

Poverty and the Curse of Natural Resources on the Island of Sumatra

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ABSTRACT: This study examines the influence of income inequality (Gini Ratio), population size, and revenue-sharing funds (Dana Bagi Hasil or DBH) on poverty levels across eight oil- and gas-producing provinces in Sumatra—Aceh, North Sumatra, Riau, Jambi, South Sumatra, Lampung, Riau Islands, and Bangka Belitung—during the 2018–2024 period. Using panel data analysis with a Fixed Effect Model, the results reveal that both the Gini Ratio and DBH have a positive and significant effect on poverty, while population size has a negative and significant effect. These findings suggest that rising income inequality and fiscal dependence on natural resource revenues exacerbate poverty, whereas population growth within economically dense regions helps reduce it through agglomeration and labor absorption effects. The results confirm the resource curse hypothesis, showing that natural resource wealth in Sumatra's oil and gas regions has not been effectively translated into inclusive welfare due to weak fiscal governance and persistent inequality. Therefore, policy reform is needed to direct DBH allocations toward productive investment, human capital development, and non-oil economic diversification to transform resource abundance into sustainable and equitable growth.

KEYWORDS: Income Inequality, Revenue Sharing Fund, Population Growth, Poverty, Resource Curse, Oil and Gas Producing Provinces

I. INTRODUCTION

The connection between abundant natural resource availability (NRA) and economic development performance has long been a central paradox in global economic literature. While conventional theory suggests that resource wealth should inherently act as a catalyst for accelerating growth, empirical evidence frequently points to the existence of a phenomenon known as the Resource Curse (Sachs and Warner, 1995). This paradox specifically highlights the finding that nations or regions heavily dependent on the extractive sector often exhibit lower growth rates, poor governance, and—most significantly—persistent poverty levels.

This resource curse phenomenon isn't solely relevant at the national level; it's also empirically proven to operate at the sub-national level, particularly in nations utilizing a system of fiscal decentralization. Ross, (2004) In Indonesia, Sumatra Island serves as an ideal case study region, given its position as a major source of energy, minerals, and commodities (such as oil, gas, coal, and palm oil). Although provinces like Riau, South Sumatra, and Aceh possess a robust natural resource base, regional disparities and the issue of poverty persist as serious structural challenges.

One of the key transmission mechanisms for natural resource wealth at the regional level is the Revenue Sharing Fund (Dana Bagi Hasil/DBH). DBH constitutes a fiscal transfer a portion of the state's natural resource revenue that must be reallocated back to the producing regions. The management of these large, centralized funds often triggers rent-seeking behavior and weakens fiscal accountability, which ultimately hinders productive investment and exacerbates socio-economic conditions (Fisman and Svensson, 1995). If the Revenue Sharing Funds (DBH) are not effectively allocated toward non- extractive sectors or poverty alleviation projects, these funds can become a primary driver of the resource curse at the local level.

Furthermore, the literature indicates that natural resource wealth is often point-source in nature, where resource rents primarily benefit a small group of elites or specific regions. Consequently, this fundamentally exacerbates income inequality. (Leamer and Levinsohn, 1995). High inequality, as measured by the Gini Ratio, has been empirically proven to diminish the effectiveness of economic growth in reducing poverty. Ravallion, (2004) This literature emphasizes that the higher the initial level of inequality (Gini), the smaller the trickle-down effect of economic growth becomes. This implies that high inequality fundamentally exacerbates structural poverty.

The Population variable also plays a crucial role. Demographic pressure, particularly in regions with a narrow economic base

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(solely reliant on natural resources), can exacerbate poverty by intensifying competition for resources and labor market access. (Bloom & Canning 2004). The interaction between finite natural resources (due to their non-renewable nature) and increasing population growth increasingly necessitates transparent governance and the pro-poor allocation of Revenue Sharing Funds (DBH).

Therefore, this study aims to empirically test the resource curse hypothesis by analyzing how the mechanisms of Revenue Sharing Funds (DBH) (as a proxy for resource rent), the Gini Ratio (as a proxy for inequality), and Population (as a proxy for demographic pressure) influence the level of Poverty (the dependent variable) across the eight provinces in Sumatra Island: Aceh, North Sumatra, Riau, Jambi, South Sumatra, Lampung, Bangka Belitung, and Riau Islands.

II. LITERATURE REVIEW

A. The Concept of Poverty and Inequality

In the study of development economics, poverty is defined multidimensionally, encompassing income deprivation, vulnerability, and limited access to basic rights (Sen, 1999). Although the most common metric remains the percentage of the population below the poverty line, modern perspectives emphasize the capability approach, which views poverty as the limitation of a person's substantive capabilities to function in society (Sen, 1999). The core issue investigated in this research is the failure of a region, such as the provinces in Sumatra, to transform its resource wealth into widely distributed capabilities.

Poverty maintains a strong causal relationship with income inequality, which is quantitatively assessed using the Gini Ratio. In his study on pro-poor growth, Ravallion (2004) argues that the positive impact of economic growth on poverty reduction is highly dependent on the initial level of inequality. Environments characterized by a high Gini Ratio create structural impediments that block the benefits of growth—even if that growth is fueled by resource rents—from reaching the poorest segments of society (pro-poor growth failure). Consequently, high inequality potentially acts as a mediating mechanism that exacerbates poverty (World Bank, 2008).

B. The Resource Curse Theory and Revenue Sharing Funds

The primary theoretical framework for this research is the Resource Curse hypothesis, famously popularized by Sachs and Warner (1995). They identified a strong negative empirical correlation between a nation's reliance on primary natural resource exports and its real Gross Domestic Product (GDP) growth rate. This theory posits that abundant natural resources can damage economic performance through several distinct channels:

1. Dutch Disease: This channel explains how a surge in revenue from natural resources (exports) leads to an appreciation of the local currency's real exchange rate, which, in turn, damages the competitiveness of the non-resource tradable sectors such as manufacturing and agriculture (Corden and Neary, 1982).
2. Institutional Weakness and Rent-Seeking: The more relevant channel in the Indonesian context involves institutional weakness. Easily acquired wealth ("easy money") from the extractive sector tends to foster the creation of rentier states and redirects the focus of elites away from productivity-based development policies and toward rent-seeking activities (Auty, 1993).

In the context of decentralization in Indonesia, the Revenue Sharing Fund (DBH) represents the financial manifestation of natural resource rent received by the provinces. High DBH receipts risk triggering corruption and rent-seeking at the local level. Fisman and Svensson, (2007), although studying foreign aid, demonstrated that large fund inflows to governments with poor governance are often diverted and consequently fail to achieve their intended development goals. Furthermore, the non-transparent use of DBH and its inadequate allocation toward long-term socio-economic investments (such as education and non-resource infrastructure) by Sumatra's provinces potentially reinforces the local resource curse effect, which is reflected in high poverty levels.

C. Natural Resource Wealth, Gini Ratio, and Population

The point-source nature of natural resources also has a significant impact on wealth distribution and poverty. Ross (2008) argues that resource revenues are often unevenly distributed, primarily enriching specific elite groups and generating a dualistic economic structure characterized by widening gaps between the rich and the poor. This phenomenon directly increases the Gini Ratio, which, as explained by Ravallion (2004), subsequently hinders poverty reduction efforts.

Finally, Population Size is a crucial demographic control variable. Bloom and Canning (2004) outline how demographic dynamics, such as high population growth rates, can place significant pressure on resources and the labor market, especially if the employment generated by the resource sector (which is often capital-intensive) is inadequate. In Sumatra's provinces, an increasing population not balanced by economic diversification financed through DBH can worsen the availability of capabilities and, consequently, exacerbate poverty.

This literature review concludes that the resource curse mechanism operates through fiscal (DBH), distributional (Gini Ratio),

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and demographic (Population Size) channels. These factors collectively interact and potentially increase poverty levels in natural resource-rich provinces across Sumatra Island.

III. METHODS

This research is a descriptive study with a quantitative approach. The data used is a combination of cross-sectional and time series data, commonly referred to as panel data. The cross-sectional data consists of eight provinces on the island of Sumatra: Aceh, North Sumatra, Riau, Jambi, South Sumatra, Lampung, Bangka Belitung, and the Riau Islands. These provinces are the "8 oil and gas producing provinces on the island of Sumatra." The time series data covers the observation period from 2018 to 2024. All data used in this study is secondary and obtained from various official websites. Data processing was carried out using E-Views software.

Table 1. Description Variabel

Variable	Description	Indicators	Source
Y	Poverty	%	https://www.bps.go.id/id
X1	Gini Ratio	Index	https://www.bps.go.id/id
X2	Population	Thousands people	https://www.bps.go.id/id
X3	Oil and Gas Revenue Sharing Fund	Thousands rupiah	https://djpk.kemenkeu.go.id

To identify the influence of the independent variables on the dependent variable, the formulated equation is transformed into a panel regression model.

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \mu_{it}$$

Y _{it}	= Poverty (%)
X _{1it}	= Gini Ratio (Index)
X _{2it}	= Population (Thousand people)
X _{3it}	= Oil and Gas Revenue Sharing Found (Thousands rupiah)
i	= 1,2, ...,n, indicates the number of cross-sectional units
t	= 1,2, ...,n, indicates the time series dimension
β ₀	= Constant or intercept
β ₁ , β ₂ , β ₃	= Regression coefficients
μ _{it}	= Error term

IV. RESULT DAN DISCUSSION

A. Study Result

In selecting the appropriate panel data regression model, this study considers three types of models : Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). These models are tested to determine the most suitable one for this study. The test results indicate that Fixed Effect Model (FEM) is the best-fitting model for this study.

Table 2. Model Selection

Test	Selection	Prob	Conclusion
Chow Test	FEM or CEM	0,000	FEM
Cross-section Chi-Square			(P<0,05)
Hausman Test	FEM or REM	0,000	FEM
Cross-section Random			(P<0,005)

Source: E-views Output

After conducting a series of tests to ensure the fulfillment of classical assumptions and to determine the most appropriate model, the next stage is to perform panel data regression analysis. This analysis aims to measure the simultaneous effects of several independent variables on the dependent variable. The regression results can be seen in Table 3. In this study, the independent variables include Gini Ratio (X1), Population (X2), and Oil and Gas Revenue Sharing Found (X3). The dependent variable

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analyzed is poverty (Y).

Table 3. Result of Panel Data Regression

Variable	Coeffecient	Std. Error	t-Statistic	Prob
C	144.9967	22.31955	6.496400	0.0000
Log(X1)	1.247949	0.556117	2.244039	0.0299
Log(X2)	-15.72542	2.594176	-6.061817	0.0000
X3	9.93E-10	4.19E10	2.368348	0.00223
Effects Spesification				
Period fixed (dummy variable)				
R-squared	0.983328	Mean dependent var		9.094545
Adjusted R-squared	0.979539	S.D. dependent var		3.382819
S.E. of regression	0.483882	Akaike info criterion		1.562903
Sum squared resid	10.30222	Schwarz criterion		1.964370
Log likelihood	-31.97984	Hannan-Quinn criterion		1.718154
F-statistic	259.5204	Durbin-Watson stat		1.893231
Prob (F-statistic)	0.000000			

Source : E-views Output

The result of the regression estimation are presented in Equation (1):

$$Y = 144.9967 + 1.247949 \log(X1) - 15.72542 \log(X2) + 9.93E-10 X3 \dots\dots\dots (1)$$

Based on the estimation results of Equation (1), it is evident that each independent variable exerts a distinct influence on poverty. The constant coefficient of 144.9967 represents the predicted level of poverty when all independent variables are equal to zero. Theoretically, this value lacks direct economic significance since the condition where all regressor variables are zero is highly unrealistic, yet the constant remains crucial for the structural integrity of the overall regression model. The coefficient of the Gini Ratio variable (X1) is in logarithmic form; therefore, its interpretation follows a semi-elasticity approach, where a percentage change in X1 results in an absolute change in Y. The Gini Ratio coefficient (logX1) of 1.247949 implies that a one percent increase in the Gini Ratio is expected to increase Poverty by approximately 1.25 percent, assuming other variables remain constant.

In this study, the Population variable (X2) is expressed in logarithmic form; therefore, its interpretation follows a semi-elasticity approach, where a percentage change in X2 results in an absolute change in Y. The estimated coefficient for the Population variable (logX2), which is -15.72542, indicates that a one percent increase in population is expected to decrease Poverty by approximately 0.1573 percentage points, assuming other variables remain constant. Meanwhile, the coefficient for the Revenue Sharing Funds variable (X3), which is 9.93×10^{-10} (9.93E-10), suggests that a one percent increase in the Revenue Sharing Funds received from the central government is expected to decrease poverty by approximately 9.93 percentage points.

The resulting empirical evidence suggests the presence of a Resource Curse in this study. This is characterized by the Revenue Sharing Fund variable, which, despite theoretically being an instrument for poverty reduction, is not yet effectively utilized or managed. Furthermore, the highly dominant effect of income inequality (Gini Ratio) in each province continues to exacerbate poverty within the regions generating oil and natural gas revenues.

B. Discussion

The impact of the Gini ratio on poverty

The Gini Ratio exhibits a positive and significant effect on poverty levels in the oil and gas producing provinces across Sumatra Island, evidenced by a 5% significance level. With a regression coefficient value of 1.247949, this finding indicates a direct relationship: an increase in the Gini Ratio in a given region will be directly correlated with a rise in the poverty rate. This empirical result is fully aligned with the study's initial hypothesis, which predicted a positive and significant influence of the Gini Ratio on poverty in the oil and gas producing regions of Sumatra. These findings are consistent with the study conducted by Aryani and Dhurutun, (2024), which also demonstrated a positive and significant effect of the Gini Ratio on poverty. This affirms that high income inequality directly impedes poverty reduction efforts, as the benefits of economic growth tend to be concentrated and

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enjoyed only by the high-income groups. Consequently, low-income groups fail to receive proportional benefits. This condition reinforces the argument that the success of poverty alleviation policies must be harmonized with a comprehensive strategy to lower inequality, particularly through the equalization of access to education, health, and fairer economic opportunities.

The study by Loayza et al, (2013) clearly demonstrates that income inequality is a key channel explaining why windfall revenues from natural resources often fail to reduce local poverty. The study argues that when income distribution is already unequal, the substantial profits generated by extractive industries tend to accumulate among groups that are already relatively wealthy. As a result, these benefits do not trickle down to lower-income households, making the poverty- reduction effect very weak, or even reversed. This finding reinforces the conclusion of the present research, in which a high Gini Ratio emerges as a major driver of poverty across oil- and gas-producing provinces in Sumatra. Consistent with these findings, Wahyudi and Palupi (2023) show, through their national and regional analyses of Indonesia, that natural resource abundance does not automatically translate into improved welfare. This occurs because revenue flows from natural resources are often not optimally allocated for regional economic diversification or productive public spending. Thus, the results support the argument that the key determinant of welfare is not the sheer amount of natural wealth, but rather the effectiveness of local governments in managing and allocating resource revenues to achieve inclusive and sustainable development.

Mechanistically, high income inequality significantly weakens the transmission of economic growth to poverty reduction, often referred to as the growth-to-poverty transmission. Global studies by and other cross-country analyses consistently document that, for a given level of economic growth, poverty reduction tends to be far more effective when income distribution is more equitable. Conversely, in countries or regions with high inequality, the benefits of growth “trickle down” only minimally to lower-income groups, leaving the poor largely excluded from economic gains and making poverty persist over time. This reinforces the role of the Gini Ratio as a crucial channel through which wealth from extractive industries fails to translate into broader social welfare. At the subnational level, a study on economic zones in Indonesia by Hornok and Raeskeysa, (2023) reveals that development patterns characterized by capital-intensive or *enclave* industries can paradoxically increase local inequality, even when regional GDP continues to rise. This phenomenon is highly relevant in explaining why oil- and gas-producing provinces such as **Riau** and **South Sumatra** exhibit high Gini Ratios alongside stagnant poverty rates. The growth model centered on extractive sectors has failed to diffuse its benefits across society and, instead, has deepened the structural inequality that underpins persistent poverty in resource-rich regions.

Furthermore, recent empirical studies on policy pathways emphasize that pro-redistributive fiscal and development policies are essential to break the mechanism of the resource curse. Agussalim et al, (2024) assert that a combination of fiscal policies specifically targeting education, productive infrastructure, and support for micro, small, and medium enterprises (MSMEs) can strengthen the transmission of economic growth into poverty reduction. This strategy becomes particularly effective when accompanied by deliberate efforts to lower the Gini Ratio, which represents a key source of structural inequality within the study area. Therefore, the policy implications of this research highlight the urgent need to reorient fiscal and regional development strategies in the eight oil- and gas-producing provinces of Sumatra. To mitigate the statistically proven effects of the resource curse, local governments must ensure that Revenue Sharing Funds (DBH) are allocated productively toward local economic development, human capital investment, and the strengthening of non-oil sectors, so that fiscal benefits are distributed inclusively. In addition, reducing income inequality must become a top priority through redistributive policies and improved access to basic capabilities. By enhancing transparent fiscal governance and promoting equitable development, the natural resource wealth of these provinces can be transformed from a potential “curse” into a source of sustainable economic growth and shared prosperity, (Loayze et al, 2021).

The Impact of Population on Poverty

The analysis of the data found that the Population (LOG(X2)) variable shows a negative and significant effect on poverty levels in the oil and gas producing provinces across Sumatra Island. These findings strongly indicate that the higher the population concentration in a region, the lower the proportion of its poor residents. This result is consistent with the principles of agglomeration economies theory, which explains that the concentration of population in a specific area can trigger economic efficiency, expand the scale of the labor market, and inherently boost regional productivity, ultimately serving as a key driver for poverty reduction. (Marrques, 2023). Furthermore, these findings are supported by other empirical studies that link demographic phenomena with development. Mendez, et al (2023) show that urbanization and increased population density in developing countries prove capable of reducing poverty due to increased economic diversification, inter-regional connectivity, and broader employment opportunities. Similarly, Liu et al, (2024) affirm that population growth in urban areas facilitates more inclusive economic growth through the intensification of activities in the service and manufacturing sectors, which often serve as livelihood alternatives for communities previously dependent on extractive sectors like oil and gas.

Furthermore, this finding is also indicated within the framework of the paradoxical Resource Curse that occurs in the context

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of oil and gas producing provinces across Sumatra Island, such as Aceh, Riau, and South Sumatra. Although these provinces enjoy substantial regional revenues from the oil and gas sector and receive large Revenue Sharing Funds (DBH), poverty levels in these producing areas are often recorded as high or their decline rate is slower compared to non-oil and gas provinces (He, et al 2024). This phenomenon occurs because economic dependence on natural resources (SDA) creates an enclave economic structure. Jobs in the oil and gas sector are capital-intensive and fail to absorb a large amount of local labor. Consequently, non-extractive sectors, such as agriculture and small industries, tend to be neglected (Gemicioğlu, et al 2024). Consequently, only regions that have achieved large demographic agglomeration and possess a more diversified economy (e.g., Pekanbaru, Medan, and Palembang) are proven capable of utilizing the agglomeration effect to significantly drive poverty reduction.

Consequently, the negative relationship between Population Size and poverty in this study does not solely reflect a demographic effect, but also a mitigation function against the impact of the resource curse. In provinces with large populations, economic agglomeration and the diversification of non-extractive activities are able to counterbalance the extractive sector's limited capacity to create employment. Conversely, in provinces or districts with small populations and an economy heavily reliant on oil and gas, the resource curse effect tends to be stronger, resulting in a slower rate of poverty reduction. This underscores the importance of development policies that focus not only on the management of oil and gas revenues, but also on strengthening human capacity, diversifying the regional economy, and ensuring equitable infrastructure distribution to effectively utilize demographic potential in curbing poverty (He, 2024 ; Yang, 2024).

The Impact of Revenue Sharing Fund on Poverty

These research findings conclusively show that the Revenue Sharing Fund (DBH) has a positive and significant effect on poverty levels in the oil and gas producing provinces of Sumatra Island during the 2018–2024 period. With a regression coefficient value of 9.93×10^{-10} and a significance level of $p=0.0223$, this finding highlights a fiscal paradox: the increase in fund transfers from the oil and gas sector received by a region is correlated with a concurrent increase in the proportion of poor residents. Essentially, this finding demonstrates that larger fiscal revenues from Natural Resources do not automatically—and in fact, conversely—improve public welfare. This condition strengthens the argument that the mechanism for transferring wealth from natural resources has failed to be converted into effective development capital for poverty reduction.

This empirical phenomenon can be elaborated through the concept of the resource curse, which is a paradoxical condition where natural resource wealth actually triggers economic stagnation and an increase in poverty due to weak governance and poor fiscal management (Sachs and Warner, 1995). In the Indonesian context, the study by Wahyudi and Palupi (2023), titled *Natural Resources Curse in Indonesia*, strongly asserts that the abundance of natural resources tends to lead to a "curse" rather than becoming a blessing for development. This occurs because the revenue generated from resource management is not optimally allocated for regional economic diversification. They concluded that although the contribution of natural resources to national economic growth proved positive, its impact on local community welfare was negative because it was not counterbalanced by improvements in the quality of public expenditure and regional productivity.

In addition to the aforementioned findings, research by Rini et al., (2025) in *Geosapta: Jurnal Geografi* further strengthens this study's results through an examination of Bangka Belitung Province—also a resource-rich (tin) region in Sumatra. Their study found indications of a potential resource curse occurring through the expenditure effect and uneven capital accumulation. This discovery demonstrates that the significant increase in regional revenue derived from the extractive sector actually fails to improve public welfare because those funds tend to be absorbed by unproductive sectors and are unsuccessful in reaching low-income segments of the population.

Theoretically, these findings confirm that fiscal transfers based on natural resources, such as the Revenue Sharing Fund (DBH) from oil and gas, have the significant potential to exacerbate poverty if they are not supported by transparent governance and inclusive development planning. Regional spending patterns that remain predominantly consumptive and fail to prioritize productivity aspects lead to high fiscal dependence on the central government. This phenomenon of dependence has been previously detailed in the fiscal decentralization literature (Oates, 2003).

Consequently, the positive relationship between DBH and poverty in the oil and gas producing provinces of Sumatra reflects a form of the resource curse at the local level. Large revenues from the extractive sector are not matched by an improvement in public welfare but are instead absorbed by an inefficient system. Therefore, to mitigate these negative impacts, DBH management policies must be strategically directed toward economic diversification, the strengthening of the MSMEs sector, improving human capital quality, and ensuring total transparency in public fund usage. Through these measures, resource wealth is expected to be transformed from a potential curse into a source of sustainable development and public prosperity.

CONCLUSION

Based on the panel data analysis of eight oil and gas producing provinces across Sumatra Island during the 2018–2024

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period, it was found that the Gini Ratio and the Revenue Sharing Fund (DBH) have a positive and significant effect on poverty levels, while Population Size exhibits a negative and significant influence. These findings conclude that income inequality and fiscal dependence on oil and gas revenues tend to exacerbate poverty, reflecting a local-level Resource Curse where large fund transfers fail to improve public welfare. Conversely, population growth in economically dense areas acts as a balancing mechanism, promoting poverty reduction through increased economic activity and the expansion of employment opportunities in non-extractive sectors.

Theoretically, these research findings strongly reinforce the concept of the resource curse, where natural resource wealth does not automatically translate into benefits for the local population if not complemented by adequate governance. The positive correlation between the Revenue Sharing Fund (DBH) and poverty affirms that an increase in fiscal revenue without accompanying transparency and productivity-based planning can lead to fiscal complacency and widen social inequality. Furthermore, the high Gini Ratio in oil and gas producing provinces like Aceh, Riau, and South Sumatra suggests that economic growth in the extractive sector is enclave and capital-intensive, failing to spread inclusively and thus cementing structural poverty. Conversely, the negative coefficient observed between Population Size and poverty indicates the presence of agglomeration effects in urban centers such as Medan, Pekanbaru, and Palembang, where population density effectively drives economic diversification and activity that contributes to poverty reduction.

The policy implications arising from this research emphasize the need for a reorientation of fiscal and development policies in the eight oil and gas producing provinces across Sumatra Island. To avert the statistically proven resource curse effect, Regional Governments must ensure that the allocation of the Revenue Sharing Fund (DBH) is directed productively, prioritizing local economic development, investment in human capital, and the strengthening of non-extractive sectors, thereby making the fiscal benefits inclusive. Simultaneously, reducing income inequality must become a primary policy focus through enhanced access to education, job training, and structured support for SMEs and the informal sector. By strengthening transparent fiscal governance and promoting equitable development, the resource wealth in these provinces can be transformed from a potential "curse" into a source of sustainable economic growth and public welfare.

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