flexibility of the external cooperation model and innovation in SMEs, including institutional change (Wu et al., 2021).

This study has increasingly interesting empirical and theoretical implications from the community's socioeconomic theory perspective. First, the emergence of the SSE system has not benefited from digital technology transfer in their business. The community is willing to collaborate to utilize the local potential for mutual prosperity. The quantitative interpretation in model 3 shows that regional economic growth is driven more by local than digitization technology. The SSE system model is emerging because it is based on community awareness to help each other. Therefore, it differs from the capitalist socioeconomic theory driven by large companies and corporations' corporate social responsibility (CSR) role and focuses on the monetary dimension. Although digital technology related to CSR could lead to responsible digitization (Cardinali & Giovanni, 2022), cultural behavior differences cause its role to remain suboptimal. Therefore, the results support Çera et al. (2022) that the demographic role of CSR in Slovakia and the Czech Republic is different and could be explained through cultural disparities.

The second implication is the potential optimization of the community's local wisdom to maintain capital with a social and financial dimension. The results explain the

emergence of SSE without being realized. However, the community feels the same fate to survive the COVID and global climate change impact and its inability to absorb the new digitization technology. The respondents stated that digital technology was important. However, their capabilities could not match the speed of digitization technology. The respondents are not well-versed in digital technology that could be appropriately utilized to optimize their businesses. Most use digital technology only for children's games and do not understand its benefits in managing their business. However, this occurs in rural and urban areas, though this study did not examine the differences between these regions. The results support Ciolek (2022) that science is important for urban areas, but social capital is the primary key for rural areas.

CONCLUSION

Digitization technology transfer encourages regional economic growth in rural areas and increases family entrepreneurship productivity. Transferring digitalization technology to rural areas strengthens human capital, improves local entrepreneurial technology, and creates flexibility for community institutions. However, this technology has not increased the community's total productivity. The positive impact has not reduced the negative impacts caused but has increased inequality.

The role of institutions increased when digitization technology entered the countryside, but the role of human capital remained dominant. Later, formal institutions became less effective and were replaced by informal institutions. This condition was based on the potential of local wisdom and social capital through human capital digitalization as the SSE system model. Furthermore, the SSE system model is driven by integrating the potential local wisdom and social capital. Human capital digitization could mitigate inequality and drive competitiveness and sustainable regional economic growth.

This study captured the potential role of local wisdom, especially the emergence of GESI behavior patterns and social capital financial culture in forming informal institutions. The role is increasingly visible, especially in social entrepreneurship. However, the study used limited representative data to examine this problem, which requires further exploration by future studies. The results could add to the understanding of the implications of institutional policy. Theoretical contributions are also expected to add knowledge and complement the understanding of new institutional theories and entrepreneurship. It is recommended that future research examine integrated collective awareness and collaborate with community institutional systems and social entrepreneurship to mitigate better the inequalities that occur.

ACKNOWLEDGMENTS

I would like to thank the Faculty of Economics and Business, Universitas Negeri Semarang, Indonesia, for all the support and facilities.

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Signifikan: Jurnal Ilmu Ekonomi
Volume 13(2), 2024: 273 - 290
P-ISSN: 2087-2046; E-ISSN: 2476-9223
https://doi.org/10.15408/sjie.v13i2.33636

Profit-Sharing and Economic Growth: The Indonesian Experience

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JEL Classification:
G21
O47

Received: 07 March 2023

Revised: 15 November 2024

Accepted: 01 December 2024

Available online: December 2024

ABSTRACT

Research Originality: The research's originality investigated the causal relationship between profit-sharing schemes (saving and financing) and economic growth.

Research Objectives: This study aimed to examine the effect of profit-sharing schemes in Islamic banking on Indonesia's economic growth, both in the short and long term. Another objective was investigating the causal relationship between profit-sharing schemes and economic growth.

Research Methods: This study used two models: the risk-sharing deposit (RSD) and the profit-and-loss-sharing financing (PLS). It used secondary data from the Financial Services Authority of the Republic of Indonesia, Bank Indonesia (BI), and the Central Bureau of Statistics of the Republic of Indonesia. It also used Nonlinear Autoregressive Distributed Lag (NARDL), Error Correction Model (ECM), and Granger Causality methods to analyze quarterly data for the 2009Q1-2022Q4 period.

Empirical Results: The results showed that profit-sharing schemes did not have a significant effect on Indonesia's economic growth in the short-term and long-term because the probability figure was more than 10%. This study obtained new findings, showing that the relationship between the RSD instrument and economic growth followed the feedback hypothesis.

Implications: The results of this study had implications for Islamic banking efforts to increase efficiency, improve regulations, and reallocate financing.

Keywords:
feedback hypothesis; supply-leading hypothesis; profit-sharing schemes; economic growth; nonlinear autoregressive distributed lag

How to Cite:
Ibrahim, Z., & Fajri, M. (2024). Profit-Sharing and Economic Growth: The Indonesian Experience. *Signifikan: Jurnal Ilmu Ekonomi*, *13*(2), 273-290. https://doi.org/10.15408/sjie.v13i2.33636.

INTRODUCTION

Several recent studies have explored the intricate relationship between financial sector development and economic growth. This relationship is characterized by contrasting viewpoints, with one asserting the positive impact of financial sector development on economic growth and the other presenting an opposing perspective (McKinnon, 2010). In addition, the first viewpoint is encapsulated in Schumpeter's theorem, positing that the financial system plays an essential role in stimulating the development of the economy (supply-leading hypothesis). According to this theorem, intermediary services offered by financial institutions facilitated through financial mobilization and credit channels are essential for financing technological innovation and sustaining economic development (King & Levine, 1993). However, the openness of the banking system can create instability in the financial sector, which tends to impede growth (Shaw, 1973). The second viewpoint adheres to the hypothesis that economic growth supports the development of the financial sector (demand-following hypothesis). In this context, the expansion and diversification of the real sector create a demand for financial institutions to enhance the efficiency of capital recruitment (Robinson, 1979). Apart from these viewpoints, a third hypothesis, the feedback hypothesis, posits that the financial sector and economic growth are mutually dependent (Patrick, 1966). This dynamic relationship suggests that as the economy expands, it is supported by capital accumulation facilitated by the presence of financial institutions. Simultaneously, economic growth generates a demand for financial services, absorbing the surplus income of individuals. A subsequent hypothesis proposed by Lucas (1988) asserts that financial sector development and economic growth are independent (neutrality hypothesis).

Controversies regarding the influence of financial system development on economic growth are evident in the Islamic financial sector, particularly in Islamic banking. Several empirical studies have offered divergent conclusions, with some supporting the supply-leading hypothesis in the context of Islamic banking and economic growth (Abedifar et al., 2016; Boukhatem & Moussa, 2018; Caporale et al., 2020; Caporale & Helmi, 2018; Kassim, 2016; Kismawadi, 2024; Mensi et al., 2020; Shah et al., 2020; Abubakar & Haq, 2020; Tabash & Anagreh, 2017; Zarrouk et al., 2017). Meanwhile, other studies suggested a neutral relationship between the two variables. This study shows that the development of transactions in Islamic banking has no impact on economic growth and vice versa (Afandi & Amin, 2019; Al Fathan & Arundina, 2019). A distinct perspective by Anwaret al. (2020) proposed a bidirectional relationship, while Nofrianto et al. (2021) stated that the development of Islamic banking impeded economic growth.

A typical question that often arises is: Why is it essential to explore themes that have been widely discussed in previous literature? In addition, most existing studies exploring the relationship between the development of Islamic banking and economic growth are based on samples from developed countries. These countries typically have banking systems and financial products that exhibit a relatively higher safety from information asymmetries, lower transaction costs, and more complete regulations (Boukhatem & Moussa, 2018). Based on the findings, it is still unclear whether the conclusions regarding the influence

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of Islamic banking development on economic growth also apply to profit-sharing schemes, which have recently been shown to play an essential role in maintaining the financial system's stability.

The selection of profit-sharing schemes was based on their ability to show the positioning of Islamic banks compared to conventional banks. In contrast to non-profit-sharing schemes, commonly referred to by most Islamic finance experts as just a mirroring of the interest system (Abbas & Arizah, 2019), profit-sharing schemes are unique due to their ability to encourage the growth of the productive sector because they have a return must be shared between *Shahibul Maal* and *Mudharib* (Fianto et al., 2018). Profit-sharing schemes can also maintain balance in the monetary and real sectors because the business's development determines the disbursement of funds (Jedidia & Hamza, 2023). Another unique aspect of these schemes lies in their ability to instill financial discipline in managing resources to be shared (Suzuki & Miah, 2023).

According to previous studies, profit-sharing schemes in Islamic banking are divided into two types, namely those from the liability side in the form of Risk-Sharing Deposits (RSD) and others from the asset side in the form of Profit and Loss-Sharing financing (PLS). The existing literature reflects a paucity of empirical studies examining these two products, with significant exceptions being the reports of Kassim (2016) and Chowdhury et al. (2018). Kassim (2016) focused on RSD products, showing that changes in RSD did not affect Malaysia's economic growth. Meanwhile, Chowdhury et al. (2018) focused on the asset side, concluding that PLS financing positively affected Bangladesh's economic growth.

Table 1. The Growth of Profit-Sharing Schemes and Indonesian GDP (in %)

Year	Growth of RSD	Growth of PLS	Growth of GDP
2009	40,67	24,92	4,63
2010	42,91	36,72	6,22
2011	54,01	25,52	6,49
2012	24,83	35,98	6,26
2013	26,08	34,79	5,56
2014	20,99	19,14	5,01
2015	6,43	18,50	4,88
2016	21,31	24,07	5,03
2017	19,44	26,61	5,07
2018	10,30	22,63	5,17
2019	10,50	17,71	5,02
2020	7,08	9,05	-2,07
2021	17,48	5,83	3,7
2022	11,63	18,41	5,31
Average	**22**	**23**	4,73

Source: (BPS-Statistics Indonesia, 2022; OJK, 2022); data is processed

In contrast to the reports conducted by Kassim (2016) and Chowdhury et al. (2018), the focus of this study extends to Indonesia for three compelling reasons. First, Indonesia has great potential because it has the world's largest Muslim population. It is one of the countries used as a barometer in developing profit-sharing schemes for other countries (Fianto et al., 2018). Second, it is one of the first countries to reform the financial system by integrating Islamic and conventional banking management (Anwar et al., 2020). Third, the average growth of profit-sharing schemes from 2009 to 2022 is more than 22%, while economic growth in the same period is relatively low, standing at only 4.73%, as shown in Table 1. Based on this argument, an in-depth study is needed regarding the influence of profit-sharing schemes on Indonesia's economic growth.

This study aims to determine the effect of profit-sharing schemes on economic growth in the short and long term and show the causal relationship between their development and economic growth in Indonesia. The results are expected to contribute to the design of better profit-sharing policies and practices by the central bank and Islamic banking.

METHODS

This study used quarterly data from 2009Q1 to 2022Q4. Furthermore, it tested secondary data from the Financial Services Authority of the Republic of Indonesia, Bank Indonesia (BI), and the Central Bureau of Statistics of the Republic of Indonesia. The primary variable examined was profit-sharing schemes, consisting of savings and financing. Deposits were given the notation RSD, namely the total deposits under a *mudharabah* agreement. Meanwhile, it was written in the PLS Financing notation on the financing side, which comprised *mudharabah* and *musyarakah* financing. RSD and PLS were expected to positively impact real GDP in this study (Chowdhury et al., 2018; Kassim, 2016).

This report also included other independent macroeconomic factors, including gross fixed capital formation (GFCF), government expenditure (GE), trade openness (TO), and inflation (INF). Tabash and Anagreh (2017) stated that GFCF was expenditure on only capital with more than one year of practical life. In this study, the GFCF variable was a proxy for capital accumulation, which was expected to influence real GDP positively.

GE was a variable for government spending in the public sector, and the relationship between government consumption and economic growth was still being debated from two different points of view. Government spending could increase economic growth when used for infrastructure development. Meanwhile, it could damage economic performance, primarily through private investment. In this report, more lavish government spending was expected to impact real GDP positively (Chowdhury et al., 2018).

TO was the ratio of total exports and imports to GDP. The more open a country was, the higher its productivity level because it could develop technology, take advantage of economies of scale, allocate resources efficiently through comparative advantages, and

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encourage competition in domestic and foreign markets. This variable was expected to contribute positively to real GDP because it opened access for local entrepreneurs to enter the global market (Shah, Rashid, & Hassan, 2020).

The inflation rate reflected changes in the purchasing power of individuals, impacting consumption, savings and investment decisions, and economic growth. High inflation has always been associated with weakening economic activity (Gheeraert & Weill, 2015). Furthermore, countries with controlled inflation rates tended to have better economic growth.

This paper referred to two models that Kassim (2016) and Chowdhury et al. (2018) tested. The first model was to test the contribution of RSD to real GDP, and the second was to assess the contribution of PLS financing. These two models were analyzed using the Nonlinear Autoregressive Distributed Lag (NARDL) method developed by Shin, Yu, & Greenwood-Nimmo (2013). This method helped to test asymmetric relationships between variables in the long term. The asymmetric relationship in this study was that fluctuations (up and down) occurring in the independent variable had a different influence on the dependent variable (Karim et al., 2017). Both models were written in the following equation:

$$LNGDPR = \beta_0 + \beta_1 LNRSD_t^+ + \beta_2 LNRSD_t^- + \beta_3 LNGFCF_t^+ + \beta_4 LNGFCF_t^- + \beta_5 LNGE_t^+ + \beta_6 LNGE_t^- + \beta_7 TO_t^+ + \beta_8 TO_t^- + \beta_9 INF_t^+ + \beta_{10} INF_t^- + e_t \quad (1)$$

$$LNGDPR = \beta_0 + \beta_1 LNPLS_t^+ + \beta_2 LNPLS_t^- + \beta_3 LNGFCF_t^+ + \beta_4 LNGFCF_t^- + \beta_5 LNGE_t^+ + \beta_6 LNGE_t^- + \beta_7 TO_t^+ + \beta_8 TO_t^- + \beta_9 INF_t^+ + \beta_{10} INF_t^- + e_t \quad (2)$$

Where LNGDPR = natural logarithm of real GDP, LNRSD = natural logarithm of RSD, LNPLS = natural logarithm of PLS financing, LNGFCF = natural logarithm of gross fixed capital formation, LNGE = national logarithm of government expenditure, TO = trade openness, INF = monthly inflation, and p = lag length. All variables were converted into natural logarithms except TO and inflation. Positive (+) and negative (-) signs were conditions when the independent variable experienced an increase or decrease.

When applied to the NARDL model, equations (1) and (2) become the following equations (3) and (4):

$$\Delta LNGDPR_t = \beta_0 + \beta_1 LNGDPR_{t-1} + \beta_2 LNRSD_{t-1}^+ + \beta_3 LNRSD_{t-1}^- + \beta_4 LNGFCF_{t-1}^+ + \beta_5 LNGFCF_{t-1}^- + \beta_6 LNGE_{t-1}^+ + \beta_7 LNGE_{t-1}^- + \beta_8 TO_{t-1}^+ + \beta_9 TO_{t-1}^- + \beta_{10} INF_{t-1}^+ + \beta_{11} INF_{t-1}^- + \sum_{k=1}^{n} \alpha_{1i} \Delta LNGDPR_{t-1} + \sum_{k=0}^{n} (\alpha_{2i} \Delta LNRSD_{t-1}^+ + \alpha_{3i} \Delta LNRSD_{t-1}^-) + \sum_{k=0}^{n} (\alpha_{4i} \Delta LNGFCF_{t-1}^+ + \alpha_{5i} \Delta LNGFCF_{t-1}^-) + \sum_{k=0}^{n} (\alpha_{6i} \Delta LNGE_{t-1}^+ + \alpha_{7i} \Delta LNGE_{t-1}^-) + \sum_{k=0}^{n} (\alpha_{8i} \Delta TO_{t-1}^+ + \alpha_{9i} \Delta TO_{t-1}^-) + \sum_{k=0}^{n} (\alpha_{10i} \Delta INF_{t-1}^+ + \alpha_{11i} \Delta INF_{t-1}^-) + \mu_t \quad (3)$$

$$\Delta LNGDPR_t = \beta_0 + \beta_1 LNGDPR_{t-1} + \beta_2 LNPLS_{t-1}^+ + \beta_3 LNPLS_{t-1}^- + \beta_4 LNGFCF_{t-1}^+ + \beta_5 LNGFCF_{t-1}^- + \beta_6 LNGE_{t-1}^+ + \beta_7 LNGE_{t-1}^- + \beta_8 TO_{t-1}^+ + \beta_9 TO_{t-1}^- + \beta_{10} INF_{t-1}^+ + \beta_{11} INF_{t-1}^- + \sum_{k=1}^{n} \alpha_{1i} \Delta LNGDPR_{t-1} + \sum_{k=0}^{n} (\alpha_{2i} \Delta LNPLS_{t-1}^+ + \alpha_{3i} \Delta LNPLS_{t-1}^-) + \sum_{k=0}^{n} (\alpha_{4i} \Delta LNGFCF_{t-1}^+ + \alpha_{5i} \Delta LNGFCF_{t-1}^-) + \sum_{k=0}^{n} (\alpha_{6i} \Delta LNGE_{t-1}^+ + \alpha_{7i} \Delta LNGE_{t-1}^-) + \sum_{k=0}^{n} (\alpha_{8i} \Delta TO_{t-1}^+ + \alpha_{9i} \Delta TO_{t-1}^-) + \sum_{k=0}^{n} (\alpha_{10i} \Delta INF_{t-1}^+ + \alpha_{11i} \Delta INF_{t-1}^-) + \mu_t \quad (4)$$

The next procedure for estimating equations (3) and (4) above was as follows: In the first step, equations (3) and (4) were calculated in the OLS method using the general to specific method to eliminate insignificant lags. The second step investigated cointegration or the long-term relationship between the dependent and independent variables using the

Bounds Testing approach developed by Pesaran, Shin, & Smith (2001). When $\beta_i = 0$, i = 1, 2, 3, ..., 11, then there was no cointegration or long-term relationship between variables, and vice versa. The third step was to test the long-term asymmetric influence of RSD and PLS on GDPR.

The following mechanism was to carry out short-term analysis through the Error Correction Model (ECM) equation as follows:

$$\Delta LNGDPR_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta LNGDPR_{t-i} + \sum_{i=0}^{p} \beta_2 \Delta LNRSD_{t-i} + \sum_{i=0}^{p} \beta_3 \Delta LNGFCF_{t-i} + \sum_{i=0}^{p} \beta_4 \Delta LNGE_{t-i} + \sum_{i=0}^{p} \beta_5 \Delta TO_{t-i} + \sum_{i=0}^{p} \beta_6 \Delta INF_{t-i} + \varphi ECT_{t-1} + \eta_t \quad (5)$$

$$\Delta LNGDPR_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta LNGDPR_{t-i} + \sum_{i=0}^{p} \beta_2 \Delta LNPLS_{t-i} + \sum_{i=0}^{p} \beta_3 \Delta LNGFCF_{t-i} + \sum_{i=0}^{p} \beta_4 \Delta LNGE_{t-i} + \sum_{i=0}^{p} \beta_5 \Delta TO_{t-i} + \sum_{i=0}^{p} \beta_6 \Delta INF_{t-i} + \varphi ECT_{t-1} + \eta_t \quad (6)$$

ECT is the Error Correction Term, a parameter that shows the dependent variable's response speed to changes occurring in the independent variable in the long term. Apart from using ECM, Granger causality analysis was also used to determine the causal relationship between endogenous variables (Engle & Granger, 1987).

RESULTS AND DISCUSSION

Estimating the NARDL model required stationary data at the first level of difference. Therefore, the first step was to perform a stationarity test using the Augmented Dicky-Fuller (ADF) and Phillip-Perron (PP) methods, as presented in Table 2. The results showed that all variables were stationed at the first difference level. This showed that there was no stationary data at the second level of difference, and NARDL model estimation could be carried out.

Table 2. ADF and PP Unit Root Test Results

Variables	ADF Test		PP Test	
	Level	1st Differ	Level	1st Differ
LNGDPR	0.591	0.000***	0.000***	0.000***
LNRSD	0.000***	0.001***	0.000***	0.000***
LNPLS	0.007***	0.000***	0.012**	0.000***
LNGFCF	0.351	0.000***	0.000***	0.000***
LNGE	0.000***	0.000***	0.000***	0.000***
TO	0.024**	0.000***	0.027**	0.000***
INF	0.000***	0.000***	0.000***	0.000***

Note: ***/**/* denote significance at 1%, 5%, and 10% levels respectively.
Source: Eviews' output

The NARDL model estimated in equations (3) and (4) was carried out to determine the two models' short-term and long-term asymmetric effects, with the results being presented in Table 3. Furthermore, both models used a maximum lag of three because the data used was quarterly. The lag estimation results in the LNRSD model showed that the increase and decrease in RSD did not significantly affect Indonesia's economic growth.

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From the perspective of other macroeconomic variables, government spending in the third lag ($^{\Delta}LNGE^{+}_{t-3}$) positively impacted on GDPR. The LNGE coefficient of 0.370 showed that every 1% increase in government spending impacted an increment in real GDP by 0.37%. If used effectively, government spending could contribute positively to economic growth (Kassim, 2016). The Indonesian government's recent focus on spending had been aimed at building valuable infrastructure for smoothing distribution channels, thereby increasing productivity, as reflected in the increase in GDPR. This finding contradicts the conclusion of Chowdhury et al. (2018) and Mensi et al. (2020), stating the negative influence of government consumption on economic growth due to the perceived lack of targeting.

Table 3. NARDL Estimates Results

LNRSD Model			LNPLS Model		
Variables	**Coefficients**	**Std. Errors**	**Variables**	**Coefficients**	**Std. Errors**
C	12.141	17.485	C	0.652	18.522
$LNGDPR_{t-1}$	-0.825	1.225	$LNGDPR_{t-1}$	-0.005	1.257
$LNRSD^{+}$	0.277	1.029	$LNPLS^{+}_{t-1}$	-2.801	5.202
$LNRSD^{-}$	-0.313	1.295	$LNPLS^{-}_{t-1}$	3.141	5.579
$LNGFCF^{+}$	-0.405	0.724	$LNGFCF^{+}_{t-1}$	-0.248	1.487
$LNGFCF^{-}$	0.544	0.709	$LNGFCF^{-}_{t-1}$	0.839	0.543
$LNGE^{+}$	0.098	0.157	$LNGE^{+}_{t-1}$	-0.067	0.297
$LNGE^{-}$	0.074	0.391	$LNGE^{-}_{t-1}$	-0.119	0.333
TO^{+}	0.006	0.009	TO^{+}_{t-1}	-0.002	0.010
TO^{-}	0.000	0.001	TO^{-}_{t-1}	-0.001	0.001
INF^{+}	-0.026	0.032	INF^{+}_{t-1}	-0.052*	0.026
INF^{-}	-0.011	0.012	INF^{-}_{t-1}	-0.022	0.015
$\Delta LNGDPR_{t-1}$	0.320	0.814	$\Delta LNGDPR_{t-1}$	-0.668	0.600
$\Delta LNRSD^{+}_{t-1}$	0.972	1.357	$\Delta LNPLS^{+}_{t-1}$	-7.311	8.517
$\Delta LNRSD^{+}_{t-2}$	-0.578	1.236	$\Delta LNPLS^{+}_{t-2}$	-0.668	5.420
$\Delta LNRSD^{+}_{t-3}$	-0.215	1.332	$\Delta LNPLS^{+}_{t-3}$	1.066	5.104
$\Delta LNRSD^{-}_{t-1}$	-0.892	1.356	$\Delta LNPLS^{-}_{t-1}$	8.372	9.423
$\Delta LNRSD^{-}_{t-2}$	0.801	1.231	$\Delta LNPLS^{-}_{t-2}$	0.840	5.922
$\Delta LNRSD^{-}_{t-3}$	0.232	1.357	$\Delta LNPLS^{-}_{t-3}$	-0.939	5.693
$\Delta LNGFCF^{+}_{t-1}$	-0.224	0.510	$\Delta LNGFCF^{+}_{t-1}$	0.303	0.477
$\Delta LNGFCF^{+}_{t-2}$	-0.019	0.230	$\Delta LNGFCF^{+}_{t-2}$	-0.138	0.278
$\Delta LNGFCF^{+}_{t-3}$	-0.042	0.168	$\Delta LNGFCF^{+}_{t-3}$	-0.221	0.158
$\Delta LNGFCF^{-}_{t-1}$	-0.184	0.598	$\Delta LNGFCF^{-}_{t-1}$	-0.699	0.594
$\Delta LNGFCF^{-}_{t-2}$	-0.191	0.352	$\Delta LNGFCF^{-}_{t-2}$	-0.506	0.462
$\Delta LNGFCF^{-}_{t-3}$	-0.210	0.344	$\Delta LNGFCF^{-}_{t-3}$	-0.755**	0.265

LNRSD Model			LNPLS Model		
Variables	**Coefficients**	**Std. Errors**	**Variables**	**Coefficients**	**Std. Errors**
$\Delta LNGE^{+}_{t-1}$	0.163	0.299	$\Delta LNGE^{+}_{t-1}$	0.563	0.327
$\Delta LNGE^{+}_{t-2}$	0.271	0.187	$\Delta LNGE^{+}_{t-2}$	0.149	0.225
$\Delta LNGE^{+}_{t-3}$	0.370*	0.190	$\Delta LNGE^{+}_{t-3}$	0.311	0.224
$\Delta LNGE^{-}_{t-1}$	-0.180	0.325	$\Delta LNGE^{-}_{t-1}$	-0.237	0.255
$\Delta LNGE^{-}_{t-2}$	-0.108	0.194	$\Delta LNGE^{-}_{t-2}$	-0.090	0.187
$\Delta LNGE^{-}_{t-3}$	0.154	0.148	$\Delta LNGE^{-}_{t-3}$	-0.160	0.131
ΔTO^{+}_{t-1}	0.005	0.010	ΔTO^{+}_{t-1}	0.005	0.007
ΔTO^{+}_{t-2}	0.005	0.008	ΔTO^{+}_{t-2}	0.004	0.005
ΔTO^{+}_{t-3}	0.006	0.010	ΔTO^{+}_{t-3}	0.002	0.006
ΔTO^{-}_{t-1}	0.000	0.001	ΔTO^{-}_{t-1}	0.001	0.000
ΔTO^{-}_{t-2}	0.000	0.000	ΔTO^{-}_{t-2}	0.001	0.000
ΔTO^{-}_{t-3}	0.000	0.001	ΔTO^{-}_{t-3}	0.000	0.000
ΔINF^{+}_{t-1}	0.025	0.027	ΔINF^{+}_{t-1}	0.051*	0.024
ΔINF^{+}_{t-2}	0.019	0.022	ΔINF^{+}_{t-2}	0.042*	0.020
ΔINF^{+}_{t-3}	0.011	0.012	ΔINF^{+}_{t-3}	0.019	0.012
ΔINF^{-}_{t-1}	0.010	0.010	ΔINF^{-}_{t-1}	0.020**	0.009
ΔINF^{-}_{t-2}	0.007	0.007	ΔINF^{-}_{t-2}	0.014	0.009
ΔINF^{-}_{t-3}	0.003	0.004	ΔINF^{-}_{t-3}	0.004	0.005
R-squared	0.960			0.972	
CUSUM	Stabil			Stabil	
ARCH test	1.534**			1.398**	
Cointeg. test	1.659***			3.130**	

Note: ***/**/* denote significance at 1%, 5%, and 10% levels respectively.
Source: Eviews' output

The estimation results in the LNPLS model also showed that PLS financing had no significant effect on Indonesia's economic growth. This result was inconsistent with the conclusions of Chowdhury et al. (2018), stating that PLS-based financing instruments had a positive and significant effect on economic growth. The perceived benefits of PLS financing were in the form of creating efficient resource allocation. Meanwhile, Nofrianto et al. (2021) explained that the proportion of dominant *murabahah* financing was why the effect of PLS financing still needed to be felt in the economy. Murabaha financing, which was consumer, did not provide a significant multiplier effect on the economy. Hassan & Aliyu (2018) also emphasized that *murabahah* financing did not have better economic benefits than the interest system and tended to create inflation through demand attraction due to increasing aggregate consumption. Meanwhile, PLS financing was more directed towards the productive sector, providing a more significant multiplier effect through investment in new projects.

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Macroeconomic variables that were proven to influence economic growth (LNGDPR) were the inflation rate (INF^{+}_{t-1}) and gross fixed capital formation ($\Delta LNGFCF^{-}_{t-3}$). The positive inflation coefficient figure at lag one (INF^{+}_{t-1}) was -0.052, showing that a 1% increase in inflation in the previous period reduced Indonesia's real GDP by 0.052%. The influence of inflation on economic growth was in line with the results of Kassim's study (2016), where it negatively influenced the real sector, as represented by the industrial production index (IPI). The positive impact of inflation showed that an increase in commodity prices by a certain percentage served as a stimulus for producers to increase output, further contributing to economic growth (Mensi et al., 2020).

The negative investment variable in the third leg ($\Delta LNGFCF^{-}_{t-3}$) was showed by a coefficient of -0.755. This showed that a 1% decrease in investment caused a contraction in real GDP by 0.76%. Furthermore, the results were consistent with the conclusions of Kassim (2016) and Tabash & Anagreh (2017), who stated that investment was essential in driving the real sector. Nofrianto et al. (2021) added that for investment to have a more significant impact on the economy, it must be supported by efficient bureaucratic services and legal certainty.

Table 4. Asymmetric Test Results

	LNRSD Model		LNPLS Model	
Variables	**Coefficients**	**Std. Errors**	**Coefficients**	**Std. Errors**
LNRSD	0.534	0.689	-	-
LNPLS	-	-	1269.78	341156.49
LNGFCF	0.331	0.430	232.16	62216.57
LNGE	0.066	0.041	-11.16	2991.25
TO	0.002	0.002	-0.27	72.95
INF	-0.004	0.003	-6.41	1720.96

Source: Eviews' output

At the end of the table, there was information on the coefficient of determination (R^2) and several model tests, namely CUSUM (Cumulative Sum), to determine the level of model stability, Autocorrelation Condition Heteroskedasticity (ARCH) to test for heteroscedasticity, and cointegration test using the bound testing approach. The results for LNRSD and LNPLS models show that all CUSUM statistical plots are within critical limits with a significance level of 1% and 5%, respectively. Therefore, all coefficients in the regression are stable, so the results are suitable for policy recommendations.

Next, the authors conducted an asymmetric test to find long-term asymmetric effects in the LNRSD and LNPLS models. Based on the results of the asymmetric test in Table 4, the five variables in both models did not have an asymmetric effect on Indonesia's real GDP. To study more deeply, the authors present the long-term asymmetric coefficient to determine how significant the five variables' asymmetric impact is on GDPR. As presented in Table 5, it can be seen that asymmetric effects in the

long term did not occur in the LNPLS model. In contrast, in the LNRSD model, an asymmetric influence was found on the government expenditure (LNGE) and trade openness variables (TO). When government expenditure increases by 1% ($LNGE^+$), it will encourage Indonesia's economic growth by 0.099%. Meanwhile, trade openness has an asymmetric influence on economic growth; where trade openness falls by 1% (TO^-), it causes GDPR to also drop by 0.0005%.

Table 5. Long-Run Asymmetric Coefficient

	LNRSD Model		LNPLS Model	
Variables	**Coefficients**	**Probabilities**	**Coefficients**	**Probabilities**
$LNRSD^+$	0.261	0.429	-	-
$LNRSD^-$	-0.273	0.488	-	-
$LNPLS^+$	-	-	-598.566	0,997
$LNPLS^-$	-	-	671.213	0,997
$LNGFCF^+$	0.034	0.901	-52.956	0,997
$LNGFCF^-$	-0.297	0.225	179.202	0,997
$LNGE^+$	0.099*	0.061	-14.296	0,997
$LNGE^-$	0.033	0.416	-25.459	0,997
TO^+	0.003	0.203	-0.410	0,997
TO^-	0.0005**	0.034	-0.142	0,997
INF^+	-0.006	0.223	-11.152	0,997
INF^-	-0.001	0.377	4.745	0,997

Note: ***/**/* denote significance at 1%, 5%, and 10% levels respectively.
Source: Eviews' output

Short-term analyses using the ECM are presented in Table 6. The LNRSD and LNPLS models found no short-term influence of profit-sharing schemes and other macroeconomic variables on economic growth (LNGDPR). The analysis resulting from the LNRSD model complemented the findings obtained by Kassim's study (2016), stating that the growth of Islamic deposits did not affect the development of the real sector in the short term. The zero influence of RSD on real GDP was supported by data on the ratio of RSD to total national banking third-party funds, which was recorded as still minimal, reaching 6.04% during the 2009-2022 period (OJK, 2022). In the same period, the RSD component was still dominated by the short-term one-month portfolio of more than 50% (OJK, 2022). In addition, the behavior of significant depositors tended to evade risk-sharing and readily migrate when there is an increase in deposit interest rates (Caporale et al., 2020).

The results obtained for PLS financing were inconsistent with the conclusions of Chowdhury et al. (2018), stating that the PLS instrument positively affected economic growth. The study's results were also consistent with the findings of Afandi and Amin (2019), showing that working capital financing did not affect Indonesia's economic growth.

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These findings were consistent with the conclusions of Nofrianto et al. (2021), where Islamic financing, government spending, and the amount of investment had no effect in the short term because all 3 required a long time to have an impact.

Table 6. ECM Estimates of Short-Run Relationship

Regressors	LNRSD Model		LNPLS Model	
	Coefficients	t-statistics	Coefficients	t-statistics
C	-0.013	-0.355	0.091	1.550
ΔLNGDPR(-1)	0.751	0.776	-0.568	-0.525
ΔLNRSD(-1)	0.788	1.233	-	-
ΔLNPLS(-1)	-	-	-0.767	-0.900
ΔLNGFCF(-1)	-0.434	-0.670	-0.033	-0.055
ΔLNGE(-1)	0.026	0.317	0.015	0.170
ΔTO(-1)	0.003	0.695	0.002	0.514
ΔINF(-1)	-0.029	-1.606	-0.011	-0.563
ECT(-1)	-0.169	-0.306	0.710	0.997
Diagnostic Test Statistics				
R-squared	0.102		0.089	
Adjusted R-Squared	-0.036		-0.052	
F-statistic	0.737		0.628	
SE-regression	0.154		0.155	
Residual sum of Squared	1.074		1.091	
DW-Statistic	1.991		1.974	

Source: Eviews' output.

From the Granger Causality output in Table 7, this study focused on finding a causal relationship between profit-sharing schemes and economic growth (LNGDPR). Meanwhile, from the liability side, a two-way causal relationship was found between LNGDPR and LNRSD and vice versa. These results indicated the validity of the feedback hypothesis regarding the relationship between the development of RSD and economic growth. However, this causal relationship was still relatively weak because it was at the 10% significance level. The findings obtained strengthened the conclusions of Anwar et al. (2020), who stated that there was a two-way relationship between Islamic deposits and Indonesia's economic growth. Islamic banking, which also functioned as an intermediary institution, connected surplus and deficit funds, as evidenced by the growth in RSD, reaching 22% during 2009-2022. This condition was channeled through PLS financing, which grew by 23% in the same period (OJK, 2022). The increased PLS financing created new businesses that opened up jobs, encouraged productivity, and accumulated in facilitating development (Ibrahim et al., 2022). In reverse, high economic growth could stimulate increasing Islamic banking transactions. The hypothesis followed

Indonesian conditions where the initial establishment of Islamic banks was inseparable from economic growth of 7 to 8%. Rapid development accompanied by the advancement of urban Muslims had created euphoria over the need for financial transaction services in line with Islamic principles. At present, Indonesia has great potential to become the world's Islamic financial center because it has the largest Muslim population in the world, with more than 70% being of the productive age. This demographic capital was significant for the progress of Islamic banking in the form of the availability of labor and public savings.

Table 7. Granger Causality Results

Null Hypothesis	Obs	F-statistic	Probability
TO does not Granger Cause LNRSD	54	4.7980	0.0125**
LNGE does not Granger Cause TO	54	3.2545	0.0470**
TO does not Granger Cause LNGE	54	5.6385	0.0062***
LNGFCF does not Granger Cause TO	54	2. 8991	0.0645*
TO does not Granger Cause LNPLS	54	3.3895	0.0418**
LNGDPR does not Granger Cause LNRSD	54	2.6934	0.0776*
LNRSD does not Granger Cause LNGDPR	54	2.4693	0.0951*
LNRSD does not Granger Cause LNGE	54	3.7169	0.0314**
LNPLS does not Granger Cause LNRSD	54	3.5116	0.0375**
LNRSD does not Granger Cause LNPLS	54	3.3528	0.0431**
LNPLS does not Granger Cause INF	54	6.0737	0.0044***
LNPLS does not Granger Cause LNGDPR	54	2.9714	0.0605*
LNPLS does not Granger Cause LNGE	54	3.4172	0.0408**
LNGE does not Granger Cause LNPLS	54	4.6261	0.0144**

Note: ***/**/* denote significance at 1%, 5%, and 10% levels respectively.
Source: Eviews' output.

From the asset side, the causal relationship between the PLS instrument and real GDP followed the supply-leading hypothesis theorem. However, the relationship was still relatively weak because it was at the 10% significance level. These results complemented the conclusions of previous studies, stating that there was a supply-leading hypothesis between Islamic financing and economic growth (Boukhatem & Moussa, 2018; Caporale & Helmi, 2018; Tabash & Anagreh, 2017). Tabash and Anagreh (2017) explained that Islamic financing was a stimulant for the entry of foreign direct investment (FDI), positioning as the engine driving economic growth in the United Arab Emirates (UAE). Meanwhile, Boukhatem and Moussa (2018) stated that a more robust institutional infrastructure was needed for the contribution of Islamic financing to be more significant.

Pappas et al. (2017) explained that the role of PLS financing in the economy was reflected in 4 aspects. First, PLS financing encouraged efficiency, where customers could manage their business efficiently to produce maximum profits, which was later shared

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with the bank. Second, it maintained the financial system's stability, where efficient PLS transactions created stable prices, full employment conditions, and a more stable macroeconomy. Third, reduced risk faced by banks. Islamic banking could not issue securities for PLS financing, so Islamic bank balance sheets were relatively safe from price fluctuations in the secondary market. Fourth, reduced risk for entrepreneurs. In PLS financing, if the losses incurred were not like default, the bank shared the losses from the business the customer operated.

There were at least four reasons why the contribution of profit-sharing schemes still did not significantly impact Indonesia's economic growth. First, the development of Islamic banking in Indonesia was still relatively slow compared to other countries. Although over 3 decades old, Indonesian Islamic banking assets only controlled 2% of global assets, far behind Malaysia, which reached 11.1%. Islamic banking market penetration was also significantly lower compared to conventional banks, leading to a lack of influence at a macro level (Al Fathan & Arundina, 2019). According to the data, Indonesia's Islamic banking market share had only reached 7%, and the average ratio of PLS financing to total credit was 2.48% (OJK, 2022). In addition, low assets were weak due to their potential to fail when internal or external shocks occurred. Banks with small assets also find it difficult to enjoy economies of scale and have limitations in creating product differentiation and technology development (Azad et al., 2020).

Second, institutional instruments still needed to be completed. Boukhatem and Moussa's (2018) study stated that although the growth of Islamic finance positively impacted the economy when the infrastructure was still weak, it reduced this positive impact. A study from Al-Jarhi (2017) also explained that one of the obstacles to developing profit-sharing schemes was the need for more availability of long-term equity instruments in the Islamic capital market. According to Al Fathan & Arundina (2019), the condition of the Islamic stock market in Indonesia had not developed well because there were not many companies offering attractive Islamic financial products. Consequently, transactions on the Islamic stock market have not contributed significantly to Indonesia's economic growth. This result showed that government intervention was needed to provide these instruments. Malaysia's experience had empirical evidence that the government was actively developing a dynamic and efficient stock market to create incentives and innovation in developing profit-sharing instruments.

Third, the lack of regulations encouraged the development of profit-sharing schemes. Afandi and Amin (2019) stated that regulations governing Islamic financing were essential in encouraging a country's economic growth, and several regulations in other countries could be used as references. Iran's central bank applied an upper and lower limit policy on PLS financing returns, which depended on the loan term, the amount of risk, and the type of contract between the bank and the client. Bank of Sudan established a minimum share capital policy of 20%, which *musyarakah* financing customers must meet. In addition, a unique account for each financing channel to accommodate transactions carried out by customers was created as a means of monitoring. Regulations were also formulated to limit *murabahah* transactions, for

example, reducing *murabahah* scheme to only 30% of total financing and decreasing *murabahah* margin to a maximum of 10% or adjusting to the inflation rate. In addition, to reduce moral hazard, banks recruited individuals with an entrepreneurial background to better understand profit-sharing schemes' characteristics.

Lastly, product development was still a duplication of conventional banks. In theory, RSD customers were shareholders of Islamic banks and shared the risks (Warninda et al., 2019). However, RSD customers were still treated like conventional bank depositors because these individuals had to accept the decisions made by the bank management regarding profits on customer deposits. In line with previous reports, other duplications included financing policies. Most Islamic banking financing has been channeled to the sizeable industrial segment, amounting to 82.27% of the total loans. The remaining 17.73% was provided to the micro, small, and medium enterprises (MSMEs) segment (OJK, 2022), despite the MSMEs sector contributing 61% to Indonesia's GDP. Therefore, so that profit-sharing instruments impacted economic growth, Yungucu & Saiti (2016) proposed that Islamic banks transformed into full-fledged investment institutions by implementing *mudharabah* and *musyarakah* schemes.

CONCLUSION

In conclusion, this study aimed to examine the effect of profit-sharing schemes in Islamic banking on Indonesia's economic growth, both in the short and long term. Another objective was investigating the causal relationship between profit-sharing schemes and economic growth (GDPR). By using the NARDL approach and ECM, profit-sharing schemes, both RSD and PLS financing, did not affect Indonesia's economic growth both in the short-term and long-term. However, the Granger Causality test showed a causal relationship between RSD and GDPR (feedback hypothesis), and the relationship between PLS and GDPR followed the supply-leading hypothesis.

Possible policy implications to ensure that profit-sharing schemes could significantly impact Indonesia's economic growth were looking for cheap sources of funds, for example, by placing state and regional spending into Islamic banking, thereby securing affordable funds. The resultant availability of cost-effective funds enhanced the competitiveness of Islamic banks, solidifying their role as pivotal contributors to economic development. In addition, efficiency could be fostered through an augmented focus on digital service collaboration, including partnerships with e-commerce entities. A shared service mechanism could provide cost-effective, flexible, and high-quality services. Efficiency considerations did not solely drive the entry of Islamic banks into the digital ecosystem but broadened public access comprehensively, thereby augmenting economic benefits. Based on the results, a more far-reaching policy comprised of regulatory improvements. Central banking authorities must be prompted to establish upper and lower limits on PLS financing returns. Setting the minimum share capital for *musyarakah* financing and imposing regulations on the proportion of *murabahah* financing, including margin restrictions, was crucial.

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Urgent enhancements to these regulations were imperative to prevent the dominance of non-profit-sharing schemes. Therefore, it is urgent to ensure these regulations do not dominate so that profit-sharing schemes will increase and become a source of funds for the productive sector and ultimately positively impact the Indonesian economy.

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https://doi.org/10.15408/sjie.v13i2.33636

Signifikan: Jurnal Ilmu Ekonomi
Volume 13(2), 2024: 291 - 302
P-ISSN: 2087-2046; E-ISSN: 2476-9223
https://doi.org/10.15408/sjie.v13i2.39092

Regional Convergence and Spatial Shift-Share Analysis of Labor Productivity in Indonesia

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JEL Classification:
C21
E24
R11

Received: 29 May 2024

Revised: 10 December 2024

Accepted: 21 December 2024

Available online: December 2024

ABSTRACT

Research Originality: This study offers a new method to analyze district labor productivity in Indonesia.

Research Objectives: This study examines the convergence of district labor productivity in Indonesia and the role of structural change in this district labor productivity growth.

Research Methods: This study uses spatial convergence and spatial shift-share analysis. This study collected data from BPS-Statistics Indonesia at the district level between 2010 and 2022.

Empirical Results: Labor productivity in Indonesia exhibits convergence. Neighbor districts' characteristics, such as initial labor productivity and unobserved variables, affect this convergence. The intrasectoral component has the most significant effect on labor productivity growth. The intersectoral component, caused by structural change, has almost no effect.

Implications: The Indonesian government can improve intrasectoral productivity growth to accelerate labor productivity development.

Keywords:

labor productivity; spatial β convergence; spatial shift-share analysis; intrasectoral component; structural change

How to Cite:

Wahyuni, R. N. T. (2024). Regional Convergence and Spatial Shift-Share Analysis of Labor Productivity in Indonesia. *Signifikan: Jurnal Ilmu Ekonomi*, *13*(2), 291-302. https://doi.org/10.15408/sjie.v13i2.39092.

INTRODUCTION

The latest trend in Indonesia's economic growth indicates diminished optimism. Prior to the COVID-19 epidemic, labor productivity had been diminishing since 2010. The analysis of output per worker uncovers an increasingly concerning tendency. The contribution of human capital to economic growth has consistently diminished during the last twenty years (Ikhsan et al., 2021).

At the same time, Indonesia has entered a new period called a demographic dividend. A demographic bonus occurs when the population of individuals aged 15 to 64 exceeds that of the non-productive population. BPS-Statistics Indonesia (2023) indicates that 69.05 percent of Indonesia's total population in 2024 comprises individuals of productive age. A demographic dividend can be advantageous when the youth have access to quality education and resources that improve their self-worth. Human resource enhancement that does not align with demographic advantages will substantially decline labor productivity growth.

Labor productivity is a key performance indicator at all levels of the economy, from the shop floor through business enterprises to the national economy, because higher labor productivity can stimulate job creation, decrease cost (Abdel-Hamid & Abdelhaleem, 2020), and increase economic growth (Auzina-Emsina, 2014; Bakas et al., 2020). Bendesa et al. (2016) argued that regional inequality is a prevalent characteristic of the Indonesian economy. Compared to the Association of Southeast Asian Nations (ASEAN) countries, Indonesia's labor productivity is also inferior to that of Singapore, Malaysia, and Thailand. To reduce disparities across regions and countries, Indonesia must increase labor productivity.

Given the importance of labor productivity, regional policies prioritize increasing its growth. Structural change can achieve this aim. When poorer regions with relatively more labor in low-productivity sectors, such as agriculture, experience faster productivity growth due to labor reallocation, structural change can have a convergent effect on labor productivity (O'Leary & Webber, 2015).

Structural change's impact on aggregate labor productivity growth is typically measured by classical shift-share analysis. The classical shift-share analysis is popular among planners, geographers, and regional scientists due to its simplicity and affordability, as it is neither data-intensive nor mathematically complex. Nevertheless, classical shift-share analysis focuses on the interdependence of regions concerning national changes, disregarding the interrelationships among these regions. Regional spatial independence is an unrealistic supposition. Regions are interconnected (Mussini, 2019; Montania et al., 2021). Therefore, the shift-share model should include spatial interaction.

There are two ways to examine spatial dependence in a shift-share model. First, the researcher uses spatial shift-share decomposition. Nazara and Hewings incorporate spatial structure within the shift-share analysis to consider interregional interaction in the decomposition analysis (Mussini, 2019). Second, the researcher uses stochastic shift-share analysis and includes spatial dependence in this model. Melchor-Ferrer (2020), for

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instance, uses spatial econometrics to estimate each sector's spatial spillovers, determine each sectoral component's contribution to productivity growth, and identify any potential spatial feedback in this process.

This study aims to show whether structural change affects labor productivity growth in Indonesia. Using the same spatial-shift share analysis method as Melchor-Ferrer (2020), this study identifies the primary sectoral component that drives labor productivity growth and measures the direct, indirect, and total impact of this sectoral component on productivity. Based on these results, policymakers can design regional policies to meet the demographic bonus and improve labor productivity. Furthermore, this study also evaluates the convergence of regional labor productivity, recognizing that a decrease in regional inequality usually follows an increase in labor productivity.

The important question is how to quantify the degree of regional interaction. This study can consider two broad classes as spatial weight matrices: geographical variables and economic variables. Some examples of geographical variables are the inverse of the squared distance between regions, the negative exponential function of the distance between territorial units, physical contiguity (Mussini, 2019), k-nearest neighbors (Melchor-Ferrer, 2020), and threshold (arc) distance (Melchor-Ferrer, 2020). Economic variables are the basis for the interrelationship of economic outcomes or potentials, such as migration patterns or trade flows. Previous studies deem two regions closer when they share more excellent economic interactions. Those interactions are shown by income per capita, employment level, commercial relations, or Gross Domestic Product (GDP). This study employs the migration pattern as a spatial weight matrix, as it is suitable for application in Indonesia, an archipelago nation. To the author's knowledge, no previous studies in Indonesia have used this method on similar topics.

METHODS

The concept of convergence refers to the decline in dispersion (disparity) of a development indicator, such as labor productivity distribution, across regions as economic entities. In growth analyses of labor productivity, convergence has a slightly different meaning: it refers to relatively lower growth of a labor productivity, with relatively higher labor productivity. Convergency measurements can use β convergence. The approximation for non-spatial β convergence is:

$$\frac{1}{T} ln\left(\frac{LP_{i,t}}{LP_{i,t-T}}\right) = \alpha + \beta\ ln\ LP_{i,t-T} + u_{i,t} \quad (1)$$

where α is intercept term, β is the coefficient of $ln\ LP_{i,t-T}$ with $-1 < \beta < 0$, $LP_{i,t-T}$ is the labor productivity at district i for the year t-T, T is a year time interval, and $u_{i,t}$ is a disturbance term. The condition $\beta < 0$ implies β convergence because the annual growth rate $\frac{1}{T} ln\left(\frac{LP_{i,t}}{LP_{i,t-T}}\right)$ is the inversely related to the $ln\ LP_{i,t-T}$. A higher coefficient β corresponds to a greater tendency for convergence.

Structural change can affect regional productivity differences and promote growth through labor movement across sectors of an economy (Konte et al., 2022). In the

convergence discourse, structural change may yield a convergent impact when poor regions, characterized by a higher proportion of labor in low-productivity sectors like agriculture, demonstrate accelerated productivity increase through labor reallocation. Structural change may result in regional divergence if rich regions expand more rapidly due to the reallocation of labor from lower- to higher-productivity sectors. O'Leary and Webber (2015) identify that structural changes within a sector exert a converging effect. The shift-share method is employed to elucidate regional production discrepancies. O'Leary & Webber (2015) break down the aggregate productivity growth for region i in year t into three components, as outlined in the following expression:

$$\begin{aligned} growth\ LP_{i,t} &= \frac{LP_{i,t} - LP_{i,b}}{LP_{i,b}} \\ &= \left(\frac{\sum_{j=1}^{n} LP_{i,j,t} S_{i,j,b}}{\sum_{j=1}^{n} LP_{i,j,b} S_{i,j,b}} - 1\right) + \left(\frac{\sum_{j=1}^{n} LP_{i,j,b} S_{i,j,t}}{\sum_{j=1}^{n} LP_{i,j,b} S_{i,j,b}} - 1\right) \\ &\quad + \left(\frac{\sum_{j=1}^{n} \left(LP_{i,j,t} - LP_{i,j,b}\right)\left(S_{i,j,t} - S_{i,j,b}\right)}{\sum_{j=1}^{n} LP_{i,j,b} S_{i,j,b}}\right) \\ &= intra_{i,t} + inter_{i,t} + residual_{i,t} \\ &= intra_{i,t} + combined_{i,t} \end{aligned} \quad (2)$$

where b is the base year; n is the set of sectors; and S_j is the share of sector j in total employment.

The interpretations of the different components in Equation 2 are as follows: The first (intrasectoral component $intra_{i,t}$) is the contribution made to annual aggregate growth by productivity growth within individual sectors (weighted by the share of each one in total employment); the second (intersectoral component $inter_{i,t}$) is the contribution made by changes in the allocation of labor between sectors; this is positive/negative if sectors with high levels of productivity attract more/fewer labor resources and hence increase/decrease their share of total employment; and the third (residual component $residual_{i,t}$) measures the interaction between changes in productivity in individual sectors and changes in the allocation of resources. The fourth component (combined component $combined_{i,t}$) is the difference between productivity growth and the intrasectoral component (Melchor-Ferrer, 2020). The intersectoral component illustrates the impact of structural changes on labor productivity growth. O'Leary & Webber (2015) propose different models for a static shift-share approach that can be expressed as:

$$\begin{aligned} growth\ LP_{i,t} &= \mu_1 + \gamma_1 intra_{i,t} + \upsilon_{1i,t} \\ growth\ LP_{i,t} &= \mu_2 + \gamma_2 inter_{i,t} + \upsilon_{2i,t} \\ growth\ LP_{i,t} &= \mu_3 + \gamma_3 residual_{i,t} + \upsilon_{3i,t} \\ growth\ LP_{i,t} &= \mu_4 + \gamma_4 combined_{i,t} + \upsilon_{4i,t} \end{aligned} \quad (3)$$

where $growth\ LP_{i,t}$ is the annual growth rate of labor productivity for each region.

As explained in the introduction, the aim of the study is twofold. The first objective is to analyze the possibility of labor productivity convergence in Indonesia. The second objective is to examine whether structural change affects labor productivity growth in

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Indonesia. Analysis of the possibility of labor productivity convergence uses spatial β convergence because the economic performance of neighboring regions often has a significant impact, affecting convergence by reducing inequality in certain locations. The equation of spatial β convergence can use the spatial econometric model:

$$\frac{1}{T} ln\left(\frac{LP_{i,t}}{LP_{i,t-T}}\right) = \alpha + \beta\ ln\ LP_{i,t-T} + \delta W \frac{1}{T} ln\left(\frac{LP_{s,t}}{LP_{s,,t-T}}\right) + \theta W ln\ LP_{s,t-T} + u_{i,t} \qquad (4)$$

where $u_{i,t} = \lambda W v_{s,t} + \varepsilon_{i,t}$, $i \neq s$, and W is the spatial weight matrix.

For several reasons, it appears that annual time intervals are insufficient for examining growth convergence. Such shorter durations may indicate substantial short-term disruptions. Consequently, this study selects four-year intervals. For the period 2010-2022, each district has four data points: 2010, 2014, 2018, and 2022. For t = 2014, t - T equals 2010, and the labor productivity growth indicators represent averages from 2010 to 2014 or $\frac{1}{4} ln\left(\frac{LP_{i,2014}}{LP_{i,2010}}\right)$.

The initial step in identifying the most suitable spatial econometric model for the investigation is a general nested spatial model (GNS). The model in Equation 4 can be simplified and expressed in multiple forms based on the estimated values of the parameters δ, θ, and λ. Spatial Error Model (SEM), Spatial Durbin Model (SDM), Spatial Autoregressive Model (SAR), Spatial Lag of X Model (SLX), Spatial Durbin Error Model (SDEM), and Spatial Autoregressive Combined Model (SAC/SARAR). These models incorporate single or combined spatial lags in the dependent variable (SAR, SAC/SARAR, and SDM), the explanatory variables (SDM, SLX, and SDEM), and the error term (SEM, SARAR, and SDEM). SAR, SDM, SDEM, and SAC/SARAR encompass both the direct influence of neighboring predicted outcomes on one's own results and the indirect (spillover) effects on adjacent regions.

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This study offers a more comprehensive econometric analysis of the impact of each component on overall labor productivity growth, as utilized by O'Leary & Webber (2015), through the application of a spatial econometric model. This study use this approach to ascertain the influence of neighboring regions on labor productivity at the district level in Indonesia. By altering Equation 3, the formulas for labor productivity growth are:

$$growth\ LP_{i.t} = \mu_1 + \gamma_1 intra_{i.t} + \varphi_1 W intra_{s.t} + \omega_1 W growth\ LP_{s.t} + \upsilon_{1i.t}$$
$$growth\ LP_{i,t} = \mu_2 + \gamma_2 inter_{i,t} + \varphi_2 W inter_{s,t} + \omega_2 W growth\ LP_{s,t} + \upsilon_{2i,t}$$
$$growth\ LP_{i,t} = \mu_3 + \gamma_3 residual_{i,t} + \varphi_3 W residual_{s,t} + \omega_3 W growth\ LP_{s,t} + \upsilon_{3i,t}$$
$$growth\ LP_{i,t} = \mu_4 + \gamma_4 combined_{i,t} + \varphi_4 W combined_{s,t} + \omega_4 W growth\ LP_{s,t} + \upsilon_{4i,t} \quad (5)$$

Where $\upsilon_{.i,t} = \lambda W \upsilon_{.i,t} + \epsilon_{.i,t}$, $i \neq s$, and W is the spatial weight matrix. This analysis employs panel data from 2010 to 2022, excluding 2016 due to the unavailability of sectoral employment figures at the district level for that year. Labor productivity is defined as gross regional domestic product (GRDP) at constant prices per worker (billion rupiah per worker) or GRDP at constant prices per working hour (million rupiah per working hour). The intrasectoral effect (γ_1) is typically positive, while the contributions of structural change (γ_2, γ_3, γ_4) are approximately zero (O'Leary & Webber, 2015).

The analytical data sources comprise the Inter-censal Population Survey (Supas), the National Labor Force Survey (Sakernas), and GRDP data from BPS-Statistics Indonesia. The purpose of Supas is to assess population size and demographic indicators, encompassing characteristics of the subject population, including births, deaths, migrations, employment, housing, state of residency, and urbanization. Sakernas, a semi-annual household survey, seeks to assess Indonesia's labor force and record structural changes over time. The sample size of Supas exceeds that of Sakernas. This research employs 2015 Supas data to quantify the components of the spatial weight matrix (W) at the district level. Each factor denotes the quantity of recent migrations between two districts for individuals aged 15 years and older.

This study utilizes raw data from Sakernas to estimate the workforce and working hours at the district level across three sectoral categories: (1) primary sector (categories 1-2); (2) secondary sector (categories 3-6); and (3) tertiary sector (categories 7-17), due to sample limitations. This analysis also considers GRDP at constant prices. The calculation integrates the new district data with the current data. This study omits illogical employment numbers at the district level, including cases where the number of sectoral workers is zero, from its analysis. This analysis encompasses 487 districts for each period.

RESULTS AND DISCUSSION

Table 1 indicates that, according to the Hausman test results, the chosen non-spatial model is a fixed effects model (FEM). The coefficient estimate of the natural logarithm of labor productivity signifies reduced labor productivity disparity among Indonesian districts. This result signifies a propensity for convergence in the labor productivity of districts.

Table 1. Estimation of Non-spatial β Convergence in Labor Productivity

Variable	Estimated parameter	t-value
Ln initial labor productivity	-0.038***	-9.95
Constant	-0.155***	-10.18
p-value Hausman test	0.000	

Notes: ***, **, and * statistical significance at the 1%, 5%, and 10%.

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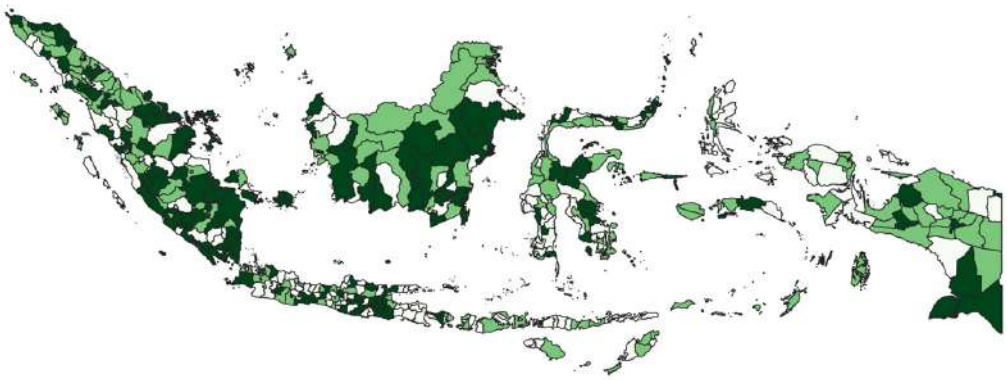
https://doi.org/10.15408/sjie.v13i2.39092

This study uses the spatial analysis method of the equal quantile map (refer to Figure 1) to ascertain the existence of spatial autocorrelation. From 2010 to 2022, districts on the same island had similar yearly labor productivity growth rates. This condition indicates the existence of spatial autocorrelation among Indonesian regions.

Figure 1. Equal Quantile Map of Annual Labor Productivity Growth During 2010-2022



This study employs two robust Lagrange multiplier (LM) tests to assess spatial dependence. The LM-LAG test is a robust LM test designed for a spatially lagged dependent variable. The null hypothesis signifies the lack of significant reliance. The robust LM-ERR test is the LM test designed to detect residual spatial autocorrelation. The null hypothesis posits the lack of residual spatial autocorrelation (Gutiérrez-Portilla et al., 2020). The outcomes of the two assessments indicate the presence of overall spatial autocorrelation. This work utilizes SAR, SDM, SDEM, SLX, SEM, and SAC/SARAR to identify the optimal model. The criterion for model selection is the maximum value of the log-likelihood function during the estimate (Gutiérrez-Portilla et al., 2020). According to the goodness of fit metric presented in Table 2, SDEM can ascertain the convergence of aggregate labor productivity at the district level.

Table 2. The Estimation of Spatial β Convergence in GRDP per Worker

Variable	SAR	SDM	SDEM	SLX	SEM	SAC
Ln initial labor productivity	-0.038*** (-9.95)	-0.048*** (-11.02)	-0.050*** (-11.59)	-0.047*** (-10.86)	-0.040*** (-9.74)	-0.044*** (-10.56)
Spatial ln initial labor productivity		0.085*** (4.58)	0.107*** (4.90)	0.073*** (4.23)		
Spatial autoregressive (lag)	0.008 (0.06)	0.244 (1.74)				-0.818*** (-5.78)
Spatial error			0.445*** (3.49)		0.209 (1.43)	0.835*** (9.07)
Constant	0.066*** (44.14)	0.065*** (44.13)	0.065*** (44.12)	0.066*** (44.14)	0.066*** (44.13)	0.065*** (43.99)
Log-likelihood value	1263.614	1273.984	1277.681	1272.496	1264.629	1274.217

Notes: t-values are given in parentheses. ***, **, and * signify statistical significance at the 1%, 5%, and 10%, respectively.

The SDEM results in Table 2 reinforce that the aspatial panel model was misspecified. The finding suggests that each district's aggregate labor productivity growth is closely related to its neighbors. Variables from other districts can positively affect aggregate labor productivity growth in a district. This indication is seen from coefficient estimation values of $v_{s,t}$ (0.445) and $ln\ LP_{s,t-T}$ (0.107). Components of $v_{s,t}$ are all variables from other districts that influence annual labor productivity growth but are unobserved in the model, such as private capital, public investment in human capital (Álvarez & Barbero, 2016), population growth (Sun et al., 2017), migration (Ganong & Shoag, 2017), and trade-induced technological spillovers (Fadly & Fontes, 2019). These variables can be the channels of the indirect effect. For example, migration contributes to the equalization of factor prices, while trade connections facilitate the dissemination of technologies across and within regions (Vatsa & Pino, 2023). SDEM also allows the convergence of labor productivity in a district, which will affect the local level of initial labor productivity and the other regions through the spatial transmission mechanism.

The results of SDEM can decompose into direct and indirect effects. The direct effect refers to the impact of altering a specific explanatory variable in district i on the dependent variable within the same district. In this study, an increase in initial labor productivity values can reduce annual labor productivity growth in the same district. Then, the indirect effect captures the cumulative effect of the changes in variables in districts other than i on the annual labor productivity growth of any district i. In this study, an increase of initial labor productivity and unobserved variables in other districts can improve annual labor productivity growth. The sum of both direct and indirect effects is called the total effect.

The total effect of the initial aggregate labor productivity value is negative. An increase of 1 percent in initial aggregate labor productivity reduces any particular Indonesian district's annual labor productivity growth by 0.023 percent: an increase of 0.027 percent is due to the indirect effect, and a decrease of 0.050 percent comes from the direct one. The coefficient of initial labor productivity ($\hat{\beta}$) is negative and statistically significant at the 1 percent level of significance. This sign is similar to the result in Table 1. The condition $\hat{\beta} < 0$ implies β convergence.

The next step explains the effect of each component on aggregate labor productivity growth using Equation 5. By knowing the contribution of each component, poorer districts can catch up and improve their aggregate labor productivity. Table 3 presents the results. Model 1 is the intrasectoral component model, model 2 is the intersectoral component model, model 3 is the residual component model, and model 4 is the combined component model. Based on model selection criteria, models 1, 3, and 4 use SDEM, while model 2 uses ordinary least squares (OLS).

The result indicates that intrasectoral change has a statistically significant and enhancing effect on aggregate labor productivity growth. The coefficient of the intrasectoral component is the highest. Furthermore, the results indicate that intersectoral and residual changes do not significantly contribute to labor productivity growth, as evidenced by the tiny and insignificant coefficient values. Those results are similar to the findings of O'Leary & Webber (2015).

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Table 3. The Spatial Shift-share Regression Results of Growth of GRDP per Worker

Variable	Model 1 SDEM	Model 2 OLS	Model 3 SDEM	Model 4 SDEM
Intrasectoral component	0.013** (2.49)			
Spatial intrasectoral component	-0.948*** (-4.68)			
Intersectoral component		0.006 (0.10)		
Spatial intersectoral component				
Residual component			0.001 (0.14)	
Spatial residual component			2.861*** (4.02)	
Combined component				0.013** (2.49)
Spatial combined component				-0.985*** (-4.53)
Spatial error	0.596*** (2.62)		0.441* (1.71)	0.567** (2.43)
Constant	-0.009 (-1.24)	-0.011 (-1.65)	-0.0003 (-0.04)	-0.009 (-1.31)

Notes: t-values are given in parentheses. ***, **, and * signify statistical significance at the 1%, 5%, and 10%, respectively.

Table 3 demonstrates that an enhancement in labor productivity within a particular sector, excluding intersectoral labor mobility, substantially aids the overall rise of labor productivity. This scenario may arise from enhanced efficiency, new technologies, or elevated capabilities among the workforce across several sectors. The reallocation of labor between sectors, specifically the transition from low-productivity to high-productivity sectors or the reverse, does not substantially enhance labor productivity in Indonesia. Therefore, structural change does not significantly affect labor productivity growth in Indonesia.

The government can enhance intrasectoral productivity growth by enacting trade, product, and financial market reforms (Konte et al., 2022). Trade reforms can eradicate frictions and costs that hinder the unrestricted movement of products and services between nations, promote the reallocation of resources to more efficient enterprises within the same sector, and enhance sectoral value added. McCaig and Pavcnik (2018) identify a substantial reallocation of labor from informal microenterprises to the formal manufacturing sector due to export prospects stemming from U.S. tariff reductions. Downstreaming mineral policy in Indonesia is a governmental policy aimed at diminishing the export of raw materials and promoting domestic companies to utilize these materials, enhancing domestic added value and generating employment opportunities. If exports are required, processing these raw materials yields the exported items (Ika, 2017).

Product market reforms eliminate barriers to the effective operation of markets by enhancing competition among providers of products and services. Product market reforms, such as the deregulation of agricultural markets and the liberalization of the

telecommunications sector, remove superfluous government interventions and entry obstacles, thereby facilitating market access. This condition heightens market competitiveness and diminishes economic rents, including markups. Nonetheless, the apprehension of forfeiting economic rents motivates enterprises to innovate substantially. Finally, financial reforms reduce credit costs, enabling financially constrained enterprises to get capital and enhance production efficiency. Hence, they contribute to intrasectoral productivity growth (see, for instance, Larrain and Stumpner 2017).

Table 4. The Spatial Shift-share Regression Results of Growth of GRDP per Working Hour

Variable	Model 1 SDM	Model 2 OLS	Model 3 SDEM	Model 4 SDM
Intrasectoral component	0.015** (2.63)			
Spatial intrasectoral component	-0.293* (-1.77)			
Intersectoral component		-0.008 (-0.12)		
Spatial intersectoral component				
Residual component			0.002 (0.27)	
Spatial residual component			2.408*** (5.31)	
Combined component				0.015*** (2.58)
Spatial combined component				-0.392*** (-2.12)
Spatial autoregressive (lag)	0.469*** (3.69)			0.538*** (5.00)
Spatial error			0.624*** (3.00)	
Constant	-0.045*** (-6.46)	-0.048*** (-7.41)	-0.038*** (-5.11)	-0.044*** (-6.40)

Notes: t-values are given in parentheses. ***, **, and * signify statistical significance at the 1%, 5%, and 10%, respectively.

This study employs an alternative measure of labor productivity, specifically GRDP per working hour, for a robustness check. Table 4 shows the results. The optimal models for models 1, 2, 3, and 4 are SDM, OLS, SDEM, and SDM, respectively. The significant coefficient estimation exhibits the same sign, with the intrasectoral component possessing the most significant coefficient value. Tables 3 and 4 show that the intrasectoral component plays the most significant role in aggregate labor productivity growth. The following analysis aims to identify the most relevant intrasectoral component within the sectoral group to enhance the overall labor productivity growth. Using different measurements of labor productivity, Table 5 shows that the OLS model is the best.

Across all sectors, the primary sector has a significant and positive impact on aggregate labor productivity growth. It means that when the primary sector's labor productivity

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increases, aggregate labor productivity grows faster. This result validates the significant contribution of the primary sector in Indonesia. It also suggests that adopting policy measures to increase primary productivity will notably impact aggregate productivity growth.

Table 5. The Effect of Intrasectoral Component on Growth of Labor Productivity by Sectoral Groups

Variable	GRDP per worker		GRDP per working hour	
	Estimated parameter	t-value	Estimated parameter	t-value
Primary sector	0.122***	3.51	0.192***	2.94
Secondary sector	0.145	1.59	0.147*	1.85
Tertiary sector	0.001	0.11	0.002	0.17
Constant	-0.056***	-3.14	-0.103***	-4.60

Notes: ***, **, and * signify statistical significance at the 1%, 5%, and 10%, respectively.

CONCLUSION

Labor productivity in Indonesia exhibited convergence during the period from 2010 to 2022. Neighbor districts' characteristics, such as initial labor productivity and unobserved variables, affect this convergence. This study uses a spatial shift-share analysis method to break down labor productivity growth into four parts: intrasectoral, intersectoral, residual, and combined. The primary influence on aggregate labor productivity growth originates from factors inside the same sector (intrasectoral component). The significant disparities in aggregate labor productivity growth in Indonesia may be attributed to the pronounced variations in production per worker across various sectors. Additional results indicate that the impact of structural change (intersectoral component) on labor productivity is negligible.

Variations in the rise of GRDP per worker among regions may primarily result from district sectoral disparities. Districts characterized by high-growth sectors typically exhibit superior performance regarding GRDP per worker. The different leading sectors in each district may result from resource advantages, such as the mining sector on Sumatra/Kalimantan Island, or geographical advantages, such as the industry/service sector on Java Island. Therefore, we can mitigate regional disparities in labor productivity by enhancing intersectoral productivity growth, particularly in labor-intensive sectors such as the primary sector.

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https://doi.org/10.15408/sjie.v13i2.39092

Signifikan: Jurnal Ilmu Ekonomi
Volume 13(2), 2024: 303 - 310
P-ISSN: 2087-2046; E-ISSN: 2476-9223
https://doi.org/10.15408/sjie.v13i2.40681

Foreign Debt: Causes and Theirs Impact on Economic Growth in Indonesia

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JEL Classification:
F34
F43
H63
O11

Received: 02 August 2024

Revised: 10 November 2024

Accepted: 15 November 2024

Available online: December 2024

ABSTRACT

Research Originality: This study presents a new analysis of the primary determinants of Indonesia's foreign debt and its impact on economic growth over the 1992-2022 period, offering new insights into debt management strategies.

Research Objectives: This study uses 31 years of time series data to analyze the main causes of Indonesia's foreign debt and its effect on economic growth.

Research Methods: This research employs a quantitative approach with data analysis techniques, including classical assumptions, Ordinary Least Squares (OLS), simple linear regression, and hypothesis testing.

Empirical Results: The results indicate that interest rates do not significantly affect Indonesia's foreign debt, while exchange rates and imports have substantial impacts. Additionally, a significant relationship between foreign debt and economic growth is confirmed.

Implications: This study suggests that the Indonesian Government should adopt a multifaceted approach to managing foreign debt, including policies aimed at maintaining low interest rates, strengthening the rupiah, boosting exports, and enhancing government spending efficiency without excessive reliance on external borrowing.

Keywords:

interest rate; exchange rate; import; foreign debt; economic growth

How to Cite:

Anggresta, V., Subiyantoro, H., & Astuty, P. (2024). Foreign Debt: Causes And Theirs Impact On Economic Growth In Indonesia. *Signifikan: Jurnal Ilmu Ekonomi*., *13*(2), 303-310. https://doi.org/13.14560/sjie.v13i2.40681.

INTRODUCTION

Indonesia's foreign debt has risen significantly in recent years, reaching $403 billion in 2023 (Bekele & Woldeyes, 2021). Loans have been sourced from a variety of countries, including Singapore ($59.54 billion), the United States ($33.52 billion), China ($21.03 billion), and Hong Kong ($26.84 billion). In addition to these, Indonesia also receives loans from other countries like Australia, France, Germany, the Netherlands, and South Korea. While this debt enables financing for crucial development projects such as infrastructure and education, it also poses a financial burden. The debt has the potential to increase interest rates and inflation, presenting a dilemma for the Indonesian government (Bekele & Woldeyes, 2021).

The challenges in managing foreign debt have been further exacerbated by the COVID-19 pandemic, which severely impacted Indonesia's economy by reducing tax revenues (Natallios et al., 2022). In addition, the global economic slowdown has led to decreased demand for Indonesian exports, further reducing state revenues from the trade sector (Kahfi, 2016). Rising interest rates have also contributed to an increase in debt payments, making it more expensive for Indonesia to manage its foreign debt.

The Indonesian government faces considerable pressure to manage its foreign debt efficiently. Failure to do so could erode investor confidence and lead to depreciation of the rupiah, potentially resulting in a slowdown in economic growth (Vechsuruck & Pratoomchat, 2024)manifesting two types of dualism: (i. The recent default of Sri Lanka on its foreign debt payments in May 2022 serves as a cautionary example, highlighting the consequences of mismanaging debt. Indonesia, therefore, must focus on maintaining economic stability, fiscal prudence, and a balanced trade outlook to avoid a similar crisis (Al Kharusi & Ada, 2018).

One critical factor influencing Indonesia's foreign debt is interest rates (Darwis et al., 2022). When interest rates rise, Indonesia must pay more to service its foreign debt, particularly because much of it is denominated in U.S. dollars (Thorbecke, 2021). A stronger U.S. dollar relative to the rupiah exacerbates this burden, as Indonesia has to pay more in rupiah to meet its dollar-denominated obligations. For example, when Bank Indonesia raised interest rates in 2017 to control inflation, the rupiah depreciated, leading to an increase in foreign debt (Dai, 2022; Born et al., 2021). Conversely, when the U.S. Federal Reserve cut interest rates in 2020 in response to the pandemic, Indonesia saw a reduction in foreign debt due to a favorable shift in exchange rates and increased foreign exchange reserves.

Other significant factors include the exchange rate and export levels. Indonesia's dependence on the U.S. dollar makes it susceptible to exchange rate fluctuations (Darwis et al., 2022; Dawood et al., 2021). A weaker rupiah makes imports more expensive, potentially causing inflation, while a trade deficit can increase foreign debt burdens. Conversely, a higher level of exports tends to reduce external debt, while lower exports can exacerbate it (Dai, 2022; Born et al., 2021). While taking on more debt may seem like a quick solution for financing development, it often leads to long-term challenges,

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especially for developing countries (Harsono et al., 2024). High levels of debt can lead to a situation where much of a country's tax revenue is used to pay interest, limiting spending on crucial areas like education, healthcare, and infrastructure. Excessive debt can also undermine investor and creditor confidence, potentially leading to currency devaluation and an economic slowdown.

Despite extensive research on Indonesia's foreign debt, there is a lack of comprehensive analysis regarding the specific interplay between interest rates, exchange rates, and export levels in shaping Indonesia's foreign debt trajectory. This study aims to fill that gap by examining how these factors influence Indonesia's foreign debt, providing a clearer understanding of their role. Unlike previous studies that focus on general debt management, this research offers a detailed exploration of economic factors that could help policymakers manage debt more effectively. By addressing this research gap, this study provides new insights into Indonesia's economic strategy for sustainable debt management and contributes to the broader academic debate on developing countries' debt dynamics.

METHODS

This study employed a quantitative approach, using secondary time-series data sourced from BPS (Badan Pusat Statistik) over a 31-year period, from 1992 to 2022. The data were collected on an annual basis, observing economic variables in Indonesia. The primary variables in the analysis were the interest rate (X1), exchange rate (X2), imports (X3), foreign debt (Y), and economic growth (WITH).

The data analysis was conducted using various econometric techniques, including classical assumption tests, Ordinary Least Squares (OLS) estimation, simple linear regression, and hypothesis testing. Two distinct research models were employed in this study.

Model I $\quad \mathrm{LogULN}_{it} = \alpha_i - \beta_1 \mathrm{LogRate} + \beta_2 \mathrm{LogExch} + \beta_3 \mathrm{LogM} + \varepsilon_{it}$

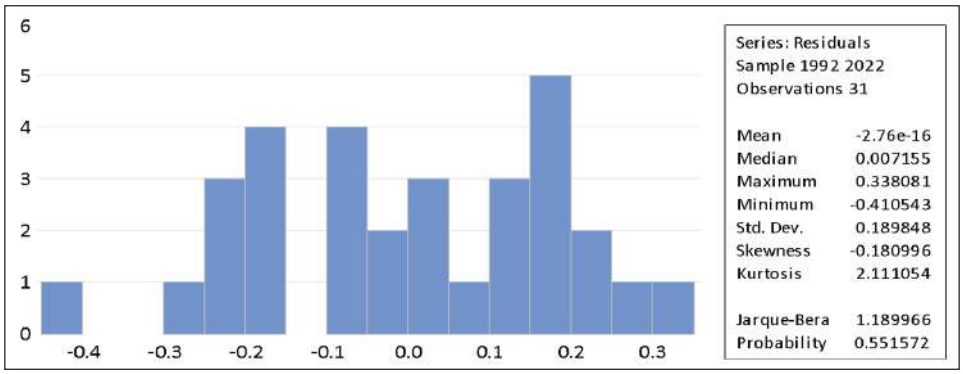
Model II $\quad \mathrm{LogZ}_{it} = \alpha_i + \beta_1 \mathrm{LogY}_{it} + \varepsilon_{it}$

Given the extensive use of multiple regression in existing literature, this research differentiates itself by not only applying OLS but also incorporating an in-depth analysis of long-term data trends (spanning three decades), which allows for a broader and more nuanced understanding of the dynamic relationships between these macroeconomic variables in Indonesia.

RESULTS AND DISCUSSION

The normality test results shows in Figure 1. Based on the Figure 1, Jarque-Bera obtained a statistical value Z = 1.189966 with a probability of 0.551572, where the value is > α of 0.05. Thus, it was decided that the model residuals were normally distributed.

Figure 1. Normality test



The results of the multicollinearity test shows in Table 1. Based on the Table 1, the value of each variable-centered VIF is not more than 10, meaning that there is no problem with multicollinearity.

Table 1. Multicollinearity Test

Variable	Coefficient Varian	Uncentered VIF	Centered VIF
C	1,087874	842,1116	THAT
LogRate	0,0009934	39,26697	2,735811
LogExch	0,006385	407,9818	1,685055
LogM	0,008145	798,9222	3,725655

Source: Processed Eviews data, 2023

The results of the heteroscedasticity test shows in Table 2. Based on the test results from the Table 2, the value of *Note R-squared Probability Chi-Squared* is 0.4474 greater than 0.05. So, it can be revealed that there is no symptoms of heteroscedasticity faound in the regression model.

Table 2. Heteroscedasticity Test

Heteroscedasticity Test: Breusch-Pagan			
F-Statistic	0,844094	Prob. F (3,27)	0,4818
Obs*R-squared	2,658134	Prob. Chi-Square(3)	0,4474
Scaled Explained	1,120175	Prob. Chi-Square(3)	0,7722

Source: Processed Eviews data, 2023

The results of multiple regression model 1 are shown in Table 3. Table 3 shows that the variables that had an impact on foreign debt are exchange rate and imports, but interest rate does not impact foreign debt. The simultaneous influence of interest rates, exchange rates, and imports is shown by the p-value = 0.000, smaller than $\alpha = 0.05$. This result means that interest rates, exchange rates, and imports simultaneously influence foreign debt. The value obtained from the R-Square is 0.844; 84.4 percent of Indonesia's foreign debt is influenced by interest rates, exchange rates, and imports, while 15.6 percent is influenced by other variables not included in model I.

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Table 3. OLS Linear Regression Model 1

Variable	Coefficient	Std.Error	t-Statistic	Prob.
C	19,65892	1,043012	18,84822	0,000
LogRate	-0,091234	0,099670	-0,917359	0,3671
LogExch	0,290452	0,079909	3,634770	0,0012
LogM	0,345406	0,090247	3,827334	0,0007
R-Squared	0,844027			
Adjusted R-square	0,826697			
F-Statistic	48,70247			
Prib (F-statistic	0,00000			

Source: Processed Eviews data, 2023

Then, the second model was tested, the impact of foreign debt (Y) on Indonesia's economic growth (Z) from 1992-2022. From the results of the significance test, it is found that the p-value is smaller than $\alpha = 0.05$, which indicates that foreign debt has a partial effect on economic growth at an error level of 5%. The value obtained from the R-squared is 0.893. This means that 89.3 percent of Indonesia's economic growth is influenced by foreign debt, while 10.7 percent is influenced by other variables not included in model II.

Table 4. OLS Model II Linear Regression

Variable	Coefficient	Std.Error	t-Statistic	Prob.
C	7,755535	1,274359	6,085831	0,0000
LogUTL	+ 0,750711	0,049105	-15,28788	0,0000
R-Squared	0,893015			
Adjusted R-square	0,889194			
F-Statistic	233,7192			
Prib (F-statistic	0,00000			

Source: Processed Eviews data, 2023

The results of this study reveal that interest rates have a negative but insignificant effect on Indonesia's foreign debt. This result suggests that high interest rates do not significantly deter the Indonesian government from borrowing abroad. The finding aligns with the study by (Elkhalfi et al., 2024), which also found that interest rates have a negative and insignificant impact on foreign debt, primarily because higher interest rates increase borrowing costs (Tjia et al., 2021). Consequently, the government tends to rely more on domestic financial resources than external debt to finance development projects.

It is necessary to understand that the availability of domestic lending facilities may influence the relationship between interest rates and foreign debt. When insufficient, governments turn to foreign loans, often benefiting from more favorable terms despite interest rate fluctuations. Additionally, foreign debt is typically utilized for long-term investments, such as infrastructure development, which tend to offer returns that exceed the interest costs (Dey & Tareque, 2020). Therefore, even when interest rates rise, the government can still manage its foreign debt obligations due to the long-term nature of these investments.

The results indicate that the exchange rate has a positive and significant effect on Indonesia's foreign debt, meaning that a depreciation of the rupiah leads to an increase in foreign debt. This finding is consistent with the research by (Wahyudi et al., 2023), which also concluded that fluctuations in exchange rates significantly impact government debt. When the rupiah depreciates against the dollar, the value of foreign debt rises because the debt is often denominated in foreign currencies. As noted, the debt burden increases when the rupiah weakens because repayments and interest are calculated in stronger foreign currencies (Fendoğlu et al., 2020).

Several factors explain the strong link between exchange rates and foreign debt. First, when the rupiah depreciates, the cost of imports rises, putting pressure on government revenues and increasing the reliance on external borrowing. Second, foreign debt, mostly in dollars, becomes more expensive when converted back into rupiah. This condition increases the debt burden, making it harder for the government to finance its budget deficit. Lastly, a weakening currency may discourage foreign investment, forcing the government to seek foreign loans to maintain economic stability and growth.

Empirical data suggest that imports positively affect Indonesia's foreign debt (Kusumo & Purnomo, 2024). High imports are associated with an increased trade deficit, leading to greater reliance on foreign borrowing to finance this deficit (Towbin & Weber, 2013). This finding is in line with Hung's research (2022), which identified a direct relationship between trade balance deficits and the need for foreign loans.

Several mechanisms explain the connection between imports and foreign debt. Firstly, when the value of imports exceeds exports, the trade deficit widens, prompting the government to borrow externally to cover the shortfall. Secondly, imports pressure the government to stabilize the rupiah exchange rate. A weaker rupiah raises import costs, increasing the trade deficit and the need for foreign loans. Lastly, imports can also compel the government to boost foreign exchange reserves, which are necessary to ensure that future import payments can be met. If these reserves are insufficient, foreign borrowing becomes inevitable.

The findings indicate that foreign debt positively affects Indonesia's economic growth, provided it is utilized efficiently (Bouabidi, 2023). Foreign debt can contribute to economic development by financing infrastructure projects, investment, and consumption. Infrastructure investments, in particular, enhance productivity and reduce operational costs, making the economy more competitive(Senadza et al., 2018). The use of foreign debt for productive investment can create jobs and increase overall economic output (Esteve & Tamarit, 2018) (Ncanywa & Masoga, 2018) (Sultana et al., 2024).

Foreign debt can also fund essential government expenditures that improve public welfare and contribute to long-term growth when adequately managed. For example, investment in education, health, and social programs fosters human capital development and reduces poverty. In this context, foreign debt is vital in supplementing domestic financial resources, especially when insufficient to fund development projects.

CONCLUSION

This study has examined the impact of interest rates, exchange rates, and import levels on Indonesia's foreign debt from 1992 to 2022. The findings reveal that while

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interest rates have a negative but insignificant effect on foreign debt, the exchange rate and import levels significantly increase foreign debt. These results highlight the importance of prudent foreign debt management to support national development.

To address the research objectives, the Indonesian Government must prioritize strategies that enhance debt sustainability. These include stabilizing the exchange rate, optimizing imports, and ensuring foreign debt is directed toward productive, long-term investments with high returns. Furthermore, balancing domestic financing and foreign borrowing is essential to reduce the country's reliance on external debt. By increasing the efficiency of government spending and boosting export performance, Indonesia can better manage its foreign debt while ensuring sustainable economic growth.

Future recommendations include enhancing foreign exchange reserves to mitigate the impact of currency depreciation and developing policies that promote self-reliance in financing national development projects, minimizing the need for external loans. These efforts will help the Government reduce potential risks associated with foreign debt and maintain economic stability.

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Signifikan: Jurnal Ilmu Ekonomi
Volume 13(2), 2024: 311 - 326
P-ISSN: 2087-2046; E-ISSN: 2476-9223
https://doi.org/10.15408/sjie.v13i2.41545

The Effects of Digital Economy on Inclusive Growth in Selected African Countries

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JEL Classification:
O3
O4
C31

Received: 28 September 2024

Revised: 10 December 2024

Accepted: 16 December 2024

Available online: December 2024

ABSTRACT

Research Originality: The originality of this work is the inclusion of more variables that are used to develop the digital economy index, which is a more accurate representation of the digital economy in Africa. Also, instead of capturing the inclusive growth with a single variable such as HDI, GDP per capita, or RGDP per person employed, as seen in previous studies, this study adds to the body of literature by creating an inclusive growth index using the four key indicators of inclusive growth.

Research Objectives: This study investigates the effect of the digital economy on inclusive growth in selected African countries.

Research Methods: The study employed longitudinal panel data sourced from the world development indicators and was analyzed using the Arellano and Bond (1991) system Generalized Method of Moments (SGMM), a dynamic panel data model that handles endogeneity, unobserved heterogeneity, and autocorrelation.

Empirical Results: The findings demonstrated a positive and significant effect of the digital economy on inclusive growth in the countries studied. The effects of the digital economy are more visible in lower—and lower-middle-income (LI and LMI) countries than in upper-middle-income (UMI) African countries.

Implications: These findings imply that improving investments in internet infrastructure and fostering a technology-driven economy can help Africa achieve more robust inclusive growth.

Keywords:

digital economy; inclusive growth; economic growth; structural change

How to Cite:

Dakwal, S. M., Okwanya, I., & Ogiri, A. I. (2024). The Effects of Digital Economy on Inclusive Growth in Selected African Countries. *Signifikan: Jurnal Ilmu Ekonomi*, *13*(2), 311-326. https://doi.org/10.15408/sjie.v13i2.41545.

INTRODUCTION

Over the years, and specifically at the beginning of the new millennium, the GDP of many nations, particularly in Africa, has been growing. However, this GDP growth does not translate into improved living standards for the citizenry. This realization is changing the development agenda across the globe. The idea of inclusive growth was born out of the need to critically reevaluate the traditional GDP measure of economic growth and replace it with a growth model that considers the need for an equitable distribution of economic gains across a wide range of society, hence the concept of inclusive growth (Adeleye et al., 2023; Kamah et al., 2021).

Interestingly, for the growth of an economy to become inclusive, empirical studies have observed that digitalization of the economy is critical (Myovella et al., 2020; David, 2019). This is because the digital economy is thought to be the main force behind inclusive growth and a significant contributor to drastically altering economic landscapes that significantly impact businesses, employment, inequality, and poverty in the region (Bukht & Heeks, 2017). The World Economic Forum (WEF) (2020) reported that the digital economy is expanding in emerging markets at 20–30% annually. For developing nations, especially those in Africa, the digital economy holds great promise for increased economic growth, higher labor and capital productivity, reduced transaction costs, and easier access to international markets (Dahlman et al., 2016).

Furthermore, certain digital dividends have already been noted that could mitigate African economic disparities. These include higher-than-average wages for digital labor in African nations, which could result in a convergence of incomes globally (Beerepoot & Lambregts, 2015); fresh and distinct local markets for digital start-ups in developing nations (Quinones et al., 2015); and digital platforms in Africa that offer a way out of inefficient, fraudulent labor markets and labor institutions (Pillai, 2016). The digital economy has also been shown to have growth-promoting effects on several empirical studies, such as increased global trade (Meijers, 2014), active innovation, entrepreneurship, and increased market access; additionally, it has been shown to reduce information asymmetry costs, which in turn facilitate access to finance (Solomon & van Klyton, 2020); and to increase productivity, greater access to information, and economies of scale (Dubey et al., 2021).

The digital economy, as a new paradigm for development, represents a turn in the path of economic growth that will improve employment, income generation, and industrial structure, all of which will have an impact on inclusive growth in Africa (Andrés et al., 2016). The African region over the years has witnessed an impressive rise in the rate of digital product usage, with active mobile-broadband subscribers rising from 2.7% in 2011 to 40.7% in 2021 and mobile cellular telephone subscriptions rising from 44.3% in 2010 to 82.7% in 2021 (World bank Development Indicators, (WDI) 2022).

Similarly, the digital economy, including e-commerce, precision agriculture, artificial intelligence, algorithmic economy, supply chain automation, blockchain technology, electronic administration, and electronic governance, is estimated to employ approximately

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3% of the worldwide workforce, with e-commerce valued at $16.2 trillion in 2016. The digital sector employs 1% of the workforce in developing countries, roughly 4% in industrialized countries, and 2.5% of the total global workforce. Also, about 4 million people work in customer care call centers, and 0.6% of the workforce in developing nations like Africa is online (World Bank 2021). The IT sector employs over 3 million people directly and 7–10 million people indirectly, with the digital economy accounting for an estimated 6 million jobs (Bukht & Heeks, 2017). Despite the fantastic expansion of the digital economy in supporting inclusive growth, as seen in most developed countries, African countries have not fared better.

A plethora of empirical studies have indicated that inclusive growth is directly connected to the extent of mainstreaming of the digital economy in both cross-country and within-country analyses. Olofin (2023) found a positive relationship between economic growth and the digital economy. It also discovered that corruption and the digital economy are connected. The study suggests that strengthening institutional quality and increasing participation in the digital economy might enhance economic growth. In a similar study, Adeleye et al. (2023) revealed that ICT, particularly mobile phones, has a positive and significant effect on Institutional Quality, with interaction effects differing on the ICT indicator used. The study recommended that policymakers prioritize institutional reforms and ICT infrastructural investment to ensure that economic growth improves living conditions for lower-income populations. Across 44 Sub-Saharan African countries, Kouladoum (2023) demonstrated that digital infrastructures promote inclusive growth across all income groups, implying that policymakers should invest more in human capital and digital infrastructure to enhance inclusive growth in the region.

Afolabi (2023) found that economic policy uncertainty stifles digital economy growth across African income levels, whereas digital infrastructure promotes it. The study also discovered that human capital development promotes the expansion of the digital economy in Africa's low-income countries. The study recommended that African governments support human capital and digital infrastructure investment and establish a stable and predictable regulatory framework. Furthermore, Solomon and Van Klyton (2020) found a positive relationship between the digital economy and economic growth in 39 African countries. The study revealed that individual use of ICT is favorably connected with growth. When the digital economy pillars were broken down into individual component indicators, social media usage and the centrality of ICTs to government vision emerged as important economic growth indicators. The study provided the current study with clarity on the role of digitization on economic growth, especially in Africa.

Between 2004 and 2019 in Uzbekistan, Kuziyeva et al. (2023) found that the digital economy positively influenced economic growth due to the broad adoption of digital technologies, improved educational environment, and information dissemination. The study recommended further digital infrastructure development to improve the accessibility and availability of digital services in order to boost economic growth. In a related study, Zhang et al. (2022) discovered within the "Belt and Road" countries that despite geographical differences, the digital economy positively impacts their economies

by improving industrial structure, employment, and job restructuring. The investigation further revealed that the COVID-19 pandemic has raised the need for digital industries, with demand having a more significant impact than supply. To increase the digital economy's impact on industrial upgrading, employment, and trade after COVID-19, the study suggested bridging the "digital divide" between nations along the "Belt and Road." Wu and Yu (2022) also demonstrated that the digital economy has been the primary driver of China's economic development and productivity increases over the last two decades. Despite this, industries with strong investment growth have failed to match industries with high total factor productivity growth due to chronic capital misallocation across industries and the continuously inefficient performance of some non-ICT enterprises. The study suggested expanding investment in ICT to encourage more enterprises to utilize technological innovations and promote the country's inclusive growth.

Accordingly, Mgadmi et al. (2021) revealed that digital technology provides significant economic growth benefits to both developed and developing economies. However, the impact of digitalization varies among countries. Internet users, cellular mobile phone subscriptions, and fixed broadband subscriptions have less impact in underdeveloped countries than in industrialized ones. The study recommended that developing countries invest more in human capital and implement proper government policies to capitalize on digitalization's favorable influence on long-term economic growth. Dubey et al. (2019) found that technology has a favorable impact on inclusive growth in India. The study also highlighted the requirement for greater use of digital and electronic payment systems to reduce leakage in the public food distribution system. In order to encourage the adoption of technology in all spheres of human effort in India, the study proposed increased investment in education.

Adejumo et al. (2020) investigated the impact of technology on the African economy. They found that technical innovation, educational accessibility, and technologically driven growth significantly impact Africa's unemployment rate and per capita income. While technology has had little impact on economic growth, it has helped to alleviate poverty and inequality. However, long-term technological growth through ICT has the potential to significantly improve income distribution, reduce unemployment, and minimize disparities. The research recommended institutional reforms to promote technical distribution and appropriate infrastructure for Africa's inclusive growth. David (2019) showed a long-term, reciprocal relationship between economic development, growth, and telecommunications infrastructure. The results of the causality tests showed a causal relationship between the development and expansion of the economy and telecommunication infrastructure. Infrastructures for telecommunications support economic expansion and development in Africa and vice versa. Therefore, it is imperative to advance comprehensive and inclusive policies to simultaneously advance economic growth, development, and digital provision in Africa.

Bahrimi and Qaffas (2019) discovered that ICT, alongside landline telephones, was the primary driver of economic growth in the Middle East and North Africa (MENA) and Sub-Saharan Africa (SSA) areas between 2007 and 2016. The study

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recommended increasing ICT infrastructure investments, focusing on financial sector development, regulatory simplicity, economic openness, and ICT infrastructure while keeping inflation and government consumption under control to enhance growth via the digital economy. Similarly, Xiaowei and Lingwen (2021) found that China's economic growth is significantly influenced by technical innovation. Further investigation indicated that the most significant influence on Chinese economic growth comes from fiscal policy assistance rather than R&D spending. Ding, Zhang, and Tang (2021) revealed that digital economic input significantly encourages growth in the domestic value-added rate of manufacturing industry exports in China and also increases the domestic value-added rate of intermediate products for exports.

Additionally, the study showed that capital- and knowledge-intensive manufacturing sectors significantly benefited from digital input and technological advancement. Cost reduction is identified as an essential mechanism by which the digital economy fosters the domestic value-added rate of exports. According to the study, economic growth will be significantly accelerated by the expansion of digital infrastructure, which will continuously give the traditional economy new life.

The reviewed studies demonstrate that previous research presents consistent findings regarding the effects of the digital economy on inclusive growth. This study, however, offers a unique perspective by examining how the digital economy affects inclusive growth in some selected African countries. Previous studies that looked at the relationship between the digital economy and inclusive growth focused on ICT adoption (proxied by mobile subscription and fixed telephones) as the primary indicator of the digital economy (Adeleye et al., 2023; Labhard & Lehtimaki, 2022; and Andres et al., 2016). This is a gap that this study will fill by broadening these variables to include secure internet servers, broadband subscriptions, mobile cellular subscriptions, high-tech exports, ICT product exports, number of internet users, and other digital infrastructures in order to create a comprehensive digital economy index using the principal component analysis (PCA). This study believes it will be the most accurate reflection of the digital economy.

Secondly, instead of capturing the inclusive growth with a single variable such as HDI, GDP per capita, or RGDP per person employed, as seen in previous studies, this study adds to the body of literature by creating an inclusive growth index using the four indicators of inclusive growth namely, economic growth and structural change, generation of productive employment, human capital development and reduction in poverty and economic inequality (Yaru et al., 2018). This index also will be developed using PCA.

Consequently, the study contributes to various fields. First, we used principal components analysis to create more accurate and comprehensive indices for the digital economy and inclusive growth in Africa. Second, the current study fills the gap and contributes to the existing literature by examining how the digital economy can enhance the growth inclusivity of African countries through increased investments in critical digital infrastructures such as secure internet servers, broadband subscriptions, mobile cellular subscriptions, high tech exports, ICT product exports, number of internet users, and other

digital infrastructures. Another vital justification for the study is examining the influence of gross capital formation, foreign direct investments, and labor force participation on inclusive growth in Africa as control variables. The findings suggest that increased investments in gross capital formation will enhance foreign investments, especially in the digital economy, and engender inclusive growth in the continent in the short and long term. Finally, the government and policymakers in Africa can utilize these findings to create successful strategies by creating digital economy enablers to ensure the inflow of FDI in the continent. This will fast-track growth inclusivity.

Therefore, this study seeks to examine the effects of the digital economy on inclusive growth in selected African countries by differentiating between the African countries according to their income level of development, such as low-income economies (LI), lower-middle-income economies (LMI) and upper-middle-income economies (UMI). The rationale behind the categorization is to allow the study to make precise recommendations that are tailored toward a specific income bracket.

METHODS

This empirical analysis is based on secondary longitudinal data from the World Bank Development Indicators between 2000 and 2022. The SGMM panel data model framework generated cross-country samples from 37 African nations in a balanced panel data structure. The choice of Africa for this study was influenced by the fact that African countries have high levels of non-inclusive growth, such as low education enrolment rates, poverty, and inequality rates, and relatively low health care delivery; however, despite these challenges, the continent appears to have a relatively high level of mobile technology adoption and utilization (WDI 2022). The dimensions, components, and measurements of inclusive growth that are employed in this study are displayed in Table 2. Table 1 also presents the digital economy development index, derived from the World Bank development indicators (WDI) and constructed using the PCA.

The variables in Table 1 and Table 2 above were used to create indices for the dependent variable inclusive growth index (Table 2) and the digital economy index (Table 1). The System Generalized Method of Moments (SGMM) will be utilized in the empirical estimations of this study's objective to estimate the effects of the digital economy on inclusive growth in some selected African countries between 2000 and 2022. Another justification for the use of the SGMM technique is the fact that it does not require a pre-estimation test such as the panel unit root test and cross-sectional dependence test since it is a flexible estimation method that can handle non-stationary data, eliminating endogeneity problems and requiring no data stationarity. It uses instrumental variables (IVs) to identify parameters and eliminate endogeneity. First-differencing can be used to render data stationary in panel data settings (Adeleye et al., 2017; Batuo, 2015). Similarly, compared to the first-differenced GMM estimator, the two-step SGMM estimator addresses the issues of heteroscedasticity, endogeneity, and finite sample bias more effectively since it makes extensive use of internal instruments. This condition is why the two-step SGMM was selected for this investigation.

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Table 1. Digital Economy Development Index

Categories Value	Name of Indicators	Meaning	Scale
Digital Economy Infrastructure	i. Secure Internet Servers (Per mill. People).	Network Environment Security and governance.	0.3 – 12248
	ii. Fixed Broadband Subscriptions (per 100 people)	Improvement of the Information Infrastructures	0.2 – 39.3
	iii. Fixed Telephone Subscriptions (per 100 people)	Improvement of the Information Infrastructures	1.2 – 54.8
	iv. Mobile Cellular Subscriptions (per 100 people)	Improvement of the Information Infrastructures	43.1 – 191
	v. Individuals Using the Internet (% of population)	Internet user base	5.1 – 95.8
Digital Economy Openness	i. High – Tech Exports (% of total exports)	Openness of Digital Economy, International Competitiveness of Technology.	0.5 – 53.3
	ii. ICT Product Exports (% of total product exports)	Openness of Digital Economy, International Competitiveness of Technology.	0 – 36.5
Digital Technology Innovative Environment and Competitiveness.	i. Enrolment in higher education institutions (% of total pop.)	Abundance of Digital Professionals	6.7–148.9
	ii. R&D Expenditure (% of GDP)	Digital Technology Innovative Environment.	0 – 5.0
	iii. Availability of Latest Technology	Technological Transformation and effective Utilization.	3.4 – 6.5

Source: World Development Indicators, (2023).

To estimate the effect of digital economy on inclusive growth in the selected African countries, the model estimate is derived using the Solow - Swan (1956) growth theory. The theory takes into account two production functions that emphasize the main role of labour and capital (which can be substituted for each other) in determining output, while technology (digital economy) is viewed as an exogenous input in the production process. As technology advances, production per worker (y) can rise without an increase in capital per worker (k).

Thus, following the work of Agyei and Idan (2022), the reduced dynamic panel data model to be estimated is given as;

$$\square_{\square,\square} = \alpha\ \square_{\square,\square-1} + \square\ '_{\square\square,\square} + \square\ 'C_{\square,\square} + \square_{\square} + \varepsilon_{\square,} \qquad (1)$$

Where, $\square_{\square,\square}$ is the dependent variable for cross-sectional unit $\square$ in period $\square$ and denotes the natural logarithm of inclusive growth (IG); $_{\square\square,\square}$ is a vector of proxies denoting the independent variable (digital economy) observed for country $\square$ in period $\square$. $C_{\square,\square}$ are the control variables. Similarly, $\square$ denotes the country ($\square$ =1, 2, …, 37) and $\square$ denotes time period (t = 2000 - 2022). $\square_{\square}$ is the $\square$-th unobservable time-invariant country-specific effects and is independent and identically distributed in country $\square$ and $\varepsilon_{\square,\square}$ is the idiosyncratic

disturbance term specific to country □ in period □ and is assumed to be independent and identically distributed over all time periods in country □. $□_{□,□-1}$ is the natural logarithm of initial (lagged) of inclusive growth (IG) index, which captures initial conditions for testing the convergence effect hypothesis with $|\alpha| < 1$, so as to ensure stationarity, α, □′ and □′ are parameters to be estimated. Therefore, equation (3.1) can be represented more explicitly as follows.

$$IG_{□,□} = \alpha\, IG_{□,□-1} + □'\, DEI_{□,□} + □'C_{□,□} + □_{□} + \varepsilon_{□,t} \quad (2)$$

Where, IG = Inclusive Growth, DEI = Digital Economy Index. Accordingly, equation (3.2) can be overtly stated as;

$$IG_{□,□} = \alpha + □_1 IG_{□,□-1} + □_2 DEI_{□,□} + □_3'C_{□,□} + \varepsilon_{□,□} \quad (3)$$

The baseline equation that needs to be estimated is equation (3.3). Additionally, the specific control variables that apply to this model are presented in equation 3.4 below;

$$IG_{□,□} = \alpha + □_1\, IG_{□,□-1} + □_2 DEI_{□,□} + □_3 GCF_{□,□} + □_4 FDI_{□,□} + □_5 LF_{□,□} + \varepsilon_{□,□} \quad (4)$$

Where, GCF = gross capital formation, FDI = foreign direct investment, and LF = labour force is introduced as the control variables. Meanwhile, the lagged value of inclusive growth ($IG_{□,□-1}$) is introduced in the equations to capture the effects of persistence of growth.

Table 2. Inclusive Growth Index

Category	Name of Indicators	Meaning	Scale
1. Economic Growth and Structural Change	i. Rate of GDP growth per capita	The annual growth calculated by dividing GDP by midyear population, excluding asset depreciation	0.02 -0.10
	ii. share of manufacturing value added in the total GDP	The sectors net output after adding all outputs and removing intermediate inputs	0.02 – 0.20
	iii. share of services value added in the total GDP	This is the net output of the sectors' after adding all outputs and subtracting for depreciation of assets.	0.3-0.60
	iv. share of agriculture value added in the total GDP	This refers to the net output of a sector after adding all outputs and subtracting intermediate inputs, without deductions for depreciation.	0.1-0.50
2. Generation of Productive Employment	i. GDP per capita of the employed (at 2021constant USD).	GDP per person employed is computed by dividing GDP by total employment and converting purchasing power parity GDP to 2021 constant international dollars.	1000 – 5000
	ii. Total employment to population ratio.	Employment to population ratio is the proportion of a country's population that is employed.	0.3 – 0.5

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Category	Name of Indicators	Meaning	Scale
3. Human Capital Development	i. Children (under 0) survival rate per 100.	This is the statistical measure that estimates the number of children who die before reaching the age of 5.	0.7 – 0.9
	ii. Life expectancy	It refers to how long a newborn infant would live if current death rates at birth stayed constant throughout their lives.	45 – 80
	iii. Proportion of population with safe drinking water.	It is defined as drinking water from improved sources with a collection time of 30 minutes or less.	0.2 – 0.8
	iv. proportion of population with improved sanitation facilities.	The percentage of individuals using improved facilities not shared with others, including flush systems, septic tanks, etc	0.1 – 0.6
	v. Secondary school enrolment	The proportion of total enrolment in a population based on their level of education, focusing on secondary education for lifelong learning and growth.	0.1 – 0.8
4. Reduction in Poverty Rate& inequalities.	i. Proportion of population living above $2.15 per day	The percentage of a country's population living in households with non-health expenditures below the$2.15 poverty line.	0.05–0.7
	ii. Proportion of population living above $3.65 per day.	The percentage of a country's population living in households with non-health expenditures below the$3.65 poverty line.	
	iii. GINI index	Measures the deviation from a perfectly equal distribution of income or consumption expenditure within an economy.	0 – 100

Source: World Development Indicators, (2023).

RESULTS AND DISCUSSION

Table 3 reports the descriptive statistics of the investigated variables. The descriptive statistics of the data utilized are presented according to income groups. These statistics include the mean, median, standard deviation, minimum, and maximum and the Jarque-Bera normality test with their respective p-values. Table 3 above presented descriptive statistics by income group and showed that low-income (LI), lower-middle-income (LMI), and upper-middle-income (UMI) countries differed significantly in terms of inclusive growth measures and related economic indicators. Compared to LI countries (0.78) and LMI countries (1.05), UMI countries have a higher mean value of 1.30 for inclusive growth (IG). This result suggests that the growth of UMI countries is more inclusive in that a more significant proportion of the population is involved in productive activities and that the distribution of economic gains is equitable and fair. The 0.25 standard deviation suggests that inclusive growth results are more widely distributed in UMI nations.

The distribution of inclusive growth data across all income groups is essentially normal, according to the Jarque-Bera statistics and p-values, with p-values surpassing the standard threshold of 0.05. The findings also reveal that UMI countries had the highest mean of 5.00 on the Digital Economy Index (DEI), a sign of more advanced infrastructure for the digital economy. This result suggests that higher-income countries allocate more funds to developing digital infrastructure. The UMI nations have a standard deviation of 1.20, indicating more significant variability in the expansion of the digital economy within this group.

Table 3. Descriptive Statistics by Income Category

Variable	Income Category	Mean	Standard Deviation	Minimum	Maximum	Jarque-Bera Statistic	p-value
IG	LI	0.78	0.15	0.50	1.10	3.50	0.17
	LMI	1.05	0.20	0.70	1.40	4.20	0.12
	UMI	1.30	0.25	0.90	1.80	5.00	0.08
DEI	LI	2.50	0.80	1.00	4.00	6.00	0.05
	LMI	3.70	1.00	2.00	5.00	4.50	0.10
	UMI	5.00	1.20	3.00	7.00	3.80	0.15
GCF	LI	12.0	3.0	8.0	18.0	2.50	0.29
	LMI	20.0	4.5	14.0	28.0	4.00	0.13
	UMI	30.0	6.0	22.0	40.0	3.60	0.16
FDI	LI	1.5	0.6	0.5	3.0	4.10	0.11
	LMI	3.0	1.0	1.0	5.0	3.90	0.14
	UMI	5.0	1.5	3.0	8.0	3.70	0.16
LF	LI	45.0	10.0	30.0	60.0	2.90	0.23
	LMI	55.0	12.0	40.0	70.0	4.00	0.12
	UMI	65.0	15.0	50.0	85.0	3.80	0.15

Source: Author's computation using Stata Version 17, (2024).

Foreign Direct Investment (FDI) and Gross Capital Formation (GCF) likewise exhibit rising trends from LI to UMI countries, with the UMI group exhibiting more excellent means and standard deviations. This result indicates that UMI nations have made more significant capital investments and drawn more foreign investments. The distributions of GCF and FDI, according to the Jarque-Bera statistics, do not significantly differ from regular. In addition, compared to LI and LMI countries, UMI countries have the most prominent mean and standard deviation in labor force data. This result indicates that these countries have a larger workforce and more fluctuation in job conditions. Gross Capital Formation (GCF) and Foreign Direct Investment (FDI) are trending upward from LI to UMI countries, with UMI countries exhibiting more considerable means and standard deviations. This result implies increased foreign investment as well as more considerable capital expenditures. With p-values more significant than 0.1, the distributions of FDI and GCF do not deviate substantially from the mean. Compared to LI and LMI nations, UMI countries have the most significant labor force statistics mean and standard deviation.

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Table 4 presents the Sargan – Hansen test of over-identifying restrictions, which determines the most suitable and efficient technique for estimating the model between the difference GMM and the system GMM. Table 4 summarizes the pooled regression, fixed effect, and difference-GMM results. The estimated results are robust because they corrected for heteroscedasticity and auto-correlation problems. According to Bond (2001), to choose between System-GMM and Difference-GMM, there is a need to estimate the models with the dependent variable lag to obtain the coefficient by Pooled regression, Fixed effects, and Diff-GMM methods. From the result, the coefficient of Diff-GMM of 0.7934 is closer to the coefficient of Fixed effects of 0.8461 than that of Pooled regression of 0.9592. Thus, the SGMM was found to be a better estimator than the difference-GMM.

Table 4. Choice of System-GMM and Difference-GMM

Variable	Pooled	Fixed Effects	Diff – GMM
$EG_{i,t-1}$	.959184**	.8461365**	.79337
$DEI_{i,t}$	-.0035205	-.0027469	-.026986
$GCF_{i,t}$	-.0003066	-.0022976	-.002797
$FDI_{i,t}$	-.0008235	-.000294	-.0013427
Constant	.0117219	.0666874***	.0894438
N	560	560	501
R^2	0.9498	0.9493	-
F-stat	676.77**	368.70**	1003.76**

Source: Author's computation; Dependent Variable: $IG_{i,t}$
Note: *, ** and *** show significance at 1%, 5% and 10% respectively.

Table 5 presents the Arellano and Bond (1991) System Generalized Method of Moments (SGMM) regression, which provides a summary of the analysis of the effects of the digital economy on inclusive growth in the selected African countries. Table 5 shows the summary of results for the SGMM. The result reveals that the model is correctly specified and linearly a good fit. Again, the AR-1 and AR-2 show that the model is free from the auto-correlation problem. Similarly, the Hansen value and the Wald chi-squared tests show that the models are statistically significant and free from the proliferation of instruments. The lag effect of economic growth on the current economic growth was found to be positive and significant. This result means that the past strongly affects the current year. Thus, previous inclusive growth activities in Africa for LMI, LI, and UMI countries are strong determinants of the current inclusive growth.

The digital economy index (DEI) has a positive effect on inclusive growth in all countries in Africa. This result means that the digital economy has a positive and significant effect on inclusive growth in the continent. The coefficients for LI and LMI nations are 0.0020 and 0.0012, respectively in Algeria, Kenya, Nigeria, Angola, Ghana, Cameroon, and Zambia. It is, however, 0.0008 in UMI nations such as Namibia, South Africa, Gabon, Namibia, and Botswana. This result demonstrates that the influence of the digital economy on inclusive growth is more potent in LI and LMI countries.

Considering the control variables incorporated in the estimations, the study discovered that foreign direct investment (FDI) significantly affects inclusive growth in UMI countries as it enhances productivity and economic opportunities. However, its impacts are negligible in LI and LMI countries, suggesting that FDI is more helpful in economies better prepared to leverage such investments. The labor force (LF) has a negative impact on inclusive growth in LI and LMI countries, implying that labor force expansion may not be a direct driver of inclusive growth due to concerns with employment quality or labor market inefficiencies. The Gross Capital Formation (GCF) coefficients vary in significance across income categories, for lower- and upper-middle-income countries, implying that capital formation increases have a more noticeable and quantifiable effect on inclusive growth in these economies.

Table 5. Two-Step (Robust) SGMM Regression: Inclusive Growth (IG), Digital Economy Index (DEI), Gross Capital Formation (GCF), Labour Force Participation (LF), and Foreign Direct Investment (FDI)

	(ALL)	(LI)	(LMI)	(UMI)
IG	0.752***	0.680***	0.755***	0.790***
	(0.045)	(0.065)	(0.053)	(0.047)
DEI	0.0013*	0.0020**	0.0012	0.0008***
	(0.0007)	(0.0008)	(0.0006)	(0.0009)
GCF	0.0035*	0.0011	0.0032**	0.0041*
	(0.0021)	(0.0018)	(0.0015)	(0.0020)
FDI	0.0018	0.0005**	0.0016	0.0020**
	(0.0012)	(0.0009)	(0.0010)	(0.0011)
LF	-0.0023***	-0.0031*	-0.0019	-0.0020
	(0.752)	(0.0013)	(0.0011)	(0.0017)
Constant	-0.054*	-0.085	-0.048	-0.023*
	(0.058)	(0.070)	(0.062)	(0.074)
No of observations	851	332	414	105
No. of countries	37	12	18	7
No. of instruments	72	72	72	72
Hansen (p-value)	0.123	0.075	0.098	0.211
AR1 (p-value)	0.021	0.030	0.025	0.045
AR2 (p-value)	0.178	0.201	0.156	0.214
F- stat	1682.34**	-	3150	3129*
F (p-value)	0.0000	-	0.0020	0.0011
Wald chi2	23456.78	7851.25	14124.67	8231.44
Chi2 (p-value)	0.0000	0.0000	0.0000	0.0000

Source: Author's computation; Dependent Variable: $IG_{i,t}$
Note: *, ** and *** show significance at 1%, 5% and 10% respectively.

In general, Table 5 shows the empirical results obtained from model estimates when evaluating the effects of the digital economy on inclusive growth in Africa. The above findings are for the primary sample of selected African counties (ALL) as well as

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the subsamples: low-income (LI), lower-middle-income (LMI), and upper-middle-income (UMI) from 2000 to 2022. The effects of the digital economy on inclusive growth in selected African countries are positive and significant for all income categories. These findings are similar to those of Olofin (2023), Adeleye et al. (2023), Zhang et al. (2022), and Bahrimi and Qaffas (2019), who found that while developments in the digital economy influence inclusive growth, it is relatively moderate. Similarly, the findings reveal varying degrees of influence of the digital economy on inclusive growth across different African income categories. It positively affects inclusive growth, which is 0.08 percent in UMI nations, 0.1 percent in LMI countries, and 0.2 percent in LI countries. This result implies that the digital economy may be used as a catalyst for inclusive growth, especially in LI and LMI nations. In UMI countries, however, the benefits of improvements in the digital economy on inclusive growth may be less pronounced or obscured by other factors. In such countries, where other economic drivers may take precedence, digital advancements may not be as revolutionary, even though they are still important.

The Gross Capital Formation (GCF) coefficients show varying degrees of significance across income categories suggesting that increases in capital formation have a more notable and quantifiable effect on inclusive growth in these economies. This result emphasizes the significance of physical capital investment as a vital engine of economic growth, especially in developing countries where capital accumulation is essential to realizing full economic potential. Though the effect is statistically significant in LI, it is unimportant. This result suggests that although capital formation is important, its effect on growth may be less pronounced in these economies because additional capital investments are necessary to effectively take advantage of growth opportunities. In upper-middle-income nations, foreign direct investment (FDI) has a positive impact on inclusive growth. This implies that FDI, which can increase productivity and economic prospects, plays a significant role in developing economies in more developed nations. FDI may contribute to growth, but its effects are not statistically significant in lower-income and lower-middle-income nations. This result suggests that FDI is more beneficial when the economy is better suited to leverage such investments. Labour Force (LF) negatively affects inclusive growth in lower-middle-income nations. This result implies that labor force growth may not be a direct driver of inclusive growth in these economies due to issues with the quality of employment or labor market inefficiencies that could counteract the benefits of an expanding labor force. In contrast, the labor force effect is insignificant in other income categories, suggesting that a more complex relationship varies depending on the economic situation between changes in the labor force and inclusive growth.

These findings support and reinforce many African governments' attempts to increase digital technology adoption to promote inclusive growth throughout the continent. For example, governments through public-private partnerships in Cameroon, Angola, Botswana, Ghana, Kenya, Nigeria, South Africa, Algeria, and Zambia are increasing their investments in digital infrastructure. They provide continuous internet connectivity for citizens, enhance broadband accessibility, and promote mobile technology to expedite the acceptance and spread of mobile technological services. Consequently, enhanced mobile coverage makes it simpler for the African digital economy to develop and support inclusive growth.

The findings of this research also validate earlier theoretical studies that proposed that the digital economy should promote inclusive growth by accelerating the adoption and development of innovation processes and, in turn, fostering competition that leads to the creation of new goods, procedures, and business models (Schumpeter, 1911; Solo-Swan, 1956; Romer, 1990; Mgadmi et al., 2021). Furthermore, these results align with most of the prior empirical studies confirming the significant positive effect of the digital economy on inclusive growth in the selected African nations, indicating that economies that have had widespread access to digital technologies have experienced more robust growth (Kouladoum, 2023; Adeleye et al., 2023; Olofin, 2023; Solomon & Van Klyton, 2020; Dubey et al., 2019; Bahrimi & Qaffas, 2019).

CONCLUSION

This study holds significant importance as it explores the effects of the digital economy on inclusive growth in selected African countries from 2000 to 2022. The varying significance of the digital economy across different income categories suggests that the digital economy is particularly influential in LI and LMI countries. Digital infrastructure and service improvements for these countries reveal a more significant impact on inclusive growth. This result indicates that the digital economy can act as a catalyst for inclusive growth in these nations. Conversely, in UMI countries, the impact of the digital economy is less pronounced, suggesting that in more advanced economies, the benefits of further digital improvements might be overshadowed by other growth factors or may exhibit diminishing returns.

The role of Gross Capital Formation (GCF) and Foreign Direct Investment (FDI) further illuminates the nuanced effects of different economic drivers on inclusive growth. Capital formation emerges as a critical factor in transitioning economies (LI and LMI), while FDI plays a more significant role in relatively advanced economies (UMI). The negative effect of the Labour Force (LF) on inclusive growth in LI and LMI countries highlights potential challenges related to employment quality and labor market inefficiencies in Africa. Overall, the findings imply that the digital economy has a effect on inclusive growth in the continent.

These results carry significant implications for policy and strategy in Africa. Therefore, tailoring digital and economic policies to the specific needs of different income categories can enhance their effectiveness, ensuring that digital transformation fosters inclusive growth in diverse economic environments. Prioritizing investments in digital infrastructure and services in these countries is imperative since the digital economy significantly affects inclusive growth in these regions. Expanding internet access and broadband subscriptions, enhancing digital literacy, and encouraging the population›s acquisition of digital skills should be the main priorities for policymakers.

Similarly, strategic capital formation and investment policies are crucial for inclusive growth in both LMI and UMI countries. Encouraging efficient capital formation and attracting quality and vital foreign investments is essential. This policy includes fostering a conducive environment for private sector investment, enhancing infrastructure, and

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allocating capital expenditures to industries that promote inclusive and sustainable growth. Incentives and regulatory changes can also help attract and retain international capital. Finally, since the labor force has a negative effect on inclusive growth, LI and LMI economies must address labor market inefficiencies. Policymakers may raise the quality of employment by providing financing for education and training initiatives, enhancing regulations, and establishing respectable job possibilities with decent remuneration and working conditions.

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http://journal.uinjkt.ac.id/index.php/signifikan
https://doi.org/10.15408/sjie.v13i2.41545

Signifikan: Jurnal Ilmu Ekonomi
Volume 13(2), 2024: 327 - 346
P-ISSN: 2087-2046; E-ISSN: 2476-9223
https://doi.org/10.15408/sjie.v13i2.41998

The Effect of Financial Deepening on Economic Growth in Indonesia

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JEL Classification:
O10
O44
C32
E31
F13
F24

Received: 21 October 2024

Revised: 10 November 2024

Accepted: 15 November 2024

Available online: December 2024

ABSTRACT

Research Originality: This study presents a new interaction between the independent variable financial deepening by adding the inflation control variable as a monetary variable, trade openness and remittances as non-monetary variables, and a dummy variable to see the influence of the pandemic period and not the COVID-19 pandemic period on economic growth.

Research Objectives: This research aims to determine the effect of financial deepening on economic growth in Indonesia.

Research Methods: This research uses quarterly time series data in Indonesia from 2010-2023 and selects an Error Correction Model (ECM) and Robustness Test model.

Empirical Results: Research findings show that financial deepening in the long term and short term has a negative effect on economic growth. This happens because financial deepening in Indonesia is still relatively low, at around 40 percent. The trade openness and remittance variables have a positive effect on economic growth, while the dummy COVID-19 variable in the long term has a negative effect on economic growth.

Implications: This study implies that the government needs to improve effective coordination in facing challenges in the financial sector and set targets to encourage financial deepening so that financial inclusion can be achieved.

Keywords:
economic growth; financial deepening; inflation; trade openness; error correction model (ECM).

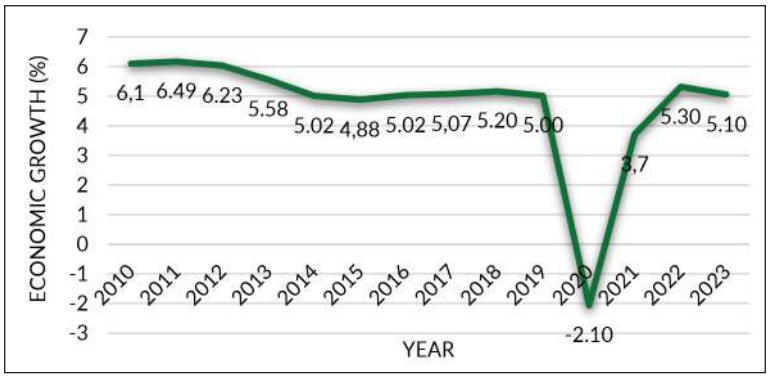
How to Cite:
Astutik, Y., & Nugroho, R. Y. Y. (2024). The Effect of Financial Deepening on Economic Growth in Indonesia. *Signifikan: Jurnal Ilmu Ekonomi*, *13*(2), 327-346. https://doi.org/10.15408/sjie.v13i2.41998.

INTRODUCTION

Economic growth in a country can be seen from increasing gross domestic product supported by financial sector stability. A monetized economy with a well-developed financial system is a prerequisite for growth and development. Miskhin and Eakins (2009) state that the financial sector has an important role by carrying out an intermediary function in stabilizing and advancing the economy. Therefore, the role of financial deepening in driving growth cannot be ignored. Theoretically, the financial system consists of institutions, instruments, and regulators that interact continuously to increase the effectiveness of this sector in maintaining growth and development (Okafor & Lilian, 2022).

In general, economic growth experienced fluctuations from 2010 to 2023, as shown in Figure 1. Indonesia's GDP in 2019 was recorded at 5 percent and experienced a drastic decline in 2020 of -2.10 percent due to the COVID-19 pandemic. This data shows that unexpected factors can influence economic growth, such as the COVID-19 pandemic, which causes economic growth to experience a recession. Economic growth will slowly return to growth in 2021 by 3.70 percent and decline in 2023 by 5.10 percent from the previous year.

Figure 1. Development of Indonesia's Economic Growth 2010-2023



Source: Bank Indonesia (2024)

The relationship between finance and economic growth has been described across economic studies as tending to differ substantially, which may be due to differences in market features, structure, and size (Hondroyiannis et al., 2005). This relationship has two basic theoretical arguments in the literature: the demand-following and supply-leading hypotheses (Chettri, 2022). This hypothesis ultimately leads to financial development and is theoretically and empirically supported by many researchers. A less efficient financial system causes economic growth to be hampered and money circulation to be reduced. The demand-following hypothesis argues that economic growth will create demand for financial services and instruments. This hypothesis ultimately leads to financial development and is theoretically and empirically supported by many researchers (Ang & Mckibbin, 2007; Apergis et al., 2007).

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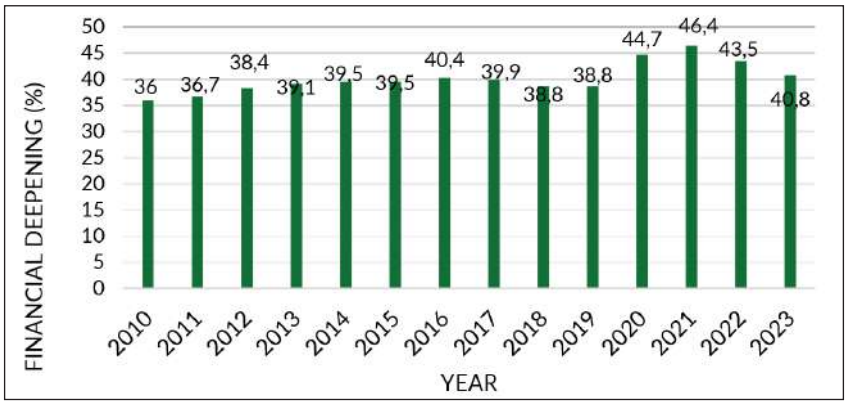
Financial deepening is an increase in volume in an economy's financial sector, which can include the total number of banks, financial instruments, financial organizations, and financial markets (Lei et al., 2022). Financial deepening can increase credit and capital, stimulate entrepreneurial activities, and reduce financing barriers for small and medium businesses in an economy (Beck, 2013a). Important empirical research that establishes the relationship between finance and growth is King and Levine (1993), then expanded by Barro (1991) with a cross-country framework by adding financial variables such as liquidity obligations in the private sector to gross domestic product (Rousseau & Wachtel, 2009).

Figure 2 below explains the development of Indonesia's financial deepening, which is taken from the M2/GDP value. Financial deepening in 2010 amounted to 36 percent and increased until 2016, amounting to 40.4 percent. Financial deepening in 2020 increased again to 44.7 percent and decreased in 2022 by 43.5 percent and 40.8 percent in 2023. Economic transactions, which continue to grow amidst economic recovery after the pandemic, can be a synergy in accelerating economic growth by strengthening the monetary and fiscal policy mix.

Figure 2. Development Financial Deepening Indonesia 2010-2023



Source: World Bank, (2023)

The increasing number of financial instruments and institutions in Indonesia does not mean that all people use these financial services. Shadow banking or irresponsible finance can occur due to financial activities outside official banking institutions. Digital-based financial crimes committed by irresponsible individuals are also widespread, including sending dangerous website links or malware, OTP code fraud, data theft, and other digital-based crimes that can harm society. The COVID-19 pandemic has also become a condition that hampers economic growth because people's purchasing power and income have decreased, and many workers have experienced layoffs.

Trade openness, which is taken from the value of exports minus imports divided by GDP, also has the potential to increase economic growth by providing access to goods and services, achieving resource allocation and efficiency, and increasing productivity through knowledge and technology (Barro & Sala-i-Martin, 1995). Countries with higher trade openness are predicted to perform better than countries with lower trade openness

(Keho, 2017). Trade openness can expand markets and increase income if the export value exceeds the import value.

Remittances or money transfers made by international immigrants to families from their country of origin in the short term allow the recipient family to consume more, generating household economic growth. In the long term, remittances can encourage economic growth if funds are invested (Sanchez, 2022). Remittances from immigrants can also promote the stability of the balance of payments in the country of origin and become a source of state finances.

Making reasonable and appropriate financial policies can increase economic growth over time. Inappropriate economic sector policies cause a mismatch in the volume of loans and those lent. This discrepancy can be subsidy funds, bailouts, or unique behavior between one sector and another. Behavior like this can distort the accumulation process, reducing economic achievements in the long term (Bhattarai, 2015).

In their research, Acedański and Pietrucha (2019) aim to determine the role of the level and dynamics of financial deepening on GDP fluctuations. The test model uses the GMM (Generalized Method of Moments) method and the SAR (Spatial Autocorrelation) model. The research results show that the role of the level of financial deepening consistently has a non-linear relationship. Higher levels of financial deepening are associated with higher volatility when the financial deepening measure exceeds 96–124 percent of GDP. The dynamics of higher financial deepening as measured by private credit can increase GDP volatility in many countries over the last 45 years.

Research conducted by Wasiaturrahma et al. (2019) aims to analyze the impact of financial deepening on economic growth in Indonesia from 1975 to 2016. The test model uses a combination of the ARDL test to determine the long-term effect and the ECM test to determine the short-term effect. The research results show that financial deepening significantly negatively impacts Indonesia's economic growth. The variables of government spending, money supply, and trade openness have a simultaneous influence. However, only the trade openness variable significantly influenced Indonesia's economic growth during the research period.

Putri and Mubin (2021) research aims to analyze the effects of financial deepening, exchange rates, and interest rates on economic growth in Indonesia from 2010 to 2019 using the VECM method. The results show that exchange rates and interest rates negatively interact with economic growth, while financial deepening has a significant negative long-term effect on economic growth.

Researchers such as Acedański and Pietrucha (2019), Wasiaturrahma et al. (2019), and Putri and Mubin (2021) have gaps in their methods, samples, and results. This fact shows that each study is different. Based on the differences in research, this study was carried out by developing several things, such as sample type, period, and methods used. This difference contributes to financial deepening so that gaps in previous research can be supported.

Financial problems that occur can affect economic growth. This condition makes researchers interested in researching the influence of financial deepening on economic

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growth in Indonesia. The development of this research uses independent variables in the form of financial deepening with the M2/GDP indicator, as well as adding control variables, namely inflation as a monetary variable, trade openness and remittances as non-monetary variables, as well as dummy variables to see the influence of the pandemic period and not the Covid-19 pandemic period on Indonesia's economic growth from 2010-2023. The author chose quarterly time series data because several previous researchers focused on using annual data in the M2/GDP variable for financial deepening. The research uses control variables in the form of non-monetary variables, such as trade openness and remittances, because most of the empirical studies used in this research only use monetary variables. Based on previous issues and research that have not received much attention regarding financial deepening in Indonesia, the author is interested in conducting this research.

METHODS

This research uses quantitative analysis with secondary data from quarterly and time series data in Indonesia's country from 2010-2023. Research data comes from the websites of Bank Indonesia and Badan Pusat Statistik. The data set includes economic growth as the dependent variable, financial deepening as the independent variable, and control variables are inflation, trade openness, remittances, and dummy COVID-19. Economic growth data uses the economic growth rate in the form of annual percentage changes (year-on-year/yoy). Financial deepening data uses a monetization measure called M2/GDP. Inflation data uses Bank Indonesia's inflation data as percentages based on changes in the Consumer Price Index. Trade openness data uses data on the total value of exports plus imports divided by GDP. Remittance data uses the value of the total remittances of Bank Indonesia in millions of USD, then converts it into rupiah by multiplying the exchange rate against the rupiah. Meanwhile, the dummy COVID-19 data uses the values 0 (not during the pandemic) and 1 (during the pandemic).

This research uses the ECM (Error Correction Model) analysis techniques. ECM is a statistical test tool used to determine the effect of independent variables on dependent variables in the short and long term. ECM data analysis aims to determine whether the time series data has a long-term balance. ECM estimation is carried out after conducting a data stationarity test and a cointegration degree test. Research that uses the ECM method must use variables that are not stationary at the level; then, it can be continued at the degree of integration test stage. The cointegrated test results show that the tested residue is stationary if the residual value is lower than the error rate. After the test is carried out, it is discovered that there is cointegration. The next process is carried out using the error correction method. The ECM estimation model in the long term can be explained in the following model:

$$Y_t = \alpha_{11} + \beta_{12} FD_t + \beta_{13} INF_t + \beta_{14} TO_t + \beta_{15} LnREM_t + e_t \quad (1)$$

Remittance data is converted into natural logarithm form to equate units with other variables. Converting data into logarithmic form is carried out on data with different

units to obtain stationary data. Meanwhile, control variables are used to prevent biased calculation results. Variables with a long-term relationship (cointegration) can be suspected that in the short term, the variables do not have an equilibrium relationship, so in the short term, a model correction needs to be carried out. This can be done by using the residuals obtained from the previous stage so that the variables can return to the process toward long-term balance. The ECM model in the short term can be written with the equation below:

$$Y_t = \alpha_{11} + \beta_{12}\Delta FD_t + \beta_{13}\,\Delta INF_t + \beta_{14}\Delta TO_t + \beta_{15}\Delta LnREM_t + \beta_{16}ECT_{t-1} + e_t \quad (2)$$

The robustness test used to determine the robustness of the model of a variable. This resilience is analyzed by loading beta (β) data. The robustness test in this research is used to test the independent variable that is added as a dummy to the dependent variable, namely economic growth during the pandemic and not during the pandemic. The long-term estimation model used in this research is as follows:

$$Y_t = \alpha_{12} + \beta_{22}FD_t + \beta_{23}\,INF_t + \beta_{24}TO_t + \beta_{25}LnREM_t + \beta_{26}Dummy_t + e_t \quad (3)$$

Meanwhile, the short-term model can be shown in the following model:

$$Y_t = \alpha_{12} + \beta_{22}\Delta FD_t + \beta_{23}\,\Delta INF_t + \beta_{24}\Delta TO_t + \beta_{25}\Delta LnREM_t + \beta_{26}\Delta Dummy_t + ECT_{t-1} + e_t \quad (4)$$

Where: α: Constant; β: Slope of the independent variable; Ln: Natural logarithm; Y_t: Economic growth; FD: Financial deepening; INF: Inflation; TO: Trade Openness; REM: Remittance; Dummy: Dummy Covid-19; e_t: Interference with white noise; Δ: first difference; ECT: Error Correction Term; t: Time period. If the ECT error coefficient value is statistically significant, then the ECM specification model used in testing is valid.

RESULTS AND DISCUSSION

The results of this research are based on data analysis carried out using the ECM test analysis method and the Robustness test. The results show that financial deepening in the long term and short term has a negative effect on economic growth. The inflation variable in the research period did not significantly affect economic growth in the long term and short term. Trade openness has a positive effect, both in the short and long term. In the long term, remittances have a positive effect on economic growth. In the long term, the dummy Covid-19 variable has a negative effect on economic growth. Meanwhile, the robustness test found that the long-term model was stronger than the short-term model.

Descriptive statistics are used to provide a general description of the characteristics of research data without concluding. Descriptive statistics are the initial part of starting data testing. Descriptive statistics in this study are presented in the form of mean, median, maximum data, minimum data, and standard deviation for each variable studied. This research uses real GDP, financial deepening, inflation, trade openness, remittances, and the dummy Covid-19. This research uses data from 2010-2023 in a quarterly format. The following are the results of descriptive statistical tests in Table 1.

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Table 1 shows that 56 data points from each variable were used in the research. The dependent variable, economic growth (Y), has a mean value of 4.74 with a standard deviation 2.32. The independent variable financial deepening (FD) has a mean value of 152.70 with a standard deviation 12.24. Financial deepening improves the financial sector by increasing the services and volume of financial instruments and institutions available on the financial market. The inflation variable (INF) has a mean of 4.25 with a standard deviation of 1.88. Since the 1970s, monetary policy has begun to play a significant role in fighting inflation. Stable and on-target inflation is very important to stabilize economic growth. Trade openness uses the indicator exports plus imports divided by GDP. The trade openness (TO) variable has a mean of 43.01 with a standard deviation of 5.49. The increasingly rapid development of globalization has encouraged many countries to carry out international trade, which each country can use to increase economic growth.

Table 1. Descriptive Statistics

Variable	Mean	Median	Maks.	Min.	Std. Dev
Y	4,74	5,10	7,10	-5,30	2,32
FD	152,70	152,25	175,70	127,40	12,24
INF	4,25	3,75	8,40	1,33	1,88
TO	43,01	43,21	53,90	30,48	5,49
LnREM	17,19	17,23	17,85	16,49	0,38
DUMMY	0,23	0,00	1,00	0,00	0,42

Source: Author Computation (2024)

The remittance variable (LnREM) has a mean of 17.19 with a standard deviation of 0.38. Remittances are money transfers made by migrant workers from abroad to their home country. Remittances are one of the foreign exchange contributors to a country's development and contribute to economic growth. Furthermore, the dummy has a mean of 0.23 with a standard deviation of 0.42. A dummy variable is used to quantify a qualitative variable that is thought to have the influence of a variable with continuous properties (Gujarati & Porter, 2009). Dummy variables are used to see whether the pandemic period or not the COVID-19 pandemic period affects the economic growth variable.

Table 2. Root Test Results at Grade Level

Variable	ADF Statistic	Critical Value			p-value	Explanation
		1%	5%	10%		
Y	-2.966	-3.573	-2.926	-2.598	0.6326	Not Stationary
FD	-1.958	-3.573	-2.926	-2.598	0.3055	Not Stationary
INF	-2.266	-3.573	-2.926	-2.598	0.1832	Not Stationary
TO	-2.244	-3.573	-2.926	-2.598	0.1907	Not Stationary
LnREM	-1.059	-3.573	-2.926	-2.598	0.7310	Not Stationary
DUMMY	-	-	-	-	-	-

Source: Author Computation (2024)

The stationarity test is carried out as a first step before testing the ECM model. The stationarity test was carried out on all variables except dummy variables. The stationarity test is used to see that the regression results do not contain spurious regression. The test results shown in Table 2 show that no variables are stationary at grade level because the statistical ADF value is lower than the critical values of 1 percent, 5 percent, and 10 percent. Meanwhile, the value of the p-value analysis results for all variables is more than 0.05, which means the data is not stationary. The stationary test continues at the first difference stage, shown in Table 3 below. The results show that all variables at this stage have statistical ADF values higher than the critical values of 1 percent, 5 percent, and 10 percent, so they are said to be stationary. The p-value in this test is 0.0000<0.05, which means the data is stationary.

Table 3. First Difference Level Root Test Results

Variable	ADF Statistic	Critical Value			p-value	Explanation
		1%	5%	10%		
Y	-8.231	-3.574	-2.927	-2.598	0.0000	Stationary
FD	-8.083	-3.574	-2.927	-2.598	0.0000	Stationary
INF	-8.460	-3.574	-2.927	-2.598	0.0000	Stationary
TO	-9.604	-3.574	-2.927	-2.598	0.0000	Stationary
LnREM	-7.554	-3.574	-2.927	-2.598	0.0000	Stationary
DUMMY	-	-	-	-	-	-

Source: Author Computation (2024)

The cointegration test used in the research uses the Engle-Granger test by creating residuals from the statistical regression results. Test results with cointegrated time show that the tested residue is stationary if the residual value is lower than the 5 percent error rate. Table 4 below shows the results of the cointegration test from the ADF stationarity test at level levels, which shows the statistical ADF value is greater than the critical value and the p-value is smaller than 0.05. These results are stationary, so it can be concluded that there is cointegration or a long-term relationship between variables. So, the ECM model can be continued because cointegration has been fulfilled.

Table 4. Engle-Granger Cointegration Results

Variable	ADF Statistic	Critical Value			p-value	Explanation
		1%	5%	10%		
ECT	-4.361	-3.573	-2.926	-2.598	0.0003	Stationary

Source: Author Computation (2024)

The cointegration test results showed cointegration between variables so that the ECM model could be continued. ECM estimates are used to analyze this research,

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provide information, and draw conclusions. This ECM estimate was carried out to test and analyze financial deepening in encouraging economic growth in Indonesia. After carrying out the stationarity and cointegration tests, the long-term and short-term ECM tests are continued. Therefore, the ECM test results are shown in Tables 5 and 6, which will be analyzed in the discussion of the ECM results. An empirical study conducted by Beck (2013) refers to efforts to improve the financial sector by increasing the volume of financial transactions in an economy. Several indicators are used to measure financial deepening. The measure of monetization in measuring financial deepening is following the empirical literature from King and Levine (1993) using M2/GDP.

Table 5. Long Term ECM Test Results

Variable	Coefficient	Std. Error	t-Statistic	Prob	Explanation
FD	-0.1103285	0.0260474	-4.24	0.000	Stationary
INF	-0.0813899	0.1530938	-0.53	0.597	Not Stationary
TO	0.2377596	0.0552226	4.31	0.000	Stationary
LnREM	2.452043	0.7865157	3.12	0.003	Stationary
C	-30.44846	12.7304	-2.39	0.020	Stationary

Source: Author Computation (2024)

The ECM model estimation results show that FD has a negative effect on economic growth in the long term and short term. The research results show that the coefficient of the FD variable in the long term is -0.1103285, which means that when FD increases by 1 percent, economic growth will decrease by 0.11 percent. The short-term research results show that the FD coefficient is -0.1146815, which means that when FD increases by 1 percent, economic growth will decrease by 0.11 percent.

Table 6. Short Term ECM Results

Variable	Coefficient	Std. Error	t-Statistic	Prob	Explanation
FD	-0.1146815	0.0386701	-2.97	0.005	Stationary
INF	0.1763119	0.1684143	1.05	0.300	Not Stationary
TO	0.220683	0.0666214	3.31	0.002	Stationary
LnREM	2.773247	1.830713	1.51	0.136	Not Stationary
ECT	-0.5381639	0.1252316	-4.30	0.000	Stationary
C	0.0089672	0.1963076	0.05	0.964	Not Stationary

Source: Author Computation (2024)

Fajeau (2021) analyzed the relationship between finance and economic growth by providing alternative estimates that support the hypothesis that overall financial deepening has more negative impacts than benefits. This study contributes to the literature establishing a negative relationship between finance and growth globally. The relationship

between finance and growth has deteriorated over time. The ongoing liberalization process has caused many countries to experience financial difficulties. An inadequate sequence of reforms may cause these adverse impacts regarding inappropriate supervision and regulation of the financial system.

Bank Indonesia (2009) stated that the M2/GDP ratio in Indonesia is still relatively low because currently, it is only around 40 percent (< 50 percent), which shows that financial deepening is still shallow. Countries in ASEAN, such as Singapore, Malaysia, Thailand, and Cambodia, have deep financial deepening because they have reached 100 percent (World Bank, 2023). The low income of the Indonesian people and the recovery after the COVID-19 pandemic are some of the causes of low levels of consumption of goods and services, which, in the end, can put pressure on national income.

An increase in economic growth causes financial deepening, which shows a downward trend, and vice versa. This fact supports a negative relationship between economic growth and financial deepening because the financial system in Indonesia is still shallow. The financial system is not yet fully capable of encouraging the country's economic growth through a financial deepening strategy (Putri & Mubin, 2021).

According to research results, financial deepening negatively affects economic growth in the short term. These results follow research by Wasiaturrahma et al. (2019), which shows that financial deepening negatively impacts economic growth. The level of monetization can be seen from the amount of people's money in banks, both savings and current accounts. The United States payment technology company, in its 2023 Visa study, released that 80 percent of people still use cash to make transactions.

The importance of financial literacy that needs to be instilled in all levels of society can align with the concept and comprehensive understanding of the technology or financial infrastructure used. Digital crime and shadow banking can also occur on financial technology (fintech) platforms that the OJK does not license. Unofficial economic activities tend to hinder the smooth functioning of the official economy. The impact of the COVID-19 pandemic could also be the cause of a reduction in the amount of money in circulation because many workers were laid off, consumption decreased, investment decreased, and a large amount of funding was spent to handle COVID-19.

Financial deepening has a more substantial negative effect in high-income countries with an impact that may increase growth in the early stages of development. From a policy perspective, stating that financial deepening is not relevant to growth but instead encourages better alignment between the financial system and economic needs, making the financial system more resilient, will reduce the negative impact of financial deepening on economic growth. Policymakers should strengthen credit constraints to limit excessive financial credit expansion (Fajeau, 2021).

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The more sustainable and profound the development of the financial sector, the greater the ability to achieve sustainable economic growth, because there are significant and varied sources of investment funding support, even though in 2020, there was an increase in financial deepening, which reached 44.7 percent, it cannot be said that there was an increase in financial deepening. This condition could happen because of the significant increase in M2 in 2020, accompanied by an economy experiencing a decline due to COVID-19.

The economic slowdown due to Covid-19 has also caused a reduction in payment activity. Cash payments experienced a contraction in line with the implementation of large-scale social restrictions, thereby reducing mobility and public demand for cash transactions. This results in a lower volume and value of non-cash payments made with ATMs, debit cards, credit cards, and electronic money. Digital banking experienced a decline in value and volume during the first semester of 2020. Several positive developments emerged during the pandemic, namely increasing public demand for digital platforms and instruments through shopping on e-commerce platforms (Bank Indonesia, 2020).

Inflation is an important indicator and must be kept stable to reduce instability in an economy. Low inflation is a prerequisite for a country to achieve macroeconomic targets, such as providing extensive employment opportunities and increasing economic growth. Choosing a stable level of inflation is the final target in Indonesia's monetary policy, which is based on the reality that a high level of inflation can cause instability and have a negative impact on the economy (Ntirabampa & Iraya, 2019).

The results of inflation show that the results are not significant in influencing economic growth in Indonesia in the long and short term. Most previous literature explains that increasing inflation can hamper economic growth.

The estimation results on the inflation variable show that the results do not significantly influence economic growth in Indonesia. In their research, Razia et al. (2023) show that inflation does not affect economic growth, although inflation ultimately impacts economic growth. This result shows that market price or inflation stabilization is needed through an effective price control mechanism to improve macroeconomic conditions. This strategy can also increase investor confidence and stimulate economic growth so that more output can be produced at lower unit costs, which is expected to achieve sustainability and economic growth. The inflation relationship in the test results during the research period was very weak, but inflation greatly influenced economic growth.

Inflation in recent years has been maintained stable within the inflation target range of 3 ± 1 percent. The government and Bank Indonesia continue to strive to maintain price stability and inflation so that when there is an increase in prices for one or two goods, the government can handle it by strengthening the Control team—central and Regional Inflation and implementing consistent fiscal and monetary policies. The government is also trying to mitigate the risk of inflation by maintaining smooth

distribution and availability of food supplies and anticipating increased demand for goods as the religious holidays approach and the change of harvest season approaches (Haryono, 2024).

Trade openness results from total exports and imports measured as part of gross domestic product to see the relationship between international and domestic transactions. The research results show that TO, in the long term and short term, has a positive and significant effect on economic growth. Based on the estimation results, it is known that the coefficient of the TO variable in the long term is 0.2377596, which means that for every 1 percent increase, it will significantly increase economic growth by 0.23 percent. The short-term estimation results for the TO coefficient are 0.220683, which shows that when there is an increase in TO of 1 percent, it will significantly increase economic growth by 0.22 percent.

These findings further strengthen the theory that increasing trade openness will have a positive impact on improving the economy. These results follow research by Keho (2017) and Omoke et al. (2022), which shows that trade openness increases the national economy significantly and is profitable in line with the development of globalization conditions, thereby encouraging integration between countries. This result follows David Ricardo's theory of comparative advantage, which shows that superior and comparative goods will be exported. Goods with a more expensive production price will be imported.

Trade openness has the potential to increase economic growth by providing access to goods and services, achieving efficiency in resource allocation, and increasing total factor productivity through technology diffusion and the spread of knowledge (Barro & Sala-i-Martin, 1995; Rivera-Batiz & Romer, 1991). Therefore, countries with higher trade openness are expected to perform relatively better than countries with lower trade openness.

Countries that carry out liberalization are required to be able to compete in international markets. Resources will be allocated on a large economic scale and more efficiently. Samuelson and Hecksher-Ohlin developed Ricardo's theory even further. This theory states that countries trade goods and factors contained therein, such as capital and labor. In line with endogenous growth theory, increased liberalization in terms of trade can create capital inflows that can accelerate technology transfer and capital accumulation in the long term. This condition can increase economic growth by increasing the production function and externalities of trade openness (Romer, 1990).

Remittances are money transfers sent to their country of origin by individuals working abroad, such as migrant workers who send money to their families in Indonesia. Remittance has the benefits and convenience of receiving and sending money from within and outside the country by cash or bank transfer. Continuously increasing remittance contributions can strengthen the economy through remittance services. The number of migrant workers with nominal remittances is directly proportional.

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If the number of migrant workers falls, then the aggregate level of remittances also falls.

Long-term research results show that the REM variable positively affects economic growth. Based on research results, the long-term REM coefficient is 2.452043, which means that when remittances increase by 1 percent, economic growth will increase by 0.0245 percent. Meanwhile, the REM coefficient in the short term is 2.773247, which means that when remittances increase by 1 percent, the direction is the same but cannot influence economic growth.

The estimated results of remittances in the long term are positive and significant, following the empirical study conducted by Meyer and Shera (2017), which shows that remittances have a positive impact on growth. This impact increases as the amount of remittances is higher compared to GDP. Remittances are one of the country's most significant foreign exchange contributors, contributing 0.8 percent to 1.07 percent of GDP. Households that receive remittances tend to have a higher standard of living. This condition is because remittance recipients will improve the quality of education and consumption, making them less likely to become poor.

The short-term remittance estimation results are supported by an empirical study conducted by Jui et al. (2024), which shows that remittances do not significantly affect economic growth. The analysis shows that although remittances are a key factor influencing economic performance in the research countries, their influence varies depending on the situation. The study also emphasizes that countries that rely too heavily on remittances are vulnerable to sudden declines in inflows, which can disrupt macroeconomic balance.

Septriani and Ariusni (2021) also support the idea that remittances do not affect economic growth in the short term. This could be because the total number of remittances entering Indonesia has not been fully recorded. Some migrant workers do not send their money through official remittance service institutions. The COVID-19 pandemic and increasing public consumption have meant that most families receive remittances that only have enough to meet their daily needs. High remittance costs are also causing problems when sending money to Indonesia.

Indonesian Migrant Workers have not been free from problems such as the Crime of Human Trafficking because, from year to year, there are still fluctuations in the number of illegal migrant workers, which have not been resolved entirely. The Indonesian Migrant Worker Protection Agency in 2022 noted that from 2019 to 2021, there were many problems faced, such as Indonesian Migrant Workers failing to leave, not complying with work agreements, human trafficking, unpaid salaries, acts of violence from employers, and fraud. For the January-April 2023 period, The Indonesian Migrant Worker Protection Agency recorded 592 complaints about Indonesian Migrant Workers placement.

A valid and good ECM model has a negative ECT value (Insukindro, 1991). The ECT value is smaller than α = 5 percent, so it can be said that the ECT coefficient

is significant. The ECT imbalance correction coefficient in the form of an absolute value describes how quickly or not time is required to obtain an equilibrium value. The estimation results show that the ECT value has a probability of 0.000 < α = 5 percent with an ECT coefficient value of -0.53, so it can be concluded that the model used in the ECM analysis is valid and can be used to correct short-term to long-term imbalances of 53 percent.

Table 7. Long Term Robustness Test Results

Variable	Coefficient	Std. Error	t-Statistic	Prob	Explanation
FD	-0.0716729	0.0327879	-2.19	0.033	Stationary
INF	-0.1129481	0.1492767	-0.76	0.453	Not Stationary
TO	0.2518816	0.0536758	4.69	0.000	Stationary
LnREM	2.252672	0.7601738	2.96	0.005	Stationary
DUMMY	-1.3159	0.7153972	-1.84	0.072	Stationary
C	-33.09446	12.02814	-2.75	0.008	Stationary

Source: Author Computation (2024)

The long-term robustness test results in Table 7 show that the probability of the FD, TO, LnREM and DUMMY variables is significant in the long term. Economic growth only has a positive effect on the TO and LnREM variables and a negative effect on FD, INF and DUMMY. Long-term robustness regression results based on 56 observations obtained from 2010Q1 to 2023Q4 are as follows:

Y = -33,0944 -1,3159DUMMY

se = (12.0281) + (0.7153)

t = (-2.75) + (-1.84)

$(0.008)^{**}$ $(0.072)^{*}$

R^2 = 0.5909

Gujarati and Porter (2009) state three measures of a random variable's central tendency: mean, median, and mode. The long-term average economic growth in this benchmark is around -33.0944. Average economic growth during the pandemic was around -1.3159, with actual average economic growth of [(-33.0944 -1.3159) = -34.4103]. The values added up are then divided by a large number of data (-34.4103/2), and the value obtained is -17.2051, which is the mean of economic growth during the Covid-19 pandemic. The R2 value in the long-term test is 0.5909 percent, which shows that all independent variables simultaneously influence 59.09 percent on economic growth. In comparison, 43.91 percent is influenced by other variables not tested in the research.

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https://doi.org/10.15408/sjie.v13i2.41998

Table 8. Short Term Robustness Test Results

Variable	Coefficient	Std. Error	t-Stat	Prob	Explanation
FD	-0.1152594	0.0382593	-3.01	0.004	Stationary
INF	0.1930744	0.1670451	1.16	0.253	Not Stationary
TO	0.2237815	0.065778	3.40	0.001	Stationary
LnREM	2.770879	1.809898	1.53	0.132	Not Stationary
DUMMY	-0.4326759	0.447139	-0.97	0.338	Not Stationary
ECT	-0.5575066	0.125748	-4.43	0.000	Stationary
C	0.1122025	0.2209564	0.51	0.614	Not Stationary

Source: Author Computation (2024)

The short-term test results in Table 8 above also have almost the same results as the long-term test, namely data instability occurs when a dummy is added. The test results show that only the FD, TO and ECT variables have a significant probability of economic growth. The short-term regression results are as follows:

Y = 0.1122 -0.4326DUMMY

se = (0.2209) + (0.4471)

t = (0.51) + (-0.97)

(0.614) (0.338)

R2 = 0.4422

Average economic growth per year during the pandemic and takes the mean or average of [(0.1122 -0.4326) =-0.3204]. The values that have been added up are then divided by a lot of data (-0.3204/2) and the value obtained is -0.1602, which is the mean of economic growth during the Covid-19 pandemic in the short term. The R^2 value in the short-term test is lower than the long-term, namely 0.4422 percent, which shows that all independent variables simultaneously have an influence of 44.22 percent on economic growth, while 55.78 percent is influenced by other variables not tested in the research.

These results also show that economic growth has a positive effect on TO and LnREM and a negative effect on FD, INF, and DUMMY. However, only the FD, TO, and ECT variables significantly affect economic growth in the short term. The estimation results above also show that the ECT value has a probability of 0.000 < α = 5 percent with an ECT coefficient value of -0.55, so it can be concluded that this model is valid and can be used to correct short-term to long-term imbalances of 55 percent. The robustness test results show that the model is more robust when the dummy is not added. However, before and when the dummy is added, the estimation results only differ in significance. Long-term models are more robust than short-term models.

Dummy variables in the research are used to see the effect of the pandemic and non-pandemic periods on economic growth. The impact of the Covid-19 pandemic on

the economy has been an issue that has been widely discussed since the beginning of 2020. The increasing number of cases has led to the need for urgent action, such as social restrictions. The necessary measures to maintain social distancing force all sectors of activity to reconsider their activities (Zamfir & Iordache, 2022). The research results show that the dummy Covid-19 has a negative and significant effect on economic growth in the long term. In contrast, in the short term, the dummy Covid-19 does not significantly affect economic growth but in the appropriate direction. Based on the robustness test results, the dummy coefficient in the long term is -1.3159, while the dummy coefficient in the short term is -0.4326759.

The dummy COVID-19 estimation results are supported by empirical studies conducted by Huang et al. (2023), which show that changes in the number of deaths due to COVID-19 and restrictions or lockdowns affect economic growth. These empirical studies generally have statistically significant impacts, although the magnitude of these impacts varies depending on the economy and period considered. The direct impact caused by the COVID-19 pandemic is felt in the health, education, social, and economic sectors. The health crisis has caused many deaths due to the COVID-19 virus.

In their empirical study, Barrett et al. (2021) stated that countries with greater pandemic-related fiscal responses are expected to experience smaller losses. The government is reallocating the budget and refocusing activities to speed up the procurement of goods and services and the budget for handling COVID-19. The government also provides a social safety net to increase people's purchasing power through social assistance (Nainggolan, 2021). Boubaker et al. (2023), in their empirical study, stated that the economy may be affected by the strict policies implemented by the government to overcome COVID-19. However, in the long term, there may be major changes in the views of investors and policymakers. Before COVID-19, investors had little consideration regarding the risks of global economic shocks that could still be overcome. COVID-19 is likely to change future risk assessment and forecasting due to its unprecedented global scope.

CONCLUSION

The issue of economic growth is an important topic because it concerns all sectors of life, including the financial sector. The research discusses the influence of financial deepening on economic growth in Indonesia in 2010-2023. The results show that financial deepening in the long term and short term during the research period has a negative and significant effect on economic growth in Indonesia. It is hoped that the importance of financial literacy that needs to be instilled in all levels of society can align with the concept and comprehensive understanding of the technology or financial infrastructure used. Domestic challenges in the financial sector originate from limited sources of long-term economic financing, income gaps, and low levels of productivity, which are obstacles. Simultaneously, stakeholder expectations regarding future financial sector performance will also increase.

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Another conclusion from this research also makes it clear that financial deepening can be encouraged by balanced banking dominance, which can be achieved by encouraging the diversification of financial products. This encourages financial deepening through effective coordination between Bank Indonesia, OJK, and the government. The challenges in the financial sector and the targets that will be achieved to encourage financial deepening and financial inclusion can be achieved well. In addition, Bank Indonesia is expected to increase supervision of financial activities. Financial deepening, which continues to increase, will encourage economic growth and increase economic stability.

It is hoped that the government will continue to increase trade openness by shifting from exports of raw materials and semi-finished goods to high-value-added goods. Remittances are a factor that influences economic growth, so it is necessary to pay attention to protecting Indonesian migrant workers who work abroad. This research also suggests that future researchers who use this topic can add other variables outside the variables studied in this research, for example, using non-monetary variables in the form of a corruption index, government quality, or by adding environmental variables to get more varied results. Future researchers can also increase the research period or use other analytical tools.

ACKNOWLEDGMENT

Thanks to Bank Indonesia for funding this research through the Bank Indonesia Institute (BINS) Research Assistance Program.

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Signifikan: Jurnal Ilmu Ekonomi
Volume 13(2), 2024: 347 - 364
P-ISSN: 2087-2046; E-ISSN: 2476-9223
https://doi.org/10.15408/sjie.v13i2.40929

Education and Mediated Effects on Economic Development of Indonesia

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JEL Classification:
I25
F21
J64

Received: 15 August 2024

Revised: 11 November 2024

Accepted: 15 November 2024

Available online: December 2024

ABSTRACT

Research Originality: This research lies in its comprehensive approach. It utilizes Structural Equation Modeling (SEM) to analyze education levels' direct and indirect impacts on economic growth through various economic indicators.

Research Objectives: This study investigates the impact of primary, secondary, and tertiary education levels on Indonesia's economic growth, specifically examining the mediating effects of Foreign Direct Investment (FDI), credit, exports, and unemployment.

Research Methods: The data from the World Development Indicators (WDI) for 2015-2023 offer a long-term perspective on the trends in education and economic performance in Indonesia.

Empirical Results: The empirical results indicate that none of the mediators significantly influence the relationship between education levels and Gross Domestic Product (GDP) growth. These challenging conventional theories predict a positive impact of education on economic development. This outcome suggests a potential misalignment between Indonesia's educational outputs and labor market demand, underscoring the need for policy reforms.

Implications: The study implies that to foster meaningful economic growth, Indonesian education policy should enhance curriculum relevance and align educational outcomes with key market needs.

Keywords:
education; foreign direct investment; credit; export; unemployment

How to Cite:
Jumhur. (2024). Education and Mediated Effects on Economic Development of Indonesia. *Signifikan: Jurnal Ilmu Ekonomi*, *13*(2), 347-364. https://doi.org/10.15408/sjie.v13i2.40929.

INTRODUCTION

Economies grow at different rates depending on resources and policies. Several studies show that human capital, especially education, stimulates long-term economic growth by increasing labor productivity and facilitating technology adoption (Feldman et al., 2016; Liao et al., 2019; Todaro & Smith, 2015). In China, higher education was found to significantly affect economic growth, especially average years of schooling (Lv et al., 2017; Mariana, 2015). Better education is believed to improve people's welfare, strengthen leadership, and accelerate sustainable economic expansion (Benos & Karagiannis, 2016; Hanushek & Woessman, 2020; Kotásková et al., 2018). However, in contrast to (Adawo, 2011), higher education in Nigeria has a negative impact on economic growth. Benos and Karagiannis (2016) found variations in results influenced by factors such as the labor market structure and a country's economic policies, so the relationship between education and economic growth is still an academic debate.

Tanaya & Suyanto (2024) found that secondary education and tertiary education have different effects on the creation of new enterprises, with tertiary education tending to encourage workers to choose multinational companies over entrepreneurship, thus affecting the economy's structure. Al-Mutairi et al. (2024) found a positive relationship between education and economic growth in Palestine, but inflation and unemployment negatively affected this relationship. They emphasized the need to improve the quality of education to make it more relevant to the market by highlighting the negative correlation between tertiary education enrollment and economic growth. Othman et al. (2024) in Malaysia found that education spending is positively correlated with growth, underscoring the importance of strategic investment in education, while Lou & Li (2022) in China showed that export expansion supports intergenerational educational mobility, improving the economic prospects of less educated families. Rönnberg and Candido (2023) found that Nordic countries use education as an export commodity, while Park and Beghin (2023) showed that Asian students in OECD (Organization for Economic Co-operation and Development) countries acquire skills that benefit the economies of their home and host countries. In Turkey, Algül (2024) noted the high unemployment risk among university graduates, suggesting that a mismatch between the number of graduates and market demand can increase unemployment rates. Safitri and Endang (2024) added that a non-robust labor market limits the absorption of highly educated labor, significantly affecting graduates who invested heavily in education. Algül (2024) and Asongu and Odhiambo (2024) emphasized the importance of secondary vocational education and industry collaboration to create more suitable and quality employment opportunities for university graduates.

As one of the developing countries in Southeast Asia, Indonesia has made education a core element of the government's development strategy. This fact is evidenced by the significant increase in public education spending in recent decades. From 2000 to 2006, government spending on education doubled in real terms, and in 2019, the budget allocation for education reached IDR 492,555 trillion, a significant increase compared to IDR 444,131 trillion in 2018. However, despite this substantial financial commitment,

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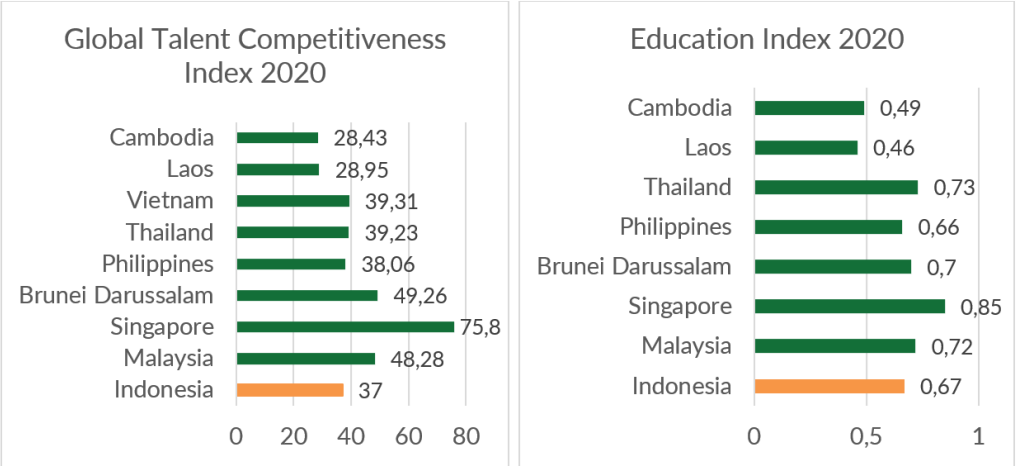
the quality of human resources in Indonesia remains challenging. Indonesia ranks 87th out of 157 countries regarding human capital quality, lagging behind many of its ASEAN neighbors. The country also ranks near the bottom of the Global Talent Competitiveness Index, which further illustrates the mismatch between increases in spending on education and improvements in the quality of human capital. This fact raises critical questions about the effectiveness of Indonesia's education system in driving economic growth.

Figure 1. Position of Indonesia in the *Global Talent Competitiveness Index of ASEAN Countries 2022* and Education Index of ASEAN Countries 2020

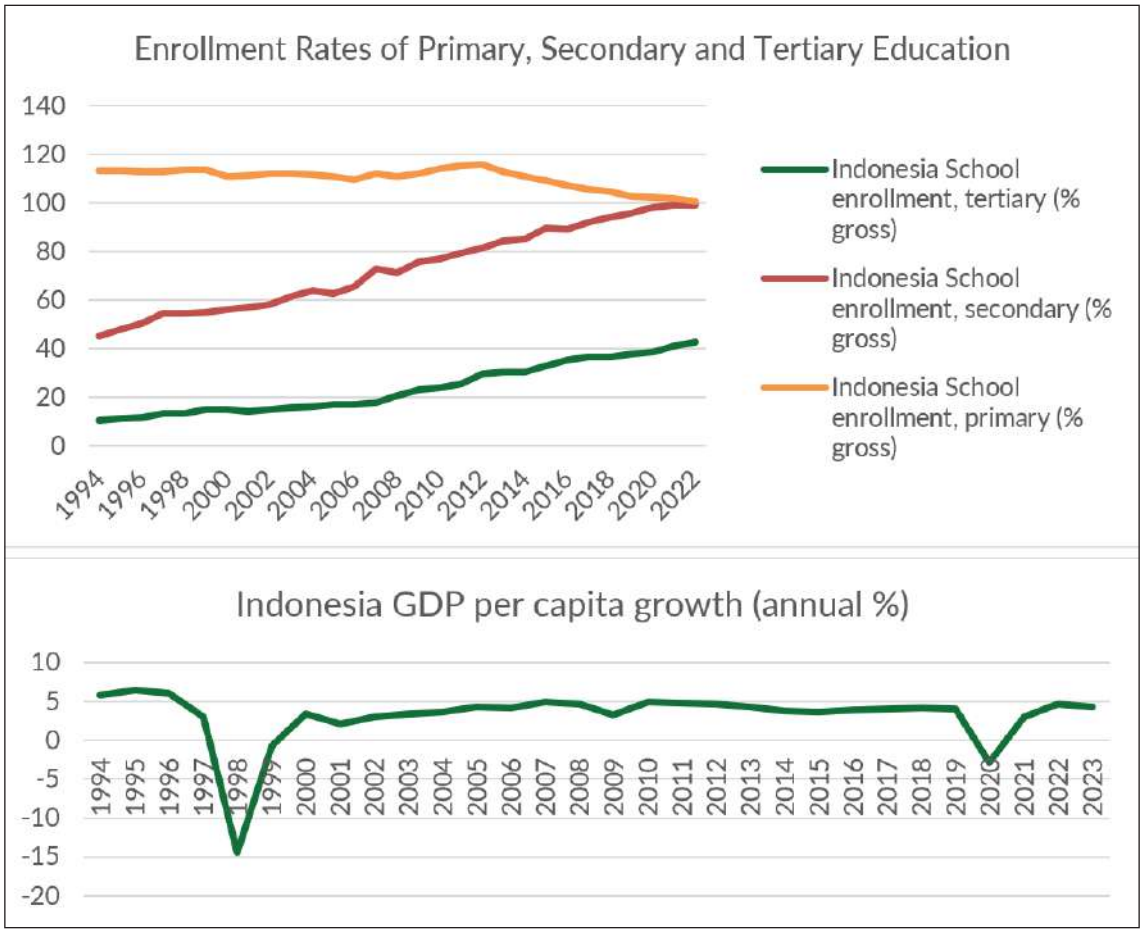


Source: World Bank World Development Indicators (WDI) Database

Based on Figure 1, Global Talent Competitiveness Index in 2022, Indonesia ranks relatively low compared to other ASEAN countries, with a score of 37. Singapore stands out with a score of 75.8, which shows a much higher level of talent competitiveness than other ASEAN countries. Then Malaysia and Brunei Darussalam rank well with scores of 48.28 and 49.26, respectively. Countries such as the Philippines (38.06), Thailand (39.23), and Vietnam (39.31) are slightly above Indonesia but still in a similar range of scores. Meanwhile, Laos and Cambodia ranked the lowest, scoring 28.95 and 28.43, respectively. Based on the 2020 Education Index, Singapore again ranks highest with an Education Index of 0.85, reflecting its excellent quality of education. With scores of 0.73 and 0.72, respectively, Thailand and Malaysia are also in a relatively good position. Meanwhile, Indonesia has an education index of 0.67, which is below Malaysia and Thailand but above countries such as the Philippines (0.66), Brunei Darussalam (0.7) and the countries with the lowest education index, Laos (0.46) and Cambodia (0.49).

School enrollment statistics in Indonesia have improved in recent decades. This condition is expected to reflect the current emphasis on achieving education for all in Indonesia as part of the Millennium Development Goals. Primary school enrollment was nearly 100 percent in 2010, compared to 70 percent in 1975 (Noone & Clare, 2011). The entire evolution of primary, secondary, and tertiary enrollment, along with Indonesia's economy or per capita income based on World Bank World Development Indicators (WDI) data from 1972 to 2018, is shown in Figure 2.

Figure 2. School Enrollment in Primary, Secondary, and Tertiary Education along with Economic Growth in Indonesia 1994-2023



Source: World Bank World Development Indicators (WDI) Database

Despite theoretical predictions, empirical evidence on how education affects economic growth has long been studied. In general, this reflects measurement problems. Most macroeconomic literature on the economy returns to education using measures of the quantity of schooling. The most common measures are enrollment and average years of schooling. Woessmann (2015) estimates the effect of education on economic growth in countries, describing average per capita gross domestic product (GDP) growth over several decades as a function of educational attainment and several other variables considered important for economic growth (Woessmann, 2015).

The purpose of this study is to provide an empirical answer to the question of whether the level of education can explain economic growth in Indonesia. In this context, Indonesia is an interesting case study because the Indonesian education system includes different forms, types, and levels of education. This study analyzes the possible indirect effect of the level of education on economic growth before and after the intervention through the variables of FDI, credit, exports, and unemployment. The results of this study are expected to be useful as recommendations to assist the government in making policies in the area of education related to economic growth. This research is also expected to

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provide input for the government to improve its educational performance and achieve a world-class educational system that is expected to improve economic performance..

METHODS

This research employs a quantitative method with a descriptive approach to examine the relationship between education levels and Indonesia's economic growth. The primary data for the study is sourced from the World Development Indicators (WDI), spanning the years 2015 to 2023. The analyzed variables include school enrollment at the primary, secondary, and tertiary levels, Foreign Direct Investment (FDI), credit availability, exports, and unemployment rates (Alam et al., 2024). The data collected is annual, recorded once per year over nine years. Annual data provides a long-term perspective on trends and relationships between education and economic indicators, critical for understanding educational investments' broader macroeconomic effects. However, it also means that the study focuses on capturing long-term patterns rather than short-term economic fluctuations, which might require quarterly or monthly data (Solikhawati et al., 2024).

This research employs Structural Equation Modeling (SEM) using the SmartPLS version 4 software. SEM is a powerful multivariate technique that allows for exploring complex relationships between variables, including direct and indirect effects. This method is beneficial for examining how education impacts economic growth directly or through mediating factors such as FDI, credit, exports, and unemployment. SEM enables the simultaneous analysis of multiple dependent variables and how they interact within the model.

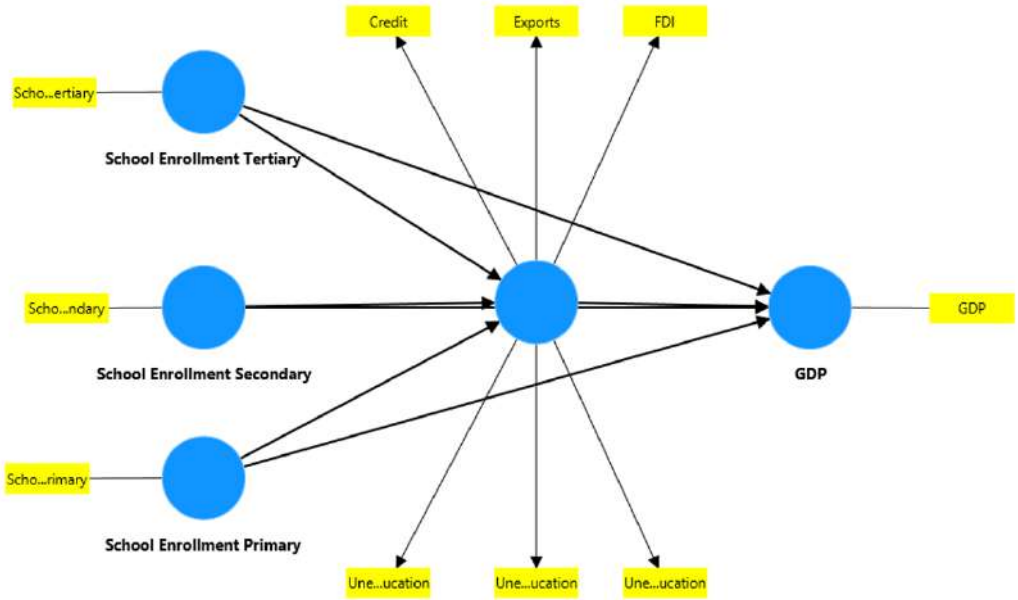
The measurement model is how latent variables (constructs) are measured by their indicators. Measurement models specify the relationships between constructs (latent variables) and associated observed indicators (manifest variables) through either reflective or formative measurement models (Hair et al., 2019). In this study, indicators cause the latent variable using the formative measurement model, with arrows pointing from the indicators to the construct. Unlike reflective models, formative indicators are not expected to be correlated, and changes in the indicators lead to changes in the construct. Formative indicators do not include error terms because they are assumed to be free of measurement error when defining the construct.

Discriminant validity refers to the extent to which a construct in a model is genuinely distinct from another construct, meaning it captures unique variance that is not explained by other constructs. This validity is essential in mediation models to ensure that the mediator and other constructs, such as the exogenous (independent) and endogenous (dependent) variables, are both statistically distinct and conceptually different. In this study, discriminant validity was assessed using the Fornell-Larcker criterion. This approach verifies that the square root of each construct's Average Variance extracted (AVE) exceeds its correlation with other constructs, ensuring that each construct captures unique variance and is distinct from others in the model.

According to Hair, the structural model (inner model) represents the relationships between latent constructs in the model, capturing the hypothesized direct and indirect paths among them (Hair et al., 2019). The structural model includes paths from the independent variable (exogenous construct) to the mediator and from the mediator to the dependent variable (endogenous construct). This setup helps to test whether the mediator carries the effect from the independent variable to the dependent variable. The structural model's key aspects in mediation analysis are as follows: path coefficients. These coefficients show the strength and direction of relationships among constructs. In a mediation model, Hair emphasizes the importance of examining direct and indirect effects (independent to dependent) (through the mediator).

Second, the value of R-square. These values indicate the amount of variance explained in each endogenous construct. Higher R2 suggests more substantial explanatory power in the model, reflecting the mediator's role in explaining the dependent variable. The third is hypothesis testing. Using techniques like bootstrapping, the model assesses the significance of direct and indirect paths. This test is essential to determine if the mediator explains part of the relationship significantly.

Figure 3. Framework Conceptual



RESULTS AND DISCUSSION

This study uses two groups of variables, namely dependent variables or dependent variables and independent variables. In this study, the dependent variable used is GDP, the independent variable used is school enrollment, and the mediating variable used is economic indicators (FDI, export, credit, unemployment). Descriptive statistics is used to determine the description of the data used in the study. The descriptive statistical data measures used are the minimum value (min), maximum value (max), average value

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(mean), and standard deviation (Std. Deviation). Descriptive statistics of the variables used in this study can be seen in Table 1.

Table 1 shows that the minimum enrollment for higher education was 20.809, the maximum enrollment for primary education was 115.964, and the average education enrollment was 102.260. The standard deviation of education enrollment is 13.527. The number of enrollments varies significantly across education levels, indicating that enrollments are quite dispersed, with some levels having much higher or lower enrollment than the average. The minimum FDI figure is 0,338, the maximum is 2.820, and the average FDI is 1.938. the standard deviation of FDI is 0,397. This standard deviation of credit is 2.94e+18. This value indicates that the overall level of variation is moderate among the various periods. The minimum credit figure is 1.82e+17, the maximum credit is 9.29e+18, and the average credit is 5.02e+18. The standard deviation of credit is 2.94e+18. This value indicates that the overall level of credit is high in the economy. The high standard deviation confirms that the range of credit values is vast, which indicates some variability in export performance over time.

Table 1. Descriptive Statistical Analysis Results

Variable	Indicator	Min	Max	Mean	Std. Dev
School enrollment	Tertiary	20809	42633	32387	6606
	Secondary	71427	99097	87458	8701
	Primary	100645	115964	108477	5024
Economic Indicators	FDI	0.33819	2.820	1938	0.3972
	Credit	1819642253919400000	9.286.578.589.620.980.000	5020408296055600000	2291019528422400000
	Export	17331	29.808	22670	3158
	Unemployment with advanced education	4097	12.353	6175	2406
	Unemployment with basic education	1985	6.466	3366	1111
	Unemployment with Intermediate education	6209	13,955	8462	2093
Economic growth	GDP	-2,885	4,903	3673	1833

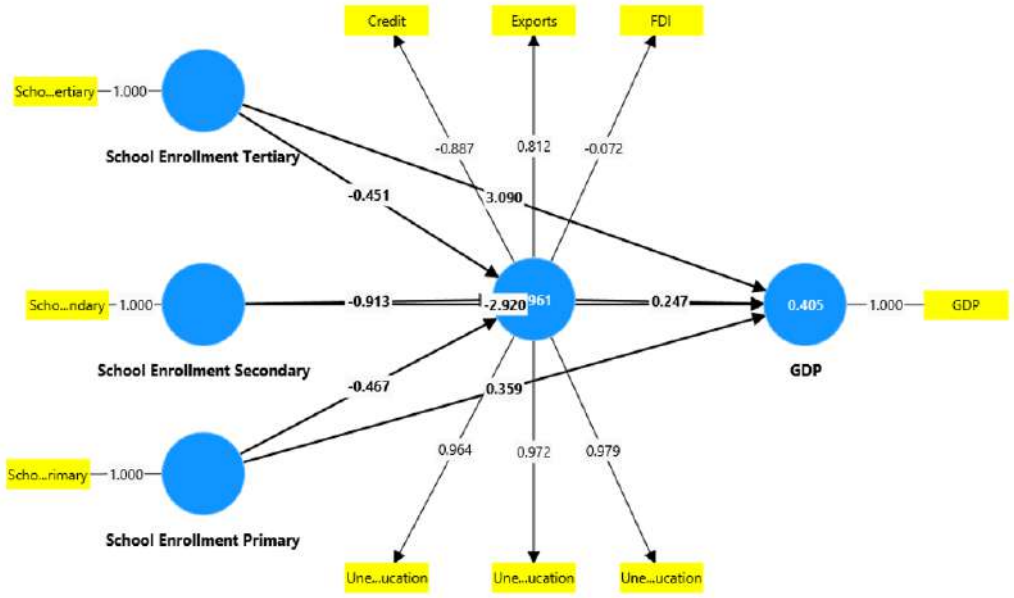
Source: Result processing by SmartPLS (2024)

The minimum unemployment with secondary education is 4.097, the maximum unemployment with secondary education is 12.353, and the average unemployment with secondary education is 2.406. Then, the minimum unemployment with primary education is 6.466, and the maximum unemployment with primary education is 3.366. The standard deviation of unemployment with primary education is 1,111. The minimum unemployment rate with higher education is 6,209, the maximum unemployment rate with higher education is 13,96, and the average unemployment rate with higher education is 8,469. The standard deviation of unemployment with higher education is 2,093.

This value shows that the unemployment rate varies more among those with secondary education than among other levels of education.

The minimum GDP growth rate is -2,89, the maximum average GDP growth rate is 4,90, and the mean GDP growth rate is 3,67. The standard deviation of GDP growth was 1,83. This value indicates that the economy has experienced relatively significant fluctuations in growth rates from year to year. This analysis aims to see how the relationship between variables. Changes in the R-Square value can be used to see how the relationship between variables affects.

Figure 4. Algorithm



Discriminant validity ensures that each concept of a latent variable/construct is different from other latent variables. The measurements in this study use the Fornell Larcker Criterion to evaluate discriminant validity by looking at the extent to which the construct in the model differs from other constructs. Suppose the root value of AVE (Average Variance Extracted) is higher than those outside the diagonal (correlation between constructs). Otherwise, there is an indication that the construct may not be sufficiently different from other constructs in the model.

Table 2 shows that Economic Indicator (Z) has an AVE of 0.587, which exceeds its correlations with other constructs, including GDP (0.240), Primar Enrollment (0.499), Secondary Enrollment (0.951), and Tertiary Enrollment (-0.950). The GDP (Y) demonstrates an AVE of 1.000, surpassing correlations with all other constructs: 0.240 with the Economic Indicator, 0.292 with Primary Enrollment, -0.416 with Secondary Enrollment, and -0.338 with Tertiary Enrollment. Similarly, Primary Enrollment (X1) has an AVE of 1.000, which is greater than its correlations with the Economic Indicator (0.499), GDP (0.292), Secondary Enrollment (-0.873), and Tertiary Enrollment (-0.863). The Secondary Enrollment (X2) also shows an AVE of 1.000, exceeding its correlations

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of -0.951 with the Economic Indicator (-0.950), GDP (-0.338), primary Enrollment (-0.863), and Secondary Enrollment (0.686). Given that all AVE values on the diagonal are more significant than the off-diagonal correlations, the matrix meets the Fornell-Larcker criterion, confirming discriminant validity among the constructs. The AVE root values are more significant than the values of other constructs, and the constructs in the model have good discriminant validity.

Table 2. Discriminant Validity Analysis Result

Variable	Economic Indicator (Z)	GDP (Y)	School Enrollment Primary (X1)	School Enrollment Secondary (X2)	Tertiary School Enrollment (X3)
Economic Indicator (Z)	0.586805556				
GDP (Y)	0.240277778	1.000			
School Enrollment Primary (X1)	0.499305556	0.291666667	1.000		
School Enrollment Secondary (X2)	-0.951	-0.416	-0.873	1.000	
School Enrollment Tertiary (X3)	-0.950	-0.338	-0.863	0.686111111	1,000

Source: Result processing by SmartPLS (2024)

Several studies emphasize the importance of human capital in driving economic growth, mainly through education (Benos & Karagiannis, 2016; Feldman et al., 2016; Hanushek & Woessman, 2020; Kotásková et al., 2018; Liao et al., 2019; Todaro & Smith, 2015). These studies typically find a positive correlation between education and economic outcomes, suggesting that higher levels of education lead to improved productivity, technological adoption, and, ultimately, enhanced economic growth.

However, the result of this study, particularly the specific indirect effects showing negative coefficients for primary, secondary, and tertiary education levels on GDP, challenge this conventional understanding in the context of Indonesia. This discrepancy echoes findings from studies such as (Adawo, 2011), which suggested a negative impact of higher education on economic growth in Nigeria, indicating that the relationship between education and economic performance is not uniform across different countries and contexts.

Moreover, the introduction referenced the importance of quality in education, noting that simply increasing enrollment does not guarantee improved economic outcomes. This condition is particularly relevant to Indonesia, where, despite substantial investments in education, the quality of human capital remains a significant challenge, as indicated by the country's low rankings in various global education and talent indices. The lack of significance in the specific indirect effects reinforces previous research suggesting that

the impact of education on economic growth is contingent on factors such as market relevance and the alignment of educational outcomes with labor market needs (Almutairi, 2024; Safitri & Endang, 2024).

Additionally, the study's result resonates with findings from Tanaya and Suyanto (2024), which identified differences in the impacts of various education levels on entrepreneurship and employment choices. In Indonesia, a significant portion of educated individuals may be drawn to multinational companies rather than pursuing entrepreneurship, which could limit the potential economic benefits of higher education.

The next step is to analyze the structural model. This analysis aims to see how the relationship between variables. Changes in R-Square value can be used to see how the relationship between variables affects. The R-Square value measures the proportion of variable values that are influenced (endogenous), which can be explained by the variables that influence them (exogenous). This result is helpful to see whether a model is good or bad. The R Square value has several criteria, including 0.75, a model is said to be substantial (strong); 0.50, a model is said to be moderate (medium); and 0.25, a model is said to be weak. Below are the results of the R-Square analysis.

Table 3. R-Square (R^2) Result

Variable	R-square	R-square adjusted
GDP (Y)	0.281	0.115

Source: Result processing by SmartPLS (2024)

Table 3 shows that the R Square value of variable Y is 0.281 and the Adjusted R Square value is 0.115, which shows that the ability of variables X1, X2, and X3 to explain Y is 11.5%. This value can be classified as a weak model. The R-squared value indicates the proportion of variance in the dependent variable that the independent variables in the model can explain. R-Square for GDP (Y) is 0.281, meaning that approximately 28.1% of the variance in GDP can be explained by the independent variables included in the analysis.

The adjusted R-square is 0.115, which accounts for the number of predictors in the model and provides a more accurate measure when comparing models with different numbers of predictors. The adjusted R2 of 0.115 suggests that only about 11.5% of the variance in GDP is explained by the model after adjusting for the number of independent variables. The relatively low R-Square implies that although the independent variables have explanatory power regarding GDP, most of the variance remains unexplained, indicating that other factors not included in the model may also play an important role in influencing GDP.

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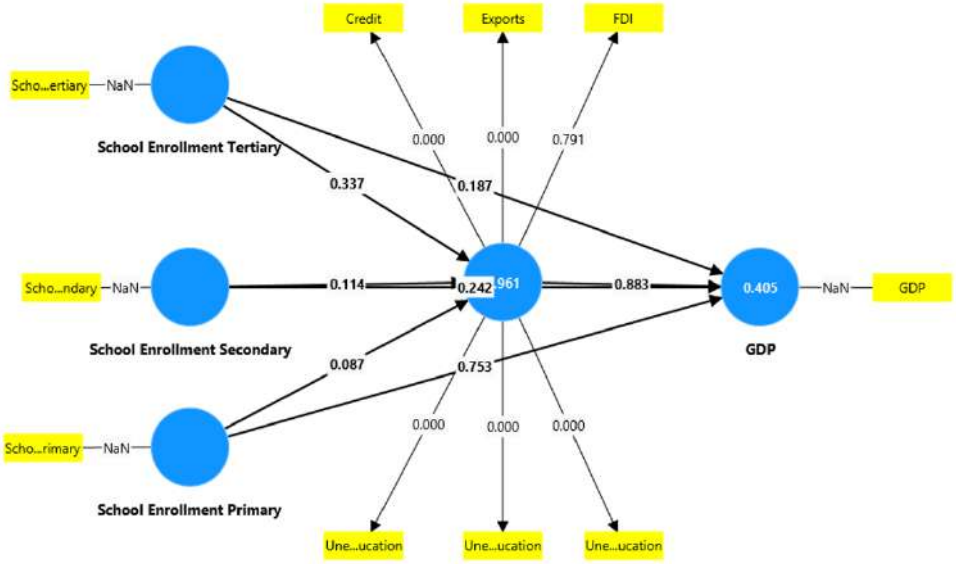
Figure 5. Test Result After Bootstrapping



In testing this hypothesis, the researcher used the direct effect analysis method, which helps test the hypothesis of the direct influence of a variable that influences (exogenous) on the variable that is influenced (endogenous). This direct effect analysis has several criteria, including, firstly, if the path coefficient value is positive, then the influence between variables runs in the same direction secondly if the path coefficient value is negative, then the influence between variables runs in the opposite direction, thirdly if the value P values < 0.05 means the influence between variables is significant, and fourth, if P values > 0.05 then the influence between variables is not significant. Hypothesis test results This can be seen through the Path Coefficient Bootstrapping technique in the Smart-PLS program.

Table 4. Path Coefficient

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
School Enrollment Primary -> GDP	0.24930556	0.35138889	1.138	0.21875	0.52291667
School Enrollment Secondary -> GDP	-2.920	-2.751	2.497	1.169	0.16805556
School Enrollment Tertiary -> GDP	3.090	3.477	2.341	1.320	0.12986111

Source: Result processing by SmartPLS (2024)

The path coefficients presented in Table 4 illustrate the relationships between school enrollment at different levels and GDP. For the relationship between primary school enrollment and GDP, the original sample coefficient is approximately 0.249, indicating a

positive association; however, the t-statistic of 0.219 and a P value of 0.523 reveals that this relationship is not statistically significant. The original coefficient of -2.920 secondary school enrollment suggests a negative association with GDP, which is unexpected, but the T is statistically significant. Lastly, the path coefficient for tertiary school enrollment is 3.090, implying a positive impact on GDP. Yet, it is accompanied by a t-statistic of 1.320 and a P value of 0.130, further confirming the lack of statistical significance. Overall, none of the path coefficients for school enrollment at any level demonstrate significant effects on GDP, suggesting that further investigation is needed to explore additional factors influencing GDP and to reassess the model and its variables.

The unexpected negative coefficient for secondary school enrollment (-2.920) presents a stark contrast to the consensus found in earlier studies, which typically argue for a positive impact of secondary education on economic outcomes as indicated by (Feldman et al., 2016; Liao et al., 2019; Todaro & Smith, 2015). This finding prompts a reconsideration of the dynamics at play within the Indonesian context, where secondary education may not be adequately aligned with labor market demands or socioeconomic factors may hinder its positive impact on GDP. This result aligns with research that suggests a mismatch between educational outcomes and labor market needs, highlighting the importance of ensuring that educational curricula are relevant and geared towards equipping students with the necessary skills.

The positive coefficient for tertiary school enrollment (3.090) also fails to achieve statistical significance, reinforcing a critical point made in previous studies regarding the need for quality over quantity in higher education. As noted in the introduction, while higher education is often linked to enhanced productivity and economic growth, the impact can vary widely depending on the quality of education provided and the alignment with economic needs. The findings from this study resonate with those of (Almutairi, 2024), which emphasize the importance of improving the relevance of tertiary education to ensure it effectively contributes to economic growth..

Table 5. Specific Indirect Effect

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
School Enrollment Primary -> Economic Indicator -> GDP	-0.162	-0.125	0.08819444	1.272	0.14097222
School Enrollment Secondary -> Economic Indicator -> GDP	-0.316	-0.230	0.18611111	1.179	0.165277
School Enrollment Tertiary -> Economic Indicator -> GDP	-0.156	-0.237	0.175	0.42986111	0.372222

Source: Result processing by SmartPLS (2024)

Table 5 outlines the indirect effects of school enrollment at various levels on GDP through the economic Indicator, revealing that none of the relationships are statistically

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significant. For the path from primary school enrollment to GDP via the Economic Indicator, the original sample coefficient is -0.162, suggesting a negative indirect effect; however, the t-statistic of 1.272 and P value of 0.141 indicate this effect lacks significance, supporting hypothesis H4, which posits that primary education's impact on GDP through factors like FDI, credit, exports, and unemployment is negligible. Similarly, secondary school enrollment demonstrates a more substantial negative indirect effect with a coefficient of -0.316. However, the t-statistic of 1.179 and P value of 0.165 confirm that this effect is also insignificant, aligning with hypothesis H5. Lastly, tertiary school enrollment shows a negative indirect effect on GDP with a coefficient of -0.156. However, its t-statistic of 0.430 and a P value of 0.372 further indicate a lack of statistical significance.

This result aligns with studies that suggest primary education provides basic literacy and numeracy skills but does not contribute significantly to complex economic activities. Hanushek and Woessmann (2020) found that while basic education is essential, its role in driving economic growth is limited without advanced skills (Hanushek & Woessman, 2020). In contrast, Psacharopoulos and Patrinos (2018) highlighted that primary education has a more significant impact on economic growth in low-income countries, which suggests that the Indonesian economy might already be at a stage where more advanced education is required to drive growth.

The direction of the positive relationship between primary education level and Indonesia's economic growth may not be the primary driver of economic growth in Indonesia, or other factors are more dominant as the primary driver. Quality education is also important in influencing economic outcomes. Primary education may only provide essential skills like reading, writing, and math. However, more complex and relevant skills for the job market are often acquired at the secondary and higher education levels. Therefore, access to higher education significantly impacts economic growth, as it produces a more skilled and innovative workforce. Other more important factors, such as good infrastructure (e.g., roads, transportation, electricity, and internet), support economic activity and can have a more significant impact directly on GDP. Government policies that support innovation, foreign investment, and trade can also strongly influence economic growth. In addition, politically and economically stable countries tend to attract more investment, which promotes faster economic growth.

This negative relationship suggests that a focus on secondary education without being matched by improvements in the quality or relevance of education may produce a workforce that does not match market needs. The secondary education system may produce graduates who are not fully prepared to enter the job market directly or whose skills do not match industry demand. The P-value of 0.16 indicates a 16% chance that the observed relationship occurred by chance, as there is a real relationship. This insignificance suggests that while there is an indication of a negative relationship, the relationship is not strong or consistent enough to prove that secondary education impedes economic growth. If secondary education is not aligned with the economy's needs, graduates may not have the necessary skills to support economic growth. This condition may lead to increased educated unemployment or a less productive workforce.

This finding contrasts with studies like those of Barro (1996) and Benhabib and Spiegel (1994), which argue that secondary education typically plays a crucial role in enhancing workforce productivity and contributing to growth. The negative relationship in this research may indicate a mismatch between the skills acquired in secondary education and the demands of the Indonesian labor market, similar to findings in certain African economies (Adawo, 2011). It reflects potential challenges in the quality or relevance of secondary education in Indonesia, suggesting that the curriculum might not be aligned with market needs. In some cases, an increase in secondary education may lead to educated unemployment if there are not enough jobs that require that level of education or jobs that do not match the skills possessed. In addition, secondary education may become less relevant if the economy shifts from sectors that require medium-skilled labor to sectors that require higher or lower-skilled labor. Other factors, such as investment in infrastructure and fiscal and monetary policies, may be more significant in driving GDP growth than an increase in secondary education.

This finding is consistent with the research of Benos and Zotou (2014), which concluded that higher education positively impacts economic growth by producing a more skilled and innovative workforce. However, the insignificant result in this study echoes findings from Adawo (2011) and Benos and Karagiannis (2016), which highlight that higher education's contribution to growth can be muted if the quality of education or its relevance to industry needs is insufficient. In Indonesia, there may be a skills mismatch, where graduates are not effectively absorbed into the labor market, reducing the potential positive impact of higher education on growth.

Although higher education can theoretically increase economic growth, the quality and relevance of education are essential. If higher education is not tailored to the needs of the labor market or economy, then its graduates will not be effective in promoting economic growth. Suppose there is a mismatch between the skills taught in higher education and those taught in higher education and the skills required by the market. In that case, the graduates will not make an optimal contribution to the economy. This condition may explain why, although there is a positive relationship, the effect is insignificant.

This study suggests that while higher education is important, further emphasis may need to be placed on improving its quality, increasing the relevance of the curriculum to industry needs, and developing policies that support the labor absorption of higher education graduates in order to maximize their impact on economic growth. Primary education may not provide sufficient skills to enable the workforce to contribute significantly to complex economic activities, such as those related to FDI, credit, exports, and exports. Therefore, its impact on economic growth through these channels may be limited.

Skills relevant to increasing foreign investment, credit access, and export capacity may be more likely to be acquired through secondary and higher education. This condition may explain why primary education alone is insufficient to affect economic growth through these variables despite their significant importance. Basic education may also be insufficient

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to prevent unemployment associated with more technical or specialized occupations. Without additional secondary or higher education skills, primary education graduates may be more vulnerable to unemployment, reducing their contribution to economic growth. These findings point to the importance of improving access and quality of secondary and higher education, rather than focusing solely on basic education, to create a workforce that is better prepared to face complex economic challenges and contribute more to economic growth through channels such as FDI, credit, and exports (Islam, 2024).

Secondary education should provide more advanced skills compared to primary education, but perhaps these skills are not enough to significantly drive macroeconomic variables such as FDI, credit, and exports. Secondary education may not provide relevant or sufficient skills to significantly increase productivity or attract foreign investment (Yulianita & Ramadhan, 2023). This insignificance suggests that although there is an indication of a negative relationship, the relationship is not strong or consistent enough to be considered statistically significant. This result means that the effect of secondary education level mediated by FDI, credit, exports, and unemployment on economic growth is unclear.

Secondary education may not be sufficient to prepare a workforce capable of contributing significantly to complex economic activities such as those related to FDI, credit, and exports. Higher and more specific skills, typically acquired from higher education, may be required to drive economic growth through these channels. There may be a mismatch between the skills acquired from secondary education and the needs of more advanced industries or job markets. Without relevant skills, secondary education graduates and the needs of industry or more advanced job markets. Without relevant skills, secondary education graduates may be unable to attract FDI or increase economic productivity, which can drive economic growth. High levels of unemployment among secondary education graduates, especially if education is not relevant to labor market needs, may hinder their contribution to economic growth. These findings point to the importance of improving access to secondary education and ensuring that secondary education is relevant to the needs of the modern economy. There may need to be a greater emphasis on technical, vocational, or industry-specific skills to ensure that secondary education graduates can contribute more to economic growth (Gunawan, 2023).

Although higher education is usually considered a key factor in driving innovation and economic growth, the contribution of higher education graduates may be limited if the skills acquired do not match the needs of the labor market or strategic sectors such as FDI, credit, and exports (Agustina et al., 2023). One reason for this negative relationship is the mismatch between the skills of higher education graduates and the needs of industries in Indonesia. If higher education graduates are not employable or cannot add enough value, this can have a negative impact on economic growth. High unemployment among higher education graduates can reduce their positive economic contribution. If the job market cannot absorb higher education graduates effectively, the positive impact of increasing higher education cannot be realized. This finding suggests that increasing access to higher education alone cannot boost economic growth. It is

important to ensure that higher education is relevant to the needs of industry and the economy and that graduates have the skills required by the job market.

CONCLUSION

The research examines how education at primary, secondary, and tertiary levels impacts Indonesia's economic growth, mainly through mediating factors such as Foreign Direct investment (FDI), credit, exports, and unemployment. The study's findings reveal that none of these mediators significantly influence the relationship between education levels and economic growth. Although theoretical frameworks often suggest a positive link between higher education and economic growth due to increased productivity and skills, the empirical results suggest otherwise. This discrepancy points to a possible mismatch between the skills provided by the Indonesian education system and the needs of the labor market, raising concerns about the current education policies' effectiveness in fostering economic growth.

The policy implications of this study emphasize the need for reforms in Indonesia's educational strategy to address the alignment of educational outcomes with economic demands. Rather than solely focusing on enrollment numbers, the government and educational institutions should prioritize curriculum improvements that cater to market-relevant skills. Policies could focus on enhancing vocational and technical training at the secondary and tertiary levels to reduce the gap between education and employability. Additionally, by fostering industry partnerships and creating pathways for graduates to enter the high-demand sector, the Indonesian government could better utilize its educated workforce to support sustainable economic growth.

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https://doi.org/10.15408/sjie.v13i2.40929

Signifikan: Jurnal Ilmu Ekonomi
Volume 13(2), 2024: 365 - 382
P-ISSN: 2087-2046; E-ISSN: 2476-9223
https://doi.org/10.15408/sjie.v13i2.40957

Price Smoothing Behavior of Cigarette Firms in Indonesia

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JEL Classification:
H24
H31
H32
I18

Received: 02 August 2024

Revisions: 10 November 2024

Accepted: 15 November 2024

Available online: December 2024

ABSTRACT

Research Originality: This research analyzes the price-smoothing behaviors of cigarette firms across various cigarette types, firm classifications, and government policies by using quarterly data at the brand level.

Research Objectives: This research aims to identify the price-smoothing tendencies of cigarette firms in Indonesia by analyzing the change in market retail price across various cigarette types and firm classifications and the impact of government policies.

Research Methods: This research used quarterly market retail price survey data covering all cigarette brands available in Indonesia from March 2014 to June 2021. The System Generalized Method of Moments (System GMM) was identified as the optimal estimation method.

Empirical Results: The results showed that cigarette firms in Indonesia employed price-smoothing strategies in response to implementing the tariff increase policy. Notably, substantial price increases tend to occur in December, immediately following the announcement of the tariff increase policy. Removing one of the ceiling price criteria has led to an increase in the average price of cigarettes within the specified criteria. The implementation of a minimum price had no significant impact on price changes.

Implications: This study's findings suggest that to address the issue of rising smoking prevalence, the government should consider implementing a more substantial tariff increase to counteract the impact of price-smoothing.

Keywords:

cigarette retail prices; time intervals; quarterly period, price smoothing.

How to Cite:

Putra, A. D., & Adrison, V. (2024). Price Smoothing Behavior of Cigarette Firms in Indonesia. *Signifikan: Jurnal Ilmu Ekonomi*, *13*(2), 365-382. https://doi.org/10.15408/sjie.v13i2.40957.

INTRODUCTION

Smoking prevalence among the Indonesian population is increasingly alarming. Although the Government has increased tobacco excise taxes annually, Indonesia still ranks high globally for smoking prevalence. In 2018, 62.9% of males and 4.8% of females aged 15 and older were smokers (World Health Organization, 2020). Among youth aged 10-18, in particular, there is an upward trend, with rates increasing from 7,2% in 2013 to 7,4% in 2023 (Amalia et al., 2024). These figures underscore the challenges posed by smoking prevalence in the nation.

The cigarette tax (in this paper referring to excise) -as in the case of the Indonesian Government- is a powerful instrument to regulate cigarette consumption and reduce smoking prevalence, ultimately leading to improved public health (Chaloupka et al., 2011; International Agency for Research on Cancer, 2011; World Health Organization, 2020). However, the efficacy of this tool largely depends on the extent to which the tax increase is reflected in changes to the retail prices of cigarettes (Linegar & Van Walbeek, 2018), as well as the degree to which these increases are passed from firms and retailers to consumers, thereby affecting consumer demand levels (Nargis et al., 2020). The extent to which cigarette firms pass on tax increases to consumers is influenced by the strategies adopted by these firms in response to tax increases. These strategies focus on mitigating the potential impact of higher tobacco taxes, which threaten the profitability of cigarette firms (Ross et al., 2017).

One of the strategies employed by cigarette firms involves a timing approach to mitigate the impact of increased tax rates. This strategy, commonly referred to as "price smoothing" or "cushioning," entails a gradual, incremental adjustment of prices over several months (Ross et al., 2017). Instead of a significant change, this strategy involves small, gradual price adjustments following tax increases (Hiscock et al., 2018; Partos et al., 2020). The primary objective is to attenuate the tangible impacts of the tobacco excise tax increase (Bayly et al., 2021), thereby preventing the potential cessation of consumer smoking habits (Hiscock et al., 2018; Sheikh et al., 2021). This approach has shown a relatively smaller impact on reducing the demand for cigarettes compared to a one-off increase in cigarette prices to the ceiling (International Agency for Research on Cancer, 2011). A gradual price increment allows sufficient time for consumers to acclimate to the impact of the excise tax increase.

However, the literature on price smoothing remains scarce, mainly limited to discussions in general systematic reviews (Hiscock et al., 2018; Partos et al., 2020; Ross et al., 2017; Sheikh et al., 2021). Recent exceptions include studies in Australia and Mexico (Bayly et al., 2021; Saenz-de-Miera et al., 2024). The first study was based on the two largest Australian supermarket chains and found that significant tobacco retailers in Australia are gradually raising prices (cushioning) on factory-made cigarettes and roll-your-own tobacco products at least one month before the scheduled tax increase. Further research with a larger sample of products, stores, and types of cigarettes is needed to confirm these findings. The second study found that the tobacco industry employed two pricing strategies in response to Mexico's 2020 tax increase: price smoothing and moderate

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https://doi.org/10.15408/sjie.v13i2.40957

overshifting. However, this study only examines pricing strategies during recent excise tax adjustments. Research covering a more extended period of annual tax increases may be needed. Considering these research gaps, this study focuses on Indonesia, a country with a high prevalence of smoking and a complex tobacco tax system consisting of various cigarette types and firm classifications.

Indonesia has a complex tobacco excise system that determines tariffs based on four categories: (1) production volume; (2) production method (i.e., by hand or using machines); (3) flavor (i.e., with a clove, known as *kretek,* or without clove; and (4) reference price limit (Harga Jual Eceran, HJE) (Prasetyo & Adrison, 2020), see Appendix 1. The regulations categorize those four[1] as types of tobacco products, firm classification (based on type and production volume), and HJE limits. The specific tariff rates and categories are determined through a Minister of Finance Regulation (Peraturan Menteri Keuangan, PMK) and usually announced towards the end of the year, between October and December, with implementation scheduled for early January or February of the following year. This timing allows cigarette firms to implement price-smoothing strategies (Bayly et al., 2021), during the period of policy announcement to the commencement of the new tariff rates.

Excise rates for hand-made cigarettes are lower than those for machine-made cigarettes, with higher rates for cigarettes containing filters. These categories collectively define different types of cigarettes. However, this study focused on three specific categories: machine-made clove cigarettes (Sigaret Kretek Mesin/SKM), machine-made non-clove cigarettes (Sigaret Putih Mesin/SPM), and hand-made clove cigarettes (Sigaret Kretek Tangan/SKT).

The firms are classified according to the type of cigarettes produced and production volume. Each group is subject to a production limit. If production exceeds the permitted limit, the firm is obliged to move up to a higher class (group). Cigarette firms are classified into three hierarchical groups: I, II, and III. Firms in the higher groups are subject to more significant production limits, which result in higher tariffs. In addition, each group of firms is also given a different limit of the reference price, known as Harga Jual Eceran (HJE). The reference price represents the allowable price range for each cigarette stick and serves as the basis for the Government's calculation of excise taxes. The reference price is set through a Minister of Finance Regulation. Notably, firms in higher groups benefit from more generous HJE limits, but higher excise rates offset this benefit. Within Indonesia's regulatory framework, in addition to the reference price, there are two other important price components: (1) the tag (banderol) price and (2) the market retail price. The tag price is the value stated on the excise tax band attached to each pack of cigarettes. The tag price is calculated by multiplying the reference price set by the firm by the number of cigarette sticks in a pack. It should be noted that the tag price, determined by the firm, may differ from the Government's reference price per individual cigarette stick.

[1] Article 5 point (2) Minister of Finance Regulation Number 192/PMK.010/2021.

It should be underlined that the tag price should not exceed the reference price limit set for each cigarette. In practice, the market retail price, referred to as the Market Transaction Price (Harga Transaksi Pasar, HTP), represents the retail price of cigarettes at the retailer level. However, discrepancies may arise between the market retail price and the tag price. In this context, the Government of Indonesia is responsible for setting and overseeing pricing policies, including monitoring retail prices of the cigarette market. This monitoring is critical due to the significant variations in market retail prices across different cigarette brands, each displaying a tag (banderol) price on its packaging. To maintain price stability and fairness in the market, the Government sets both a ceiling price and a minimum price, which serve as the upper and lower limits for the market retail price of cigarettes.

Before 2015, market retail price monitoring focused on two criteria for the ceiling price (see Appendix 1). These two criteria were: (1) the market retail price of a cigarette brand was not allowed to exceed the reference price limit per stick of the above tier and/or (2) for brands whose excise tax rate is at the highest reference price per stick for each group, the market retail price may not exceed 5% of the tag price. Between 2015 and 2021, two important policies were implemented regarding monitoring market retail prices. The first was the elimination of one of the two ceiling price criteria that had been set previously. The second was the introduction of minimum prices.

The Minister of Finance Regulation No. 198/PMK.010/2015, effective as of November 6, 2015, removed one of the two ceiling price criteria. As a result, brands with excise tariffs with the highest reference price per stick for each group were allowed to have a retail price exceeding 5% of the tag (banderol) price. Consequently, ceiling price monitoring ensures that the market retail price of a cigarette brand does not exceed the reference price limit per stick of the above tier.

Following the Minister of Finance Regulation No. 146/PMK.010/2017, which became effective on October 25, 2017, the Government has established a minimum market retail price requirement. This regulation mandates that the market retail price for a brand should not be less than 85% of the tag price. Prior to the issuance of this regulation, no minimum market retail price was set, thus allowing firms to sell their cigarettes at any price below the tag price without restriction. Therefore, since October 25, 2017, market retail price monitoring has been conducted with a focus on two specific aspects: (1) market retail prices that exceed the reference price limit per stick or gram of the above tier or (2) market retail prices that are less than 85% of the tag price.

This study aims to identify instances of price smoothing within the Indonesian cigarette market by analyzing market retail price fluctuations. These fluctuations are observed from the announcement of tobacco tax (excise) tariff changes to the effective date of the new tariffs in the following year. To track market retail price changes over the specified intervals, this study uses the period between policy announcements and the quarterly periods of the current year as a proxy.

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According to the authors, this is the first study investigating price smoothing behaviors in Indonesia. It is distinct from previous research by employing brand-level data with nationwide coverage over an extended period. It covers various cigarette types, firm classifications, and government policies regarding cigarette prices in Indonesia. These policies include the elimination of one of the two ceiling price criteria in 2015 and the introduction of minimum pricing in 2017.

METHODS

Our study is based on a comprehensive analysis of quarterly market retail price (hereafter referred to as retail price) data for all cigarette brands available between March 2014 and June 2021. The data was obtained from the Directorate General of Customs and Excise, Ministry of Finance. The analysis specifically focused on the three largest categories of cigarettes produced in Indonesia (Zheng et al., 2018). These categories are machine-made clove cigarettes (referred to as SKM), machine-made non-clove cigarettes (referred to as SPM), and hand-made clove cigarettes (referred to as SKT).

The data set consists of the retail prices per stick, applicable tax (excise) rates, the types of cigarettes, the group or class of producers or firms, and information on whether a brand is at the highest reference price within its category. In addition, data from the Minister of Finance Regulation on tobacco tax rates from 2013 to 2020 is used to ascertain the time interval between the announcement of the tariff policy and the survey period.

A total of 245,852 rows of survey data from various cigarette brands were collected during the specified survey period. The average retail price for each brand and period was calculated, and panel data were generated. The retail price data for each of the same cigarette brands were aggregated on a per-survey-period basis. Given that (1) the retail price of each brand may vary by region, (2) a single brand of cigarette in the market may have an excise stamp design with a different tag (banderol) price and tax rates, we calculated the average retail price per cigarette brand across the same survey period. Due to the fluctuations in retail prices within the same survey period, it was necessary to calculate the time interval data from the enactment of the Minister of Finance Regulation stipulating excise tax rates, until the end of the survey period (March 31, June 30, September 30, or December 31). This approach is taken to capture the distribution of these changes.

It is assumed that in the absence of an announcement regarding the tax rates policy for the upcoming year within the specified survey period, the firm will refrain from speculation. As a result, the retail price of cigarettes was still determined based on the previous tax rates. Changes in retail prices were observed quarterly, with a particular focus on price adjustments occurring at the end of the year (t-1) before the tax increase (pre-emptive), during the tax increase (contemporaneous), and after the tax increase (delayed). Given that the tax increase is effective in early January or February, while the data used is quarterly price data (December, March, June, September), the price smoothing analysis employs price changes in December (pre-emptive) and in March, June, and September (delayed).

To determine the impact of tax rate changes and the time interval since the announcement of the new rate policy on price movements, we regress price changes as a function of these variables on the price survey period. Using dynamic panel data regression estimation (The Generalized Method of Moments), we test the consistency of the parameters by performing several stepwise regressions from restricted to unrestricted specifications for the brand's price in period t by the following equation:

$$\begin{aligned} ln\,(AvgPrice_{it}) = {} & \beta_0 + \beta_1 ln\,(AvgTax_{it}) + \beta_2 Interval_t + \beta_3 DQ1_t \; x \; Interval_t + \\ & \beta_4 DQ2_t \; x \; Interval_t + \beta_5 DQ3_t \; x \; Interval_t + \beta_6 DSKM_i \; x \; Interval_t + \\ & \beta_7 DSPM_i \; x \; Interval_t + \beta_8 DGol1_i \; x \; Interval_t + \beta_9 DGol2_i \; x \; Interval_t + \\ & \beta_{10} DTop105_{it} + \beta_{11} DNonTop_{it} + \beta_{12} D85_t + \beta_{13} ln\,(AvgPrice_{it-1}) + \delta_t + \\ & \alpha_i + \varepsilon_{it} \end{aligned} \quad (1)$$

In the initial step, the explanatory variables consist of the average applicable tax per stick of brand i at t period (in natural logarithm), $AvgTax$; the time interval (in days) between the announcement of the new tax rate and the survey end date of t period, denoted as $Interval$; and interaction terms between $Interval$ and quarterly period dummy. This baseline specification investigates the effect of the cigarette tax changes and length of time interval across different quarters. Since there are four quarterly periods -March (Q1), June (Q2), September (Q3), and December (Q4)- we use three dummy variables for the quarterly period (DQ1,DQ2,DQ3) with Q4 as the reference group. In this case, the coefficient for $Interval$ represents the effect without interaction.

In the second step, we add interaction terms between the interval and the cigarette type dummy variables to account for the potential differences in retail prices across different cigarette types and quarters. There are three types of cigarettes considered: machine-made clove cigarettes (SKM), machine-made non-clove cigarettes (SPM), and hand-made clove cigarettes (SKT). Two dummy variables (DSKM,DSPM) are used to categorize cigarette types, with SKT as the reference group. In this case, the coefficient for the $Interval$ represents the effect without interaction.

In the third step, we add interaction terms between the interval and the firm classifications dummy variables to account for the potential variation in retail prices across different firm classes over various quarters. There are three firm classifications: class I (Gol1), class II (Gol2), and class III (Gol3). Two dummy variables are employed for each firm class ($DGol1$ and $DGol2$), indicating that the reference group is Gol3, representing a pure coefficient on $Interval$ without interaction.

Furthermore, in the final step, three additional dummies are employed to capture the impact of price policy changes. The three dummies are: (1) $DTop105$ is a dummy variable interacting with cigarette brand i that is in the top tier in its classification, with a dummy marking the periods before and after the implementation of PMK No.198/PMK.010/2015. This dummy interaction is used to determine the effect of the policy of eliminating one of the ceiling price criteria for cigarette brands that occupy the top position of the reference price limit per cigarette in their category. (2) DNonTop is used to determine the spillover effect on the retail price of cigarette brands that do not occupy

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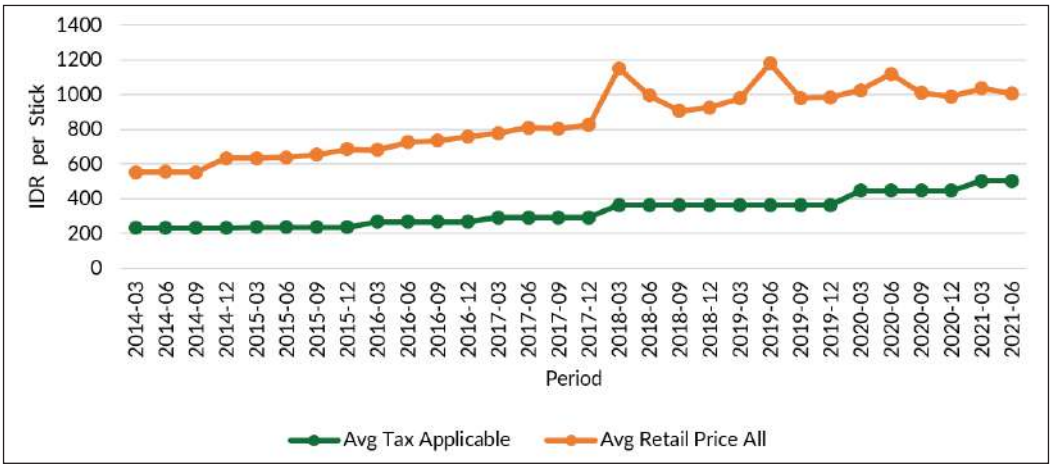
the top tier of the reference price limit per cigarette in their category. (3) *D*85 is used to examine the impact of the minimum price implementation policy in 2018.

RESULTS AND DISCUSSION

The statistical significance and magnitude of change in the average retail price over distinct time intervals can be used to identify price smoothing behavior. A sudden, sharp price increase occurring in a single step or a substantial rise distributed incrementally across multiple stages may indicate price smoothing. On the other hand, if the average retail price shows significant fluctuations up and down over a period, these patterns do not indicate price smoothing.

As illustrated in Figure 1, the descriptive statistical analysis shows that between 2014 and 2017, the retail prices followed a gradual upward trend. A notable shift was observed from 2017 to 2018, indicating a substantial increase in retail prices. Notably, the period from late 2018 to early 2019 did not show any significant retail price increases and no concurrent changes in tax rates or reference prices. Considering that strong market demand and the absence of excise tax increases affect product costs, cigarette firms subsequently increased their market transaction prices in the second quarter of 2019. However, in keeping with the previous year's pattern, this increase was followed by a marked decline in reference prices from the second to the third quarter of 2019.

Figure 1. Average Tax Tariff Applicable and Average Retail Price (HTP) Between Survey Periods



Source: Authors' calculation from the dataset

It is essential to perform an econometric test and analyze the statistical significance by estimating statistical software to reach a conclusion regarding the existence of price smoothing behavior. Therefore, we performed multiple regression analyses for equation (1) using STATA, with the results presented in Table 1. The first column shows the application of Pooled Least Squares (PLS) estimation for the base model, excluding price policy as a control variable but including the time trends. The second column applies the PLS estimation method, incorporating both price policy and time trend variables into

the model. Furthermore, our analysis uses the fixed effect model (FEM), as illustrated in the third and fourth columns of the table.

Table 1. Regression Results

Regression	PLS		FEM		Diff. GMM	Sys. GMM
Specification	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Variable	**lnAvgPrice**	**lnAvgPrice**	**lnAvgPrice**	**lnAvgPrice**	**lnAvgPrice**	**lnAvgPrice**
lnAvgTax	0.0812***	0.100***	0.180***	0.198***	0.286***	0.407***
	(0.00644)	(0.00692)	(0.0367)	(0.0339)	(0.0650)	(0.0539)
Interval	0.000339***	0.000305***	0.000358***	0.000322***	0.000332***	0.000383***
	(0.0000877)	(0.0000889)	(0.0000690)	(0.0000693)	(0.0000869)	(0.0000968)
DQ1_Int	0.00000153	-0.0000173	-0.0000588	-0.0000548	**-0.0000596**	**-0.000115***
	(0.0000547)	(0.0000544)	(0.0000434)	(0.0000442)	(0.0000510)	(0.0000513)
DQ2_Int	-0.000165**	-0.000185**	-0.000170***	-0.000157**	-0.000168**	-0.000247***
	(0.0000623)	(0.0000623)	(0.0000506)	(0.0000516)	(0.0000585)	(0.0000590)
DQ3_Int	-0.000201**	-0.000222***	-0.000181***	-0.000163**	-0.000184**	-0.000260***
	(0.0000663)	(0.0000667)	(0.0000538)	(0.0000547)	(0.0000606)	(0.0000613)
DSKM_Int	-0.000160***	-0.000234***	-0.0000191	-0.0000313	-0.0000604	-0.0000235
	(0.0000210)	(0.0000226)	(0.0000210)	(0.0000210)	(0.0000880)	(0.000108)
DSPM_Int	-0.000118***	-0.000204***	-0.0000237	-0.0000341	**-0.000112**	**-0.000321***
	(0.0000231)	(0.0000244)	(0.0000250)	(0.0000251)	(0.000121)	(0.000157)
DGol1_Int	0.0000727*	0.000172***	-0.000120***	-0.000100**	-0.0000300	0.0000336
	(0.0000337)	(0.0000368)	(0.0000333)	(0.0000345)	(0.000104)	(0.000125)
DGol2_Int	-0.00000988	0.000145***	-0.000123***	-0.000103**	-0.0000747	-0.0000640
	(0.0000284)	(0.0000329)	(0.0000329)	(0.0000343)	(0.000106)	(0.000127)
DTop105		0.00565		0.0179***	0.0519***	0.0408***
		(0.00456)		(0.00526)	(0.00991)	(0.00949)
DNonTop		-0.0392***		-0.0456**	-0.136**	-0.147**
		(0.00521)		(0.0162)	(0.0519)	(0.0460)
D85		-0.00307		-0.0132**	-0.00840	-0.00520
		(0.00521)		(0.00465)	(0.00507)	(0.00501)
t	0.00161***	0.00230***	0.0150***	0.0148***	0.0106***	0.00926***
	(0.000222)	(0.000364)	(0.000946)	(0.000914)	(0.00109)	(0.000981)
L.lnAvgPrice	0.834***	0.787***	0.108***	0.0991***	**0.162****	0.130**
	(0.00955)	(0.0118)	(0.0249)	(0.0250)	(0.0578)	(0.0485)
_cons	0.624***	0.827***	4.708***	4.681***		3.394***
	(0.0459)	(0.0558)	(0.258)	(0.249)		(0.247)
N	7674	7674	7674	7674	6162	7674

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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https://doi.org/10.15408/sjie.v13i2.40957

The panel FEM addresses the problem of unobserved heterogeneity that may exist in the estimation model. However, due to the correlation between the dependent variable ($AvgPrice_{it}$) and the previous lagged dependent variable ($AvgPrice_{it-1}$), the estimation results with FEM are biased. This correlation arises because cigarette firms set cigarette prices across periods by considering the previous period's price, reflecting forward-looking behavior with consumer rational addiction. Additionally, this is also caused by the policy prohibiting the tag price of a firm's new brand from being lower than the tag price of similar cigarette products it owns. To address this correlation problem, models (2) and (4) are estimated using the GMM dynamic panel model.

Initially, the retail price ($AvgPrice_{it}$) was regressed as a basic function of ($AvgTax_{it}$) and $Interval_t$, with interactions for dummy variables differences between quarter periods, types of cigarettes, and firm classification, while controlling for time trends. Then, the price policy variables (dummy $DTOP105_t$, $DNonTop_t$, and $D85_t$) were added to the regression. This regression process was performed using both PLS and FEM estimation methods.

The results from regression specifications (1), (2), (3), and (4) indicate that the lagged dependent variable ($AvgPrice_{it-1}$) is consistently positive and significant. Therefore, the lagged dependent variable should be included in the model specifications. Since the specification uses a lagged dependent variable, the estimation technique is no longer suitable for a static panel model, so it is more appropriate to use the GMM dynamic panel model for the unrestricted model specifications (2) and (4). The GMM technique results are presented in specification (5) for the difference GMM and specification (6) for the system GMM estimation.

Based on the results from the difference GMM and the system GMM estimations, the coefficient of the lagged dependent variable ($AvgPrice_{it-1}$) remains consistent and significant, so it is appropriate to use GMM dynamic panel estimation. The coefficients for $AvgTax_{it}$ and $Interval_t$ also show significant interaction in both types of GMM estimation. However, there is a difference in the interaction terms $DQ1_t \; x \; Interval_t$ and $DSPM_t \; x \; Interval_t$ between the difference GMM and the system GMM results. To determine the most appropriate model, the coefficients of the lagged dependent variable ($AvgPrice_{it-1}$) from the difference GMM is compared with previous PLS (as an upper limit) and FEM (as a lower limit) estimates.

The lagged dependent variable ($AvgPrice_{it-1}$) coefficient estimated by the difference GMM is 0.162, which lies between 0.787 for the PLS estimation (specification 2) and 0.0991 for the FEM estimation (specification 4). These results indicate that the selected GMM model passes the unbiased test. As a rule of thumb, if the difference of GMM estimation results is closer to or lower than the FEM estimation results, then the system GMM estimation results of the system should be appropriate, as it provides slightly better results. Since 0.162 is closer to 0.0991, the system GMM estimation results (specification 6) are chosen.

In addition to passing the unbiased test, the difference GMM and the system GMM estimations has also passed the instrument validity and consistency tests. The Hansen test of overidentifying restrictions, used to test the validity of the instruments, shows a probability value greater than 5%. Meanwhile, the instrument consistency test, conducted using the Arellano-Bond test for zero autocorrelation in first-differenced errors with a probability value of greater than 5% at the second order, confirms that the error term is not correlated with AR order 2 (no autocorrelation).

The estimation results using the system GMM (specification 6) show that the coefficient $AvgTax_{it}$ is positive and significant, indicating the correlation between increases in average excise tax and average retail price. These results align with the previous research (Linegar & Van Walbeek, 2018; Prasetyo & Adrison, 2020) and the majority of other literature shows that tax increases lead to higher cigarette prices (Chaloupka et al., 2000). When taxes rise, firms increase costs that are ultimately passed on to consumers. The difference lies in the degree of shifting of the tax charged to consumers, whether under-shifting, full-shifting, or over-shifting.

Initially, we assumed the average retail price (Market Transaction Price, HTP) across different periods, types of cigarettes, and firm classification (groups) correlated with the time interval between the tax increase announcement and the survey period. To test this hypothesis, we created an interaction variable between $Interval_t$ and the quarterly survey period (Q) dummy, $Interval_t$ and the cigarette type dummy, as well as $Interval_t$ with the firm classification dummy as the control variable.

The results show that the $Interval_t$, used as the reference (along with its interactions between the $Interval_t$ and the Q4 survey period, the type of SKT cigarettes, and class III firms), is significant. The time interval is relevant to retail price changes in Q4 and for SKT cigarettes and class III firms. In addition to Q4 retail price changes, the time interval is also relevant to price changes in the Q1, Q2, and Q3 periods as shown by the significant coefficients for $DQ1_t \; x \; Interval_t$, $DQ2_t \; x \; Interval_t$, and $DQ3_t \; x \; Interval_t$. Based on the estimated coefficients, the impact of changes in time intervals on the average price for each Q period can be calculated and summarized in Table 2.

Table 2. Impact of Changes in Time Intervals on the Average Price Between Periods

Variable	Coefficient	Significance	Period	Total Coefficient	Impact of Change
$Interval_t$ (reference)	0.000383	Significant	Q4	0.000383	0.0383%
$DQ1_t \; x \; Interval_t$	-0.000115	Significant	Q1	0.000268	0.0268%
$DQ2_t \; x \; Interval_t$	-0.000247	Significant	Q2	0.000136	0.0136%
$DQ3_t \; x \; Interval_t$	-0.000260	Significant	Q3	0.000123	0.0123%

Note: Q, Quarterly Survey Period

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https://doi.org/10.15408/sjie.v13i2.40957

The coefficient of the $Interval_t$ and its interaction with $DQ1_t$, $DQ2_t$, and $DQ3_t$ are significant, indicating that the length of time since the announcement of the tax increase correlates with the average retail price in the survey periods Q4, Q1, Q2, and Q3. The negative coefficient on the interaction of $Interval_t$ with Q1, Q2, and Q3 indicating the average price increase in these three periods is lower than in Q4, which serves as the reference. This decreasing coefficient indicates the price smoothing for SKT cigarettes and class III firms, representing the key finding of this study.

The average price increase in Q4 of the previous year was substantial but not sudden. The rise in Q4 last year is followed by a further increase in Q1, Q2, and Q3 of the following year through a decreasing magnitude (indicating a declining slope). Thus, since the announcement of the excise tax policy at the end of the year, cigarette firms have gradually increased their average prices (price smoothing). The longer the interval between the policy announcement and the survey period, the smaller the impact on average price changes. Cigarette firms engage in price smoothing to reduce the impact of tax increases.

There is a difference in consumer response between a sudden and a gradual price increase. A substantial body of research shows that many smokers are highly responsive to changes in cigarette prices, demonstrating a marked price sensitivity (Hyland et al., 2005). As a result, sharp and substantial hikes in cigarette prices are often associated with a greater likelihood of smokers quitting (Chaloupka et al., 2000; Forster & Jones, 2001; Lee, 2008; Ross et al., 2011; Ross et al., 2011; Tauras & Chaloupka, 1999). In contrast, consumers generally show less sensitivity to lower price increments (Li et al., 2017). This observed behavior informs firms' strategies, gradually motivating them to raise prices (Bayly et al., 2021; Hiscock et al., 2018; Linegar & Van Walbeek, 2018; Partos et al., 2020). By implementing gradual price adjustments, firms take advantage of consumers' reduced sensitivity to minor price changes, allowing them to raise prices gradually without causing a significant demand reduction.

When firms raised cigarette prices following the announcement of the new tariffs, they could secure additional profits until the new tariffs officially took effect. However, such price hikes prompted consumers to reduce their demand in response to the price increases (Ross et al., 2017). It should be noted that this demand reduction was less pronounced than what would occur if firms implemented price increases in a single step on the effective date of the new tariffs. As a result, firms prefer a gradual approach to raising prices in subsequent periods.

The identification of price smoothing as the key finding of this study is in line with observations indicating that tax increases can be passed on to consumers over several months (Linegar & Van Walbeek, 2018). This transmission occurs in anticipation of the tax increase (pre-emptive), during the tax increase (contemporary), and following the tax increase (delayed price adjustments). More significant nominal price increases for cigarettes are expected to predominantly appear around the month when the tax increase takes effect.

Cigarette firms tend to smooth the incremental price changes throughout the year. This behavior aligns with the concept of rational addiction (Becker & Murphy, 1988), which suggests that the intertemporal relationship between current cigarette consumption and its impact on future consumption encourages cigarette firms to adopt a forward-looking approach (Gordon & Sun, 2015; Rogeberg, 2020). In this context, cigarette firms seek to identify optimal pricing strategies that maintain demand over time. Firms anticipate future events by influencing current consumption (Showalter, 1999). Rather than abruptly increasing prices to the equilibrium level following tax hikes, firms choose a gradual price adjustment strategy. This measured approach prevents consumers from reducing their current and future cigarette consumption. By doing so, firms can safeguard long-term profitability in the tobacco industry, prioritizing sustained revenue streams over short-term gains from immediate price increases aligned with tax hikes.

However, this price smoothing behavior in Indonesia contrasts with findings in Australia. In Australia, cigarette prices showed marked fluctuations, especially after a regular tax increase in March and undergoing significant changes in the two months following a more extensive tax hike in September (Bayly et al., 2021). The results of this study suggest a different pattern: significant price changes occurred immediately following a tax increase announcement. After the tax increase took effect in the first quarter and subsequent periods, Indonesian firms continued to raise prices, albeit at a smaller percentage increase, indicating a more gradual and sustained approach to pricing adjustments.

This study's results also indicate that the coefficient for the interaction variable between $Interval_t$ and the $DSKM_i$ is not statistically significant. This shows that SKM cigarettes did not experience significant changes in the average retail price in each period, relative to SKT. In contrast, the interaction between $Interval_t$ and the $DSPM_i$ shows a significant negative coefficient, indicating a correlation between time intervals and changes in the average retail price of SPM, albeit with a lower marginal effect when compared to SKT. This observation is reasonable given that SPM is subject to a higher reference price limit and tax rates compared to SKT and SKM. The higher reference price limit inherently implies a higher minimum price for SPM. Consequently, this means that SPM targets consumers with relatively higher incomes who demonstrate loyalty to a particular type of cigarette. In response to this distinct market positioning, cigarette firms adjusted SPM prices by a smaller incremental increase compared to SKT. As a result, the average price of SPM increased gradually throughout the year. This strategic pricing approach aligns with the consumer profile associated with SPM, appealing to higher-income individuals who are committed to this particular cigarette type.

The insignificance of SKM but the significance of SPM may be attributed to differences in excise tax rates. Between 2014 and 2021, annual increases in excise tariffs for both SKM and SPM cigarettes were consistent in Indonesia. Although both are high-end cigarettes, SKM is subject to a slightly lower excise tax rate than SPM.

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https://doi.org/10.15408/sjie.v13i2.40957

Consequently, the price changes due to tax changes experienced by SKM are not as high as those experienced by SPM. Therefore, firms have not changed their prices drastically, as shown by the insignificant estimation results. In contrast, SPM, which is subject to higher taxes, results in price changes that force firms to engage in price smoothing. However, because SPM is a high-end cigarette, the degree of price smoothing is smoother than SKT. The firms commonly increase prices differently among the segmented brands. The firms prefer under-shifting cheap brands but over-shifting premium brands to keep up with the excise tax increases (Marsh et al., 2016). Higher deviation for the higher-priced brands allows the firm to earn a larger profit margin from the high-end cigarette brands. Meanwhile, the deviation in the low-priced cigarette segment is smaller. The lower relative price of the firm intends to expand demand for cheaper brands by compensating for the profits of exclusive brands (Nargis et al., 2020). This is because higher prices have been observed to significantly reduce consumption of economy and mid-priced cigarettes, while demand for premium cigarettes remains highly price inelastic (Atuk & Özmen, 2017).

Similar results also occur in the firm classification. The average price changes for firms class I and II do not show statistically significant changes compared to firms class III. This may be because firms class I and II firms are the upper classes that have great power and loyal consumers for their products. Although they are subject to higher taxes than firms class III, they do not engage in price smoothing for their premium products.

When examining the influence of government policies, we observe that the coefficient $DTop105_{it}$ is positive and statistically significant. This dummy variable represents an interaction between cigarette brands that occupy the highest reference price position in their classification and the period after Minister of Finance Regulation No.198/PMK.010/2015 enactment on November 6, 2015. The coefficient value of 0.0408 indicates that, the retail prices of cigarette brands that occupy the highest reference price within their class are, on average, higher after eliminating one of the criteria governing the ceiling price limit. This criterion had previously restricted cigarette brands with the highest reference price not to exceed 5% of their tag price. These results prove that the government's policy, by eliminating this criterion, effectively increased the average retail prices of cigarette brands occupying the highest reference price positions within their respective classification. Thus, cigarette firms gained greater flexibility in pricing their products, even though the products were priced higher than their price tags. This newfound flexibility eliminates concerns regarding the maximum retail transaction price limit, which was previously capped at 105% of the tag price.

One remaining ceiling price criterion stipulates that the retail price of a cigarette brand must not exceed the reference price limit per stick of the above tier in the same class (group). This condition primarily impacts cigarette brands that are not positioned at the highest price tier in their respective class. Our estimation shows that the dummy variable $DNonTop_{it}$ is statistically significant and has a negative coefficient of -0.147. This

finding indicates that, the average retail price of cigarettes that are not in the highest reference price tier of their class is lower than that of cigarettes in the top reference price tier. Cigarette brands below the highest tier tend to carefully manage their transaction prices to ensure they do not exceed the reference price of the above tier. This strategic approach aims to avoid triggering adjustments (i.e., reference price increases), as this could potentially lead to a higher tax rate if the reference price limits of the upper tier are breached. Furthermore, this strategy enables firms to remain competitive with lower-class cigarette brands but at the highest reference price in their class. As a result, this condition contributes to a significant difference in the average retail prices between brands not located at the highest reference price tier and those positioned at the highest reference price but in the lower class.

The findings of this study show that the implementation of a minimum price does not result in a significant impact on price changes. This may be attributed to the fact that the minimum price set by the government does not exceed the pre-existing market price, as in Malaysia (Liber et al., 2015). This assumption aligns with previous studies indicating that firms keep prices close to the minimum level that consumers can afford. For SKT, the firms keep prices close to the minimum price to maintain a large market share, offsetting this with higher taxes and profit margins from sales of the less price-elastic SPM cigarette types (Adrison & Dauchy, 2023). To effectively address this behavior, it is crucial to set a minimum price for cigarettes at or above the price consumers currently report paying. This could serve as an effective strategy to reduce tobacco use (Golden et al., 2016).

This study is limited to analyzing changes in the average retail price of cigarette brands for a quarterly period (March, June, September, and December) from 2014 to June 2021. Due to the limitations of data availability, we do not account for the sales volume of a cigarette brand, which may vary across regions in Indonesia and be concentrated in specific areas. Our analysis focuses solely on SKM, SPM, and SKT cigarette brands, as these types are the most widely produced in Indonesia. The largest market share during 2011-2017 was SKM, followed by SKT and SPM (Zheng et al., 2018).

This study also did not control for geographic differences and characteristics between regions in Indonesia. Each region may have a different price range due to variations in cost structure components. However, this condition can be minimized by the implementation of a national upper and lower limit price policy. Cigarette brands that violate the price policy in most monitored areas would be subject to tariff adjustments and firm profile reviews.

CONCLUSION

Cigarette firms in Indonesia have adopted a price smoothing strategy by gradually increasing the retail price. The cigarette firms prevent drastic declines in consumer consumption by progressively raising prices. This pricing approach has been consistently observed in the previous year's last quarter (Q4) and the following quarters of Q1,

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https://doi.org/10.15408/sjie.v13i2.40957

Q2, and Q3. During Q4, cigarette firms promptly adjusted their prices upon receiving confirmation of the upcoming year's tax policy. However, the marginal effect observed in Q4 of the previous year diminishes significantly in the following quarters of Q1, Q2, and Q3 of the following year. This pattern underscores the deliberate and systematic nature of the price smoothing strategy employed by cigarette firms for hand-made clove cigarettes, machine-made non-clove cigarettes (SPM), and lower-class firms. Meanwhile, machine-made clove cigarettes (SKM) and higher-class firms did not show significant price smoothing behavior.

The Government's decision to eliminate one of the ceiling price criteria at the end of 2015 has had a tangible impact on the average price of cigarettes. Shortly after the policy was implemented, the average price of cigarettes at the highest reference price within their respective classification (class) increased, resulting in higher prices than before the policy change. In contrast, cigarette brands that do not occupy the highest reference price position in their class tend to have lower average retail prices than those positioned at the top reference price in their class. This price difference reflects the effects of the policy on the pricing dynamics of cigarettes in different tiers, with brands at the highest reference price experiencing notable price increases compared to brands at lower tiers. Meanwhile, implementing a minimum price had no significant impact on price fluctuations.

The main focus of this study is related to the function of excise tax rates as an instrument to limit cigarette consumption. A key challenge in reducing smoking prevalence in Indonesia is the absence of a consistent policy for increasing tobacco excise tax. Each regulation's tariff increase is insignificant, around 10% to 12%. These conditions encourage the complexity of Indonesia's excise policy, making it less effective in reducing cigarette consumption. Cigarette firms' price smoothing behavior makes the condition even more ineffective. To overcome the problem of increasing cigarette prevalence, the Government should implement higher tariff increases to reduce the impact of price smoothing.

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https://doi.org/10.15408/sjie.v13i2.40957

Signifikan: Jurnal Ilmu Ekonomi
Volume 13(2), 2024: 383 - 398
P-ISSN: 2087-2046; E-ISSN: 2476-9223
https://doi.org/10.15408/sjie.v13i2.42464

Unpacking the Forces Behind Indonesia's Foreign Debt: What Drives Long-Term and Short-Term Borrowing?

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JEL Classification:
F34
E44
E31
F41
H63
C32

Received: 19 November 2024

Revised: 09 December 2024

Accepted: 11 December 2024

Available online: December 2024

ABSTRACT

Research Originality: This research explores the factors influencing Indonesia's foreign debt, providing insights into the long-term and short-term effects of inflation, exchange rates, the Fed Funds Rate (FFR), budget deficit, and exports. The originality lies in the comprehensive analysis of these variables using time series data from 2005 to 2022.

Research Objectives: This study examines the impact of key macroeconomic variables on Indonesia's foreign debt, analyzing both long-term and short-term relationships to inform policy and future research.

Research Methods: The study uses time series data from 2005 to 2022, applying the Error Correction Model (ECM) with EViews10 to analyze the dynamic relationships between foreign debt and the influencing factors.

Empirical Results: The study finds that in the long term, exchange rates and exports positively influence foreign debt, while inflation has a negative impact. In the short term, only the Fed Funds Rate (FFR) negatively affects foreign debt. All variables are significantly influential in both the short and long term.

Implications: These findings highlight the importance of managing inflation, exchange rates, and exports in the long term while considering the short-term impact of global financial conditions, such as the FFR, on Indonesia's foreign debt.

Keywords:

external debt; inflation; exchange rate; the fed funds rate; budget deficit

How to Cite:

Fadli, F. (2024). Unpacking the Forces Behind Indonesia's Foreign Debt: What Drives Long-Term and Short-Term Borrowing? *Signifikan: Jurnal Ilmu Ekonomi*, *13*(2), 383-398. https://doi.org/10.15408/sjie.v13i2.42464.

INTRODUCTION

Foreign debt plays a critical role in developing emerging economies, including Indonesia. It is a key financial instrument for infrastructure development, industrial growth, and poverty alleviation. Foreign debt sources include private banks and international institutions like the IMF and the World Bank (Dey & Tareque, 2020). However, the increasing reliance on foreign debt poses significant risks, including fiscal and financial instability, if not managed carefully (Manasseh et al., 2022; Yusuf & Mohd, 2021).

As of 2022, Indonesia ranks seventh globally in foreign debt among middle-income countries, amounting to USD 417.53 billion. By August 2023, this figure reached IDR 7,870.35 trillion, reflecting a consistent upward trend, except for declines in 2021–2022 due to the COVID-19 pandemic (Bank Indonesia, 2023). This condition underscores the urgency of analyzing the factors influencing foreign debt to inform better management and policy formulation. Key economic factors, including inflation, exchange rates, international interest rates, budget deficits, and export performance, significantly influence the dynamics of foreign debt. For example, as Keynesian and Irving Fisher's theories explain, inflation affects debt-servicing costs, real debt value, and exchange rate fluctuations (Sumba, 2023). The exchange rate reflects the currency's comparative value and influences debt repayment capacity, with significant fluctuations observed in Indonesia from 2005 to 2022 (Nizamuddin et al., 2024). Similarly, international interest rates, such as the Fed Funds Rate (FFR), impact borrowing costs and repayment risks, particularly during global financial crises (Alekseievska et al., 2024).

The budget deficit also contributes to rising foreign debt. According to Keynesian and Ricardian theories, deficits arise when government expenditures exceed revenues, often necessitating external borrowing to bridge fiscal gaps (Sanusi, 2022). On the other hand, export performance is pivotal in reducing debt burdens by generating foreign exchange reserves critical for repayments (Kim et al., 2020). Economic theories and empirical evidence suggest that inflation, exchange rates, international interest rates, budget deficits, and export performance significantly influence foreign debt dynamics. The relationship between inflation and foreign debt aligns with Paul Samuelson's Imported Inflation Theory (1971), which posits that inflation, exacerbated by exchange rate fluctuations, increases the government's debt repayment burden (Espinosa, 2023). While inflation reduces the actual value of debt, it also raises interest payment costs and complicates monetary policy. Moreover, inflation has a significant negative long-term effect on foreign debt, indicating that while inflation influences debt, it cannot mitigate its growing burden (Sharaf & Shahen, 2023).

Exchange rates and foreign debt are linked through the Purchasing Power Parity (PPP) theory, which reflects the comparative price of goods between countries (Adistya et al., 2024). High exchange rates often make debt repayment more challenging because exchange rate volatility affects macroeconomic conditions and foreign debt (Ahmed et al., 2021). A depreciating rupiah, for instance, directly increases Indonesia's debt obligations denominated in foreign currencies. International interest rates, such as the Fed Funds

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Rate (FFR), are critical determinants of foreign debt. According to Keynesian theory, interest rates significantly impact investment and borrowing decisions (Akram, 2022). High FFR rates increase global borrowing costs, indirectly raising debt levels for developing economies (Farooq et al., 2021). For Indonesia, fluctuations in the FFR directly affect borrowing terms and repayment schedules, emphasizing the need for cautious monetary policy alignment.

As Keynesian theory explains, budget deficits drive foreign debt accumulation (Kentikelenis & Stubbs, 2022). When government expenditures exceed revenues, external loans often bridge fiscal gaps (al-Rubaie & Ahmed, 2023). There is a positive relationship between budget deficits and foreign debt, reinforcing that deficits necessitate increased borrowing, potentially escalating financial risks (Liu et al., 2022). Conversely, exports mitigate foreign debt burdens, supported by the Balance of Payments Theory (Sabado, 2023). A negative correlation exists between export performance and foreign debt, as higher exports generate foreign exchange reserves to service debt obligations (Oberholzer, 2023). Enhancing export competitiveness is thus crucial for reducing dependency on foreign loans.

This study analyzes long-term and short-term influences of inflation, exchange rates, FFR, budget deficits, and exports on Indonesia's foreign debt during 2005–2022 to build upon this theoretical framework. Previous research provides critical insights into these relationships. For instance, several studies identified significant effects of exchange rates and exports on foreign debt (Kim et al., 2020; Nurjanah & Mustika, 2021a; Djalo et al., 2023), while some studies emphasized the impact of U.S. monetary policy on global debt (Abraham et al., 2020; Gupta & Dubey, 2024; Kose et al., 2021). However, these studies often lack comprehensive analysis, integrating all key variables over extended periods.

Given these multifaceted influences, understanding Indonesia's foreign debt's short- and long-term determinants is crucial. This study applies the Error Correction Model (ECM) to analyze the effects of inflation, exchange rates, FFR, budget deficits, and exports on foreign debt during 2005–2022. The ECM framework allows for assessing equilibrium relationships over time, addressing gaps in previous research by providing a nuanced understanding of both immediate and delayed impacts (Georgescu et al., 2024).

The findings of this study contribute to theoretical advancements and practical policy insights. By identifying dominant factors and their relative impacts, the research seeks to assist policymakers in designing strategies to ensure sustainable debt management and economic stability. Thus, this study is a vital resource for academics, practitioners, and government agencies in addressing Indonesia's growing foreign debt challenges.

METHOD

This study uses a descriptive-quantitative approach to analyze the factors influencing Indonesia's foreign debt from 2005 to 2022. The data utilized in this study are secondary and sourced from reputable institutions such as the Central Statistics Agency, Bank Indonesia, the World Bank, and the Ministry of Finance of the Republic of Indonesia.

The dataset consists of annual time-series data, as annual observations provide sufficient intervals to capture long-term trends and minimize the noise associated with higher-frequency data, such as quarterly or monthly observations. This frequency is particularly suitable given the focus on macroeconomic indicators like inflation, exchange rates, and the budget deficit, which often exhibit smoother trends over yearly periods.

The analysis employs the Error Correction Model (ECM) technique, widely recognized for examining short-term dynamics and long-term equilibrium relationships among non-stationary variables (QASEEM, 2024; Silvia et al., 2023). The ECM was selected for several reasons. First, it deals with Non-Stationary Data. Time-series data often exhibit trends and variability that render them non-stationary. The ECM is particularly useful in addressing this challenge, combining short-term changes with long-term equilibrium through cointegration analysis.

Second. Focus on Long- and Short-Term Dynamics: This study aims to distinguish between short-term deviations and long-term relationships between variables such as inflation, exchange rates, and foreign debt. The ECM technique uniquely identifies these dual effects, offering a more comprehensive understanding of the data. Third, suitability for Annual Data: Annual data often results in fewer observations, which limits the application of more granular econometric methods. The ECM, however, works effectively with limited datasets, provided there is a clear long-term equilibrium relationship among variables.

The general form of the ECM equation is as follows:

Long-Term Equation:

$$ULN_t = \beta_0 + \beta_1 INF_t + \beta_2 NT_t + \beta_3 FFR_t + \beta_4 DA_t + \beta_5 EXPORT_t + \varepsilon_t$$

Short-Term Equation:

$$D(ULN_t) = \beta_0 + \beta_1 D(INF_t) + \beta_2 D(NT_t) + \beta_3 D(FFR_t) + \beta_4 D(DA_t) + \beta_5 D(EXPORT_t) + \beta_6 ECT(-1) + \varepsilon_t$$

$$ECT = Y_{t-1} - \beta_0 - \beta_1 X_{t-1}$$

Where:

ULN = Foreign Debt (Million US$)
INF = Inflation (Percent)
NT = Exchange Rate (Rupiah against US$)
FFR = *Fed Funds Rate*
DA = Budget Deficit (Trillion Rupiah)
EXPORTS = Exports (Million US$)
ECT = Short-term residual value (*Error Correction Model*)

By employing the ECM with annual data, this study provides robust insights into how macroeconomic variables influence Indonesia's foreign debt over both the short and long term. This approach also accounts for the inherent time-lagged effects of macroeconomic policies, ensuring a more accurate interpretation of the results.

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RESULTS & DISCUSSION

The first stage in the ECM model analysis is the stationarity test of the data used in this study. The data used is *time series data* for 2005-2022. The results of the stationarity test using the ADF (*Augmented Dickey-Fuller*) method can be seen in Table 1. A stationarity test needs to be done on time series data because if there is non-stationary data, there will be a spurious regression phenomenon (spurious regression). Based on the test results with the ADF method above, it can be seen that several variables used are not stationary at the level and first difference degrees, so they are retested at the second difference degree. Therefore, the results of the stationarity test of all variables at the second difference degree are used in this study by looking at the probability value of the ADF Test, where each variable has a probability value of less than 0.05, which means that all variables are stationary at the second difference.

Table 1. Stationarity Test Results with the ADF Method

Variables	URT Test	ADF Test	Prob. (5%)	Stationary
Foreign Debt (ULN)	Level	-2.053933	0.2634	No
	1st Difference	-1.432644	0.5402	No
	2nd Difference	-4.202594	0.0064	Yes
Inflation	Level	-2.171413	0.2223	No
	1st Difference	-6.492968	0.0001	Yes
	2nd Difference	-10.16984	0.0000	Yes
Exchange rate	Level	-0.128840	0.9311	No
	1st Difference	-3.101868	0.0468	Yes
	2nd Difference	-4.536849	0.0035	Yes
FFR	Level	-4.007612	0.0085	Yes
	1st Difference	-2.925658	0.0643	No
	2nd Difference	-6.276671	0.0002	Yes
Budget Deficit	Level	1.664718	0.9988	No
	1st Difference	-4.995570	0.0015	Yes
	2nd Difference	-5.960767	0.0003	Yes
Export	Level	-0.249599	0.9141	No
	1st Difference	-2.456146	0.1435	No
	2nd Difference	-4.533741	0.0039	Yes

The results obtained are shown in Table 2. The ECT variable is obtained using the long-term regression equation's residual results. The cointegration results above show that the probability of *the Error Correction Term* (ECT) is 0.0051, so there is a long-term balance of the independent variable against the dependent variable in this study because the ECT probability value is less than 0.05. This step follows the requirements for conducting the *Error Correction Model* (ECM) method test.

Table 2 Cointegration Test Results

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistics		**-4.228139**	**0.0051**
Test critical values:	1% level	-3.886751	
	5% level	-3.052169	
	10% level	-2.666593	

The long-term equation of the ECM test estimation results is as follows:

$$ULN_t = -66.77820 - 474.9123 *INF_t + 23.43817* NT_t - 139.5808* FFR_t + 0.050179* DA_t + 0.568791* EXPORT_t + \varepsilon_t$$

Table 3 shows the results of the F-Statistic Test, T-Statistic Test, and Determination Coefficient Test (*R-Square*) from the long-term model equation above. The independent variables—Inflation, Exchange Rate, The Fed Funds Rate, Budget Deficit, and Exports—significantly affect Foreign Debt in Indonesia from 2005 to 2022. In the long term, Inflation, Exchange Rate, and Exports significantly influence Foreign Debt. However, The Fed Funds Rate and Budget Deficit do not have significant effects. The Determination Coefficient (R-Square) test shows that the independent variables explain 96% of the variation in Foreign Debt.

Table 3. Results of F-Test, t-Test, R2 Test Long-Term Estimates

Variables	Coeff.	t-Statistic	Prob.	Information
Inflation	-474.9123	-3.127134	0.0087	Significant
Exchange rate	23.43817	5.518943	0.0001	Significant
FFR	-139.5808	-0.339089	0.7404	Not Significant
Budget Deficit	0.050179	1.372666	0.1950	Not Significant
Export	0.568791	4.041274	0.0016	Significant
C	-66.77820	-1.397828	0.8634	
R-Square	0.968870			
Adj. R-Square	0.955899			
F-statistic	74.69652			
Prob. F-statistic	0.000000			

In the long term, the estimation results show that inflation changes negatively affect foreign debt. In addition to the budget deficit, the domestic inflation rate affects the volume of foreign debt loans (Abuka et al., 2019; Dal Borgo, 2021; Prah & Tenakwah, 2017). If domestic inflation increases, the borrowing country will reconsider the decision to provide loans to Indonesia, as Indonesia faces a significant risk (the recipient of the loan), which may result in the inability to repay the debt and interest on the loan. Therefore, when domestic inflation increases, the volume of foreign debt will be lower. Based on Keynesian theory, which states that inflation can reduce the actual value of debt when inflation increases, the value of the domestic currency (rupiah) will depreciate

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(Arisa, 2020; Hidayat et al., 2019; Yusnaini, 2023). Therefore, in the long term, inflation will have a negative effect. High and uncontrolled inflation signals a weak domestic economy, which reduces the trust of countries willing to lend. This condition will also prompt borrowing countries to reconsider, calculate debt and interest, and choose to hold off on loans to focus on improving the poor economy.

Based on the results of the long-term estimation, the Exchange Rate has a positive direction towards foreign debt. This is because when the domestic currency strengthens (appreciates), it can reduce export competitiveness, result in a trade balance deficit, and impact the country's ability to pay its foreign debt. This result is in line with several studies that use the exchange rate variable as one of the independent variables that have an effect in the long term but no effect in the short term (Chowdhury et al., 2023; Morina et al., 2020; Saqib et al., 2021). Keynesian theory also states that when the exchange rate appreciates, domestic money strengthens, which builds confidence in the country making loans, ultimately increasing foreign debt (Wanyama et al., 2020).

The long-term estimation results show that Fed interest rate changes have an insignificant effect. This result is in line with several studies, which state that the foreign interest rate (the Fed Funds Rate) does not have a significant effect on Indonesia's foreign debt (Malini et al., 2022; Nurjanah & Mustika, 2021b; Pramudita & Ivander, 2022). This condition is because, besides Indonesia is highly dependent on and requiring loans as an instrument to cover domestic capital shortages, the Fed Funds Rate is relatively low compared to Indonesia's borrowing needs, with a value of US $32.573 billion. The country with the highest lending to Indonesia is Singapore, with a US $57.455 billion value. Thus, Indonesia considers the Singapore interest rate (SIBOR) more significantly when deciding on foreign debt.

Based on the theory of monetary policy, changes in interest rates can affect the flow of international funds or capital originating from foreign debt (Bräuning & Ivashina, 2020; Kumhof et al., 2020). Additionally, macro variables, such as the negative balance of public spending in international trade and interest rates, determine foreign debt demand in countries like Nigeria and Morocco (Benkhaira & El Hassani, 2023; Coulibaly et al., 2024). The estimation results, both in the long and short term, show that the Budget Deficit variable has an insignificant relationship to foreign debt in Indonesia. This result means that an increase or decrease in the budget deficit, in both the long and short term, does not affect foreign debt in Indonesia. Therefore, this result does not follow the hypothesis of this study, which suggests that the Budget Deficit has a positive and significant effect on Foreign Debt.

The long-term estimation results indicate a positive relationship between the budget deficit and foreign debt. This result suggests that when the budget deficit increases, foreign debt also increases, and vice versa when the deficit decreases, which follows Keynesian Theory (Amade & Oyigebe, 2024; Onwuka, 2022). However, the relationship is insignificant, meaning it has no statistically significant impact. This result could be because the positive correlation is not strong enough to influence foreign debt substantially in the long run.

The long-term results show that the export variable has a positive and significant relationship with foreign debt. This result is in line with the Export-Import Model Theory, as increasing exports in Indonesia is done to encourage economic growth (Hendrayanti et al., 2024). On the other hand, Indonesia still needs foreign debt to finance industry, development, and national growth (Juliansyah et al., 2022). Moreover, foreign debt helps meet export industries' financing and capital needs. In the long term, this research hypothesis is rejected, meaning the export variable positively affects foreign debt.

The short-term equation of the ECM test estimation results is as follows:

$$D(D(ULN_t)) = 0.249349 - 38.16920 *D(D(INF_t)) - 2.525842*D(D(NT_t)) - 102.7577*D(D(FFR_t)) + 0.017714*D(D(DA_t)) - 0.042682*D(D(EXPORT_t)) - 0.579911*ECT(-1)$$

The imbalance correction coefficient ECT is an imbalance error (*disequilibrium error*) (Ibrahim & Bashir, 2023). So, when ECT equals zero, X and Y are in equilibrium. This value explains how fast it takes to get the equilibrium value. The coefficient value of ECT is 0.579911, where the absolute value is less than one with a negative direction. The magnitude of the equilibrium value of -0.579911 is that the adjustment process to the imbalance of changes in Foreign Debt in 2005-2022 is relatively slow. This value also means that if there is a past imbalance of 100%, the change in Foreign Debt will adjust by decreasing by 57.99%. Thus, it can be interpreted that Foreign Debt takes 5-6 years to reach full equilibrium (100%).

Table 4. Results of F Test, T Test, R2 Test Short-Term Estimates

Variables	Coeff.	t-Statistic	Prob.	Information
D(D(Inflation))	-38.16920	-0.625201	0.5474	Not Significant
D(D(Exchange Rate))	-2.525842	-0.476295	0.6452	Not Significant
D(D(FFR))	-102.7577	-0.340281	0.0415	Significant
D(D(Budget Deficit))	0.017714	0.961939	0.3612	Not Significant
D(D(Export))	-0.042682	-0.287705	0.7801	Not Significant
ECT(-1)	-0.579911	-2.077944	0.0375	Significant
C	0.249349	0.079684	0.9382	
R-Square	0.385791			
Adj. R-Square	-0.023681			
F-statistic	0.942167			
Prob. F-statistic	0.010607			

Table 4 shows the results of the F-Statistic Test, t-Statistic Test, and Determination Coefficient Test (*R-Square*) from the short-term model equation above. Simultaneously, the independent variables—Inflation, Exchange Rate, The Fed Funds Rate, Budget Deficit, and Exports—significantly affect Foreign Debt in Indonesia from 2005 to 2022. However, in the short term, Inflation, Exchange Rate, Budget Deficit, and Exports do not significantly affect Foreign Debt. Only the Fed Funds Rate has a significant negative effect. The

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Determination Coefficient (R-Square) test reveals that the independent variables explain 39% of the variation in Foreign Debt in the short term, with the remaining 61% explained by factors outside the study.

The short-term estimation results show that the inflation rate does not significantly affect foreign debt. This result means that an increase or decrease in inflation in the short term cannot affect foreign debt in Indonesia. If foreign debt is stated in foreign currency, changes in the exchange rate will have a more significant influence than the inflation factor on the amount of foreign debt. The trendline of the data graph for each variable shows that the exchange rate has an increasing trendline and tends to be linear with the trendline of foreign debt (positive relationship), compared to the trendline of the inflation data graph. This result shows that the exchange rate has a more significant influence than inflation on foreign debt. Domestic inflation may affect the exchange rate, but this is very complex and depends on global economic factors and the monetary policies of other countries. Therefore, while inflation may not significantly impact in the short term, persistent or extreme changes in the long term can affect external debt and require special attention in external debt management (Brandao-Marques et al., 2024).

On the other hand, in the short term, the Exchange Rate variable does not significantly affect foreign debt. This result means that every increase or decrease in the exchange rate has not been able to affect foreign debt. This result is in line with several studies, which state that the exchange rate is not significant in the short term but is significant in the long term, as it depends on the term of the foreign debt incurred by each country (Koijen & Yogo, 2021; Şen et al., 2020; Zahra et al., 2023). In general, foreign debt has a long-term maturity. Therefore, the exchange rate cannot affect foreign debt in the short term.

Meanwhile, based on the results of short-term estimates, the Fed Funds Rate variable has a significant negative effect. This result is in line with Monetary Policy Theory, as an increase in this interest rate will raise the cost of debt interest and increase the burden of debt payments in the future (Blanchard, 2023). Therefore, when interest rates are high, Indonesia will hold back from borrowing foreign debt. This result is in line with several studies, which state that an increase in the Fed Funds Rate significantly affects the amount of foreign debt and debt maturity (especially short-term debt) in both developed and developing countries (Aslam & Jaafar, 2020; Elkhishin & Mohieldin, 2021; Wray & Nersisyan, 2020).

Similarly, in the short term, the Budget Deficit variable shows a positive but insignificant relationship with foreign debt. This research further supports the idea that changes in the budget deficit, whether increasing or decreasing, do not significantly affect foreign debt in the short term. These findings are in line with several studies, which suggest that the budget deficit does not significantly affect foreign debt in Indonesia, as the budget deficit can be financed domestically without reliance on foreign loans (Handaria et al., 2022; Jokolelono et al., 2023; Nizamuddin et al., 2024). Domestic resources, such as high tax revenues, government bonds, and asset sales, can be used to cover the deficit.

While in the short term, the export variable has an insignificant relationship with foreign debt. This result means that an increase or decrease in exports still cannot affect foreign debt, even though there is a negative relationship. However, this impact is not statistically significant enough, possibly due to other variables or events during the research period that caused exports not to have a significant effect on Indonesia's foreign debt.

The results of this short-term estimation do not match the hypothesis, where the export variable has a negative effect. This result aligns with several studies, which concluded that the export variable has a negative and insignificant effect in the short term (Ahmad et al., 2021; Emako et al., 2022; Zaman et al., 2021). According to the Trade Balance Theory, high foreign debt is due to a high trade balance deficit (Truong & Van Vo, 2023). Low exports and high imports will increase the burden of foreign debt, reducing the ability to pay it off and eventually leading to a mounting debt burden (Rajković et al., 2020). Conversely, consistent and sustainable increases in exports in the long term can help reduce foreign debt and strengthen a country's trade balance. However, the impact may not always be significant in the short term due to other complex factors affecting foreign debt, such as exchange rates and commodity price variability (Blavasciunaite et al., 2020).

CONCLUSION

This study analyzes the factors that influence Indonesia's foreign debt during 2005-2022 using the Error Correction Model (ECM) method. In the long term, inflation has a negative effect on foreign debt, meaning that an increase in inflation will reduce foreign debt. However, inflation does not have an effect in the short term. The exchange rate positively affects foreign debt in the long term, but it is not significant in the short term, indicating that exchange rate changes affect debt more in the long run. The Fed Funds Rate (FFR) does not significantly affect foreign debt in the long term. However, it has a negative effect in the short term, suggesting that an increase in the FFR interest rate can reduce Indonesia's foreign debt. The budget deficit does not significantly impact foreign debt in the long or short term, although there is a positive relationship. Exports positively influence foreign debt in the long term, while the effect is not significant in the short term.

The government needs to control inflation to maintain stability, as stable inflation reflects a healthy economy and boosts investor confidence. Additionally, the stability of the Rupiah exchange rate should be prioritized, as large fluctuations, primarily depreciation, can increase the burden of foreign debt. The government must also consider the monetary policies of lending countries, such as the FFR interest rate, when deciding to borrow, particularly in the short term. Since the budget deficit does not significantly affect foreign debt, the government should reduce dependence on foreign borrowing by exploring other funding alternatives, such as increasing tax revenues or developing the domestic bond market. Lastly, boosting exports remains crucial to strengthening the economy in the

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long run. The government should seek strategies other than foreign debt to finance the industrial and development sectors. The government can manage foreign debt more effectively and maintain Indonesia's economic stability by implementing these measures..

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Signifikan: Jurnal Ilmu Ekonomi
Volume 13(2), 2024: 399 - 424
P-ISSN: 2087-2046; E-ISSN: 2476-9223
https://doi.org/10.15408/sjie.v13i2.42534

Unintended Beneficiaries: Examining 3 kg LPG Consumption Among Upper-Middle-Class Households in Bali

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JEL Classification:
D12
H23
L95
Q41
Q48

Received: 23 November 2024

Revised: 11 December 2024

Accepted: 18 December 2024

Available online: December 2024

ABSTRACT

Research Originality: This study investigates the consumption patterns and awareness of 3 kg LPG subsidy policies among upper-middle-class households in Bali, a relatively unexplored area in energy subsidies and consumer behavior.

Research Objectives: To examine the effects of income, price, and practicality on awareness and consumption of 3 kg LPG and evaluate whether awareness mediates these relationships.

Research Methods: A mixed-methods approach combines quantitative survey data with qualitative interview insights. Structural Equation Modeling (SEM) analyzes quantitative relationships, while qualitative findings provide contextual depth.

Empirical Results: Income does not affect awareness, while price and practicality had a significant positive impact. However, income, price, and practicality had adverse but insignificant effects on 3 kg LPG consumption. Awareness did not mediate the relationships between income, price, practicality, and consumption.

Implications: Policymakers should improve subsidy distribution, strengthen public education campaigns, and promote alternatives like induction stoves to reduce dependence on subsidized LPG.

Keywords:
consumer behavior; energy policy; upper-middle-class households

How to Cite:
Pardita, D. P Y., Purnami, A. A. S., Putra, I. K., & Darma, I. K. (2024). Unintended Beneficiaries: Examining 3 kg LPG Consumption Among Upper-Middle Class Households in Bali. *Signifikan: Jurnal Ilmu Ekonomi*, *13*(2), 399-424. https://doi.org/10.15408/sjie.v13i2.42534.

INTRODUCTION

Energy subsidies are crucial in supporting low-income households in Indonesia, particularly in meeting their daily cooking needs. The subsidized 3 kg LPG has become a vital energy source, replacing more polluting fuels such as kerosene and firewood (Fernandes, 2018). The Indonesian government's 3 kg LPG subsidy program aims to alleviate the economic burden on low-income households and promote the use of cleaner energy. However, a concerning trend has emerged in recent years: increasing subsidized 3 kg LPG consumption by upper-middle-class households, who are not the intended beneficiaries. This phenomenon raises concerns because it can reduce the effectiveness of the subsidy program, cause supply shortages for people experiencing poverty, and increase the government's fiscal burden. This research is important to understand the consumption patterns and factors driving upper-middle-class households to use subsidized LPG and to evaluate their awareness of the subsidy policy.

The consumption of Liquefied Petroleum Gas (LPG) has been extensively studied in the framework of its economic, environmental, and technological implications. Previous research highlights the economic impact of LPG, such as its positive correlation with economic growth in regions like Saudi Arabia and BRICS-T countries, alongside its role in reducing energy costs and promoting sustainability through targeted price policies (Daly et al., 2024; Mohamad Taghvaee et al., 2023; Tekin & Dirir, 2024). Additionally, LPG is recognized for its environmental benefits, including reduced emissions compared to traditional fuels, making it a cleaner and more sustainable energy source, particularly for urban areas and developing countries (H. Liu et al., 2022; Warguła et al., 2020).

Technological advancements further enhance LPG's efficiency and adoption. Research highlights improved appliances, vehicle modifications, and optimized production processes as drivers of increased LPG usage across diverse applications, including automotive and household energy needs (Ali et al., 2021; Synák et al., 2019). Income levels and socioeconomic factors also significantly influence LPG adoption, with higher incomes enabling transitions from traditional biomass fuels to cleaner options like LPG, particularly in rural areas (Bazgir et al., 2024). Various studies have highlighted the factors affecting LPG consumption, including price, income, and urbanization. Sapnken et al. (2020) and Dalaba et al. (2018) found that price, income, and urbanization significantly impact LPG consumption in the short and long term, with evidence of fuel substitution from kerosene to LPG. Puzzolo et al. (2019) and Alzyadat (2022) affirm that subsidized prices increase LPG usage. Kalli et al. (2022) and Xu et al. (2019) add that higher food and LPG prices can reduce food security and LPG consumption, presenting challenges in achieving the Sustainable Development Goals (SDGs).

Other studies have analyzed the impact of price differences between the public and private sectors on LPG consumption. Alefan et al. (2018), Štimac et al. (2023), and Zemenkov et al. (2017) found that LPG prices in the private sector are higher than in the public sector, affecting affordability and consumption patterns. Kim (2024) and Kamugisha et al. (2019) emphasize the importance of considering standard prices

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https://doi.org/10.15408/sjie.v13i2.42534

for LPG, gasoline, and diesel, along with annual fuel consumption and price growth rates, in the economic feasibility analysis of LPG consumption. Market dynamics also influence LPG prices. Gonzalez and Lagos (2021) found that the presence of natural gas providers can reduce retail LPG prices. Moreover, appeals have been shown to increase the willingness to pay for unsubsidized LPG and encourage actual consumption (Tang, 2024; Zahno et al., 2020).

Other research also shows that personal income levels significantly influence LPG consumption patterns. Kumar et al. (2020) found a positive correlation between household income and the adoption and sustainable use of LPG. Parikh et al. (2019) emphasized that higher income levels are associated with increased spending on LPG as a substitute for traditional fuels such as wood. Kizilcec et al. (2022) highlight the crucial role of household income and education in the adoption and sustainable use of LPG. The portability of LPG also influences consumption patterns. Angoori and Kumar (2023) showed that the availability and easy distribution of LPG, especially in urban and suburban areas, and the potential accessibility in rural areas after the supply chain is established are the main drivers of increased LPG consumption. Pollard et al. (2018) and Liu et al. (2023) added that introducing smaller LPG cylinders, such as 5 kg, increases portability and reduces upfront costs for low-income households, potentially increasing LPG usage.

Awareness and knowledge of subsidy policies also play a significant role in influencing LPG consumption patterns. Lestarianingsih and Adrison (2021) showed that higher education levels can increase awareness of LPG subsidies among poor households. Government initiatives such as the Direct Benefit Transfer for LPG (DBT-PAHAL) in India demonstrate the impact of policy awareness on consumption behavior (Jagadale & Kemper, 2022). Various researchers with diverse focuses have conducted other research on LPG usage. Almaya et al. (2021) examined the influence of world oil prices, inflation, and household consumption on Indonesia's economic growth, finding that fluctuations in world oil prices affect people's purchasing power for LPG. Mulyana et al. (2023) reviewed business development strategies for 3 kg LPG distributors in Cirebon, showing that supply availability greatly determines consumption patterns. Carrión et al. (2021), in their study on LPG adoption in Ghana, found that relevant intervention programs can enhance sustainable LPG usage. Aryani and Rachmawati (2019) examined the poverty typology in Palembang, highlighting the role of subsidized energy in the lives of poor households. Nduka et al. (2020) studied the impact of a pay-as-you-go LPG system in Nigeria, highlighting the importance of payment mechanisms in LPG adoption.

Meanwhile, Hu et al. (2019) and Sapnken et al. (2023) examined urban household energy consumption, showing that income and economic stability significantly influence fuel choices. Abdulai et al. (2018) reviewed the mass distribution of LPG stoves in Ghana, showing that public knowledge and awareness of subsidies greatly determine adoption levels. Das & Pal (2019), in their study on energy choices of poor households in India, found that price and awareness are critical factors in LPG usage. Thoday et al. (2018) discussed Indonesia's mass conversion program from kerosene to LPG, highlighting lessons and recommendations for expanding clean energy. Fernandes (2018) studied consumer

knowledge about subsidized LPG in Indonesia, showing that many consumers are unaware of the subsidy allocation.

Despite extensive research, several gaps remain unanswered. One of the main gaps is the lack of understanding of the specific factors driving upper-middle-class households to use subsidized LPG. Almaya et al. (2021) and Mulyana et al. (2023) focused more on macroeconomic and distribution aspects without delving into individual or household motivations for LPG usage. Carrión et al. (2021) and Nduka et al. (2020) focused on policy interventions without deeply examining upper-middle-class consumer behavior. Hu et al. (2019) and Abdulai et al. (2018) reviewed economic factors in general but did not explore the role of awareness and knowledge of subsidy policies in usage decisions. Das and Pal (2019) and Fernandes (2018) identified the importance of consumer knowledge but did not explain in detail how this level of awareness interacts with economic and social factors. Thoday et al. (2018) and Stanistreet et al. (2019) focused more on policy and implementation in general without touching on the specific behavior of upper-middle-class households.

The novelty of this study lies in its holistic approach to understanding 3 kg LPG consumption by upper-middle-class households in Bali. This study not only focuses on economic factors such as income and price but also examines convenience and the role of awareness and knowledge regarding subsidy policies. This approach has not been widely explored in previous studies focusing on one aspect. By combining quantitative and qualitative analyses, this research offers a more comprehensive and in-depth view of consumer motivations and behavior, which is expected to serve as a foundation for more effective and equitable energy subsidy distribution policies.

This study aims to identify the factors influencing the consumption of 3 kg LPG by upper-middle-class households in Bali. Specifically, this research will analyze the impact of household income, market LPG prices, and convenience on consumption levels and the role of awareness and knowledge of subsidy policies as intervening variables. Through this approach, it is hoped to gain a more comprehensive understanding of the motivations and behaviors of upper-middle-class households in using subsidized LPG. This study is expected to contribute significantly to economics and public policy. Theoretically, this research will enrich the literature on consumer energy behavior, especially in the context of government subsidy programs. The findings from this study can provide new insights into the interaction between economic factors and policy awareness in determining household energy consumption patterns. Practically, the results of this research can be used as a basis for the government to formulate more effective policies in targeting energy subsidies and to develop educational programs that increase public awareness about the allocation of subsidies.

METHOD

This study employed a mixed-methods approach integrating quantitative and qualitative methods. This approach was chosen to provide a more comprehensive and

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in-depth understanding of the phenomenon under study, which cannot be achieved using a single method alone. The independent variables in this research include income, price, and practicality, with awareness as the intervening variable and consumption level of 3 kg LPG as the dependent variable. The research was conducted in Bali Province, Indonesia, targeting middle-to-upper-income households using 3 kg LPG. The sampling technique used was purposive sampling. This technique was chosen as the study focused on households with specific characteristics relevant to the research objectives. The quantitative sample size was 100 respondents, based on a total population of 198,000 households.

The quantitative respondents were selected based on the following criteria: (1) having a minimum monthly household income of IDR 2,700,000, categorized as middle-to-upper income in Bali, and (2) actively using 3 kg LPG for household activities. These criteria were designed to ensure that the sample accurately represents the target population. For the qualitative approach, ten respondents were selected using purposive sampling with the same criteria: middle-to-upper income households actively using 3 kg LPG. Quantitative data collection was conducted through surveys using closed-ended Likert-scale questionnaires to measure respondents' perceptions of the research variables. On the other hand, qualitative data were obtained through in-depth interviews using semi-structured interview guidelines. This approach allowed the study to produce robust statistical analysis from quantitative data while offering richer contextual insights from qualitative data.

The data analysis technique used was Partial Least Squares Structural Equation Modeling (PLS-SEM). PLS-SEM is a variance-based multivariate analysis technique widely employed to examine complex relationships among latent variables. This technique is particularly advantageous for predictive purposes, especially in studies involving theoretical models with multiple reflective or formative constructs (Hair & Alamer, 2022; Kono & Sato, 2023). PLS-SEM is highly flexible in handling non-normal data distributions and requires a smaller sample size than Covariance-Based SEM (CB-SEM), making it highly suitable for exploratory research or studies with sample size limitations (Cheah et al., 2024). Furthermore, PLS-SEM excels in predictive accuracy and dynamically identifies mediation and moderation effects (Ringle et al., 2014).

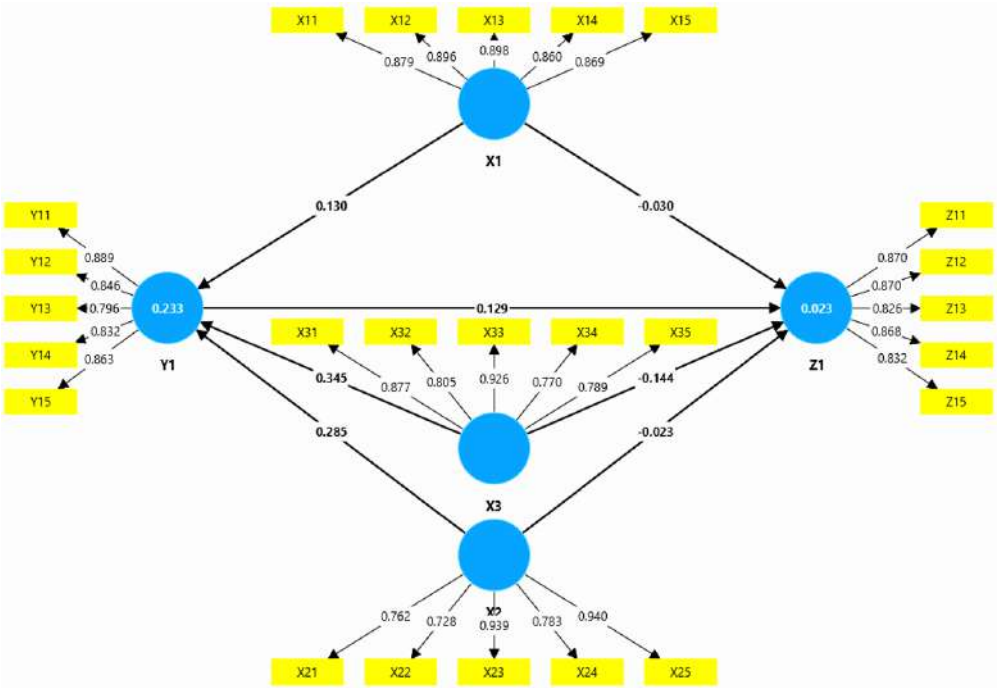
The PLS-SEM analysis process began with formulating the research model, including the specification of relationships between latent variables (unmeasured directly) and manifest variables (directly measured). The outer model illustrates the relationships between latent variables and their indicators. In contrast, the inner model describes the relationships among latent variables, whether independent, intervening, or dependent. Data collected through questionnaires were first tested for validity and reliability and cleaned of missing values and outliers. The measurement model evaluation ensured the constructs' validity and reliability. Convergent validity was assessed through loading factor values and Average Variance Extracted, while discriminant validity was tested using the Fornell-Larcker criterion (AVE should be greater than inter-variable correlations) or HTMT analysis. Reliability was examined through Composite Reliability and Cronbach's Alpha.

The structural model evaluation included testing the R^2 values, where an R^2 of approximately 0.67 is considered strong, 0.33 moderate, and 0.19 weak. Path coefficients were tested using bootstrapping techniques to determine statistical significance (t-statistics > 1.96 and $p < 0.05$). Additionally, mediation analysis was conducted to identify the role of the intervening variable. The results of these analyses were interpreted to understand significant relationships, model strength, and predictive relevance. These findings were then summarized in conclusions, encompassing the theoretical and practical implications of the research. This step ensured that the PLS-SEM analysis was performed accurately, reliably, and transparently (Al-Emran et al., 2019; Hair & Alamer, 2022; Sarstedt & Moisescu, 2024).

RESULT AND DISCUSSION

The measurement model analysis in this study uses Smart PLS 4 to evaluate the convergent validity of the indicators for each variable. Convergent validity refers to the extent to which indicators designed to measure a construct measure that construct. Based on the analysis results, all indicators used in this study have outer loading values greater than 0.70. These high outer loading values indicate that each indicator has a strong and consistent correlation with the construct it measures. Figure 1 below shows the results of the outer loading analysis for each construct.

Figure 1. Outer Loading Analysis Results for Each Construct



The outer loading analysis results indicate that all indicators used in this study have good convergent validity. This means that each indicator accurately measures the intended construct. Thus, the measurement model used in this study can be considered

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valid and reliable. Meanwhile, construct reliability and validity are evaluated to ensure that the measurement instruments used in this study are reliable and valid. This evaluation includes statistical indicators such as Cronbach's Alpha, Composite Reliability, and Average Variance Extracted (AVE). The results obtained show that all constructs have excellent reliability and validity. Table 1 presents the reliability and validity values of the constructs.

Cronbach's Alpha values for all constructs are above 0.90, indicating a very high level of internal consistency. This means that all indicators used to measure the constructs provide consistent and reliable results. The Composite Reliability values also show excellent results, with all constructs having values above 0.90. Composite Reliability provides a better picture of construct reliability than Cronbach's Alpha as it considers the factor loadings of each indicator. These results indicate that the constructs measured in this study are reliable. The Average Variance Extracted (AVE) for all constructs also shows satisfactory results with values above 0.50. This indicates that the constructs have good convergent validity, meaning they can capture a significant amount of variance from their indicators compared to the variance caused by measurement error. Overall, the measurement instruments used in this study are reliable and valid. Therefore, the measurement model can be trusted to measure the studied constructs and provide a solid foundation for further analysis.

Table 1. Reliability and Validity Values of the Constructs

Variable	Cronbach's Alpha	Composite Reliability (Rho_A)	Composite Reliability (Rho_C)	Average Variance Extracted (AVE)
X1	0,928	0,948	0,945	0,776
X2	0,909	1,158	0,919	0,698
X3	0,908	1,078	0,920	0,698
Y1	0,901	0,914	0,926	0,715
Z1	0,911	0,984	0,931	0,729

Source: PLS-SEM Algorithm Test Result, 2024

Discriminant validity measures the extent to which constructs that should not correlate with each other are truly uncorrelated. Two measures used to test discriminant validity are the Heterotrait-Monotrait Ratio (HTMT) and the Fornell-Larcker Criterion. The HTMT results show that all values are below 0.85, indicating that the constructs in this study have good discriminant validity. HTMT measures the relationships between different constructs, and these results show that the constructs are indeed distinct from each other, as proposed by the theory. The Fornell-Larcker Criterion also indicates that each construct has a higher square root AVE than the inter-construct correlations. This means that the variance captured by the construct is more significant than that captured by other constructs. In other words, the constructs have good discriminant validity, indicating that each construct is unique and does not overlap with different constructs. Table 2 presents the results of the discriminant validity analysis.

Table 2. Discriminant Validity Analysis Results

Variable	Heterotrait-Monotrait Ratio (HTMT)	Fornell-Larcker Criterion
X2 <-> X1	0,059	-0,028
X3 <-> X1	0,110	0,080
X3 <-> X2	0,114	0,058
Y1 <-> X1	0,161	0,149
Y1 <-> X2	0,239	0,301
Y1 <-> X3	0,301	0,372
Z1 <-> X1	0,111	-0,021
Z1 <-> X2	0,065	0,008
Z1 <-> X3	0,117	-0,100
Z1 <-> Y1	0,096	0,064

Source: PLS-SEM Algorithm Test Result, 2024

These two measures collectively provide strong evidence that the constructs measured in this study are discriminantly valid. Good discriminant validity ensures that the results obtained from data analysis can be trusted and support the overall validity of the research model. The quality evaluation of the model in this study is conducted by examining the R-square criteria. R-square measures the proportion of variance in the dependent variable that the independent variables in the model can explain. R-square adjusted provides an adjustment to the R-square for the number of predictors in the model and the sample used. Table 3 presents the R-square and R-square adjusted values.

Table 3. R-square and R-square Adjusted Values

Variable	R-square	R-square Adjusted
Y1	0,233	0,209
Z1	0,023	-0,018

Source: PLS-SEM Algorithm Test Result, 2024

The R-square results show that all the variables collectively explain 23.3% of the variance in awareness (Y1), indicating a moderate predictive power of the model. However, for variable consumption level (Z1), the model only explains 2.3% of the variance, showing shallow predictive power. The adjusted R-square value for awareness (Y1) is 0.209, slightly lower than the R-square, indicating adjustment for the number of predictors in the model. Meanwhile, the adjusted R-square for consumption level (Z1) is -0.018, indicating that the model does not have significant predictive power after adjustment. Path coefficients in the structural model indicate the strength and direction of relationships between latent variables. P-values are used to test the statistical significance of these relationships. Figure 2 presents the path coefficients and p-values results.

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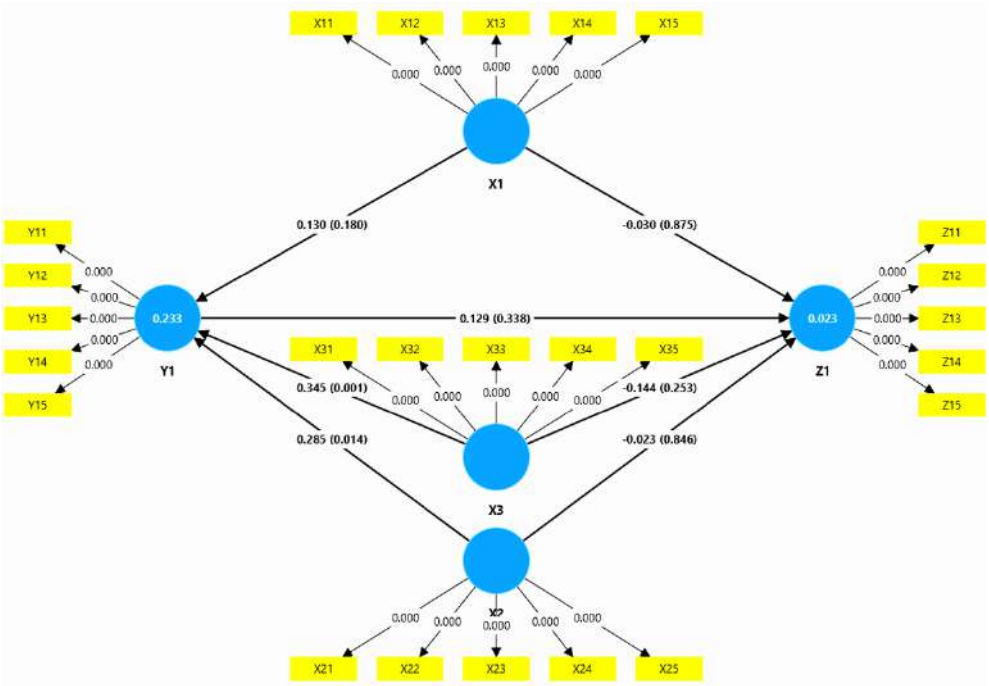
Figure 2. Path Coefficients and P-Value Results



The relationship between price and awareness and between practicality and awareness is statistically significant, indicating that these two variables have a positive effect on awareness. Conversely, although vivacious, the relationship between income and awareness is insignificant, indicating that income does not have a strong enough effect on awareness. For variable consumption level, no significant relationships were found. The relationships between income, price, practicality, and awareness with consumption level are all insignificant. This result indicates that these variables do not directly impact this study's consumption level. The total indirect effects analysis results show no indirect effects of income, price, and practicality on consumption level through awareness. Thematic analysis and coding techniques were employed to identify themes and patterns in the interview transcripts, resulting in several key findings regarding the respondents' perceptions, preferences, and consumption habits of 3 kg LPG gas. Most respondents stated that their primary reason for using 3 kg LPG gas was its practicality and ease of use. Respondents appreciated the small size of the 3 kg LPG cylinder, which is easy to lift and move.

Price emerged as a significant theme in the interviews. Although the respondents are from middle-to-upper-income households, they still consider price in their consumption decisions. Some respondents showed a high awareness of the 3 kg LPG subsidy policy. They understand that the 3 kg LPG cylinders are subsidized by the government and intended for low-income households. However, this awareness does not always stop them from using the subsidized cylinders. Respondents also revealed that personal habits and preferences significantly influence their decision to use 3 kg LPG. Some respondents have been using 3 kg LPG for a long time and feel comfortable with it. This preference is often

maintained even when other alternatives are available, indicating that established habits are challenging to change. The distribution and availability of 3 kg LPG also emerged as important factors in the interviews. Some respondents noted that 3 kg LPG cylinders are more easily found and widely distributed in their area. This wide availability makes 3 kg LPG more accessible for middle-to-upper-income households.

Some respondents highlighted the moral and ethical aspects of using 3 kg LPG. Despite recognizing the economic benefits of using subsidized gas, some respondents feel guilty about using subsidies intended for people experiencing poverty. This sentiment indicates a moral dilemma among users. Respondents also mentioned that social influence and the surrounding environment affect their decisions. Some respondents admitted to following the example of neighbors or friends who also use 3 kg LPG. This condition shows that consumption decisions are also influenced by social environment and local norms.

Based on quantitative analysis, the first finding of this study reveals that income has a positive but statistically insignificant influence on awareness of the 3 kg LPG subsidy policy. While income tends to increase awareness of the subsidy policy, its effect is not strong or consistent enough to be deemed statistically significant. Theoretically, Keynesian Consumption Theory posits that higher-income individuals have better economic capacity to access information or engage in public issues, including subsidy policies (Kates, 2014). However, in the case of 3 kg LPG, these results suggest that awareness of subsidies is not solely dependent on income level but is more influenced by other factors, such as price, access to information, or specific household energy needs. Another explanatory factor is the Rational Ignorance Theory, which posits that higher-income individuals may deprioritize information about subsidy policies because the direct impact of subsidies on their expenditures is relatively tiny (Somin, 2019). Conversely, subsidies play a critical role in meeting daily needs for lower-income groups, making them more aware of such policies. In this context, higher incomes may reduce the urgency to understand or pay attention to subsidy policies as the contribution of subsidies to overall expenditures is perceived as insignificant.

Previous studies have shown that higher income generally correlates positively with adopting LPG as an energy source, as households with higher incomes are more likely to transition from traditional fuels to cleaner and more efficient LPG. Ishengoma and Igangula (2021) and Pallegedara et al. (2021) demonstrated that higher-income households are more likely to adopt LPG than lower-income households, owing to their greater capacity to purchase clean energy. However, in the context of subsidized 3 kg LPG, the effect of income on subsidy awareness may differ due to factors such as limited access to information or alternative energy preferences.

This phenomenon also relates to energy stacking, wherein higher-income households continue using traditional and modern energy sources despite having access to LPG, as Alananga (2024) noted. This indicates that income growth does not always correlate with increased awareness of subsidy policies, as higher-income groups tend to use LPG

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as one of several energy options rather than a primary necessity. Other factors, such as awareness of the health and environmental benefits of LPG, also play a significant role. Dewoolkar et al. (2020) emphasized that households aware of the negative health impacts of traditional fuels are more likely to adopt LPG. However, misinformation and lack of trust in subsidy policies may hinder LPG adoption despite economic incentives. Calvo-Gonzalez et al. (2017) found that mistrust of LPG subsidy reforms reduced early adoption in El Salvador until more accurate information became available. These findings resonate with the reality in Indonesia, where limited government communication regarding the 3 kg LPG subsidy policy may affect public awareness, particularly among higher-income groups who may perceive the policy as less relevant to them.

Although higher incomes enable households to utilize the 3 kg LPG subsidy, they do not necessarily increase policy awareness. This underscores the need for targeted education and awareness campaigns, as Swain and Mishra (2021) and Gill-Wiehl et al. (2022) suggested. Campaigns emphasizing health benefits, cost savings, and environmental support can enhance awareness, even among groups not directly dependent on the subsidy. Furthermore, accessibility and distribution of LPG are critical factors supporting adoption and awareness, as highlighted by Swain and Mishra (2020). These findings align with previous literature indicating that while income influences LPG adoption, it is not always the primary determinant of subsidy policy awareness. Therefore, effective policy strategies should integrate improved distribution approaches, strong public communication, and educational campaigns targeting middle-income groups to enhance awareness of the 3 kg LPG subsidy policy.

The second finding of this study reveals that price has a positive and significant influence on awareness of the 3 kg LPG subsidy policy. Compared to unsubsidized alternatives or larger cylinders, the low price of 3 kg LPG becomes a striking factor that attracts consumer attention, including middle-income households. This price difference encourages consumers to choose 3 kg LPG and raises awareness that the government subsidizes this product. In other words, low prices are a key element influencing purchasing decisions and enhancing public awareness of the underlying subsidy policy. Price is an economic tool and an effective informational instrument in communicating public policies. This finding aligns with the Price Signaling Theory (Debo et al., 2020; Grigoriou et al., 2016), which explains that price can serve as an informational signal to consumers, mainly when there is an information asymmetry between consumers and producers. The low price of 3 kg LPG signals that the government subsidizes the product, creating awareness of the subsidy policy. This is also supported by Consumer Behavior Theory (Foxall, 2015; Taheran et al., 2024), which emphasizes that price is a central element influencing consumer perceptions and awareness of a product or policy. In this case, the price difference between subsidized 3 kg LPG and unsubsidized LPG provides a direct stimulus for consumers to recognize that they benefit from government intervention.

The relationship between the price of 3 kg LPG and public awareness of the subsidy policy reflects a complex interplay of factors, such as supply chain management, economic accessibility, and public awareness levels. The findings indicate that the affordable price

of 3 kg LPG can effectively enhance public awareness of the subsidy policy. However, the study also highlights challenges in implementing the subsidy policy, particularly regarding distribution and supply availability. Previous studies by Sulistio et al. (2016) and Meutia and Anshar (2021) revealed that inefficient supply chain management often leads to scarcity and price surges for 3 kg LPG, especially outside Java Island. This results in consumer-level prices exceeding the government-mandated retail ceiling price, undermining the subsidy policy's effectiveness in raising public awareness. In contrast, this study indicates that maintaining price stability sustains public awareness of the subsidy.

From an economic accessibility perspective, previous research by Jeuland et al. (2023) and Swain and Mishra (2020) demonstrated that subsidies significantly improve LPG affordability for low-income households. These findings align with this study, where low prices act as an economic incentive that fosters both awareness and usage of LPG, even among households not primarily targeted by the subsidy. However, Dewanjaya et al. (2022) highlighted that price reductions alone are insufficient if distribution issues remain unresolved, underscoring a gap in the current subsidy policy.

In terms of public awareness, this study found that public awareness of the 3 kg LPG subsidy policy is generally high. This finding is consistent with Woolley et al. (2022), who noted that awareness levels increase with targeted communication campaigns. However, awareness alone cannot drive LPG adoption without addressing economic and logistical barriers. Patil et al. (2021) added that public education campaigns on the health and environmental benefits of LPG could potentially enhance awareness and LPG adoption. These findings underscore the importance of integrating effective price signaling with robust communication efforts to strengthen the success of subsidy policies.

The policy implications drawn from this study suggest the need for an integrated approach encompassing reliable supply chain management, adequate subsidy levels to ensure affordability and comprehensive public awareness campaigns. This supports the views of Sulistio et al. (2016) and Troncoso & Soares da Silva (2017), who emphasized that regionally targeted subsidies and consistent supply distribution can improve overall policy effectiveness. This study reaffirms that price is a primary factor in increasing public awareness of the 3 kg LPG subsidy policy. However, a synergy between price stability, distribution efficiency, and public education is essential for holistic policy success.

The third finding of this study reveals that the practicality of using 3 kg LPG has a positive and significant effect on public awareness of the 3 kg LPG subsidy policy. This indicates that the functional aspects of a product play a crucial role in shaping consumer awareness of public policies. The practicality of a product, such as ease of transportation, size suitability for household needs, and user-friendliness in daily activities, increases the likelihood of individuals paying attention to information related to policies governing the product. The accessibility and ease of use of 3 kg LPG encourage consumers to understand the subsidy policy better, including identifying the intended target beneficiaries. Moreover, practicality often enhances consumer engagement with the product, ultimately creating opportunities to receive or seek additional information about related aspects, such as

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subsidy objectives and eligibility requirements. This finding underscores practicality influences consumption preferences and increases awareness of the underlying policy. Therefore, energy subsidy policies should consider practicality factors in their design and implementation to ensure better effectiveness and awareness among the public.

In consumer behavior theory, practicality is one of the utilitarian attributes influencing consumer decisions and engagement (McFadden, 2024; Sheth, 2021; Wood et al., 2022). Practicality, such as the small and portable size of cylinders and their ease of use for daily cooking, fosters a closer relationship between consumers and the product. This connection enables consumers to be more exposed to information about the product, including policies regulating it, such as the LPG subsidy. This finding is also consistent with brand exposure theory, which states that the more frequently a product is used or seen, the more likely consumers are to notice and understand information related to the product (Kwon & Shin, 2020; Zeqiri et al., 2024). The practicality of 3 kg LPG increases usage frequency, thereby enhancing the likelihood of consumers understanding the subsidy policy associated with the product.

The small and accessible size of the cylinders is designed to meet the needs of low-income households and small businesses, making them easier for these groups to purchase and use (Arifin, 2021; Sulistio et al., 2016). However, the effectiveness of this practicality is often hindered by distribution challenges. Previous studies have shown that inefficient distribution systems lead to shortages and price increases, particularly in regions outside Java, reducing their availability for the intended beneficiaries (Dewanjaya et al., 2022; Meutia & Anshar, 2021). Furthermore, fraudulent practices, such as purchases by higher-income individuals, exacerbate this problem and limit accessibility for low-income communities (Arifin, 2021). Public awareness of subsidy policies is crucial to ensuring the effectiveness of such programs. However, low enforcement levels and insufficient outreach efforts result in many consumers not fully understanding the purpose of these subsidies. Additionally, the significant fiscal burden of LPG subsidies underscores the importance of ensuring that subsidies are well-targeted to reduce budget inefficiencies (Aziz et al., 2024; Hakam et al., 2022).

Alternative solutions, such as transitioning from LPG to induction stoves, have also been proposed to reduce reliance on subsidized LPG by leveraging excess electricity capacity from new power plants (al Irsyad et al., 2022; Hakam et al., 2022). Thus, this study supports the notion that the practicality of 3 kg LPG can increase awareness of the subsidy policy. However, this must be complemented by better distribution mechanisms and broader educational efforts to ensure that subsidy benefits reach the appropriate recipients.

The fourth finding reveals that income has a negative and insignificant influence on the consumption of 3 kg LPG by upper-middle-class households in Bali. This indicates that income is not a primary determinant in the decision-making process of upper-middle-class households to use subsidized 3 kg LPG. According to consumption theory, such as the Theory of Consumer Choice (Thaler, 2019), purchasing decisions are typically influenced

by income, with higher income levels generally prompting consumers to shift towards higher-quality or more exclusive goods and services. However, in this study, the results contradict the theory's predictions. One possible explanation is that the consumption of 3 kg LPG by upper-middle-class households is not driven by economic necessity but by practicality and habit. Habitual behavior theory (Pollard, 2015) explains that long-standing habits often influence consumption decisions, regardless of economic factors such as income. Upper-middle-class households may use 3 kg LPG due to familiarity or comfort with its size and usage rather than economic constraints.

Additionally, these findings are supported by previous research indicating that higher-income groups often disregard subsidy compliance due to a lack of awareness about regulations or the ease of accessing subsidized goods (Das & Pal, 2019; Fernandes, 2018). Furthermore, Prospect Theory (van Bilsen & Laeven, 2020) provides another perspective, suggesting that these groups may view 3 kg LPG as a safe and practical choice, regardless of their economic status. These findings underscore the importance of considering non-economic factors, such as habit and practicality, in understanding the consumption behavior of 3 kg LPG among upper-middle-class households. This also highlights the need for the government to emphasize education and stricter oversight of energy subsidy policies to ensure better targeting.

The findings deviate from the predictions of the energy ladder hypothesis (Ishengoma & Igangula, 2021; Sapnken et al., 2020), which posits that higher income levels drive a transition to cleaner and more efficient energy sources, such as LPG. Upper-middle-class households are expected to transition to non-subsidized LPG or alternative energy sources. However, this study found that they continue to use 3 kg LPG, which is intended explicitly for low-income groups. Previous studies have also noted a positive relationship between income and LPG consumption. Yawale et al. (2021) and Baul et al. (2018) show that higher income enables households to transition from biomass to LPG. However, this study finds that the consumption of 3 kg LPG by upper-middle-class households in Bali is more influenced by non-economic factors, such as habit and practicality, rather than income. This is supported by Arifin (2021) and Sulistio et al. (2016), who note that subsidized LPG distribution is often ineffective, allowing easy access for non-target households regardless of income level.

Moreover, price sensitivity also plays an important role. A study in Rwanda by Witinok-Huber et al. (2024) found that higher-income households are more responsive to changes in LPG prices, while lower-income households rely more on subsidies. In Bali, these findings may reflect that upper-middle-class households continue using 3 kg LPG not because of economic constraints but due to accessibility and practicality. This study's findings indicate that the relationship between income and 3 kg LPG consumption by upper-middle-class households does not align with general assumptions in energy transition theory. This reinforces the importance of prioritizing distribution monitoring and ensuring that subsidy policies are well-targeted, as suggested by Dewanjaya et al. (2022) and Hakam et al. (2022).

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The fifth finding of this study indicates that price has a negative but insignificant influence on the consumption of 3 kg LPG by upper-middle-class households in Bali. This suggests that the decision of upper-middle-class households to use subsidized 3 kg LPG is not significantly affected by price fluctuations. In classical economic theory, price is often considered a primary factor influencing consumption decisions through the mechanisms of supply and demand (Kates, 2014; Migunov & Syutkina, 2024). However, the findings do not fully support the theory in this case. These results can be explained by consumer behavior theory, which posits that consumer behavior is not solely determined by economic factors such as price but also by habits, social norms, and ease of access. Upper-middle-class households in Bali may continue using 3 kg LPG due to established habits or perceptions of its practicality and convenience, even though they have the financial capacity to switch to non-subsidized LPG or alternative energy sources.

Previous studies also provide relevant insights. Research by Dewanjaya et al. (2022) and Arifin (2021) found that poorly targeted subsidized LPG distribution can allow easy access for upper-middle-class households, thereby reducing the significance of price in influencing consumption decisions. These findings differ from earlier studies that generally identified a significant negative relationship between price and LPG consumption. For example, research in Rwanda by Witinok-Huber et al. (2024) showed that a price increase of 1 USD per kilogram reduced LPG consumption by 4.1 kg per month. Similarly, in Cameroon, mid-term price elasticity ranged between -0.330 and -0.401, indicating that higher LPG prices significantly reduced consumption (Sapnken et al., 2023). However, in Bali, the price impact on consumption was insignificant, which may be explained by other factors, such as the practicality and habitual use of 3 kg LPG outweighing price considerations. Research in Indonesia also demonstrated that subsidies for 3 kg LPG cylinders have helped maintain consumption levels despite price increases (Aziz et al., 2024). This suggests that the availability of subsidies can reduce price sensitivity among users, including upper-middle-class households.

Further research in India by Mishra et al. (2024) indicated that while subsidies increased LPG adoption, annual consumption per user tended to decline. This highlights that subsidy mechanisms and government policies can influence the effect of price on consumption. In Thailand, LPG price hikes triggered public protests, prompting the government to implement price compensation policies to maintain energy affordability (Sripokangkul, 2014). The price sensitivity of 3 kg LPG consumption among upper-middle-class households in Bali may not be as strong as in other countries due to non-economic factors such as habits, accessibility, and subsidies playing a more dominant role.

The sixth finding indicates that practicality has a negative but insignificant influence on the consumption of 3 kg LPG by upper-middle-class households in Bali. This suggests that although practicality, such as the small cylinder size, ease of transportation, and user-friendliness, is considered an important utilitarian attribute, it is not a primary determinant in consumption decisions for this group. In product utilitarianism theory, practicality is often viewed as a key factor influencing purchase decisions, particularly for everyday products like LPG (Littmann, 2016). However, in the case of upper-middle-class

households in Bali, the results indicate that practicality does not play a significant role in increasing the consumption of subsidized 3 kg LPG. These findings can be explained through the Theory of Planned Behavior (Ajzen & Schmidt, 2020). Upper-middle-class households in Bali may use 3 kg LPG more out of habit or because of easy accessibility rather than considerations of practicality.

These findings differ from previous studies that demonstrated practicality, such as small size and ease of transportation, significantly promoting LPG consumption. Quaglione et al. (2019) found that the small and lightweight cylinder size facilitates storage and transportation, making it more appealing to households requiring high flexibility. Moreover, the user-friendly design and ease of use of 3 kg LPG are often associated with consistent consumption patterns, especially in areas with limited space or infrastructure (Dewanjaya et al., 2022). However, in the case of upper-middle-class households in Bali, these findings suggest that practicality is not a primary factor driving consumption. This may be due to entrenched habits or a preference for the accessibility of 3 kg LPG supported by subsidies rather than prioritizing its practical attributes. Furthermore, upper-middle-class households likely have more energy options, such as non-subsidized LPG or other energy sources, making the practicality of 3 kg LPG less relevant compared to lower-income households.

This discrepancy can also be attributed to uneven distribution factors. Dewanjaya et al. (2022) highlighted that distribution challenges often affect perceptions of the practicality of 3 kg LPG, particularly in more remote areas. In the context of Bali, the relatively easy access of upper-middle-class households to 3 kg LPG may reduce their reliance on practicality as a factor in consumption decisions. These findings underscore that while practicality theoretically enhances consumption, it is not universally applicable and can be influenced by socioeconomic contexts and the dynamics of prevailing subsidy policies. The implications of these findings point to the need for policy approaches that consider more complex consumption motivations, particularly among upper-middle-class households.

The seventh finding of this study reveals that awareness of subsidy policies has a positive but insignificant effect on the consumption of 3 kg LPG by upper-middle-class households in Bali. Additionally, awareness of subsidy policies does not mediate the relationship between income, price, and practicality with 3 kg LPG consumption. This suggests that although upper-middle-class households may understand that 3 kg LPG is a subsidized product for lower-income groups, this knowledge cannot significantly influence their consumption behavior. According to the Theory of Planned Behavior (Ajzen & Schmidt, 2020), awareness of subsidy policies can influence behavior by forming attitudes, subjective norms, and perceived behavioral control. However, when this awareness is not strong enough to change attitudes or overcome existing consumption habits, its impact on consumption behavior becomes insignificant. Moreover, this theory posits that external factors, such as income and price, only influence behavior if mediated through psychological mechanisms like awareness or intention. The insignificant mediating effect suggests that the relationship between income, price, and practicality with 3 kg LPG consumption occurs directly, without subsidy awareness.

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This finding can also be explained through the Value-Action Gap Theory (de Bernardi & Waller, 2022; Meistrup & Klitmøller, 2023; A. Williams & Hodges, 2022), which asserts that knowledge or awareness does not always translate into tangible actions. In this context, although households are aware of the subsidy policy, they continue to use 3 kg LPG due to other factors such as habits, ease of access, or convenience, which outweigh the influence of awareness. From the perspective of Cognitive Dissonance Theory (Cooper & Carlsmith, 2015), upper-middle-class households may experience cognitive dissonance between their understanding of the subsidy policy and their consumption behavior. However, this dissonance can be minimized through justifications such as accessibility or efficiency, rendering subsidy awareness ineffective as a behavioral change driver or mediating factor. These results emphasize that while awareness of subsidy policies is important, it is not strong enough to be a significant mediating mechanism in influencing 3 kg LPG consumption among upper-middle-class households.

These findings differ from previous studies that demonstrated the importance of subsidy awareness in driving LPG adoption and usage. Gill-Wiehl et al. (2022) and Patil et al. (2021) found that awareness of subsidy policies, such as India's Pradhan Mantri Ujjwala Yojana (PMUY) program, significantly increased LPG adoption, particularly among low-income households. Similarly, Woolley et al. (2022) in Rwanda observed that awareness of LPG subsidies and charcoal ban policies increased households' intentions to switch to LPG. These findings suggest that awareness of the benefits and objectives of subsidy policies can be a driving factor for LPG adoption. However, in the context of upper-middle-class households in Bali, their socioeconomic conditions may explain the insignificant impact of awareness on 3 kg LPG consumption. Greve and Lay (2023) noted that subsidy removal could prompt households to revert to traditional fuels. However, households with higher economic capacity are less likely to be influenced by subsidy awareness due to their accessibility and preference for convenience. Sulistio et al. (2016) also highlighted that the mistargeted distribution of subsidies in Indonesia makes access to 3 kg LPG more dependent on distribution factors than awareness.

Additionally, Guta et al. (2024) demonstrated that social determinants such as education, economic status, and community influence play a significant role in energy consumption decisions. In the case of upper-middle-class households, these factors may be more dominant than subsidy awareness, reducing its significant impact on consumption. Overall, these findings indicate that while awareness of subsidy policies is important, its influence on the consumption of 3 kg LPG by upper-middle-class households in Bali is more complex and affected by non-economic factors such as habits, preferences, and accessibility. This underscores the importance of policy strategies that enhance awareness and ensure equitable distribution and effective oversight.

CONCLUSIONS

This study reveals the complex dynamics of consumption and awareness of the 3 kg LPG subsidy policy among upper-middle-class households in Bali. Income was found to have a positive but insignificant effect on subsidy policy awareness, indicating that income

levels do not entirely determine awareness. Conversely, price and practicality positively affected policy awareness, emphasizing the importance of functional product attributes and economic factors in enhancing public understanding of subsidies. However, income, price, and practicality each had adverse and insignificant effects on consuming 3 kg LPG. This suggests that economic or utilitarian factors do not solely drive upper-middle-class households' decisions to use 3 kg LPG but are more influenced by habits or accessibility. Awareness of the subsidy policy also did not mediate the relationship between income, price, and practicality with consumption, indicating that although households may be aware of the subsidy, this knowledge is insufficient to alter their consumption behavior.

To enhance the effectiveness of the subsidy policy, the government needs to strengthen the distribution system to ensure that 3 kg LPG is better targeted and accessible to low-income groups. Public education should also be enhanced through campaigns emphasizing the benefits of subsidies, particularly for groups that do not directly rely on them. Additionally, introducing alternative energy solutions, such as induction stoves, could be a long-term strategy to reduce reliance on subsidized LPG. The government must also maintain price stability for 3 kg LPG to reinforce public policy signals and increase consumer awareness of the subsidies.

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Signifikan: Jurnal Ilmu Ekonomi
Volume 13(2), 2024: 425 - 438
P-ISSN: 2087-2046; E-ISSN: 2476-9223
https://doi.org/10.15408/sjie.v13i2.41206

Enhancing Competitiveness of Indonesian Culinary SMEs: The Role of Entrepreneurial Networks, Entrepreneurial Bricolage, and Frugal Innovation

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JEL Classification:
L14
L26
O31
O32

Received: 03 September 2024

Revised: 10 November 2024

Accepted: 15 November 2024

Available online: December 2024

ABSTRACT

Research Originality: This study comprehensively analyzes entrepreneurial networks, bricolage, and frugal innovation within the context of Indonesian culinary SMEs.

Research Objectives: This study explores how entrepreneurial networks, entrepreneurial bricolage, and frugal innovation contribute to improving the competitiveness of SMEs in Indonesia's culinary sector.

Research Methods: Data analysis was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM) on 100 culinary SMEs across various regions of Indonesia.

Empirical Results: This study reveals that while entrepreneurial networks do not directly impact competitiveness, they play a crucial role in fostering entrepreneurial bricolage and frugal innovation. These two constructs, in turn, significantly enhance the competitiveness of SMEs.

Implications: This research provides insights on how SMEs in emerging economies can harness resourcefulness and innovation to sustain growth and competitiveness.

Keywords:

entrepreneurial networks; entrepreneurial bricolage; frugal innovation; SME competitiveness.

How to Cite:

Alamanda, D. T., Anggadwita, G., Profityo, W. B., & Kurniati, D. M. (2024). Enhancing Competitiveness of Indonesian Culinary SMEs: The Role of Entrepreneural Bricolage, and Frugal Innovation. *Signifikan: Jurnal Ilmu Ekonomi*, *13*(2), 425-438. https://doi.org/10.15408/sjie.v13i2.41206.

INTRODUCTION

Indonesia's culinary industry, renowned for its rich cultural diversity and unique flavors, is a key contributor to the national economy. Small and Medium Enterprises (SMEs) in this sector play a crucial role in generating employment, preserving cultural heritage, and supporting regional economic growth (Kalfas et al., 2024). However, these enterprises face significant competitive challenges in an increasingly globalized and dynamic market (Anggadwita et al., 2021). Factors such as limited access to resources (Yuldinawati et al., 2018), financial constraints (Ramdhani et al., 2020), and heightened competition necessitate innovative approaches to sustain and enhance their market position (Alamanda et al., 2019).

This study integrates Network Theory and the Resource-Based View (RBV) to examine how entrepreneurial networks, bricolage, and frugal innovation enhance SME competitiveness. These strategies—entrepreneurial networks (Abu-Rumman et al., 2021), bricolage, and frugal innovation (Iqbal et al., 2024)—are pivotal for empowering SMEs to navigate complex market challenges. Network Theory highlights that networks grant SMEs access to critical external resources, such as knowledge, capital, and partnerships, which may not be available within the enterprise (Granovetter, 1985). These entrepreneurial networks are particularly beneficial for Indonesia's culinary SMEs, providing essential support and fostering collaboration that enables them to thrive even in resource-constrained environments. The RBV aligns entrepreneurial bricolage and frugal innovation by proposing that SMEs can enhance their competitive advantage through the creative use of limited internal resources (Barney, 1991). For Indonesian culinary SMEs, this strategy involves creating high-quality, cost-effective food products that align with local tastes, accomplished with a limited investment. Integrating Network Theory and RBV offers a compelling framework for understanding how entrepreneurial networking, entrepreneurial bricolage, and frugal innovation interact to enhance competitiveness. While Network Theory emphasizes the value of external resources that extend SMEs' capabilities beyond internal limitations, RBV focuses on optimizing these resources to sustain competitive advantage. This study provides insights into how these strategies can be leveraged in synergy to support SME resilience and growth in a competitive market by integrating these theories.

Entrepreneurial networks have emerged as an important resource for SMEs, providing critical connections, knowledge, and access to resources that facilitate growth and enable market expansion (Aldrich & Zimmer, 1986; Abu-Rumman et al., 2021). These networks enable collaboration and the exchange of information, empowering SMEs to utilize shared knowledge and access new markets with greater efficiency. For culinary SMEs, entrepreneurial networks serve as crucial resources for understanding market trends, enhancing brand visibility, and fostering cross-regional collaboration opportunities that expand their influence (Jones et al., 2019). These networks facilitate market entry and expansion and enable collaboration and sharing of best practices among entrepreneurs (Wasim et al., 2023).

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Conversely, entrepreneurial bricolage—the innovative application of existing resources to address challenges and seize opportunities—has demonstrated effectiveness for SMEs operating with limited resources (Baker & Nelson, 2005; Mateus & Sarkar, 2024). This approach is particularly relevant in SMEs, where resource scarcity is often a significant barrier to growth. By adopting a bricolage mindset, these enterprises can turn constraints into opportunities, developing unique solutions that differentiate them in a competitive market (Tajeddini et al., 2023).

Frugal innovation complements bricolage by emphasizing cost-effective, sustainable, and user-centric innovation (Fu et al., 2024). This approach allows SMEs to create customer value while maintaining affordability and efficiency, crucial factors in competitive markets (Bound & Thornton, 2012; Radjou et al., 2012). The integration of these elements establishes a strong framework that effectively addresses the challenges SMEs encounter while capitalizing on their strengths in ways that conventional business strategies may overlook. Understanding this interplay is vital for developing strategies that enhance the competitiveness of SMEs, particularly in the dynamic and challenging environment of the Indonesian culinary sector.

Despite the recognized importance of these strategies, the existing literature has not sufficiently explored the synergistic effects of entrepreneurial networks, entrepreneurial bricolage, and frugal innovation in the context of Indonesian culinary SMEs. Most studies focus on these elements in isolation, leaving a gap in understanding how they interact to enhance competitiveness. This research aims to address this gap by examining the interconnected roles of entrepreneurial networks, bricolage, and frugal innovation in strengthening the competitiveness of culinary SMEs in Indonesia. This study is significant as it offers insights into how Indonesian culinary SMEs can leverage their networks and resourcefulness to innovate and compete effectively in a challenging market environment. Culinary SMEs have significant potential to expand into global markets. The growing global trend of appreciating authentic and unique foods from various countries presents opportunities for Indonesian culinary SMEs to penetrate international markets. However, to capitalize on these opportunities, SMEs must overcome various challenges, such as resource limitations and market access, making exploring strategies to enhance their competitiveness highly relevant.

By critically reviewing existing literature and addressing the identified research gap, this study will contribute to a broader understanding of how SMEs in developing economies can achieve sustainable growth and competitiveness. The findings will have implications for academic research, policymakers, and practitioners seeking to support the growth and development of SMEs in the Indonesian culinary sector.

METHODS

The research method employed in this study involves a quantitative approach using Structural Equation Modeling (SEM) based on Partial Least Squares (PLS). SEM PLS was chosen for its ability to test complex structural relationships between latent variables

and because it can be used with relatively small sample sizes without assuming normal distribution (Hair et al., 2019).

The data used in this study were collected through a survey conducted with 100 respondents who are culinary SME owners across Indonesia. This sample size represents understanding general relationship patterns between the proposed variables, providing insightful and reliable findings. Furthermore, Partial Least Squares (PLS) analysis does not require a large sample size, with recommended ranges between 30 to 100 respondents (Jumani & Sukhabot, 2021; Singkheeprapha et al., 2022). The respondents were randomly selected from various regions throughout the country, ensuring broad representation from diverse geographical and cultural contexts within the culinary sector, with the following detailed breakdown.

The geographic distribution of respondents reveals that 60% are based on the island of Java, highlighting the significant concentration of culinary SMEs in this densely populated region, renowned for its diverse and vibrant culinary industry. Another 10% of the respondents are from Bali, where the tourism-driven economy strongly influences the local culinary sector. Meanwhile, 15% of the respondents are from Sumatra, a region with a rich culinary heritage and a growing SME sector that substantially contributes to local and national markets. Additionally, 10% of the respondents are from Kalimantan, representing the emerging culinary businesses on this resource-rich island. The remaining 5% of the respondents are from Sulawesi, a region known for its distinctive culinary offerings and a developing SME sector.

The respondents are involved in a diverse range of culinary product types, with 40% engaged in producing snack chips, which are widely popular across Indonesia and play a significant role in the local snack industry. Another 25% focus on producing various cakes, catering to the growing market demand for traditional and modern cake varieties. Additionally, 20% of the respondents specialize in various beverages, offering a mix of traditional and innovative beverages that appeal to diverse consumer preferences. In the catering services segment, 5% of the respondents provide meal packages for events and daily consumption. Another 5% are involved in producing packaged spices, essential in Indonesian cuisine, offering both convenience and traditional flavors to consumers. The remaining 5% of the respondents are engaged in producing snack boxes, which are a popular choice for events and gatherings.

The duration of business operations among the respondents shows that 70% have been operating their culinary SMEs for less than five years, indicating that a significant portion of these businesses are relatively new and emerging. On the other hand, 30% of the respondents have been in business for 5-10 years, representing a more established group of SMEs with a more extended presence and potentially more experience in navigating the challenges of the culinary industry. This distribution highlights the dynamic nature of the sector, with a mix of new entrants and established players contributing to the overall landscape.

The survey was designed to measure variables related to entrepreneurial networks, bricolage, frugal innovation, and the competitiveness of SMEs. Smart PLS software was used as the analytical tool to analyze the collected data. Smart PLS was selected for its capability to perform flexible path modeling and handle models with numerous indicators

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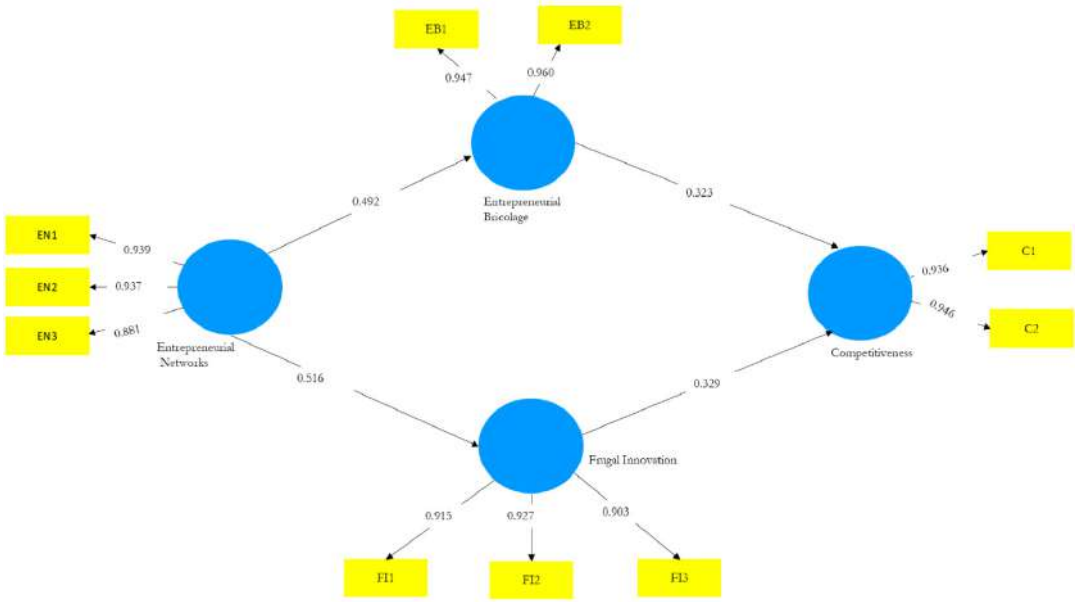
and latent variables. Additionally, Smart PLS allows researchers to comprehensively test the validity and reliability of the model, including estimating direct and indirect relationships between the hypothesized variables (Hair et al., 2019).

RESULTS AND DISCUSSION

In this study, the structural model testing using the Partial Least Square (PLS) method was conducted in two stages: measurement model testing (outer model) and structural model testing (inner model). At an outer model stage, the measurement model determines the validity and reliability of the reflective indicators associated with the latent variables. The validity measurement is carried out by examining the factor loadings, where an indicator is considered valid if it has a factor loading greater than 0.50 (Figure1). Meanwhile, reliability is measured through the internal consistency of the indicators that describe the latent variable construct. After confirming that all indicators are valid and reliable, the testing continues by evaluating the structural model. This evaluation examines the percentage of variance explained (R^2) for the endogenous latent variables, which are influenced by the exogenous latent variables. Additionally, the t-statistic values obtained through bootstrapping are used to determine the significance of the relationships between variables.

Figure 1. Full Structural Model (PLS Algorithm)



The numbers displayed on each arrow indicate the factor loading values, which reflect the validity of the indicators about the latent variables. Each indicator with a factor loading greater than 0.50 is considered valid. The testing results show that all indicators have significant factor loadings and meet the validity requirements, as seen from the values on each arrow. The measurement model (outer model) connects latent variables to manifest variables. The measurement model is evaluated through Confirmatory Factor Analysis (CFA) to assess the validity and reliability of the latent constructs. This method

involves testing for convergent validity, discriminant validity, and reliability. Convergent validity is based on the principle that measures (manifest variables) of a construct should be highly correlated. A common rule of thumb for assessing convergent validity is that factor loadings should be greater than 0.7 for confirmatory research, and loadings between 0.6 and 0.7 are acceptable for exploratory research.

The Average Variance Extracted (AVE) should also exceed 0.5. However, for the initial stages of measurement scale development, factor loadings between 0.5 and 0.6 are still considered adequate (Chin, 1998). Reliability testing evaluates the instrument's accuracy, consistency, and precision in measuring the construct, typically using Composite Reliability (CR). The standard criterion for construct reliability is a CR value greater than 0.7 for confirmatory research, with values between 0.6 and 0.7 acceptable for exploratory research. All manifest variables in this study were declared to have met the requirements for convergent validity. To further ensure the robustness of the model, discriminant validity can be assessed through cross-loading factors with constructs and by comparing the AVE with the correlation of latent variables.

Discriminant validity can be assessed by cross-loading factors with constructs and comparing the AVE with the correlation of latent variables. If the correlation of a construct with its associated indicators is higher than its correlation with other constructs, the variable is said to have high discriminant validity. The cross-loading values are presented in Table 1. The cross-loading factor values show that the correlation of each latent construct with its corresponding indicators is higher than with other constructs. Therefore, the indicators used to measure the latent variables have met the necessary criteria.

Table 1. Factor Cross Loading Test

	Entrepreneurial Network	Entrepreneurial Bricolage	Frugal Innovation	Competitiveness
EN1	0.939	0.467	0.545	0.497
EN2	0.937	0.461	0.485	0.445
EN3	0.887	0.456	0.478	0.456
EB1	0.436	0.947	0.421	0.476
EB2	0.499	0.960	0.433	0.548
FI1	0.463	0.369	0.915	0.498
FI2	0.436	0.353	0.927	0.487
FI3	0.513	0.498	0.903	0.512
C1	0.44	0.49	0.479	0.936
C2	0.443	0.524	0.547	0.946

Source: Authors (2024)

The Fornell-Larcker Criterion is a method used to assess discriminant validity in a structural equation model. It compares the Average Variance Extracted (AVE) square root for each latent variable with the correlations between those and other latent variables. According to the Fornell-Larcker Criterion, for discriminant validity to be established,

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the diagonal values (square roots of AVE) should be greater than the off-diagonal values (correlations with other constructs) in their respective rows and columns.

In Table 2, each diagonal value is higher than the corresponding off-diagonal values in the same row and column, indicating that each construct shares more variance with its indicators than with other constructs. This result suggests that discriminant validity is achieved, meaning that the constructs are distinct and measure different concepts effectively.

Table 2. Fornell-Lacker Criterion

	Entrepreneurial Network	Entrepreneurial Bricolage	Frugal Innovation	Competitiveness
Entrepreneurial Network	0.941			
Entrepreneurial Bricolage	0.539	0.954		
Frugal Innovation	0.546	0.448	0.915	
Competitiveness	0.469	0.492	0.516	0.921

Source: Authors (2024)

Furthermore, from the results of Composite Reliability (CR) and Cronbach's Alpha, the Composite Reliability (CR) value is greater than 0.7 and the Cronbach's Alpha value is greater than 0.6, so it can be concluded that the data is reliable which shows that all indicators have consistency in measuring each variable.

Figure 2. Bootstrapping

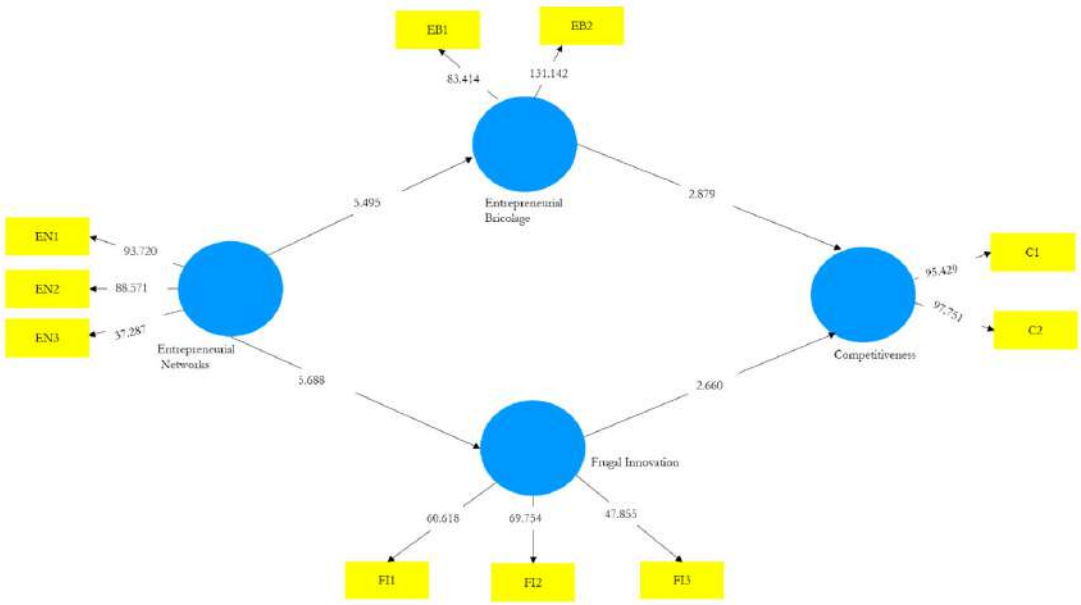

Figure 2 represents bootstrapping results in a Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis. Bootstrapping is a resampling method used to assess the stability and reliability of the model's estimates, particularly the significance of the paths between constructs. The t-values indicate the significance of the relationships, with

values greater than 1.96 generally considered statistically significant at the 5% level. For instance, the t-values between EB1 and Entrepreneurial Bricolage (83.414) and between C1 and Competitiveness (95.429) suggest robust and significant relationships. Overall, the bootstrapping results suggest that the relationships between the constructs and their indicators are robust and statistically significant, reinforcing the model's validity. This result supports the model's reliability in explaining the relationships among the latent variables.

Building on this result, the hypotheses in this study will be tested using the path coefficients and t-values (Table 3) to determine whether the effects are statistically significant. Additionally, the significance of the path analysis will also reveal the parameter coefficients (original sample), which indicate the significance of the influence of each research variable.

Table 3. Path Analysis

	Original Sample (O)	T Statistics (|O/STDEV|)	P Values	Note
Entrepreneurial Network -> Competitiveness	0.140	1.259	0.209	Reject H_1
Entrepreneurial Network -> Entrepreneurial Bricolage	0.492	5.495	0.000	Accept H_1
Entrepreneurial Network -> Frugal Innovation	0.516	5.688	0.000	Accept H_1
Entrepreneurial Bricolage -> Competitiveness	0.323	2.879	0.004	Accept H_1
Frugal Innovation -> Competitiveness	0.329	2.660	0.008	Accept H_1
Entrepreneurial Network -> Entrepreneurial Bricolage -> Competitiveness	0.159	2.494	0.013	Accept H_1
Entrepreneurial Network -> Frugal Innovation -> Competitiveness	0.170	2.410	0.016	Accept H_1

Source: Authors (2024)

According to Richter and Tudoran (2024), business research typically employs a 95% confidence level. The t-statistic value indicates that the path coefficient score must be above 1.96 for a two-tailed hypothesis. Based on the result, it was found that the Entrepreneurial Network does not significantly affect Competitiveness. Conversely, the Entrepreneurial Network positively affects Entrepreneurial Bricolage and Frugal Innovation. Additionally, entrepreneurial bricolage positively affects Competitiveness, and frugal innovation impacts Competitiveness. Furthermore, Entrepreneurial Bricolage mediates the effect of the Entrepreneurial Network on Competitiveness, while Frugal Innovation mediates the effect of the Entrepreneurial Network on Competitiveness through Frugal Innovation.

The Entrepreneurial Network construct typically includes indicators such as the strength of business connections, the frequency of interactions within the network, and access to resources like knowledge, capital, and market opportunities (Robledo et al., 2023). In this study, the Entrepreneurial Network was expected to directly influence the competitiveness of SMEs, particularly in the culinary sector in Indonesia. However, the findings indicate that this network does not significantly impact competitiveness.

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One possible reason is the nature of the connections within the network. The benefits may be limited if these networks are primarily composed of similar, small-scale businesses without substantial ties to larger, more resource-rich entities. The network might be substantial regarding social capital but weak in access to critical resources that could enhance competitiveness, such as advanced technology, skilled labor, or innovative practices (Pylypenko et al., 2023). In Indonesia, many SMEs in the culinary sector may rely heavily on traditional practices and local markets, limiting the potential competitive advantage that can be gained from networking alone (Shahira et al., 2023).

In Indonesia, the culinary sector predominantly comprises micro and small enterprises with limited access to large-scale distribution channels and advanced technological tools (Alamanda et al., 2023). While valuable for maintaining relationships and gaining incremental knowledge, the Entrepreneurial Network might not be sufficient to enhance competitiveness significantly (Liu et al., 2023). Many of these businesses operate in a highly competitive and fragmented market, where differentiation and innovation are crucial to staying ahead. Therefore, the influence of networks might be overshadowed by other factors, such as product innovation, customer service, and pricing strategies, which are more directly linked to competitiveness.

Additionally, Indonesia's cultural and social dynamics might contribute to this outcome (Samsu et al., 2023). The entrepreneurial networks in Indonesia, especially in traditional culinary businesses, are often informal and based on social ties rather than strategic alliances. This result limits the scope of resource-sharing and collective bargaining power, which are critical for improving competitiveness on a larger scale.

This finding contrasts with the firm's Resource-Based View (RBV), which suggests that access to unique resources through networks can be a source of competitive advantage (Kero & Bogale, 2023). The RBV posits that entrepreneurial networks should provide access to rare, valuable, and inimitable resources, enhancing competitiveness. However, in the context of Indonesian culinary SMEs, the resources accessed through these networks may not meet the criteria of rarity or inimitability or be adequately leveraged to enhance competitiveness (Perdana & Prasasti, 2023).

Another contrasting concept is the Social Capital Theory (Alpino & Mehlum, 2023), which argues that the value of networks is in the strength and diversity of connections. If the networks are not diverse or do not include connections to more powerful or innovative partners, the expected competitive advantage may not materialize. This condition might explain why, despite strong networking, the impact on competitiveness is insignificant.

In the future, it would be valuable to compare the role of entrepreneurial networks across different sectors and regions within Indonesia to understand the contextual factors that enhance or diminish their impact on competitiveness. Understanding how entrepreneurial networks evolve and their long-term impact on competitiveness could provide deeper insights (Perdana & Prasasti, 2023). This network includes studying how networks transition from social to strategic alliances (Mathey et al., 2024).

The constructs of Entrepreneurial Network, Entrepreneurial Bricolage, and Frugal Innovation each play crucial roles in driving competitiveness, particularly in the context of SMEs in Indonesia's culinary sector. Entrepreneurial network typically includes the breadth and depth of business connections, the frequency of information exchange, and the extent of resource sharing (Mathey et al., 2024). These networks are essential for accessing ideas, knowledge, and materials vital for entrepreneurial bricolage and frugal innovation.

Entrepreneurial bricolage involves using limited resources in creative and unconventional ways to solve problems and create value (Iqbal et al., 2024). Indicators include the ability to repurpose existing resources, improvisation skills, and the capacity to operate under constraints. Those creative approaches align closely with frugal innovation, which focuses on developing simple, cost-effective solutions within tight resource constraints. Frugal innovation focuses on creating simple and cost-effective solutions that are both affordable and sustainable (Dima et al., 2022). Indicators include innovating within budget constraints, adapting existing technologies, and delivering value to resource-constrained customers (Cai et al., 2019).

The positive effect of Entrepreneurial Networks on both Entrepreneurial Bricolage and Frugal Innovation indicates that strong networks provide the necessary resources, ideas, and support systems that enable entrepreneurs to creatively leverage their limited resources (bricolage) and develop cost-effective innovations (frugal innovation). In turn, entrepreneurial bricolage and frugal innovation significantly enhance competitiveness by allowing SMEs to differentiate themselves, meet market needs efficiently, and maintain flexibility in a competitive environment (Al Omoush et al., 2023). These relationships are particularly relevant in the Indonesian culinary SME sector. Many SMEs operate with limited financial and technological resources but have access to rich networks of suppliers, customers, and other entrepreneurs. These networks often serve as vital channels for exchanging knowledge about local tastes, sourcing affordable ingredients, and sharing best practices for operational efficiency.

Entrepreneurial bricolage is common in this context, as many business owners must creatively use what is available to them, such as adapting traditional recipes with modern twists using locally sourced, inexpensive ingredients (Iqbal et al., 2024). Frugal innovation is also critical, as SMEs must innovate within tight budget constraints to create products that appeal to a broad market while remaining affordable (Al Omoush et al., 2023). The ability to innovate frugally allows these businesses to compete effectively against larger firms with more resources (Rossetto et al., 2023).

While the findings align with theories that emphasize the importance of networks in resource-constrained environments, they challenge some traditional views that prioritize resource abundance as a key driver of competitiveness. The Resource-Based View (RBV) suggests that firms with unique, valuable, and difficult-to-imitate resources achieve a competitive advantage (Kero & Bogale, 2023). However, in Indonesian culinary SMEs, competitiveness derives more from how resources are utilized creatively (bricolage) and innovatively (frugal innovation) than from abundant resources.

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This challenges the notion that more resources always lead to greater competitiveness. Instead, it supports the idea that resourcefulness—how resources are applied—drives competitive success in resource-scarce environments. This perspective aligns with the theory of effectuation, which posits that successful entrepreneurs do not start with a given set of resources but instead create value by leveraging available means.

Future research could explore several areas, and future research should investigate the specific characteristics of entrepreneurial networks that contribute most to bricolage and frugal innovation. For example, studies could examine whether the network's diversity or the strength of ties is more crucial for fostering these outcomes (Flipo et al., 2023). Future research can conduct more detailed, sector-specific studies that provide further insights into how these relationships play out in different industries. For instance, comparing the role of networks in the culinary sector with those in technology-based SMEs could reveal sector-specific dynamics. It would be valuable to explore potential barriers to the effectiveness of entrepreneurial networks, such as cultural or social factors that limit the full utilization of these networks for bricolage and innovation.

CONCLUSION

The study explored the relationships between Entrepreneurial Networks, Entrepreneurial Bricolage, Frugal Innovation, and Competitiveness within the context of Indonesian culinary SMEs. The findings reveal that while entrepreneurial networks do not directly impact competitiveness, they play a crucial role in fostering both entrepreneurial bricolage and frugal innovation. These two constructs, in turn, significantly enhance the competitiveness of SMEs. The results suggest that for SMEs in resource-constrained environments, such as Indonesia's culinary sector, leveraging networks to stimulate bricolage and frugal innovation is key to achieving a competitive advantage.

This study offers valuable implications for academic research, practical application, and policy development. It broadens the literature on SME competitiveness by analyzing the combined effect of entrepreneurial networks, entrepreneurial bricolage, and frugal innovation, focusing on emerging markets like Indonesia. By demonstrating the interaction among these constructs, the study advances our understanding of resource-constrained entrepreneurship, underscoring the importance of creatively leveraging limited resources to maintain competitiveness. Additionally, this research integrates the Resource-Based View (RBV) and Network Theory, presenting a novel framework that illustrates how external and internal resources can work synergistically to overcome limitations and drive sustainable growth.

For SME owners and managers, the findings emphasize the value of adopting entrepreneurial bricolage and frugal innovation strategies. Policymakers can leverage these insights to create tailored support programs that enhance networking opportunities, such as entrepreneurship hubs and industry-specific meetups. Business training programs should incorporate modules on creative problem-solving and affordable innovation techniques, equipping SME entrepreneurs to maximize limited resources and enhance their flexibility

in a dynamic market landscape. Additionally, government agencies can allocate dedicated funding for research and development (R&D) targeted at culinary SMEs, focusing on cost-effective innovations, efficient production practices, and sustainable packaging. These initiatives would enable culinary SMEs to respond to market demand and consumer preferences without requiring substantial capital investment.

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http://journal.uinjkt.ac.id/index.php/signifikan
https://doi.org/10.15408/sjie.v13i2.41206

Signifikan: Jurnal Ilmu Ekonomi
Volume 13(2), 2024: 439 - 454
P-ISSN: 2087-2046; E-ISSN: 2476-9223
https://doi.org/10.15408/sjie.v13i2.43188

The Impact of Internet Access Contributing to Farmers' Welfare in Indonesia: A Case Study Based on National Socio-Economic Survey

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JEL Classification:
D6
I24
L86
Q12

Received: 30 November 2024

Revised: 18 December 2024

Accepted: 24 December 2024

Available online: December 2024

ABSTRACT

Research Originality: This study highlights the transformative role of digitalization, particularly the use of internet networks and mobile phones, in addressing these challenges and enhancing the welfare of farmers.

Research Objectives: This research aims to analyze the impact of internet usage on farmers' welfare in Indonesia. Specifically, it examines how access to digital tools can bridge the knowledge gap in the agricultural sector and improve economic outcomes, focusing on regional disparities between Western and Eastern Indonesia.

Research Methods: This study uses National Socio-Economic Survey (Susenas) data and the ordered probit model with marginal effects.

Empirical Results: Farmers in the upper-middle expenditure group can leverage the Internet and mobile phones to access production information, markets, and farm credit, supported by better finances and education. In contrast, low-income farmers, particularly in eastern Indonesia, face barriers such as costs, limited infrastructure, and low digital literacy, hindering technology adoption to improve welfare.

Implications: The government is expected to address this digital divide by accelerating the development of internet infrastructure in rural areas, improving digital literacy, subsidizing technological devices, and developing accessible agricultural applications.

Keywords:
farmer; internet services; welfare; education gap

How to Cite:

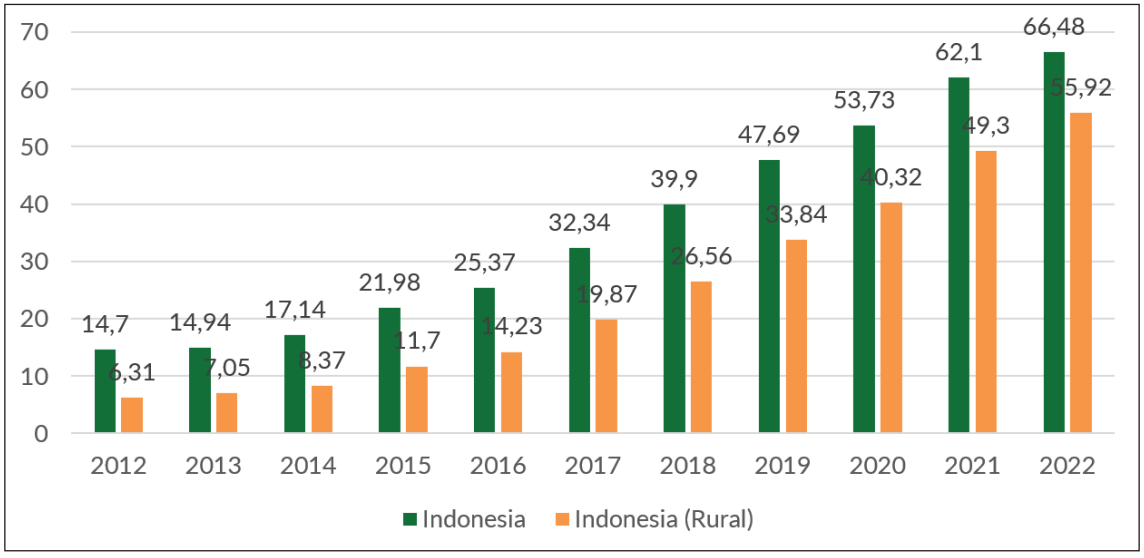
Wardhana, A., Fauzy, M. Z., Anggana, A. K., & Kharisma, B. (2024). The Impact of Internet Access Contributing to Farmers' Welfare in Indonesia: A Case Study Based on National Socio-Economic Survey. *Signifikan: Jurnal Ilmu Ekonomi*, *13*(2), 439-454. https://doi.org/10.15408/sjie.v13i2.43188.

INTRODUCTION

Digital technology supports the economy by expanding access to information and business. In Indonesia, the Internet helps farmers access production information, inputs, credit, and government assistance, thereby reducing information asymmetry and increasing efficiency. Research shows that the Internet increases income (Chang & Just, 2009), production efficiency (Chen et al., 2022), and product marketing (Owusu et al., 2018). The Internet helps farmers find solutions to agricultural problems, including land management (Ma & Zheng, 2021). However, its impact varies depending on farmers' age, education, and income. Therefore, developing internet infrastructure in rural areas is key to supporting farmers' welfare.

The public is increasingly using the Internet to get the information needed; the internet development in Indonesia can be seen in the figure below. The amount of Internet used is increasing, so the utilization of the Internet by the people of Indonesia is increasing. Rural communities can utilize greater internet access for their work interests. The figure below shows the development of the Internet due to greater public demand for the Internet. The increase in Internet access in rural areas has exceeded 50% in 2022, which means that the Internet's role is getting more prominent in the activities of rural communities.

Figure 1. Development of Internet Usage in Indonesia 2012-2022 (in percent)



Source: Central Bureau of Statistics of Indonesia

The Internet can contribute to farmers' performance by improving welfare and technical efficiency. Several studies have utilized the Internet to increase farmers' income, such as the results of research by Siaw et al. (2020), which showed a positive relationship between internet access and farmer welfare. Research shows that internet access helps farmers and their household income. The role of information and communication technology can increase the efficiency of agricultural products. In general, research in

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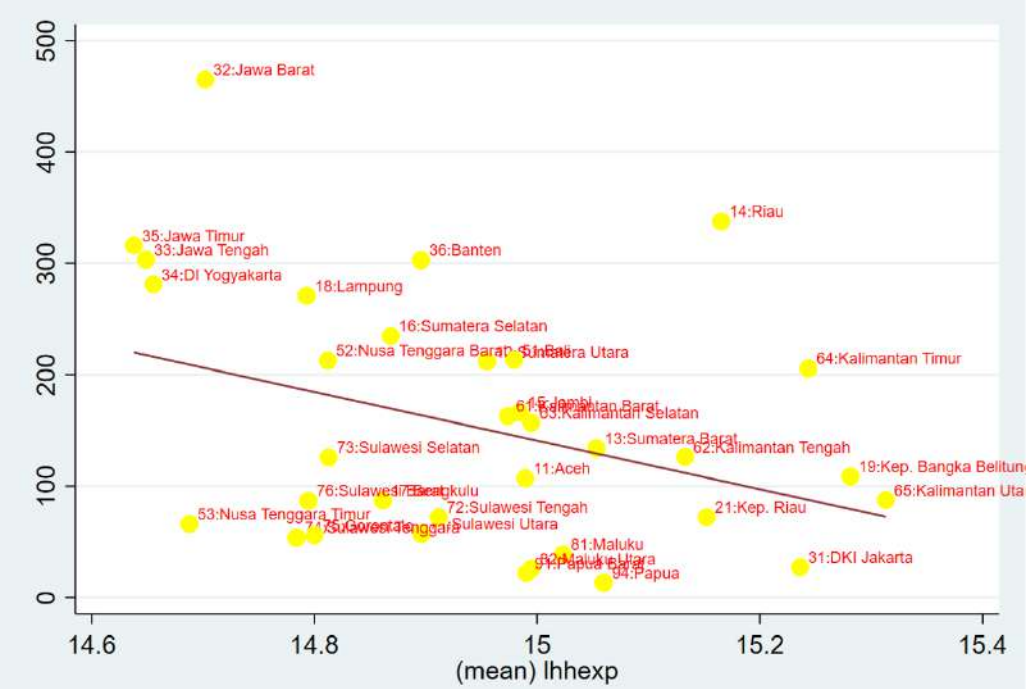
various countries shows that the role of the Internet has had a significant influence on the welfare of farmers. Research by Zhang et al. (2021) and Ma et al. (2020) shows that the Internet has provided technical efficiency for farmers. Internet access in rural areas has a significant impact on increasing farmers' knowledge and welfare, which can improve production quality. Research by Yuan et al. (2021) shows a positive relationship between internet use and farmer welfare, primarily through increased income. However, limited digital infrastructure, low farmer education, and difficult access in remote areas hinder optimizing internet benefits. Research by Moeis et al. (2020) confirms that information networks in rural areas are still inadequate. Government support through technology training, information systems, and the provision of devices such as cellular phones is needed to increase farmer productivity and welfare. The figure below shows the suboptimal role of the Internet in improving farmers' welfare at the provincial scale in Indonesia. Farmers' limited knowledge of internet usage hinders their welfare due to their low level of education.

Figure 2. Scatter Plot between Internet Use and Farmer Welfare by Province in Indonesia



Source: National Socio-Economic Survey (Susenas).

Some research has a negative relationship between the role of the Internet and the agricultural sector; Harahap et al. (2024) show the negative impact of digital transformation on Indonesia's agricultural sector; digital technology introduced for the agricultural sector is not by agricultural conditions such as weather, planting patterns, and land availability. Information technology for agriculture becomes less effective, which adds to the problems farmers face in managing agriculture. According to research by Ilyas (2022), agricultural information technology is still minimal, which impacts the low

number of young people working in the agricultural sector. A low understanding of the Internet is due to farmers' limited education in utilizing the Internet's role in supporting agricultural production. Research by Whitacre (2014) shows that broadband development does not affect the increase in the number of farmers using the Internet in agricultural activities, causing low farmer welfare. Farmers' understanding of digital technology must accompany broadband development through training.

Previous research shows the importance of internet use in improving farmers' welfare, but the research has some limitations. The study by Rahman et al. (2023) only focused on well-being, such as happiness and life satisfaction, without exploring the use of the Internet on material well-being through farmer household expenditure. Then, the research of Ardianti et al. (2023) only examines the effect of the Internet on food insecurity without exploring the relationship with household expenditure as a proxy for farmer welfare. Research by Moeis et al. (2020) explored farmer welfare through labor mobility and land ownership without examining the role of the Internet based on aspects between Eastern and Western Indonesia. Therefore, this study aims to fill the gap by analyzing the role of the Internet in improving farmers' welfare and identifying barriers to internet use in rural areas to provide strategic recommendations. The novelty of this study is that it will analyze the influence of the Internet on farmers' welfare according to the classification of farmers' household expenditures, which are seen as the highest to the lowest expenditures. The study will discuss the impact of the Internet on farmers' welfare in eastern and western Indonesia.

METHODS

This study uses the National Socio-Economic Survey (Susenas) was conducted in 2021, which the Central Statistics Agency (BPS) collected. Susenas is a cross-section of data consisting of a Kor section and a module section that we used to obtain demographic information, farmers who use the Internet, and household expenditures, which are processed by Stata 17.0 and ArcGIS. The survey is representative of national and provincial society. It was initiated in 1963 and continues in 2024. Furthermore, the study focuses on the effect of the Internet on farmers for every quartile of household expenditures in Western and Eastern Indonesia. Therefore, we employ ordinal probit and estimate with marginal effects to evaluate the impact of change in covariates on the probabilities (Chen & Tsai, 2012; Greene, 2003).

Ordinal Probit is most frequently and suitable for the analysis of cross-section data on ordinal or ordered dependent variables rather than OLS (Daykin & Moffatt, 2002; Hausman et al., 1992; Noreen, 1988; Peel et al., 1998; Williams, 2016). Because the use of OLS on ordinal dependent variable may tend to break assumptions of OLS regression and bring the model to inaccurate interpretation (Peel et al., 1998), the problem might arise if the OLS assumption is violated, including the following (Peel et al., 1998): (i). Pointless prediction, which is outside the range or between values, may occur on the scale of the nominal or categorial predicted variable; (ii) Erroneous hypothesis testing

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may occur because of invalid sampling variances and irregular to estimated standard errors on the coefficient of independent variables (t-values) and regression line (F-values); (iii) consequently for (i) and (iii) can bring for misleading of measure of goodness of fit.

Consider the mathematical model that we used as follows (Abdel-Aty, 2003; Chen & Tsai, 2012; Daykin & Moffatt, 2002; Greene, 2003; Hausman et al., 1992; Johnston et al., 2020; Peel et al., 1998):

$$K_n^* = x_n^{'}\beta + u_n \text{ , where } n = 1, \dots, n;$$

K_n^* is a latent and continuous variable measure of the quartile of household expenditure, $x_n^{'}$ is a vector of explanatory variables, and β is an estimated vector of parameters and Un error terms.

$$K_n = \begin{cases} 1. & if\ K_n^* < \alpha_1 \\ 2. & if\ \alpha_1 < K_n^* < \alpha_2 \\ j. & if\ K_n^* > \alpha_{j-1} \end{cases}$$

The parameters $\alpha j.j$ = 1. ... .n is known as *threshold parameters* or *cut points*. In addition, we estimated the probability as follows:

$$Prob(1) = \Phi(\alpha_1 - x_n^{'}\beta)$$
$$Prob(2) = \Phi(\alpha_2 - x_n^{'}\beta) - \Phi(\alpha_1 - x_n^{'}\beta)$$
$$Prob(j) = \Phi(\alpha_j - x_n^{'}\beta) - \Phi(\alpha_{j-1} - x_n^{'}\beta)$$
$$Prob(J) = 1 - \Phi(\alpha_j - x_n^{'}\beta)$$

For Φ is a standard normal cumulative distribution function. Based on the theoretical mathematical model we explained before, the following is our model:

$$Probit(Exp) = ln\ [\frac{Exp}{1 - Exp}]$$
$$= \alpha + \beta_1 Int + \beta_2 HP + \beta_3 Land\ + \beta_4 Age + \beta_5 Educ + \beta_2 Male + \epsilon$$

Where $ln\ [Exp/(1 - Exp)]$ is household expenditure as the dependent variable by having five categories of expenditure of households working in the agricultural sector by classifying them into five categories of expenditure, namely "Quantile 1: 20% lowest household expenditure", "Quantile 2: 20% low household expenditure", "Quantile 3: 20% medium household expenditure", "Quantile 4: 20% high household expenditure", and "Quantile 5: 20% highest household expenditure". With Int s an independent variable that explains the use of Internet used by farmers with binary form 0: No; 1: Yes. Then binary control variables such as HP is the farmer's cell phone ownership, Land is the farmer's land ownership, Male is the gender of the farmer's head of household. Other control variables such as Age is the age of the head of the farmer's family, Educ is the years of schooling of the head of the farmer's family, IB is the Indonesian Section consisting of 1: Western Indonesia and 2: Eastern Indonesia.

In estimating binary models and presenting results meaningfully, epidemiologists and clinical researchers often use logit models with odds ratios. In contrast, economists may use logit, probit, or linear probability models with a tendency to use marginal

effects (Norton & Dowd, 2018). Marginal effects (ME) are useful in explaining the probability of a binary model predicting changes in risk factors (Norton et al., 2019). The authors chose to use MEs because they are most intuitive and in nonlinear models such as logistic regression, MEs of risk factors are an informative way of answering the researcher's question - How do changes in risk factors impact the probability of an outcome occurring? (Norton, et al., 2019).

RESULTS AND DISCUSSION

Table 1 shows the estimation results of the effect of the Internet on farmers' welfare based on household expenditure groups. The variable internet use (Int) negatively and significantly affects the welfare of farmers in the Q1-Q2 household expenditure classification. In contrast, farmers' use of the Internet in the Q3-Q5 household expenditure classification positively and significantly affects the welfare of farmers. Likewise, the variable cellular phone (HP) negatively and significantly influences farmers' welfare in the Q1-Q2 household expenditure group. Then, the variable cellular phone (HP) has a positive and significant effect on the welfare of farmers in the Q3-Q5 household expenditure group.

Table 1. Probit Regression of the Effect of the Internet on Improving Farmer Welfare in Indonesia

VARIABLES	Q1	Q2	Q3	Q4	Q5
int	-0.0624***	-0.0133***	0.00608***	0.0226***	0.0470***
	-0.00348	-0.000746	-0.000374	-0.00127	-0.00261
HP	-0.0804***	-0.0171***	0.00783***	0.0292***	0.0605***
	-0.00269	-0.000607	-0.000316	-0.000992	-0.00206
Land	-0.0359***	-0.00766***	0.00350***	0.0130***	0.0271***
	-0.00319	-0.000685	-0.000321	-0.00116	-0.0024
educ	-0.00550***	-0.00117***	0.000536***	0.00200***	0.00414***
	-0.000376	-8.10E-05	-3.88E-05	-0.000137	-0.000283
Male	-0.202***	-0.0430***	0.0197***	0.0732***	0.152***
	-0.00372	-0.001	-0.000548	-0.00145	-0.00302
age	0.00195***	0.000416***	-0.000190***	-0.000709***	-0.00147***
	-0.0001	-2.18E-05	-1.08E-05	-3.65E-05	-7.58E-05
Observations	78,402	78,402	78,402	78,402	78,402

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Furthermore, farmer land ownership (Land) in the Q1-Q2 household expenditure classification negatively and significantly affects the welfare of farmers. Meanwhile, farmers' land ownership has a positive and significant effect on the welfare of farmers in the middle, high, and highest household expenditure groups. Then, the variable years of schooling of the head of the farmer family (Educ) and the gender of the head of the farmer family

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(Male) negatively and significantly affect the welfare of farmers in the Q1-Q2 household expenditure group, the variables (Educ) and (Male) positively and significantly affect the welfare of farmers in the Q3-Q5 household expenditure group. The age variable of the head of the farming family (age) has a positive and significant effect on the welfare of farmers in the Q1-Q4 household expenditure group. In contrast, the variable age of the head of the farming family (age) in the Q5 household expenditure classification negatively and significantly affects the welfare of farmers.

Farmers in household expenditure groups Q3 to Q5 have utilized the Internet and mobile phones to improve welfare. Meanwhile, farmers in the Q1 to Q2 household expenditure groups can still not optimize the use of the Internet and mobile phones to support welfare improvement. Better digital infrastructure can improve information on agricultural production. Farmers who obtain information from the Internet and mobile phones will help make agricultural production more efficient. In addition to agricultural production information, farmers can obtain information on market prices and digital marketing opportunities. The Internet will make it easier for farmers to access education platforms on agricultural production techniques and crop quality. Mobile phones make it easier for farmers to communicate with distribution networks and access farm business credit. Farmers can sell business information directly to the final seller through this digital role without intermediaries. This finding is consistent with Chang and Just's (2009) research, where using the Internet can significantly improve farmers' welfare. The Internet can give farmers broader access to market information, commodity prices, and modern agricultural practices. Farmers can more easily make the right decisions for their farming business after getting information from the Internet. In addition, farmers can expand the market to reduce intermediaries who can reach buyers directly.

Research by Chang and Just (2009) showed that cell phones can contribute significantly to farmers' welfare. Cell phones make it easier for farmers to communicate with buyers, who can speed up transactions. Research by Chen et al. (2022), the Internet will make it easier for farmers to produce agriculture more efficiently. Farmers will be more optimal in using resources so that there is no waste and increased crop products. Ma and Zheng research (2021) explains that the Internet can help farmers manage agricultural production, such as crop rotation, fertilizer use, and irrigation. The more effective agricultural management, the more likely it is to improve the welfare of farmers. Research by Wu et al. (2023) explained that farmers who utilize the Internet will increase the efficiency of agricultural production. Wu et al. (2023) also emphasized the development of adequate digital infrastructure in rural areas to maximize agricultural production.

Based on the probit regression results, the farmers with household expenditure in Q3-Q5 are financially superior, so Internet and mobile phone access can be utilized efficiently. This finding is consistent with the studies of Khan et al. (2019), Moeis et al. (2020) and Javaid et al. (2022), showing farmers with higher expenditures will more easily access the Internet and cell phones because they can meet the costs of internet and cellphone access for agricultural activities. In contrast, farmers in the lowest and low

household expenditure groups (Q1-Q2) find it challenging to utilize Internet and mobile phone access in improving farmers' welfare. Limited access to digital technology makes it more difficult for farmers to obtain the latest information on agricultural techniques. Farmers in the Q1-Q2 household expenditure classification find it challenging to obtain digital technology devices because the cost is higher than the income received by farmers. This finding is consistent with the research of Javaid et al. (2022) and Ilyas (2022); farmers will find it difficult to access the Internet due to higher costs and limited Internet access in rural areas. Moeis et al. (2020) state that low farmer income is insufficient to meet the need for internet access.

Farmers' land ownership (Land) in the Q3-Q5 household expenditure group significantly affects farmers' welfare. Farmers with higher household expenditures can access the latest technology, better fertilization, and efficient farming techniques. Farmers can diversify their agricultural products with the help of the newest technology to increase their source of income. Farmers with higher expenditures have more significant capital to access the newest technology and invest their income in improving agricultural products. Meanwhile, land holdings of farmers in the Q1-Q2 household expenditure classification will find it challenging to obtain the latest technology. Farmers with the lowest household expenditure do not have sufficient capital to increase agricultural production. According to research by Pasaribu and Istriningsih (2020), farmers who own agricultural land will have higher incomes than those who work with a profit-sharing system. Research from Mihailova (2022) shows that farmers who own land can reduce operational costs compared to farmers who rent land. According to research by Sanchez et al. (2022), farmers who own agricultural land tend to be able to increase product diversification. This diversification contributes to increased income, especially for farmers with adequate resources to support the process.

The length of schooling of the farmer household head (education) significantly affects farmer welfare, especially for farmers in the middle to highest household expenditure groups. Farmers in the middle to high household expenditure group tend to have a higher level of education. Farmers with higher education can access better agricultural information and technology. Higher education allows farmers to utilize knowledge of the latest agricultural techniques, financial management, and market access. Meanwhile, farmer household heads who do not have higher education often do not have large enough household expenditures. Farmers in the lowest and lowest expenditure household groups face difficulties accessing education, resulting in a lack of efficiency in agricultural production. Low-knowledge farmers are unable to adopt the latest technology to improve agricultural yields. This finding is consistent with Siregar, R. (2016) and Moeis, M. et al. (2020), showing that farmer knowledge determines better agricultural production outcomes.

Farmers with higher knowledge can obtain more efficient farming techniques to increase their income. Highly educated farmers will better manage their finances regarding production costs, increasing welfare. Conversely, farmers with low levels of education tend to be more dominant in the lowest to low-expenditure household groups. This results in difficulties accessing the latest agricultural technology supporting welfare improvements.

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Farmers' knowledge affects the quality of resources used, such as water and fertilizer, which can reduce agricultural yields and ultimately reduce farmers' income. Farmers from the middle to upper household expenditure group can better utilize knowledge to achieve higher welfare than farmers from the low household expenditure group. The results of this analysis follow the research of Istriningsih et al. (2022) farmers' low knowledge of agricultural techniques will hinder productivity and lead to a decrease in farmers' income.

Male household head gender is often associated with improved farmer welfare, especially in the middle and upper household expenditure groups. Male household heads in higher household expenditure groups tend to have better education, training and technology resources. In addition, the majority of male farmers have the opportunity to participate in agricultural activities that can increase income. Male household heads have social networks and relationships with various parties that can support agricultural businesses. Therefore, male heads of households in the upper-middle expenditure household group significantly improve farmers' welfare. This is reflected in their ability to utilize more adequate resources, knowledge and economic opportunities. The results of this study by Gurning et al. (2024) showed that the influence of gender can determine the welfare of farmers. Male farmer family heads have more opportunities to make more strategic decisions regarding investment in agriculture. Male farmers are likely to have better access to education, agricultural training, and new technologies that can increase the productivity and efficiency of agricultural businesses. The results of this analysis are based on the research of Fauziyah (2018), which shows that access to education, training, agricultural extension, capital, and credit is dominated by men. This means that male farmers have a greater chance of owning agricultural resources than women.

The variable age of farmers (age), according to the lowest and lowest household expenditure groups, affects the improvement of farmers' welfare. Conversely, farmer age by middle and upper household expenditure group decreases farmer welfare. The age of farmers with medium to high household expenditure may change the priority of economic activities from agriculture to non-agriculture. Meanwhile, farmers with the lowest and lowest household expenditure have extensive farming experience, so they are able to manage their land well despite having limited resources. This analysis is based on the research of Sujaya et al. (2018), who state that farmer experience plays an important role in improving farmers' technical expertise, which has an impact on increasing farm productivity. The increasing productivity of farmers has the opportunity to improve welfare. Some studies explain that farmer age has no significant effect on farmer welfare, as research by Hildayanti et al. (2017) showed that the age of farmers did not significantly affect farmers' household expenditure. The agricultural sector requires the regeneration of young farmers to replace unproductive age regardless of household expenses. This finding was made by research by Suriani et al. (2023), which shows that young farmers will be more productive in managing the agricultural sector than those of an unproductive age. Meanwhile, farmers of unproductive age face physical limitations in accessing new technological information. According to research by Gusti et al. (2021), the productive age variable significantly affects agricultural knowledge and can improve farmers' welfare.

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Table 2. Probit Regression of the Effect of the Internet on Improving the Welfare of Farmers in Western and Eastern Indonesia

Variables	Western Indonesia					Eastern Indonesia				
	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5
int	-0.0617***	-0.0110***	0.00687***	0.0226***	0.0433***	-0.0715***	-0.0195***	0.00533***	0.0258***	0.0598***
	-0.00446	-0.0008	-0.000536	-0.00164	-0.00312	-0.00557	-0.00154	-0.000504	-0.00203	-0.00466
HP	-0.108***	-0.0193***	0.0120***	0.0396***	0.0759***	-0.0530***	-0.0145***	0.00395***	0.0192***	0.0444***
	-0.00364	-0.000731	-0.000499	-0.00137	-0.00264	-0.00397	-0.00111	-0.000356	-0.00145	-0.00334
land	-0.0635***	-0.0113***	0.00706***	0.0232***	0.0445***	-0.00964**	-0.00264**	0.000718**	0.00348**	0.00807**
	-0.00436	-0.000798	-0.000517	-0.00161	-0.00307	-0.0046	-0.00126	-0.000345	-0.00166	-0.00385
educ	-0.0103***	-0.00183***	0.00115***	0.00377***	0.00722***	-0.00144***	-0.000395***	0.000108***	0.000522***	0.00121***
	-0.000536	-9.98E-05	-6.72E-05	-0.000199	-0.000378	-0.000519	-0.000142	-3.91E-05	-0.000188	-0.000435
age	0.00176***	0.000313***	-0.000196***	-0.000643***	-0.00123***	0.00105***	0.000286***	-7.81e-05***	-0.000379***	-0.000877***
	-0.000143	-2.59E-05	-1.67E-05	-5.23E-05	-0.0001	-0.000145	-3.99E-05	-1.16E-05	-5.25E-05	-0.000122
Male	-0.222***	-0.0394***	0.0246***	0.0810***	0.155***	-0.174***	-0.0477***	0.0130***	0.0631***	0.146***
	-0.00495	-0.00122	-0.000781	-0.002	-0.00383	-0.00556	-0.00174	-0.000741	-0.00212	-0.00488
Observations	45,960	45,960	45,960	45,960	45,960	32,442	32,442	32,442	32,442	32,442

Note: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

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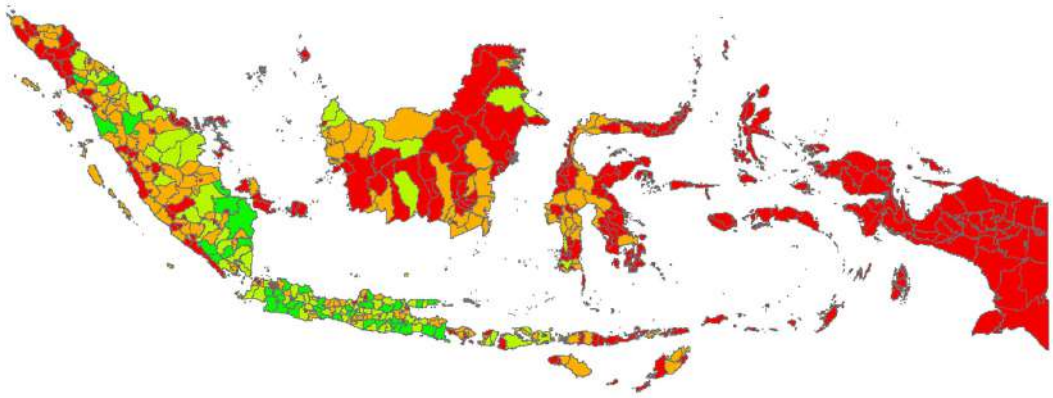
Table 2 shows the effect of the internet and control variables on farmer welfare based on Western and Eastern Indonesia. The role of the Internet and mobile phones in western and eastern Indonesia is in line with the regression results in Table 1. Using the Internet and mobile phones is likely to improve the welfare of farmers in the upper-middle household expenditure classification (Q3-Q5) in western and eastern Indonesia. Farmers in the upper-middle household group (Q3-Q5) in western and eastern Indonesia are most likely to access agricultural technology, market prices and weather forecasts. The use of the Internet and mobile phones by farmers in the upper household expenditure group has access to digital information for the needs of agricultural products, income and access to basic needs such as education and health. Furthermore, the control variables of farmers' land ownership, years of schooling, and age in the western and eastern parts of Indonesia have no difference in the effect on farmers' welfare compared to the general regression results (Table 1).

Figure 3. Map of Farmers' Internet Usage by City District in Indonesia in 2021

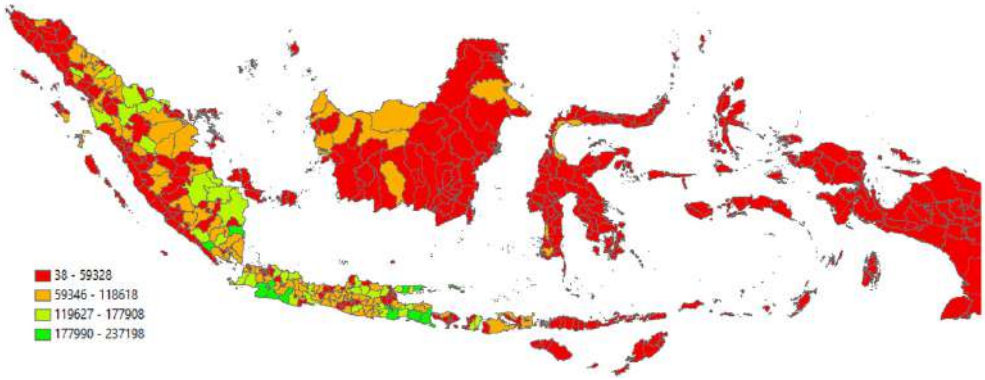


Source: National Socio-Economic Survey (Susenas).

Although the Internet and mobile phones positively influence farmers' welfare in the middle and upper household expenditure groups, there is still a digital divide between western and eastern Indonesia. Figure 3 shows internet utilization by farmers spread across Indonesia. As seen on the green map, farmers' Internet use in Indonesia is still concentrated in the western part of Indonesia (Sumatra and Java Islands). Farmers have not utilized the Internet evenly due to unreachable internet access in some areas. Some areas in eastern Indonesia tend to have limitations in accessing digital-based information. This finding is based on research (Ardianti et al., 2023); limited digital infrastructure causes farmers to have difficulty accessing the Internet more easily. The digital literacy of farmers in eastern Indonesia is still low, so the utilization of the Internet is still inefficient. This finding is consistent with the research study of Iskandar et al. (2020), which shows that some farmers in Indonesia may not understand how to use the Internet effectively and efficiently. Farmers generally have limited ability and knowledge to utilize the Internet to facilitate agricultural activities. Then, the limitations to accessing the Internet in eastern Indonesia are due to the cost of accessing the Internet being more expensive. Ultimately, internet access burdens

farmers' expenses in eastern Indonesia, which is difficult to fulfil. This finding is similar to the study of Javaid et al. (2022), which states that devices that support internet access are complicated for farmers to obtain because these devices tend to have high costs.

Figure 4. Map of Farmers' Cell Phone Ownership by City District in Indonesia in 2021



Source: National Socio-Economic Survey (Susenas).

Figure 4 shows farmers' distribution map of cell phone ownership in Indonesia. Based on the distribution map, cell phone ownership by farmers in eastern Indonesia is still low. This can be caused by several factors, including financial limitations, which are a condition that causes farmers to have limitations in cell phone ownership, especially in rural areas. Many farmers face limited financial resources, making buying a cell phone and paying for telecommunication services a significant economic burden. This finding is consistent with Tadesse and Bahiigwa (2015) research that farmers' low income makes cell phones a problematic item to afford, especially for farmers in remote areas. Cell phones are a heavy burden for farmers because they have to buy cellphone devices, plus operational costs. In addition, farmers in eastern Indonesia are generally not covered by adequate telecommunications networks, limiting their ability to use cell phones effectively. Eastern Indonesia still has many remote areas difficult to reach to build digital infrastructure. This finding aligns with the study of Moeis et al. (2020), which shows that rural areas often face limitations of cellphone networks, especially in remote areas with mountainous topography. This makes it difficult for remote farmers to access information via mobile phones.

CONCLUSION

Farmers in the upper-middle household expenditure group (Q3-Q5) can optimally utilize the Internet and mobile phones to improve welfare. The Internet makes it easier for farmers to obtain information on production techniques, market prices, digital marketing, and access to farm credit. Higher finances and education levels support this ability, so they understand how to apply technology effectively. In contrast, farmers from low household expenditure groups (Q1-Q2) face difficulties accessing and utilizing the Internet and mobile phones due to cost constraints and inadequate digital infrastructure in rural areas. Farmers in the lowest household expenditure group constitute a significant obstacle to improving farmer welfare.

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Although the Internet and mobile phones can potentially improve welfare among farmers in the middle to upper-middle household expenditure group (Q3-Q5), digital inequality still exists between the eastern and western Indonesian regions. Internet utilization by farmers is concentrated in the western regions, such as Sumatra and Java. Meanwhile, farmers in eastern Indonesia face limited internet access in terms of infrastructure, digital literacy and high internet access costs.

The government can make policies for farmers to make applying the Internet and cell phones easier. This digital divide still occurs in western and eastern Indonesia, where digital applications are used. The government is expected to make policies to build digital literacy in rural eastern Indonesia through socialization, counseling, and training. In addition, the government can provide policies to accelerate the development of internet networks in rural eastern Indonesia so that access becomes more effortless.

Digital infrastructure can be realized through collaboration between the government and the private sector so that internet access is evenly available and increases the digital literacy of rural communities. The government can develop applications that suit the needs of farmers to get information on how to develop agricultural products, market access, and weather conditions with applications that are easy to understand. The government subsidizes internet devices and cell phones for low-income farmers. Farmers will more easily access technical agricultural information and business management after the government subsidizes farmers.

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https://doi.org/10.15408/sjie.v13i2.43188

Signifikan: Jurnal Ilmu Ekonomi
Volume 13(2), 2024: 455 - 474
P-ISSN: 2087-2046; E-ISSN: 2476-9223
https://doi.org/10.15408/sjie.v13i2.42673

The Management of Productive Zakat in Indonesia: The Case of Baznas' Economic Empowerment Program

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JEL Classification:
I30
I31
O12

Received: 07 November 2024

Revised: 02 December 2024

Accepted: 09 December 2024

Available online: December 2024

ABSTRACT

Research Originality: This study contributes to the gap in the literature on the empowerment process in measuring the success history of zakat management.

Research Objectives: This research aims to measure the factors influencing the improvement of *Mustahik's welfare through a* mediating variable, namely, the empowerment process.

Research Methods: This research uses mixed-method analysis through quantitative and qualitative approaches. Quantitative approach using SEM-PLS.

Empirical Results: The study's findings show that the empowerment process is a mediating variable capable of providing more substantial value and a favorable influence on Mustahik welfare, depending on input factors such as zakat funds and mentorship at the individual, organizational, and community levels. Meanwhile, the Z-Chicken initiative had no substantial positive influence on Mustahik's welfare.

Implications: The study's findings indicate the necessity of assessing Baznas' management of distribution programs to improve the empowerment process, primarily via the community empowerment method.

Keywords:

empowerment; mustahik welfare; maqashid shariah; productive zakat; sustainable

How to Cite:

Hosen, M. N., Hidayat, R., Hidayah, N., & Lathifah, F. (2024). The Management of Productive Zakat in Indonesia: The Case of Baznas' Economic Empowerment Program. *Signifikan: Jurnal Ilmu Ekonomi*, *13*(2), 455-474. https://doi.org/10.15408/sjie.v13i2.42673

INTRODUCTION

Currently, the rate of poverty in Indonesia stands at 9.36 percent. In other words, 25.90 million members of Indonesian society still fall into the poverty category (BPS, 2023). The number of individuals living in poverty remains relatively high. According to BPS, poverty includes individuals with an income of approximately IDR 550,458 per month. In response to the poverty rate, Baznas, a zakat amil institution with a vision for enhancing the welfare of the people, plays a crucial role in reducing the poverty rate in Indonesia.

Furthermore, given the complexity of today's societal problems, several opinions suggest that zakat could be managed productively. The productive zakat program is a result of contemporary studies aimed at addressing the issue of poverty. Therefore, the zakat management prioritizes sustainability, transforming mustahik into muzaki through productive zakat. Baznas decided on ten income categories (10 deciles). The step of moving out *of mustahik* to *muzaki* started in society in the poverty category (IDR. 0-1.5 million/first decile), society in the low-and non-fixed income rate category (IDR 1.5-3.4 million/2nd-4th decile), society in the low and fixed-income rate category (IDR 3.4-8.1 million/5-8th decile), and society in the high-income rate category (IDR 8.1- >12.7 million/9-10th decile) for a family/a month.

Numerous research studies have assessed the effectiveness of managing productive zakat, emphasizing optimizing the transition from mustahik to muzaki. The productive zakat program has significantly influenced monetization (Restuningsih & Wibowo, 2019; Hosen et al., 2023; Hidayat, 2023) and spirituality (Beik & Arsyianti, 2015; Hosen et al., 2023; Hidayat, 2023) for its mustahik both prior to and following the program, yet it has not effectively transformed mustahik into muzaki. The execution of the productive Zakat program has not resulted in substantial improvements in Mustahik welfare due to the misalignment between the program and market demands (Restuningsih & Wibowo, 2019), and the empowerment process remains suboptimal (Restuningsih & Wibowo, 2019; Hosen et al., 2023).

Consequently, both external and internal factors hindered the effective management of productive zakat, including climatic conditions, business location, entrepreneurial motivation, individual moral hazard in the administration of productive zakat funds, and the inclination for immediate results (Nazara et al., 2022). Moreover, the underlying problems of zakat institutions encompass an underdeveloped program planning process, insufficient supporting human resources, and the lack of a suitable program success measuring method, all of which impede the efficient usage of zakat funds.

Several studies have also measured the effectiveness of productive zakat programs and their impact using the CIBEST model construction, which has been developed by Beik and Arsyanti since 2014 (Beik & Arsyianti, 2015; Beik & Arsyanti, 2016; Beik & Pratama, 2017; Hidayat, 2023; Widana & Hakim, 2023) and the National Zakat Index which developed by Baznas in 2016 (Puskas, 2016; Bastiar & Bahri, 2019). However, the performance index of the amil institution will show good performance if the

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performance of the empowerment process is carried out optimally. If the empowerment process is carried out optimally, the performance of zakat distribution will automatically be good because it can reduce significant poverty levels. So, the important key to getting maximum distribution performance for the Zakat productive program is the empowerment process.

In terms of empowerment in the context of BAZNAS, economic utilization usually provides business capital to certain businesses with *Mustahik* so that they can manage their businesses and be independent. Article 27 of Law No. 23 of 2011 states that zakat can be used for productive businesses to handle people with low incomes and improve the quality of life of the people. Zakat empowerment is an effort to change the status of *mustahik* into *muzaki*. The effectiveness of zakat distribution can be reached by integrating the role of empowerment and optimal social capital to build an economic community.

According to Pailis et al. (2016) and Setyaudin (2023), expanding the economic independence program with empowerment is necessary to achieve the goals of the Moving Out Mustahik (MoM). This hypothesis suggests that the welfare of Mustahik will significantly improve if the zakat empowerment and business assistance programs positively influence their business growth (Widiastuti, 2021; Mawardi et al., 2022). The results of an effective mentoring process and careful planning will be seen in the long term, which can be seen in one of the factors, namely through an increase in *mustahik* business income, *mustahik* fixed income, and significant *mustahik* business development (Anwar, 2018; Widiastuti, 2021).

Zimmerman (2000) asserted that we can view empowerment theory through multi-level analysis. The management process divides the empowerment mechanism into people, organizations, and communities. Habib (2021) proposes dividing the empowerment theory into two focuses: the empowerment process and the results. People carry out the empowerment process to gain control, obtain necessary resources, and critically understand their social environment. Generally, community empowerment targets vulnerable and weak community groups, empowering them to meet their basic needs. Beyond meeting basic needs, the community should also be able to access productive sources that can boost their income and procure essential goods and services of high quality.

In the empowerment process, *altruistic value* is built from social capital. This social capital serves as the foundation for enhancing the economic strength and independence of the community. Social capital is associated with a group of individuals, group cultures, and institutions governed by policies, procedures, and precedents. In social capital, there is also cognitive capital, which consists of shared norms, values, habits, and beliefs as a reciprocal process between individuals (Jahar et al., 2024).

The productive zakat program implements zakat, segmenting it into eight beneficiary groups (mustahik). The application of the values contained in zakat social capital is empowered through productive programs through the empowerment process and

accompanied by a companion as an individual who controls the policy of implementing social capital. Vulnerable groups typically manage social capital, necessitating the application of cognitive aspects during the empowerment process to build the zakat economy effectively.

Furthermore, the effectiveness of MoM, *maqashid sharia* bridges the spiritual dimension in all aspects of the economy. Zakat can corrode the rich's greed and avarice for their own money. Zakat can purify the soul of the individual who does it of stinginess. Zakat can provide goodness and multiply the wealth issued by the muzaki (blessings/ barakah). Zakat can benefit people in need on a social and economic level; it inhibits the accumulation of riches in a few persons, resulting in wealth inequality. Zakat includes two fundamental elements from an economic standpoint, namely, fair growth and a sharing mechanism.

Beik and Arsyianti (2015b) have given the view that *mustahik* welfare must be included in economic and spiritual welfare. Conceptually, Rozalinda (2018) argues that zakat has three main dimensions, namely the personal spiritual dimension, the social dimension, and the economic dimension. Furthermore, Zakaria (2014), Zakaria and Mohammad (2019), and Widiastuti et al. (2021) show that the concept of zakat in transforming *mustahik* welfare is in line with the concept of *maqashid sharia* of Imam As-Syatibi. The five elements *of maqashid sharia* positively impact the effectiveness of distributing zakat funds from the perspective of religiosity/spiritual understanding, soul, intellect, lineage, and property. The study of Zakaria (2014) is still relevant, showing that the management of productive zakat should not be seen only in a partial economic way but holistically through the aspect *of maqashid sharia*, namely, preservation of religion, preservation of soul, preservation of intellect, preservation of lineage and preservation of property. The emphasis on the five elements of human needs is expected to contribute to reducing poverty at the regional and national levels due to *maslahah* or guide to sound and benefit (Zakaria, 2014; Widiastuti, 2021).

The object of this research is Z-Chicken. Z-Chicken is one of the innovative zakat productive programs for *mustahik* in urban areas that has been running since 2018 and has become a flagship program initiated by the Central Baznas to enhance *mustahik* welfare, especially in urban areas. The previous study analyzed the Z-Chicken program, namely, Setyaudin (2023) in South Tangerang focused on analyzing the welfare of the community and recommended the strength of the empowerment program. Fatchurrohman and Asifa (2023) focused on analyzing the economic empowerment program for mustahik due to development program of Z-Chicken. Putri and Hanifah (2024) focused on analyzing the welfare of mustahik in Central Java Province and Bojonegoro. Ahmad et al. (2024) focused on strategies for empowering Mustahik Z-Chiken. Maulina et al. (2023) focused on empowering Mustahik in Semarang City. These studies employed a qualitative approach to analyze the Z-Chiken program and discovered that its execution is highly beneficial in boosting Mustahik's economic change. Mustahik receives zakat funds and economic development help through this program.

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According to management system theory, utilizing productive zakat is expected to have an effective impact if it has good planning and implementation. The concept of productive zakat begins by examining the causes of poverty, lack of working capital, and lack of employment. So, planning is needed according to the cause so that the implementation will be more effective and, in the long term, will provide a steady income. There is *mustahik* through increasing and developing the business. Finally, this research suspected the un-effectiveness of the distribution of productive zakat programs because the empowerment program is still running partially (Pailis et al., 2016; Setyaudin, 2023; Hosen et al., 2023).

This study will complement previous research, which has shown that empowerment is key to the effectiveness of the productive zakat program (Pailis et al., 2016; Setyaudin, 2023; Hosen et al., 2023; Setyaudin, 2023). This research will study the gap between the method and the empowerment model. So, this research aims to measure the impact of input variables of the Zakat productive program in enhancing *mustahik* welfare through empowerment as a mediating variable to improve MoM effectiveness.

METHODS

The object of this research is the Z-Chicken program, which the Central Baznas manage in the Greater Jakarta area. Data of Z-Chicken beneficiaries were collected through purposive sampling techniques. The respondents' criteria are as follows: 1) the respondent is a *mustahik* of the Z Chicken Baznas program, and 2) the business has been running for at least 3 months. This research collected 79 data of Z-Chicken beneficiaries. The measurement of mustahik welfare as a result of the Z-Chicken program utilizes three layers of management system approaches: input variables, process variables, and program outputs. Figure 1 depicts the research framework.

Figure 1. Framework of the Research

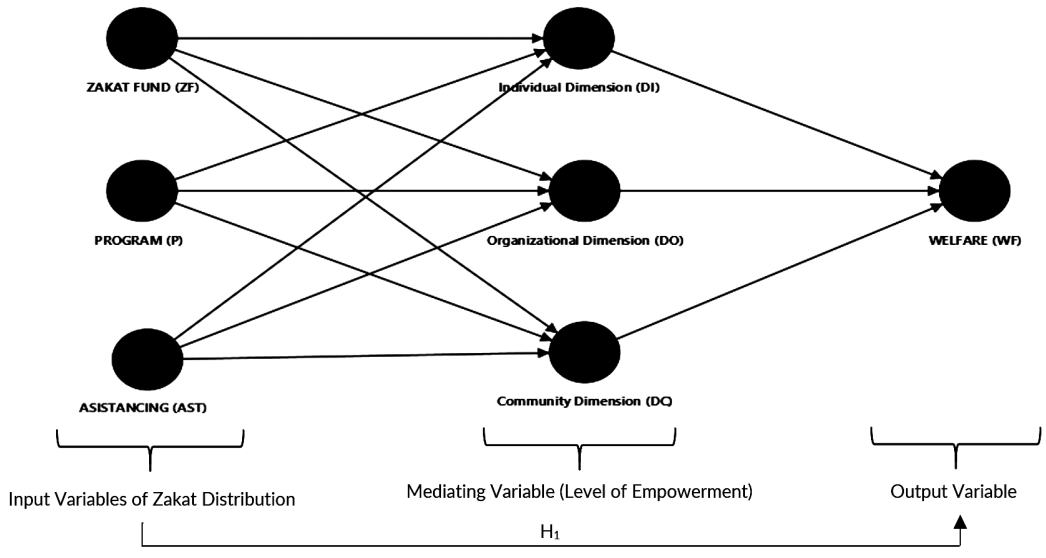

Table 1. Research Variables and Indicators

Variable	Indicator	Code
Dana Zakat (ZF)	Amount of funds	ZF1
	Adequacy of funds	ZF2
	Allocation of funds	ZF3
Program (P)	Z-Chicken	P1
Assistance (AST)	Religiosity	AST1
	Business development community	AST2
	Training of business skills	AST3
	Reach to market access	AST4
	Reach to the other capital access	AST5
	Mentoring of business development	AST6
Individual Empowerment (DI)	Commitment to learning the Qur'an	DI1
	Commitment to perform the 5 times daily prayers	DI2
	Fasting behavior	DI3
	ZIS behavior	DI4
	Covering the intimate part of body	DI5
	Health allocations	DI6
	Health insurance	DI7
	Business development information	DI8
	Business training	DI9
	Business diversification	DI10
	Fulfillment of primary needs	DI11
	Spirit of helping each other	DI12
	Sharing experiences	DI13
Organizational Empowerment (DO)	Understanding of sharia business practices	DO1
	Applied of sharia contracts	DO2
	Access to other capital	DO3
	Market channel information network	DO4
	Supply chain system development	DO5
	Commitment to business continuity and quality	DO6
	Business savings ownership	DO7
	Employee health insurance	DO8
	Issuing zakat on business results	DO9
	Business development training	DO10
	Business license management (PIRT, etc.)	DO11
	Sharing ability	DO12

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Variable	Indicator	Code
Community Empowerment (DC)	Ability to network with the business community	DC1
	Joint decision-making	DC2
	Ability to influence good attitude	DC3
	Participation in community activities	DC4
	The spirit of mutual bearing	DC5
	Leadership	DC6
	Active in community activities	DC7
	Other halal capital relations	DC8
	Informal business training relations between communities	DC9
Welfare (WF)	Quality of Worship (preservation of religion)	WF1
	Health (preservation of soul)	WF2
	Education (preservation of intellect)	WF3
	Social Humanities ((preservation of lineage)	WF4
	Assets/Income (preservation of property)	WF5

Source: Previous research (2022)

The input variable consists of three variables: zakat funding, zakat program, and mentoring. The process variable consists of three variables: the empowerment process for individuals, the organizational empowerment process, and the community empowerment process. The study's output variable is the *mustahik* welfare of the Z-Chicken program. Furthermore, the variables arranged are derived from measurement indicators (Table 1). The research employed a triangulation mixed-method design incorporating qualitative and quantitative components. Using a descriptive analysis approach, we conducted a qualitative analysis based on the results of open interviews. In the meantime, we analyzed quantitative data using processing techniques and the Structural Equation Modelling Partial Least Square (SEM-PLS) method.

The SEM-PLS method estimates partial model structures using ordinary least square regression and principal components analysis (Hair et al., 2018). The power of SEM PLS is quite helpful for explanatory research that examines less-developed or still-developing theories (Hair et al., 2018). Furthermore, we extract an average value to assess convergent validity in each construct measure. Moreover, the last test is the *heterotrait-monotrait* (HTMT) test. The HTMT assesses the primary correlations between items in different constructs, comparing them to the average correlations for the items measured in the same construct (Henseller et al., 2015).

RESULTS AND DISCUSSION

The survey results indicate that 58.2% of Z-Chicken beneficiaries are male, and 41.8% are women. *Mustahik* in this program is dominated by high school graduates/ equivalent with a percentage of 54.4% and in the age category of 36-45 years old. After

participating in this program, Mustahik's income falls into the decile category of 6 or 4.1 - 5 million rupiah/month (gross), accounting for 21.52% of the total. 51.90% of the mustahik in the Z-Chicken program are those who have never managed a small business. Most mustahik have an occupation in managed small enterprise Z-Chicken as the main *mustahik* business after participating in the productive zakat program. The map reveals that the majority of mustahik reside in North Jakarta (31.60 percent), West Jakarta (30.40 percent), Tangerang Regency (22.80 percent), East Jakarta (10.10 percent), and South Tangerang City (5.10 percent).

Table 2 explains that the Z Chicken program is indeed a flagship empowerment program for poor society segmented in urban areas. The program's objective is to empower Mustahik and enhance their welfare level. The characteristics of Mustahik, whom Baznas can assist and finance in productive business programs, align with the poverty alleviation calculation standard (Z-Chicken Impact Assessment). Amil's strategy for raising Mustahik's living standards is a mentoring process. Mentoring is the key to MoM's success. Saini (2016) argued that the mustahik category in productive zakat requires unique criteria, including the mustahik's ability and potential to develop a business and their energy to work. With the demands of urban living costs, a person's income must be at least in the fourth decile to support a nuclear family, indicating that they have adequate living conditions economically.

Baznas implements the productive zakat program by providing three input factors: zakat funds, programs, and mustahik assistance. These input factors include capital goods, training, and cash. Additionally, Z Chicken maintains its supply chain flow to ensure the quality of its products from producers to consumers. The suppliers deliver chicken to stock points following Mustahik's orders. The Stock Point is a standardized distribution center that manages chicken orders from Z-Chicken partners. Each partner gets a supply of chicken from stock points. Additionally, partners purchase chicken from stock points, reprocess it into crispy chicken, and then sell it to their customers. The selling price of crispy chicken ranges from IDR 7,000 to 23,000, adjusted for packaged and non-packaged menus.

Mustahik has not been fully effective in the implementation of Z-Chicken business management. As Mustahik's business capital for managing Z-Chicken, Baznas distributed money and assets in IDR of 9 million. Productive zakat recipients must fulfill at least three conditions, namely (1) have a productive business, (2) be willing to accept assistance, and (3) be willing to submit periodic business reports every six months (Anwar, 2018). The criteria for determining mustahik do not follow the standards for mustahik recipients mentioned by Anwar (2018). So 69.62% of mustahik depend on their daily needs from the proceeds from managing the Z-Chiken business. Achieving MoM goals will not be easy if maximum assistance is not provided. Many mustahik are still confused about stock and display, sales quantity targets, and limited market access. Furthermore, some *mustahik* complained about the distance between partners and stock points, which caused high costs. However, there are also *Mustahik* who have managed their business very well and have even been able to transform into muzaki. The sales strategies carried out by *Mustahik* include supporting technology and information networks, namely, WhatsApp, Instagram, and the online market in Gojek/Grab Food/Shopee Food Apps.

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Table 2. Demographics of Respondents

	Criterion	Frequency	Percentage
Gender	Male	46	58.2
	Female	33	41.8
Education	Elementary School/Equivalent	4	5.10
	Junior High School/Equivalent	9	11.40
	High School/Equivalent	43	54.4
	Diploma	12	15.2
	Undergraduate or Postgraduate	11	13.9
Age	18-35	15	19.0
	36-45	37	46.8
	46-55	19	24.1
	56-65	7	8.90
	> 65	1	1.3
Revenue/month	0 – 1.5 million –D1	2	2.53
	1.5 – 2.2 million –D2	16	20.25
	2.2-2.8 million – D3	6	7.59
	2.8 – 3.4 million – D4	4	5.06
	3.4 – 4.1 million – D5	9	11.39
	4.1 – 5.0 million – D6	17	21.52
	5.0-6.2 million – D7	8	10.13
	6.2 -8.1 million – D8	10	12.66
	8.1 – 12.7 million – D9	3	3.0
	>12.7 million – D10	4	5.06
Business Experience (years)	Never	41	51.90
	1-3	18	22.78
	4-7	12	15.19
	9-12	3	3.80
	>12	5	6.33
Occupation	Teacher	4	5.06
	Freelance	5	6.33
	Small Enterprise	55	69.62
	Private officer	4	5.06
	Driver	2	2.53
	Online services	2	2.53
	Housewife	1	1.27
	Other	6	7.59
Location	East Jakarta	8	10.10
	West Jakarta	24	30.40
	North Jakarta	25	31.60
	Tangerang Regency	18	22.80
	South Tangerang City	4	5.10

Source: Primary Data, processed (2024)

Table 3 shows the identification of *mustahik* in accessing financial institutions. The results showed that 29.1 percent of *mustahik* already had a previous relationship with a financial institution, of which 5.1 percent of the total *mustahik* respondents had access to institutional finance for additional capital. The remaining 94.90 percent are *mustahik* who only have savings accounts. Some of the financial institutions used are Bank Rakyat Indonesia (BRI), Bank Central Asia (BCA), Bank Mandiri, Bank DKI, Bank Negara Indonesia (BNI), Bank Syariah Indonesia (BSI), Bank Artha Graha, CIMB Niaga, and Bank Mekar.

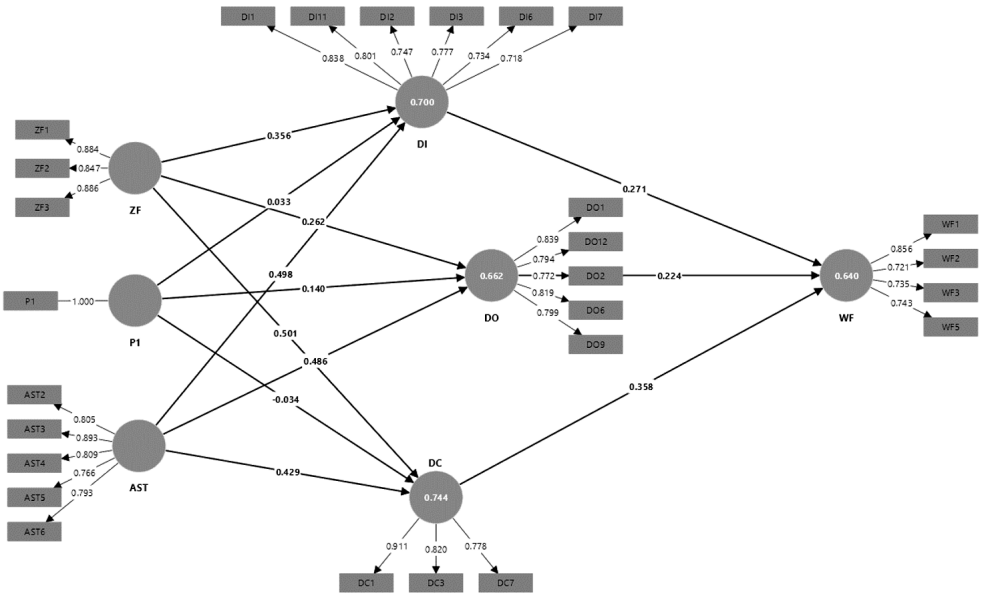
Table 3. Access Financial Institutions

Criterion	Frequency	Percentage
Relationship with Financial Institutions		
Already	23	29.10
No	56	70.90
Access to Financing at Financial Institutions		
Already	4	5.10
No	75	94.90

Source: Primary Data, *processed* (2024)

This research excluded 22 indicators because the outer loading value showed a number below 0.6 (Hair et al. 2019), namely AST1, DI4, DI5, DI8, DI9, DI10, DI12, DI13, DO3, DO4, DO5, DO7, DO8, DO10, DO11, DC2, DC4, DC5, DC6, DC8, DC9, and WF4. Those indicators still not been able to reflect the implementation of Z-Chicken, right now. In general, the indicators that can be reflected in supporting the welfare of mustahik currently still focus on material changes *(hifdz maal)*. Furthermore, awareness of maintaining aspects of spirituality has become the foundation built by the mustahik in this research.

Figure 3. Outer Model Process Input and Program Output Z-Chicken Baznas



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The input variable (Table 4) shows that the zakat fund variable can be reflected by the indicator of the amount of funds allocated for the program, the value of fund adequacy, and the use of funds for business programs. The Z-Chicken program's variables are reflected, and Mustahik utilizes them. Indicators of business community mentoring, training, market access reach, access to other capital, and business monitoring can reflect the mentoring variable (AST).

Table 4. Instrument Validity and Reliability Test

Variable	Code	Convergence of Validity		Internal Consistency		Discriminant Validity	
		Loading Factor	AVE	Cronbach Alfa	CR	*Cross Loading*	HTM
		> 0.6	> 0.5	0.6-0.90	0.6-0.90	CL > Other Constructs	< 1.0
Dana Zakat (ZF)	ZF1	0.884	0.762	0.844	0.849	Yes	Yes
	ZF2	0.847				Yes	
	ZF3	0.886				Yes	
Program (P)	P1	1.000	NaN	NaN	NaN	NaN	NaN
Assistance (AST)	AST2	0.805	0.663	0.872	0.874	Yes	Yes
	AST3	0.893				Yes	
	AST4	0.809				Yes	
	AST5	0.766				Yes	
	AST6	0.793				Yes	
Individual Level of Empowerment (DI)	DI1	0.838	0.593	0.862	0.863	Yes	Yes
	DI2	0.747				Yes	
	DI3	0.777				Yes	
	DI6	0.734				Yes	
	DI7	0.718				Yes	
	DI11	0.801				Yes	
Organizational Level of Empowerment (DO)	DO1	0.839	0.648	0.864	0.870	Yes	*No support*
	DO2	0.772				Yes	
	DO6	0.819				Yes	
	DO9	0.799				Yes	
	DO12	0.794				Yes	
Community-level of empowerment (DC)	DC1	0.911	0.703	0.788	0.822	Yes	Yes
	DC3	0.820				Yes	
	DC7	0.778				Yes	
Welfare (WF)	WF1	0.856	0.568	0.765	0.788	Yes	Yes
	WF2	0.721				Yes	
	WF3	0.735				Yes	
	WF5	0.743				Yes	

Source: Primary Data, *processed* (2024)

The mediating variable reflects individual empowerment through mustahik indicators such as learning the Qur'an, adhering to five daily prayers, fasting, allocating personal health funds, owning fitness insurance (BPJS or similar), and meeting primary, secondary, and tertiary needs. The organization's differentiation can be reflected by the *mustahik* understanding of business practices following sharia, the implementation of sharia contracts, the commitment to maintain business continuity and quality, the implementation of ZIS for businesses, and the ability to share for their businesses. Indicators of inter-community networking skills, the ability to influence good behavior, and Mustahik's active participation in community activities reflect community-level empowerment.

The "Baznas" label effectively raises Mustahik's awareness of the social impact of their programs. Even though the mustahik do not fully understand the goals of the MoM of the Z-Chiken program, awareness of the commitment to the preservation of religion or spiritual change and the preservation of the soul. In particular, can reflect the empowerment effect on the individual level so that it has an impact on improving the welfare of the mustahik. Beik and Arsyianti's (2015) also found that spiritual transformation plays a crucial role in assessing the effectiveness of the zakat distribution program on a micro level.

Furthermore, empowerment at the organizational level better reflects the combination of Maqashid Sharia's achievements in terms of economic and spiritual preservation. Meanwhile, at the community level, they can reflect on social preservation as social capital in achieving other welfare aspects. This study reinforces study by Zakaria (2014), Zakaria and Mohammad (2019), and Widiastuti et al. (2021), which suggest that maqasid sharia can serve as a bridge to achieve mustahik welfare. This research provides novelty by emphasizing the mawashi sharia aspect of the empowerment process, which does not just focus on the program's results. Finally, combining the empowerment process, the maqashid sharia approach, and social capital has a bigger effect on the well-being of Mustahik in terms of keeping the quality of their worship high, keeping them healthy, keeping them smart and educated, and protecting their assets by making the business they run more profitable. Validity and reliability tests measure reflections that accurately explain each indicator variable.

Input variables influence the empowerment process at the individual level by 68.8%, the empowerment process at the organizational level by 64.9%, and the empowerment process at the community level by 73.4%. Furthermore, the empowerment process influenced *Mustahik's* welfare by 62.6%. These findings show that the contribution of variable inputs through the zakat empowerment program can significantly increase *mustahik* welfare.

Assistance to the three categories of *mustahik* empowerment had a moderate size effect. The impact of empowerment on welfare is relatively moderate. Programs on empowerment have a weak side effect. Finally, the impact of zakat funds on empowerment is weak in the organizational empowerment dimension but moderate in the individual and community empowerment dimensions. These findings indicate that the first input factor, assistance through empowerment, plays a significant role in achieving mustahik

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welfare. In contrast, the second input factor is the amount of funds managed through the empowerment process.

Table 5. Coefficients of Determination

Variable	R-square	R-square adjusted	f-square				Q2
			DI	DO	DC	WF	
DI	0.700	0.688				0.069	
DO	0.662	0.649				0.032	
DC	0.744	0.734				0.072	
WF	0.640	0.626					0.914
AST			0.276	0.234	0.241		
P			0.002	0.031	0.003		
ZF			0.121	0.058	0.28		

Source: Primary data. processed (2024)

This finding shows that Mustahik also does not fully understand the aims of the productive zakat program, especially Z-Chicken. This result can be seen from the effect size, which shows the average numbers in the low to moderate category. More significant assistance is needed so that a significant level of increase in Mustahik's welfare is truly established. These results are also reinforced by research from 2016-2023 showing that the MoM program has not demonstrated effective management despite its positive impact from mustahik changes (Widiastuti, 2021; Mawardi et al., 2022).

The input variable, in the form of a program, has not significantly influenced this research. This finding suggests that the program can only function as a moderating variable. This finding implies that any program has the potential to mediate and improve Mustahik's welfare. However, a program without an empowerment process will not produce optimal results, and it is not easy to measure its success. Hosen et al. (2023) demonstrates that partial implementation of the empowerment process does not yield significant results for the welfare of Mustahik. Furthermore, the Q predictive relevance (Q2) results show that this model can predict the size of input, process, and output factors to evaluate the performance of productive zakat programs. This result implies that each input variable can predict the degree of increase in mustahik welfare through empowerment factors.

Furthermore, the Z-Chicken Program has not shown a significant influence on Mustahik welfare. The allocation of assistance and zakat funds through empowerment significantly influences Mustahik's welfare. The Z-Chicken program significantly contributes to Mustahik's welfare by mediating individual, organizational, and community empowerment variables. The maqashid sharia approach, which emphasizes religion, soul, intellect maintenance, lineage, and property, is the basis for measuring welfare. This result means that the empowerment process in the Z-Chicken program has not been managed optimally.

However, the empowerment process is the key to the effectiveness of the Zakat productive program. The finding shows that zakat funding affects the improvement of

mustahik welfare. The productive zakat program is managed through a business program, where the Mustahik segmentation represents a group that has emerged from poverty and is capable of managing a business. The aim is for Mustahik to not only remain Mustahik for an extended period but also gradually improve the welfare of himself, his family, and even his community.

Tabel 6. *Bootstrapping* Inner Model

	Original Sample (O)	Sample Mean (M)	Standard deviation (STDEV)	T statistics (|O/ STDEV|)	P values
Path Coefficient					
ZF --> OF	0.356	0.358	0.155	2.305	0.011*
ZF --> DO	0.262	0.276	0.139	1.894	0.029*
ZF --> DC	0.501	0.486	0.123	4.065	0.000*
P --> OF	0.033	0.038	0.108	0.307	0.379
P --> DO	0.140	0.131	0.128	1.089	0.138
P --> DC	-0.034	-0.023	0.074	0.486	0.320
AST --> DI	0.498	0.5	0.124	4.03	0.000*
AST --> DO	0.486	0.485	0.119	4.068	0.000*
AST --> DC	0.429	0.435	0.131	3.269	0.001*
DI--> WF	0.271	0.265	0.123	2.208	0.014*
DO--> WF	0.224	0.248	0.152	1.474	0.070**
DC--> WF	0.358	0.346	0.167	2.144	0.016*
Total Indirect Effect					
ZF -->WF	0.335	0.343	0.098	3.424	0.000*
P1 --> WF	0.028	0.028	0.062	0.447	0.327
AST -->WF	0.397	0.398	0.091	4.37	0.000*
Specific Indirect Effect					
ZF--> DI--> WF	0.096	0.100	0.071	1.367	0.086**
ZF --> DO--> WF	0.059	0.072	0.067	0.874	0.191
ZF --> DC--> WF	0.179	0.171	0.098	1.834	0.033*
P--> DI--> WF	0.009	0.008	0.030	0.299	0.383
P --> DO--> WF	0.031	0.029	0.041	0.771	0.220
P --> DC--> WF	-0.012	-0.009	0.027	0.455	0.325
AST --> DI--> WF	0.135	0.129	0.066	2.058	0.020*
AST--> DO--> WF	0.109	0.120	0.082	1.326	0.092
AST --> DC--> WF	0.154	0.148	0.085	1.801	0.036*
Total Effect					
ZF --> OF	0.356	0.358	0.155	2.305	0.011*
ZF --> DO	0.262	0.276	0.139	1.894	0.029*
ZF --> DC	0.501	0.486	0.123	4.065	0.000*
ZF--> WF	0.335	0.343	0.098	3.424	0.000*
P --> OF	0.033	0.038	0.108	0.307	0.379
P --> DO	0.140	0.131	0.128	1.089	0.138

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	Original Sample (O)	Sample Mean (M)	Standard deviation (STDEV)	T statistics (|O/ STDEV|)	P values
P --> DC	-0.034	-0.023	0.074	0.468	0.320
P--> WF	0.028	0.028	0.062	0.447	0.327
AST --> DI	0.498	0.5	0.124	4.030	0.000*
AST --> DO	0.486	0.485	0.119	4.068	0.000*
AST --> DC	0.429	0.435	0.131	3.269	0.001*
AST-->WF	0.397	0.398	0.091	4.370	0.000*
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DC--> WF	0.358	0.346	0.167	2.144	0.016*

Source: Primary Data, *processed* (2024), (*sig at 5%; **sig at 10%)

The results of bootstrapping the inner model in Table 9, indicate that zakat funds are the second input factor in this research, following mentoring. The initial value of the total sample for the effect indicated a positive direction. Furthermore, this discovery clarifies that zakat funds indirectly enhance mustahik welfare through an efficiently managed empowerment process. Specifically, all levels of the community, including individuals and all three organizations, demonstrate the indirect impact of empowerment on the empowerment process. However, empowerment through funding factor inputs is only significant at the community level. Z-Chicken Program Effect to Improve Mustahik Welfare. The Z-Chicken program is an innovation of the flagship zakat program for Mustahik in urban areas. Baznas finances Z-Chicken, a productive Mustahik business, with cash and non-cash inputs. Based on the results of the open interviews, Baznas distributed a total of IDR 9,000,000 to Mustahik. This amount included 6 million rupiah in cash capital and 3 million rupiah in non-cash capital, which was used for business support tools and soft skills training related to the Z-Chicken business.

Most mustahik expressed their desire to join the Z-Chicken program for various reasons, including improving their family's economic structure, accessing business assistance, obtaining both cash and non-cash capital to start a business, enhancing relationships with relatives, and increasing family income. Z-Chicken manages the productive zakat distribution scheme in an integrated manner, involving partners (mustahik) and customers, pintra and stock points, suppliers (RPA/chicken slaughterhouses), and product quality standardization. After the Z Chicken program runs, Mustahik transforms into decile six and shows upward welfare; Z Chicken has become Mustahik's main work in the neighborhood where he lives.

The most excellent monetization value comes from increasing income/mustahik profits. Based on the results of calculations before and after participating in the Z-Chicken program, the average increase in *mustahik* income is 50.14%. The average increase in revenue amounts to approximately 2.73 million rupiah. According to the December 2022 survey, Mustahik's Z-Chicken business remains at the birth level, indicating a positive

contribution from the Z-Chicken Program to his overall well-being. Before participating in the program, the income range fell into the Decile 2 category, but after participating in the program, it moved into the Decile 6 category. However, despite the average income reaching a kifayah limit after the program, it has not yet moved to the muzaki level (see Table 7 and Figure 5).

Table 7. Changes in the average income of *Mustahik* Z-Chicken in Greater Jakarta (in IDR, 2022)

Before	After	Change	Percentage of Change
2,136,522	4,982,429	2,727,215	50.14

Source: Primary Data, *processed* (2024)

The results of this study indicate that the Z-Chicken program has not significantly impacted Mustahik's welfare, either directly or indirectly. The program primarily contributes to the empowerment process of the organization or Z-Chicken's business itself. According to the interview results with Mustahik, the Z-Chicken business under Mustahik's management has only been operational for 1 to 24 months. If analyzed based on *the life cycle of the business*, this may happen because the age factor of Z-Chicken *Mustahik's* business is still at the introductory level. Therefore, it is highly likely that Mustahik will not experience the full impact of the Z-Chicken program at once.

Assistance is the process of monitoring Baznas's development of mustahik. The mentoring variable significantly and positively influenced Mustahik's welfare, yielding a score of 0.397. Assistance that contributes significantly to the welfare of Mustahik is provided through the empowerment process at the individual level, followed by empowerment at the organizational and community levels. Specifically, the assistance provided by the organizational empowerment process or the mustahik business itself has not significantly impacted the welfare of the organizational level. This result means that the mustahik business model is still running very simply; such things as the implementation of Sharia contracts, Sharia business practices, business continuity and quality, commitment to issuing ZIS, and the ability to share have not directly contributed to the welfare of mustahik indirectly.

The success of financing through microfinance access for the weak or vulnerable has been proven by Grameen Bank's "Banking for the Poor" in Bangladesh with the Nobel Prize in 2006. Muhammad Yunus' concept at Grameen Bank is to develop the concept of sustainable development as a synthesis of a capitalist economy for poor people with a door-to-door system and door-to-door *system* empowerment (Rizky, 2015). This study confirms that implementing empowerment is key to the effectiveness of the Zakat productive program. Its supporting previous studies, namely Pailis et al. (2016); Widiastuti et al. (2021); Mawardi et al. (2022); Setyaudin (2023); Nazara et al. (2022). Empowerment in distribution and zakat management should function as a mediating variable, not an intervening one. The community's role in fostering empowerment has emerged as the most significant factor contributing to Mustahik's well-being.

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https://doi.org/10.15408/sjie.v13i2.42673

When Mustahik joined, the "Baznas" label made Mustahik aware of the social impact of the programs they received. The label can make Mustahik aware of the social impact due to the programs they receive. Mustahik does not fully understand the MoM of the Z-Chiken program, but being aware of the commitment to religion, spiritual change, and soul preservation can empower an individual level, which is beneficial for Mustahik's welfare. This study agrees with Beik and Arsyianti's (2015) study, which said that spiritual change is an important part of figuring out how well the zakat distribution program works at the micro level.

Also, giving people more power at the organizational level better shows how Maqashid Sharia protects money and spirituality. Meanwhile, at the community level, there is a more remarkable ability to reflect on aspects of social preservation, such as social capital. This study strengthens previous research by Zakaria (2014), Zakaria and Mohammad (2019), and Widiastuti et al. (2021), showing that maqasid sharia can be a bridge to achieving mustahik well. This research provides novelty by emphasizing the maqashid sharia aspect of the empowerment process, which does not just focus on the results. Lastly, the empowerment process, along with the maqashid sharia approach and social capital, has a more significant effect on the level of welfare of Mustahik in terms of keeping the quality of their worship high, keeping them healthy, keeping them bright and educated, and protecting their assets by making the business they run more profitable.

Lastly, the combination of empowerment, maqashid, and sharia determines the income of their business. The strong role of empowerment mirrors the productive zakat program that can be managed optimally and can give birth to new muzaki. The results of this study reinforce the importance of the role of empowerment in the management of productive zakat to build a just economic community. More than that, the concept of zakat in Baznas empowerment combines economic, social, and spiritual concepts simultaneously (Rozalinda, 2018) and the concept of maqashid shariah (Zakaria, 2014).

Implementing social capital plays a crucial role in enhancing the community's welfare through empowerment. The community's role in both the path and indirect effects demonstrates the empowerment process's significant value. The World of Giving Index Report (2024) shows that Indonesia has ranked first for the last 7 years with the highest level of donations and volunteers. This data means that the social sensitivity of Indonesian people, in general, has high social capital. Thus, giving zakat money to the productive sector through the utilization system can be managed very well with the help of the best empowerment mechanism.

This finding implies that the empowerment role of any program is crucial and essential for achieving maximum welfare. These findings show that any program without a beneficial empowerment process will not maximize the community's welfare. However, any program with consistent funds and assistance will result in a significant level of *Mustahik* welfare. The idea of health is geared toward a higher goal. According to Imam As-Syatibi's proposed sharia maqashid, the first concept of maqasid is about money, the second concept is about reaching goals, and the third concept is about what the future holds (Hashem, 2023). So, Imam As-Syatibi explains something important about the

purpose of religious life according to the Qur'an and Sunnah: to protect religion, protect the soul, protect children, protect property, and keep minds sharp.

In the context of empowerment in the productive zakat program, this study refers to the welfare of *mustahik* life, which is not only measured based on economic value. However, sharia maqashid also serves as a measure of welfare. The results of this study show that increasing the level of welfare is the first goal. Next comes improving the quality of mustahik observance (WF1), which is an example of preserving religion; next comes improving mustahik health (WF2), which is an example of preserving the soul; and finally, improving welfare in education (WF3), which is an example of preserving intellect ensures the achievement of maqasserve property. The order of achievement and the level of welfare are followed by increasing the quality of *mustahik* observan*mustahik.*

CONCLUSION

The study's results indicate that the empowerment process, combined with the input variables of zakat fund and mentoring at the individual, organizational, and community levels, can significantly enhance mustahik welfare. Meanwhile, the Z-Chicken program did not show a significant positive effect on *Mustahik's* welfare. Huda's research (2019) complements the Ministry of Religion's study by suggesting we can implement zakat distribution with creative productivity. This study's results suggest that we can manage productive zakat in a productive, creative, and collaborative manner. This study suggests that empowering productive zakat should be managed and accompanied sustainably and better-controlled. Baznas, with the opening of zakat laboratory management, can collaborate with the campus so that students can assist their *mustahik*..

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https://doi.org/10.15408/sjie.v13i2.42673

Signifikan: Jurnal Ilmu Ekonomi
Volume 13(2), 2024: 475 - 484
P-ISSN: 2087-2046; E-ISSN: 2476-9223
https://doi.org/10.15408/sjie.v13i2.42506

Tax Aggresiveness Analyis: The Role of Internal Financial Factors

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JEL Classification:
M41
H26

Received: 21 November 2024

Revised: 15 December 2024

Accepted: 20 December 2024

Available online: December 2024

ABSTRACT

Research Originality: This research may suggest a deeper relationship between internal company factors and tax aggressiveness, which has not been studied explicitly. Many studies examine the influence of external factors, but this study can highlight how a company's internal financial and tax management decisions can influence tax aggressiveness.

Research Objectives: This study investigates the influence of several financial factors, such as thin capitalization, financial distress, and earnings management, on tax aggressiveness.

Research Methods: This study analyzed 310 data from manufacturing companies listed on the Indonesian Stock Exchange from 2019 to 2023.

Empirical Results: This study found that the high thin capitalization range can reduce tax aggressiveness. Conversely, earnings management is one tool used by management to reduce tax aggressiveness, while financial distress has no impact on tax aggressiveness.

Implications: The study suggests that while certain financial practices influence tax aggressiveness, broader factors such as financial stability, investor relations, and risk management also play a significant role.

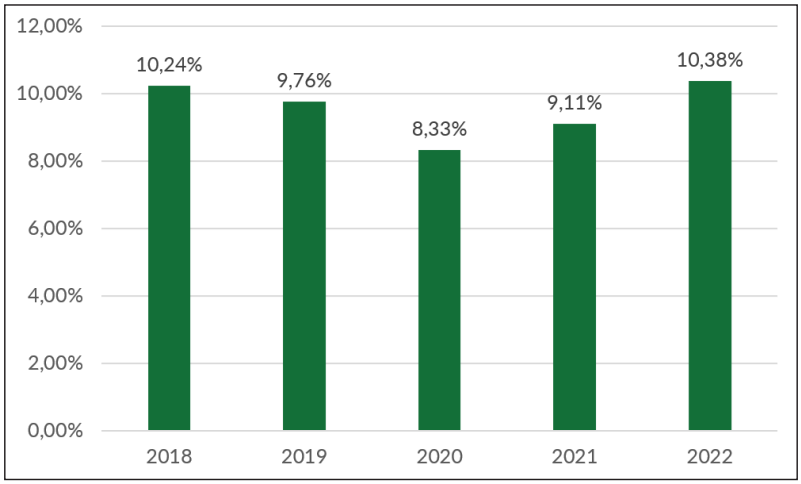
Keywords:
thin capitalization; financial distress; earnings management; tax agresiveness

How to Cite:
Mulyani, S. D., Fitria, G. N., & Tarmidi, D. (2024). Tax Agresiveness Analysis: The Role of Internal Financial Factors. *Signifikan: Jurnal Ilmu Ekonomi*, *13*(2), 475-xx. https://doi.org/10.15408/sjie.v13i2.42506.

INTRODUCTION

The world is interconnected. Likewise, companies in Indonesia not only operate domestically but also in several other countries. They must expand abroad if they want to become global players. Globalization has created conditions allowing business activities and operations to grow continuously. Corporate development strategy is directed toward a primary goal: maximizing profits and minimizing costs, including tax expenses. Meanwhile, the development of tax regulations that impose taxes on global company profits has not seen significant changes. Tax avoidance is often interpreted as a legal activity, such as minimizing tax burdens without violating tax laws. However, this practice has become more aggressive to reduce the tax that must be paid to the state. As a result, the country experiences significant tax potential loss. Aggressive corporate tax practices are a serious concern, as evidenced by Indonesia's low tax ratio. The country's tax ratio over the last five years (2018-2022) is shown in Figure 1.

Figure 1. Indonesia Tax Ratio



Indonesia's low tax ratio indicates tax leakage. This fact occurs due to the opportunistic behavior of taxpayers through illegal tax planning practices. There is still a large amount of untapped tax potential, as reflected in the low tax ratio, making it necessary to take steps to address this issue. The lack of specific government attention to tax collection policies creates opportunities for companies to engage in tax planning and more aggressive tax practices. Differences in interests between principals and agents can impact various aspects of company performance, including corporate tax policies. Indonesia's self-assessment tax system grants companies the authority to calculate and report their taxes. Agency issues arising from conflicting interests between management and shareholders shape the link between agency theory and tax aggressiveness. Several methods exist to control agents' actions related to tax aggressiveness, such as evaluating the company's financial statements through financial ratios compared to the agent's tax aggressiveness strategies.

Several researchers have identified factors influencing tax aggressiveness, including thin capitalization, financial distress, and earnings management. Thin capitalization is an

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https://doi.org/10.15408/sjie.v13i2.42506

independent variable in the mechanism of international tax avoidance. It poses a tax-related issue due to the differing treatment of capital and debt investments. In capital investments, returns in the form of dividends are taxable, whereas debt financing incurs interest expenses that can be deducted from taxable income. Companies often leverage agency theory to pursue tax aggressiveness strategies. As a result, many companies opt for debt financing, reducing their taxable income through interest payments.

This practice refers to a phenomenon where companies increase their interest-bearing debt, leading to a reduced proportion of equity in the capital structure (Fasita et al., 2022). Through their research in the manufacturing sector, the influence of thin capitalization on tax aggressiveness was demonstrated by Hasanudin et al. (2022). The research findings indicate that the higher the debt utilized in thin capitalization to expand a company's operational capital, the lower the rate of tax aggressiveness, particularly in healthcare companies. In other words, the level of debt in a company influences the degree of its tax avoidance behavior. However, this contradicts the research conducted by Irawan and Ragil (2021), which states that thin capitalization has no effect on tax aggressiveness in the manufacturing sector in Indonesia. This result is also supported by Tiyanto and Achyani (2022) and Ramadhan (2023).

The inability of a company to fulfill its financial obligations when they become due can result in bankruptcy or liquidity challenges, which may mark the onset of bankruptcy (Hidayanto et al., 2021). In times of financial difficulties or pressures, management must implement strategies to preserve the business (Hapsari & Wibowo, 2024). Companies will undoubtedly strive to manage bankruptcy risks, particularly when driven by internal factors such as debt and external factors like a weakening economy, rising interest rates, and currency depreciation. In line with this, Indonesia's economic conditions have deteriorated recently, marked by the rupiah's depreciation against foreign currencies and increasing interest rates. When a company faces a high risk of bankruptcy, it needs "fresh funds" to repay debts and sustain its operations. As a result, managers must work diligently to manage cash reserves more efficiently. Exploring alternatives to reduce tax burdens becomes a practical strategy in such situations, motivating the company's aggressive actions. Financial distress can disrupt operational activities, and to continue running the business, a company requires working capital. Therefore, management often turns to debt financing to support its operations.

Financial distress can be understood as a decline in income, typically reflected in financial statements, where cash, receivables, inventory, equity, and operating profits show a downward trend, potentially affecting the company's liquidity. Meanwhile, operational expenses tend to rise. This situation often compels companies to take various actions to prevent costs from worsening their financial condition. Consequently, many companies may exploit such circumstances to reduce their tax burden. According to a research study, financial distress can lead to deviant behavior in tax payments, as companies may feel justified in neglecting their tax obligations due to pressing financial pressures.

According to agency theory, management holds more information about the company than the principal, especially its financial performance. This information asymmetry can lead to potential conflicts of interest, as management may act in its best interests, sometimes at the expense of the shareholders or principals (Wijaya & Syarifah, 2024).

The company's financial performance is critical for the principal when assessing its success and making decisions about future economic actions regarding its investment. As a result, management, entrusted with authority by the principal, may implement various strategies when recognizing signs of financial distress that could harm the company's performance. One key reason companies opt for debt as a funding source is the associated tax advantages, as interest payments on debt can be deducted from taxable income, effectively reducing the overall tax burden. Financing through debt incurs interest expenses, reducing taxable income; however, higher debt can also increase the company's burden (Dang & Tran, 2021). Research conducted by Wijaya and Syarifah (2024) indicates that financial distress positively impacts tax aggressiveness. This research is supported by Maulida et al. (2023), who state that bankruptcy risk also positively influences tax aggressiveness. Saputri and Radianto (2023) shared different results that show that financial distress has no significance in tax aggressiveness. This result is supported by Ahdiyah and Triyanto (2021), who state that financial distress has no significant influence on tax aggressiveness.

A company's management is closely linked to the agency problem, which arises from the contractual relationship between the owner, the stakeholder, and management, the agent. Management is entrusted with the authority to make decisions to maximize the owner's profits and is responsible for managing the company to enhance the owner's value. This relationship can lead to conflicts of interest, as management may prioritize its goals over the owners. In business practice, companies often perceive tax payments as an expense that diminishes earnings. As a result, managers seek to leverage the flexibility in accounting standards to enhance efficiency and minimize the tax burden. Managers feel pressured because of the owners' high expectations (Duhoon & Singh, 2023). This condition can lead them to adopt various strategies to reduce taxable income, ultimately preserving more earnings for the company (Zaman et al., 2024). Earnings management by management increases the likelihood that a company will engage in tax-aggressive actions (Nugroho et al., 2020). By manipulating financial statements and reporting practices, management can create a more favorable view of the company's financial performance, which can facilitate strategies aimed at reducing tax liabilities. Management intentionally avoids or minimizes tax liabilities by employing various techniques and methods within accounting policies, often exploiting gaps or weaknesses in tax regulations. This approach allows them to reduce the company's tax burden while remaining within the legal framework.

Prior research has indicated that complex tax aggressiveness strategies can empower managers to act opportunistically. This behavior includes engaging in related party transactions, diverting resources through other activities, and manipulating earnings to achieve favorable outcomes for themselves or the company (Herusetya & Stefani, 2020). Zaman et al. (2024) indicate that earnings management positively influences tax aggressiveness. Sitorus et al. (2023) also explain that earnings management has an effect on tax aggressiveness in Indonesia's energy companies. In contrast, Hajawiyah et al. (2024) explain that earnings management has a negative effect on tax aggressiveness in manufacturing companies in Indonesia. Delgado et al. (2023) find that discretionary accruals do not affect tax aggressiveness. In the third, we hypothesize that earning management influences tax aggressiveness.

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https://doi.org/10.15408/sjie.v13i2.42506

Previous research results have not shown consistency regarding the influence of each variable—individually and collectively—including Thin Capitalization, Financial Distress, and Earnings Management on Tax Aggressiveness. This research has contributed to the body of accounting literature concerning tax aggressiveness by examining the effects of thin capitalization, financial distress, and earnings management on tax aggressiveness in manufacturing companies. The Directorate General of Taxation can use this research to enhance anti-tax avoidance regulations and develop the necessary competencies to address tax avoidance activities in manufacturing corporations.

METHODS

This research was conducted using a quantitative descriptive approach, focusing on secondary data. The study population comprised building construction companies listed on the IDX from 2019 to 2023. The study utilized annual financial reports collected from sources such as www.idnfinancials.com and www.idx.co.id. Purposive sampling was employed to exclude firms that became publicly listed after January 1, 2019, and those that consistently report their financial reports on the stock exchange, the companies reporting in Indonesia currency. Ultimately, the research included a total of 310 sample data. We employ regression analysis to answer the hypotheses. Thin capitalization, financial distress, and earnings management are used as independent variables in this research. Meanwhile, tax aggressiveness is used as the dependent variable with the following research model:

$$\text{Tax Agrs} = \alpha + \beta 1\ \text{TC} + \beta 2\text{FD} + \beta 3\ \text{EM} + \varepsilon$$

TaxAgrs represents tax aggressiveness which measured using effective tax rate (Saputri & Radianto, 2023) is obtained by calculating the total tax burden divided by the company's net profit. TC is thin capitalization was measure by MAD Ratio (Ruknan et al., 2024). Financial distress is a condition of financial distress using the Springate model calculation formula (Maulida et al., 2023). If the springate model value is <0.82 then the company is declared to be in financial distress and is given the number 0, whereas if the springate value is > 0.82 then the company is declared healthy and given a value of 1. EM is earnings management by measuring the distribution of profits which is calculated from the difference between the company's profits for the year t with the profit of company t-1 then divided by the market value of company t-1 (Maulida et al., 2023).

RESULTS AND DISCUSSION

Table 2 reports the descriptive statistics of the investigated variables by 31 data analyzed. As illustrated in Table 2, Thin capitalization refers to a high level of debt compared to equity in a company's capital structure. This condition is often associated with tax avoidance strategies, where companies use debt to reduce their tax burden through interest deductions. If it is stated that the average thin capitalization is 0.714, it means that the debt-to-equity ratio of the company is 0.714. In other words, for every 1 unit of equity, the company has, it carries 0.714 units of debt. This result shows that the

company has a higher proportion of debt than its equity, but not to an extreme level. This average indicates the company's capital structure and how much it relies on debt to finance its operations. In the context of taxes, this ratio is often related to the company's ability to claim interest expenses as deductions to reduce taxable income.

Table 1. Statistic Descriptive

Variable	Min.	Max.	Mean	Std. Error
TC	0.026	5.546	0.714	0.477
FD	0.000	1.000	0.676	0.424
EM	-6.776	1.249	-0.005	0.404
TaxAgrs	-1.322	0.981	0.272	0.170

Note: TC = Thin Capitalization; FD = Financial Distress; EM=Earning Management; TaxAgrs = Tax aggresiveness

A score of 0.676 indicates that, on average, the companies being analyzed are at a relatively high level of financial risk, though not necessarily at the point of severe bankruptcy. Typically, the lower the financial distress score or index, the more likely a company will face financial difficulties. In this case, a score of 0.676 suggests that the company is financially vulnerable and may require careful attention to debt management, liquidity, or profitability to avoid bankruptcy.

The average earnings management value is -0.005; this result typically indicates that the average value of earnings management practices carried out by the companies in the sample is negative. This result means that the companies are more likely to decrease earnings than increase earnings. A negative value suggests that the companies analyzed are more likely to engage in tactics that result in lower earnings, such as delaying revenue recognition or recognizing expenses earlier, possibly for reasons like reducing tax liabilities or managing market expectations.

Table 2. Regression Test Result

Variable	Coefficient	Std. Error
Constant	0.096	0.008
TC	-0.014	0.004***
FD	-0.009	0.006
EM	0.032	0.012***
F-Test	0.000***	
R-Square	0.207	

Note: TC = Thin Capitalization; FD = Financial Distress; EM=Earning Management.
***significant in 5%

Tax aggressiveness refers to the extent to which a company employs strategies to reduce its tax burden, often through more aggressive means or by exploiting loopholes in tax regulations. This may include tax avoidance or tax planning strategies that allow a company to pay less tax than it otherwise would. If it is stated that the average tax aggressiveness value is 0.272, this means that the average level of tax aggressiveness exhibited by the

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companies in the study sample is 0.272. This value indicates a relatively low level of tax aggressiveness. However, there is still a tendency for companies to use strategies aimed at reducing their tax obligations, albeit not in an extreme way.

This study shows that thin capitalization has a negative effect on tax aggressiveness, supporting the hypothesis that thin capitalization negatively influences tax aggressiveness. This result suggests that manufacturing companies listed on the Indonesian Stock Exchange have not utilized interest charges on debt for tax avoidance. From the perspective of agency theory and positive accounting theory regarding the debt-to-equity ratio (DER), both stakeholders—creditors, suppliers, and investors—can assess the company's ability to generate profits from sales and investments. By incorporating interest charges on debt, the company can reduce its tax burden, which, in turn, can help mitigate agency conflicts.

The results of this research align with those conducted by Hasanudin et al. (2022) and Fasita et al. (2022), proving that Thin Capitalization significantly affects Tax Aggressiveness. A company's financing strategy significantly impacts its taxable income level. As the level of debt increases, so does the interest burden that must be paid, leading to lower fiscal profits. Consequently, a company's funding policy will affect its effective tax rate (ETR), as taxes are treated differently depending on its capital structure. This interplay highlights the importance of strategic financing decisions in managing tax liabilities. However, the results of this research are not in line with research conducted by Ahdiyah and Triyanto (2021), Ramadhan (2023), and Ruknan et al. (2024), which states that thin capitalization does not have a significant influence, which can be interpreted as thin capitalization individually does not affect tax avoidance.

This study indicate that financial distress has no effect on tax aggressiveness, which contradicts the hypothesis that financial distress influences tax aggressiveness. Changes in a company's income and expenses do not impact the tax aggressiveness exhibited by manufacturing companies listed on the Indonesian Stock Exchange. Tax aggressiveness can occur in financially distressed and stable companies as they seek to maximize income. Conversely, companies may also strive to reduce their tax burden.

Regarding agency theory, the relationship between agents and shareholders is particularly crucial for companies experiencing financial distress. The risk of losing investors increases significantly during financial difficulties, prompting agents to maintain positive relationships with investors. To achieve this, agents may focus on preserving the company's financial health by minimizing expenses, which can sometimes involve compromising the relationship between the company and the government through tax avoidance practices.

This research aligns with studies by Saputri and Radianto (2023) and Takasanakeng (2022), which show that companies experiencing financial distress in Indonesia are less likely to seek additional cash or profits by minimizing their tax burden. This is because investors are generally averse to high risks, such as bankruptcy. When a company goes bankrupt, the funds invested by investors are lost, so they avoid taking such risks. Debt restructuring, where managers seek extensions from creditors to repay debts once the company has sufficient cash, and management changes, which involve replacing current management with more competent individuals, are strategies aimed at preventing potential

investors from avoiding financially distressed companies. Ariff et al. (2023) also note that companies facing financial difficulties have fewer opportunities to pursue tax aggressiveness strategies. However, research by Oktaviano et al. (2024) contradicts these findings. Their study demonstrates that bankruptcy risk significantly influences tax aggressiveness. Financial distress, they argue, is a situation that can trigger deviant tax behavior, as companies may have strong motivations to disregard tax obligations.

This study show that Earnings Management has a positive impact on Tax Aggressiveness. This result is consistent with the hypothesis, which suggests that Earnings Management influences Tax Aggressiveness. Specifically, as Earnings Management increases, the Tax Aggressiveness carried out by manufacturing companies listed on the Indonesian Stock Exchange tends to decrease. Agency theory helps explain the relationship between earnings management and profit distribution, highlighting an agency problem between shareholders and managers. Shareholders, as principals, set performance targets for managers, but these targets are not always met, leading managers to engage in earnings management. Companies can use differences in financial reporting standards and tax regulations to manipulate the reported taxable income. For instance, a company may report high commercial profits while declaring relatively low fiscal profits, reducing its tax obligations. This study's findings contradict the research of Oktyawati et al. (2023) and Mulyaningsih et al. (2023), which found no effect of earnings management on tax aggressiveness (ETR). However, the results align with studies by Herusetya and Stefani (2020) and Hajawiyah et al. (2024), which confirm that Earnings Management significantly affects Tax Aggressiveness.

CONCLUSION

The results reveal several important insights. The study finds that thin capitalization has a negative effect on tax aggressiveness, supporting the hypothesis that thin capitalization reduces tax aggressiveness. Although debt financing can reduce taxable income by incorporating interest expenses, companies avoid exploiting this strategy for tax benefits, likely to maintain financial stability and avoid potential risks. This study also show that financial distress does not significantly affect tax aggressiveness. Tax aggressiveness can occur in financially distressed and stable companies, as both aim to maximize income or reduce tax liabilities. Agency theory suggests that when companies experience financial difficulties, managers may focus on preserving financial health and maintaining positive relationships with investors, possibly avoiding aggressive tax strategies.

The study further confirms that earnings management positively impacts tax aggressiveness, in line with the hypothesis. As earnings management increases, tax aggressiveness decreases. This result supports the notion that companies manage earnings to meet performance targets, which can sometimes involve manipulating reported taxable income. The findings highlight the complex interplay between financial strategies (such as thin capitalization, earnings management, and financial distress) and corporate tax behavior. The results suggest that while certain financial practices can influence tax aggressiveness, companies' decisions are also shaped by broader concerns, including financial stability, investor relationships, and risk management.

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https://doi.org/10.15408/sjie.v13i2.42506

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Signifikan: Jurnal Ilmu Ekonomi (Journal of Economics) is accredited "Sinta S2" by Ministry of Research, Technology and BRIN Republic of Indonesia Republic of Indonesia No. 85/M/KPT/2020 renewal of the certificate number 30/E/KPT/2018 (Valid from Vol. 8(2), 2019 until Vol. 13(1), 2024). The journal indexed by Dimensions, CrossRef, Google Scholar, ISJD LIPI, IPI, Moraref, etc.

Signifikan: Jurnal Ilmu Ekonomi (Journal of Economics) has been covered (indexed and abstracted) by following indexing services:

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Countries	2010	2020
ASEAN Countries		
Indonesia	5,814 (71)	5,54 (71)
Malaysia	6,608 (36)	6,62 (36)
Thailand	6,436 (42)	5,96 (50)
Filipina	6,403(44)	5,71 (63)
Singapura	7,719 (11)	8,00 (6)
Vietnam	6,080 (61)	5,64 (68)

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Submission date: 04-Feb-2025 04:37PM (UTC+0700)
Submission ID: 2306107724
File name: Jurnal_SIGNIFIKAN_Vol._13_2_,_2024_Susi_DM.pdf (276.04K)
Word count: 4694
Character count: 27684

Signifikan: Jurnal Ilmu Ekonomi
Volume 13(2), 2024: 475 - 484
P-ISSN: 2087-2046; E-ISSN: 2476-9223
https://doi.org/10.15408/sjie.v13i2.42506

Tax Aggressiveness Analysis: The Role of Internal Financial Factors

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JEL Classification:
M41
H26

Received: 21 November 2024

Revised: 15 December 2024

Accepted: 20 December 2024

Available online: December 2024

ABSTRACT

Research Originality: This research may suggest a deeper relationship between internal company factors and tax aggressiveness, which has not been studied explicitly. Many studies examine the influence of external factors, but this study can highlight how a company's internal financial and tax management decisions can influence tax aggressiveness.

Research Objectives: This study investigates the influence of several financial factors, such as thin capitalization, financial distress, and earnings management, on tax aggressiveness.

Research Methods: This study analyzed 310 data from manufacturing companies listed on the Indonesian Stock Exchange from 2019 to 2023.

Empirical Results: This study found that the high thin capitalization range can reduce tax aggressiveness. Conversely, earnings management is one tool used by management to reduce tax aggressiveness, while financial distress has no impact on tax aggressiveness.

Implications: The study suggests that while certain financial practices influence tax aggressiveness, broader factors such as financial stability, investor relations, and risk management also play a significant role.

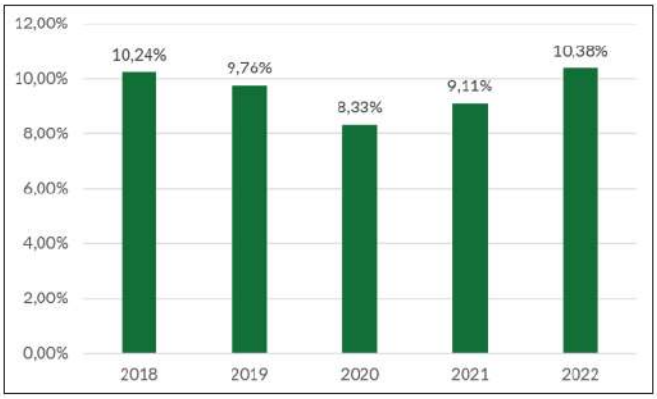
Keywords:
thin capitalization; financial distress; earnings management; tax agresiveness

How to Cite:
Mulyani, S. D., Fitria, G. N., & Tarmidi, D. (2024). Tax Agresiveness Analysis: The Role of Internal Financial Factors. *Signifikan: Jurnal Ilmu Ekonomi, 13*(2), 475-xx. https://doi.org/10.15408/sjie.v13i2.42506.

INTRODUCTION

The world is interconnected. Likewise, companies in Indonesia not only operate domestically but also in several other countries. They must expand abroad if they want to become global players. Globalization has created conditions allowing business activities and operations to grow continuously. Corporate development strategy is directed toward a primary goal: maximizing profits and minimizing costs, including tax expenses. Meanwhile, the development of tax regulations that impose taxes on global company profits has not seen significant changes. Tax avoidance is often interpreted as a legal activity, such as minimizing tax burdens without violating tax laws. However, this practice has become more aggressive to reduce the tax that must be paid to the state. As a result, the country experiences significant tax potential loss. Aggressive corporate tax practices are a serious concern, as evidenced by Indonesia's low tax ratio. The country's tax ratio over the last five years (2018-2022) is shown in Figure 1.

Figure 1. Indonesia Tax Ratio



Indonesia's low tax ratio indicates tax leakage. This fact occurs due to the opportunistic behavior of taxpayers through illegal tax planning practices. There is still a large amount of untapped tax potential, as reflected in the low tax ratio, making it necessary to take steps to address this issue. The lack of specific government attention to tax collection policies creates opportunities for companies to engage in tax planning and more aggressive tax practices. Differences in interests between principals and agents can impact various aspects of company performance, including corporate tax policies. Indonesia's self-assessment tax system grants companies the authority to calculate and report their taxes. Agency issues arising from conflicting interests between management and shareholders shape the link between agency theory and tax aggressiveness. Several methods exist to control agents' actions related to tax aggressiveness, such as evaluating the company's financial statements through financial ratios compared to the agent's tax aggressiveness strategies.

Several researchers have identified factors influencing tax aggressiveness, including thin capitalization, financial distress, and earnings management. Thin capitalization is an

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https://doi.org/10.15408/sjie.v13i2.42506

independent variable in the mechanism of international tax avoidance. It poses a tax-related issue due to the differing treatment of capital and debt investments. In capital investments, returns in the form of dividends are taxable, whereas debt financing incurs interest expenses that can be deducted from taxable income. Companies often leverage agency theory to pursue tax aggressiveness strategies. As a result, many companies opt for debt financing, reducing their taxable income through interest payments.

This practice refers to a phenomenon where companies increase their interest-bearing debt, leading to a reduced proportion of equity in the capital structure (Fasita et al., 2022). Through their research in the manufacturing sector, the influence of thin capitalization on tax aggressiveness was demonstrated by Hasanudin et al. (2022). The research findings indicate that the higher the debt utilized in thin capitalization to expand a company's operational capital, the lower the rate of tax aggressiveness, particularly in healthcare companies. In other words, the level of debt in a company influences the degree of its tax avoidance behavior. However, this contradicts the research conducted by Irawan and Ragil (2021), which states that thin capitalization has no effect on tax aggressiveness in the manufacturing sector in Indonesia. This result is also supported by Tiyanto and Achyani (2022) and Ramadhan (2023).

The inability of a company to fulfill its financial obligations when they become due can result in bankruptcy or liquidity challenges, which may mark the onset of bankruptcy (Hidayanto et al., 2021). In times of financial difficulties or pressures, management must implement strategies to preserve the business (Hapsari & Wibowo, 2024). Companies will undoubtedly strive to manage bankruptcy risks, particularly when driven by internal factors such as debt and external factors like a weakening economy, rising interest rates, and currency depreciation. In line with this, Indonesia's economic conditions have deteriorated recently, marked by the rupiah's depreciation against foreign currencies and increasing interest rates. When a company faces a high risk of bankruptcy, it needs "fresh funds" to repay debts and sustain its operations. As a result, managers must work diligently to manage cash reserves more efficiently. Exploring alternatives to reduce tax burdens becomes a practical strategy in such situations, motivating the company's aggressive actions. Financial distress can disrupt operational activities, and to continue running the business, a company requires working capital. Therefore, management often turns to debt financing to support its operations.

Financial distress can be understood as a decline in income, typically reflected in financial statements, where cash, receivables, inventory, equity, and operating profits show a downward trend, potentially affecting the company's liquidity. Meanwhile, operational expenses tend to rise. This situation often compels companies to take various actions to prevent costs from worsening their financial condition. Consequently, many companies may exploit such circumstances to reduce their tax burden. According to a research study, financial distress can lead to deviant behavior in tax payments, as companies may feel justified in neglecting their tax obligations due to pressing financial pressures.

According to agency theory, management holds more information about the company than the principal, especially its financial performance. This information asymmetry can lead to potential conflicts of interest, as management may act in its best interests, sometimes at the expense of the shareholders or principals (Wijaya & Syarifah, 2024).

The company's financial performance is critical for the principal when assessing its success and making decisions about future economic actions regarding its investment. As a result, management, entrusted with authority by the principal, may implement various strategies when recognizing signs of financial distress that could harm the company's performance. One key reason companies opt for debt as a funding source is the associated tax advantages, as interest payments on debt can be deducted from taxable income, effectively reducing the overall tax burden. Financing through debt incurs interest expenses, reducing taxable income; however, higher debt can also increase the company's burden (Dang & Tran, 2021). Research conducted by Wijaya and Syarifah (2024) indicates that financial distress positively impacts tax aggressiveness. This research is supported by Maulida et al. (2023), who state that bankruptcy risk also positively influences tax aggressiveness. Saputri and Radianto (2023) shared different results that show that financial distress has no significance in tax aggressiveness. This result is supported by Ahdiyah and Triyanto (2021), who state that financial distress has no significant influence on tax aggressiveness.

A company's management is closely linked to the agency problem, which arises from the contractual relationship between the owner, the stakeholder, and management, the agent. Management is entrusted with the authority to make decisions to maximize the owner's profits and is responsible for managing the company to enhance the owner's value. This relationship can lead to conflicts of interest, as management may prioritize its goals over the owners. In business practice, companies often perceive tax payments as an expense that diminishes earnings. As a result, managers seek to leverage the flexibility in accounting standards to enhance efficiency and minimize the tax burden. Managers feel pressured because of the owners' high expectations (Duhoon & Singh, 2023). This condition can lead them to adopt various strategies to reduce taxable income, ultimately preserving more earnings for the company (Zaman et al., 2024). Earnings management by management increases the likelihood that a company will engage in tax-aggressive actions (Nugroho et al., 2020). By manipulating financial statements and reporting practices, management can create a more favorable view of the company's financial performance, which can facilitate strategies aimed at reducing tax liabilities. Management intentionally avoids or minimizes tax liabilities by employing various techniques and methods within accounting policies, often exploiting gaps or weaknesses in tax regulations. This approach allows them to reduce the company's tax burden while remaining within the legal framework.

Prior research has indicated that complex tax aggressiveness strategies can empower managers to act opportunistically. This behavior includes engaging in related party transactions, diverting resources through other activities, and manipulating earnings to achieve favorable outcomes for themselves or the company (Herusetya & Stefani, 2020). Zaman et al. (2024) indicate that earnings management positively influences tax aggressiveness. Sitorus et al. (2023) also explain that earnings management has an effect on tax aggressiveness in Indonesia's energy companies. In contrast, Hajawiyah et al. (2024) explain that earnings management has a negative effect on tax aggressiveness in manufacturing companies in Indonesia. Delgado et al. (2023) find that discretionary accruals do not affect tax aggressiveness. In the third, we hypothesize that earning management influences tax aggressiveness.

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https://doi.org/10.15408/sjie.v13i2.42506

Previous research results have not shown consistency regarding the influence of each variable—individually and collectively—including Thin Capitalization, Financial Distress, and Earnings Management on Tax Aggressiveness. This research has contributed to the body of accounting literature concerning tax aggressiveness by examining the effects of thin capitalization, financial distress, and earnings management on tax aggressiveness in manufacturing companies. The Directorate General of Taxation can use this research to enhance anti-tax avoidance regulations and develop the necessary competencies to address tax avoidance activities in manufacturing corporations.

METHODS

This research was conducted using a quantitative descriptive approach, focusing on secondary data. The study population comprised building construction companies listed on the IDX from 2019 to 2023. The study utilized annual financial reports collected from sources such as www.idnfinancials.com and www.idx.co.id. Purposive sampling was employed to exclude firms that became publicly listed after January 1, 2019, and those that consistently report their financial reports on the stock exchange, the companies reporting in Indonesia currency. Ultimately, the research included a total of 310 sample data. We employ regression analysis to answer the hypotheses. Thin capitalization, financial distress, and earnings management are used as independent variables in this research. Meanwhile, tax aggressiveness is used as the dependent variable with the following research model:

$$\text{Tax Agrs} = \alpha + \beta 1\ \text{TC} + \beta 2\text{FD} + \beta 3\ \text{EM} + \varepsilon$$

TaxAgrs represents tax aggressiveness which measured using effective tax rate (Saputri & Radianto, 2023) is obtained by calculating the total tax burden divided by the company's net profit. TC is thin capitalization was measure by MAD Ratio (Ruknan et al., 2024). Financial distress is a condition of financial distress using the Springate model calculation formula (Maulida et al., 2023). If the springate model value is <0.82 then the company is declared to be in financial distress and is given the number 0, whereas if the springate value is > 0.82 then the company is declared healthy and given a value of 1. EM is earnings management by measuring the distribution of profits which is calculated from the difference between the company's profits for the year t with the profit of company t-1 then divided by the market value of company t-1 (Maulida et al., 2023).

RESULTS AND DISCUSSION

Table 2 reports the descriptive statistics of the investigated variables by 31 data analyzed. As illustrated in Table 2, Thin capitalization refers to a high level of debt compared to equity in a company's capital structure. This condition is often associated with tax avoidance strategies, where companies use debt to reduce their tax burden through interest deductions. If it is stated that the average thin capitalization is 0.714, it means that the debt-to-equity ratio of the company is 0.714. In other words, for every 1 unit of equity, the company has, it carries 0.714 units of debt. This result shows that the

company has a higher proportion of debt than its equity, but not to an extreme level. This average indicates the company's capital structure and how much it relies on debt to finance its operations. In the context of taxes, this ratio is often related to the company's ability to claim interest expenses as deductions to reduce taxable income.

Table 1. Statistic Descriptive

Variable	Min.	Max.	Mean	Std. Error
TC	0.026	5.546	0.714	0.477
FD	0.000	1.000	0.676	0.424
EM	-6.776	1.249	-0.005	0.404
TaxAgrs	-1.322	0.981	0.272	0.170

Note: TC = Thin Capitalization; FD = Financial Distress; EM=Earning Management; TaxAgrs = Tax aggresiveness

A score of 0.676 indicates that, on average, the companies being analyzed are at a relatively high level of financial risk, though not necessarily at the point of severe bankruptcy. Typically, the lower the financial distress score or index, the more likely a company will face financial difficulties. In this case, a score of 0.676 suggests that the company is financially vulnerable and may require careful attention to debt management, liquidity, or profitability to avoid bankruptcy.

The average earnings management value is -0.005; this result typically indicates that the average value of earnings management practices carried out by the companies in the sample is negative. This result means that the companies are more likely to decrease earnings than increase earnings. A negative value suggests that the companies analyzed are more likely to engage in tactics that result in lower earnings, such as delaying revenue recognition or recognizing expenses earlier, possibly for reasons like reducing tax liabilities or managing market expectations.

Table 2. Regression Test Result

Variable	Coefficient	Std. Error
Constant	0.096	0.008
TC	-0.014	0.004***
FD	-0.009	0.006
EM	0.032	0.012***
F-Test	0.000***	
R-Square	0.207	

Note: TC = Thin Capitalization; FD = Financial Distress; EM=Earning Management.
***significant in 5%

Tax aggressiveness refers to the extent to which a company employs strategies to reduce its tax burden, often through more aggressive means or by exploiting loopholes in tax regulations. This may include tax avoidance or tax planning strategies that allow a company to pay less tax than it otherwise would. If it is stated that the average tax aggressiveness value is 0.272, this means that the average level of tax aggressiveness exhibited by the

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companies in the study sample is 0.272. This value indicates a relatively low level of tax aggressiveness. However, there is still a tendency for companies to use strategies aimed at reducing their tax obligations, albeit not in an extreme way.

This study shows that thin capitalization has a negative effect on tax aggressiveness, supporting the hypothesis that thin capitalization negatively influences tax aggressiveness. This result suggests that manufacturing companies listed on the Indonesian Stock Exchange have not utilized interest charges on debt for tax avoidance. From the perspective of agency theory and positive accounting theory regarding the debt-to-equity ratio (DER), both stakeholders—creditors, suppliers, and investors—can assess the company's ability to generate profits from sales and investments. By incorporating interest charges on debt, the company can reduce its tax burden, which, in turn, can help mitigate agency conflicts.

The results of this research align with those conducted by Hasanudin et al. (2022) and Fasita et al. (2022), proving that Thin Capitalization significantly affects Tax Aggressiveness. A company's financing strategy significantly impacts its taxable income level. As the level of debt increases, so does the interest burden that must be paid, leading to lower fiscal profits. Consequently, a company's funding policy will affect its effective tax rate (ETR), as taxes are treated differently depending on its capital structure. This interplay highlights the importance of strategic financing decisions in managing tax liabilities. However, the results of this research are not in line with research conducted by Ahdiyah and Triyanto (2021), Ramadhan (2023), and Ruknan et al. (2024), which states that thin capitalization does not have a significant influence, which can be interpreted as thin capitalization individually does not affect tax avoidance.

This study indicate that financial distress has no effect on tax aggressiveness, which contradicts the hypothesis that financial distress influences tax aggressiveness. Changes in a company's income and expenses do not impact the tax aggressiveness exhibited by manufacturing companies listed on the Indonesian Stock Exchange. Tax aggressiveness can occur in financially distressed and stable companies as they seek to maximize income. Conversely, companies may also strive to reduce their tax burden.

Regarding agency theory, the relationship between agents and shareholders is particularly crucial for companies experiencing financial distress. The risk of losing investors increases significantly during financial difficulties, prompting agents to maintain positive relationships with investors. To achieve this, agents may focus on preserving the company's financial health by minimizing expenses, which can sometimes involve compromising the relationship between the company and the government through tax avoidance practices.

This research aligns with studies by Saputri and Radianto (2023) and Takasanakeng (2022), which show that companies experiencing financial distress in Indonesia are less likely to seek additional cash or profits by minimizing their tax burden. This is because investors are generally averse to high risks, such as bankruptcy. When a company goes bankrupt, the funds invested by investors are lost, so they avoid taking such risks. Debt restructuring, where managers seek extensions from creditors to repay debts once the company has sufficient cash, and management changes, which involve replacing current management with more competent individuals, are strategies aimed at preventing potential

investors from avoiding financially distressed companies. Ariff et al. (2023) also note that companies facing financial difficulties have fewer opportunities to pursue tax aggressiveness strategies. However, research by Oktaviano et al. (2024) contradicts these findings. Their study demonstrates that bankruptcy risk significantly influences tax aggressiveness. Financial distress, they argue, is a situation that can trigger deviant tax behavior, as companies may have strong motivations to disregard tax obligations.

This study show that Earnings Management has a positive impact on Tax Aggressiveness. This result is consistent with the hypothesis, which suggests that Earnings Management influences Tax Aggressiveness. Specifically, as Earnings Management increases, the Tax Aggressiveness carried out by manufacturing companies listed on the Indonesian Stock Exchange tends to decrease. Agency theory helps explain the relationship between earnings management and profit distribution, highlighting an agency problem between shareholders and managers. Shareholders, as principals, set performance targets for managers, but these targets are not always met, leading managers to engage in earnings management. Companies can use differences in financial reporting standards and tax regulations to manipulate the reported taxable income. For instance, a company may report high commercial profits while declaring relatively low fiscal profits, reducing its tax obligations. This study's findings contradict the research of Oktyawati et al. (2023) and Mulyaningsih et al. (2023), which found no effect of earnings management on tax aggressiveness (ETR). However, the results align with studies by Herusetya and Stefani (2020) and Hajawiyah et al. (2024), which confirm that Earnings Management significantly affects Tax Aggressiveness.

CONCLUSION

The results reveal several important insights. The study finds that thin capitalization has a negative effect on tax aggressiveness, supporting the hypothesis that thin capitalization reduces tax aggressiveness. Although debt financing can reduce taxable income by incorporating interest expenses, companies avoid exploiting this strategy for tax benefits, likely to maintain financial stability and avoid potential risks. This study also show that financial distress does not significantly affect tax aggressiveness. Tax aggressiveness can occur in financially distressed and stable companies, as both aim to maximize income or reduce tax liabilities. Agency theory suggests that when companies experience financial difficulties, managers may focus on preserving financial health and maintaining positive relationships with investors, possibly avoiding aggressive tax strategies.

The study further confirms that earnings management positively impacts tax aggressiveness, in line with the hypothesis. As earnings management increases, tax aggressiveness decreases. This result supports the notion that companies manage earnings to meet performance targets, which can sometimes involve manipulating reported taxable income. The findings highlight the complex interplay between financial strategies (such as thin capitalization, earnings management, and financial distress) and corporate tax behavior. The results suggest that while certain financial practices can influence tax aggressiveness, companies' decisions are also shaped by broader concerns, including financial stability, investor relationships, and risk management.

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