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Natural resource dependence and economic growth in Sulawesi: An empirical study of the resource curse phenomenon

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ABSTRACT

Natural resource abundance does not always guarantee successful regional economic development. In many cases, heavy reliance on extractive sectors can lead to structural disparities and growth stagnation, a condition widely referred to as the resource curse. This study aims to identify early signs of the resource curse in six provinces across Sulawesi Island and to examine the influence of the Regional Resource Curse Index (RRCI) on Gross Domestic Regional Product (GDRP) during the period 2013–2023. A quantitative approach was employed by constructing a composite RRCI derived from the Natural Resource Dependency Index (NRDI) and the Regional Sustainable Development Index (RSDI), followed by regression analysis using Two-Stage Least Squares (2SLS), with nickel commodity prices used as an instrumental variable. The results show that the highest RRCI value was recorded in Southeast Sulawesi at 49.7 in 2023, followed closely by West Sulawesi and North Sulawesi, both with scores of 50.8. While the OLS and Fixed Effects models found no significant effect of RRCI on GDRP, the 2SLS estimation revealed a significant and positive causal relationship, with a lnRRCI coefficient of 0.5438 at the 1% significance level. These findings suggest that regional economic growth remains strongly driven by the extractive sector, although its contribution may be short-lived. This study concludes that Sulawesi Island has not yet fully experienced the resource curse, but early indications are present. Strengthening institutional capacity and developing alternative economic sectors are necessary to prevent long-term dependency on natural resources.

1. Introduction

The abundance of natural resources is often considered a strategic advantage for promoting economic growth in developing regions. However, empirical findings suggest that such abundance may instead hinder sustainable development through a phenomenon known as the resource curse (Y. Guo et al., 2023; Saeed, 2021; Amalia & Emalia, 2022). In the Indonesian context, Sulawesi has emerged as a prominent resource-rich region due to its significant nickel reserves and large-scale extractive activities (Bappelitbangda, 2024; Sihotang & Ishak, 2024). Despite rapid growth, concerns remain about the long-term economic, environmental, and institutional consequences of this dependency. Empirical research across multiple countries affirms that natural resource abundance often constrains sustainable economic growth. In China, it has been shown to hinder green development, with environmental regulation following a U-shaped curve, while market openness and education exert limited effects (Y. Guo et al., 2023). Studies in OPEC countries also reveal that technological innovation, social development, and financial performance drive GDP growth, whereas military spending reduces it (Sepehrdoust & Shabkhaneh, 2018). Additionally, in resource-dependent

Chinese cities, the intensity of the resource curse varies across economic cycles and is exacerbated by Dutch disease, institutional weakening, and crowding-out effects (Lu et al., 2019).

In the Indonesian context, several studies confirm that resource-rich regions tend to experience slower structural transformation and greater institutional vulnerability. Provinces that rely heavily on extractive industries often face governance challenges, environmental degradation, and spatial inequality (Rahma et al., 2021; Wahyudi & Palupi, 2023). While some findings suggest that these effects can be mitigated through effective institutions and macroeconomic strategies (Ali et al., 2024), most existing analyses remain descriptive. As a result, a causal understanding of how resource dependence affects regional development is still lacking, particularly at the subnational level (Kinnaman, 2023; Dell'Anno, 2020). Despite the growing body of literature on the resource curse, most existing studies remain predominantly descriptive and focus on national-level aggregates. Empirical investigations that establish a robust causal relationship between resource dependence and economic performance at the subnational level are still limited. Furthermore, there is a lack of composite indices that capture the multidimensional nature of resource dependence beyond sectoral output alone. In the Indonesian context, few studies employ rigorous econometric methods to disentangle the endogenous dynamics between natural resource exploitation and regional growth outcomes. These methodological and spatial gaps hinder a nuanced understanding of how the resource curse may be unfolding at the regional level, particularly in resource-rich provinces like those in Sulawesi.

To address this gap, this study focuses on Sulawesi as a critical case for examining early signs of the resource curse through a composite Regional Resource Curse Index (RRCI) and a robust causal framework. By employing an instrumental variable approach using global nickel prices, this research aims to provide more accurate evidence on the link between resource dependence and regional economic performance. The findings are expected to offer strategic insights for strengthening institutional resilience and promoting economic diversification in resource-rich regions (Hilmawan & Clark, 2019; Benfica & Henderson, 2021).

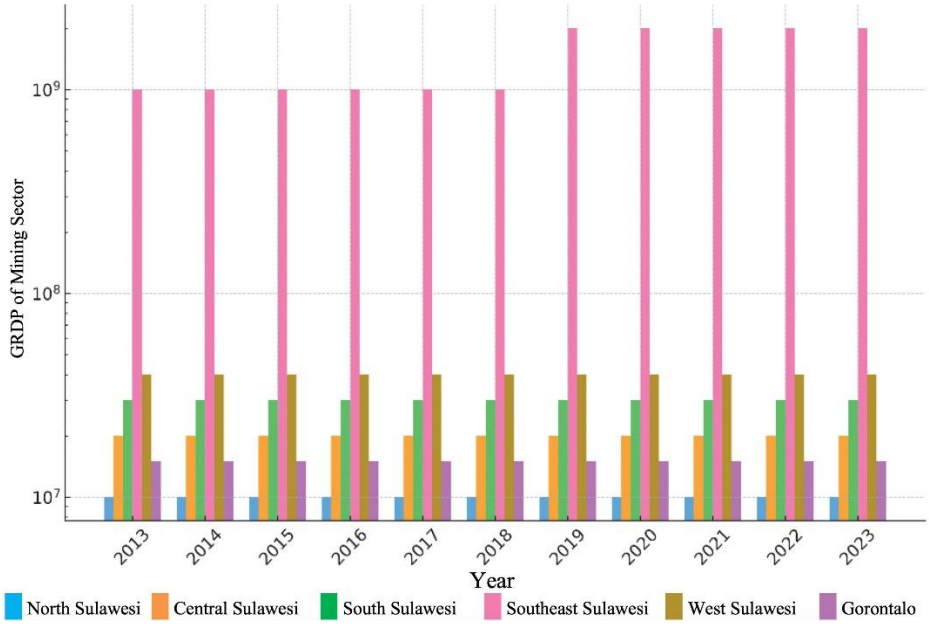

Figure 1. The GDRP of The Mining Sector

The island of Sulawesi is dominated by nickel mines and other metal-based mining activities is spatially concentrated in Central and Southeast Sulawesi. These regions record high contributions of the mining sector to regional GDP, as depicted in Figure 1, indicating a deep-rooted structural dependence on natural resource extraction. While such trends may generate short-term economic benefits, they also increase the risk of path dependency and constrain the development of more diversified and productive sectors. This geographic and sectoral concentration underscores the region's vulnerability to external shocks and raises critical concerns about the long-term sustainability of its development trajectory (Y. Guo et al., 2023; Hilmawan & Clark, 2019). Therefore, a study is needed that aims to analyze the relationship between non-permanent worker mobility and energy consumption in Indonesia and how it impacts the economy. The contribution of the study for

government is to determine policies related to non-permanent worker mobility in Indonesia. This research has novelty related to the econometric method which in its calculations considers the impact of the mobility of workers living in sprawl areas directly on energy consumption. The contribution of the study is strengthening the literature on the formation of the Regional Resource Curse Index (RRCI) as an index that links resource dependence and regional economic development.

2. Literature Review

2.1. Natural Resource Curse

The term "natural resource curse" describes the paradox in which countries rich in natural resources often experience slower economic growth and weaker development outcomes than resource-poor countries (Yameogo et al., 2021). This phenomenon is associated with several structural vulnerabilities, including Dutch disease, where resource-driven currency appreciation undermines the competitiveness of non-resource sectors; volatile commodity prices that disrupt fiscal planning; and a tendency toward rent-seeking and institutional degradation (Sachs & Warner, 2001). Additionally, overreliance on non-renewable resources results in short-term growth, while undermining human capital accumulation and technological innovation. Without structural transformation and sound governance, resource abundance can lead to stagnation rather than sustainable development. These dynamics underscore the importance of managing resource wealth strategically to avoid long-term economic fragility.

Havranek et al (2016) argued the abundance of natural resources is not the only major driver of economic growth. Atienza (2019) believes there is a mediator in overcoming the curse of natural resources and that mediator is still unclear, so that every country that has natural resource wealth has some that have succeeded in overcoming the curse and some that have not yet succeeded. Timbe et al (2024) argued that FDI and industrial policy as tools for counter the resource curse and founds economic growth that Mozambique has experienced, it has not been able to improve its industrial structure, which points towards the eventual onset of the resource curse. Dong et al (2024) founds regulatory quality and government effectiveness have the most significant influence in high income countries in processing natural resources and the smallest impact in countries with low incomes, while there is some uncertainty about the impact in middle income countries.

Ross (2001) argued that countries rich in natural resources face socio-political problems such as high levels of corruption and that the natural resources are at all enjoyed by the community but only by a handful of "people". Joya (2015) believes that abundant natural resources can be a driver of optimal economic growth. Some of the "paths" supporting economic growth through natural resource wealth are international trade, product diversification, and quality of governance. Wang et al (2024) estimates that the abundance of natural resources has "limits" in driving economic growth. Although the factors mediating the abundance of natural resources in driving economic growth vary from country to country, this shows that exploration of these mediating factors must be pursued immediately in order to achieve optimal economic growth.

2.2. Endogenous Growth

Endogenous growth theory posits that long-term economic growth originates from firm-level dynamics, particularly through human capital and R&D investment (Juhro & Trisnanto, 2018). Smith emphasized output and population growth, driven by labor, capital, and natural resources. Schumpeter highlighted entrepreneurship, fostered through education, as a key endogenous factor of growth (Febriansah, 2019). Economic growth, typically measured by real per capita GDP, reflects an economy's expanding production capacity over time. Zhang & Wu (2025) believes that heterogeneous data synergy accelerates output growth, enhances innovation, and improves welfare through Innovations in the Internet of Things (IoT) and Industrial IoT in endogenous growth.

Endogenous growth emphasizes the importance of technology in output growth, indicating that the same level of input can produce greater output and that technology plays an important role in production. Afonso et al (2025) founds that robotization stimulates economic growth, but contributes to widening wage inequality between skilled and unskilled workers, robotization as the result of R&D implementation and human capital improvement. Yuan & Zhang (2024) stated that technological innovation, gross capital creation, and the domestic labor force all contribute positively to economic development. In a similar vein, the endogenous growth hypothesis predicts that when economies develop rapidly, their use of natural resources would decrease. However, endogenous growth

models have also broadened the scope to include R&D, patents, and regulatory considerations (Su et al., 2021).

Natural resources are related to the theory of endogenous growth in a way that is indirectly linked to the importance of technology in extracting natural resources. Technological transformation not only plays an important role in driving economic growth, but is also important in reducing negative externalities in the use of resources. Technological transformation is a key factor in long-term economic growth prospects (van Zanten & van Tulder, 2021), in addition to promoting economic growth, it also maintains ecological balance (Chai et al., 2021), and the use of technology can also shift the paradigm from a natural resource curse to a natural resource abundance that can drive sustainable economic growth (Ahmad et al., 2022).

3. Method

This study used a quantitative explanatory design to examine the causal relationship between natural resource dependence and regional economic growth across six provinces on Sulawesi Island. The analysis utilizes balanced panel data covering the 2013–2023 period, with annual observations derived from secondary sources such as BPS, ESDM, Bappeda, and BKPM. Key variables include regional GRDP, mining sector contribution, foreign direct investment, infrastructure investment, education indicators, and demographic characteristics. The hypotheses tested propose that natural resource dependence, proxied by the Regional Resource Curse Index (RRCI), significantly affects regional economic growth, and that structural variables such as FDI, infrastructure, education, and population density also play a substantial role. Table 1 shows the definition for each variables used in the study.

Table 1. Definition of Variables

Variable	Definition	Source
GRDP	Regional output measured in constant 2010 prices, representing economic performance at the provincial level	BPS
NRDI	Natural Resource Dependence Index: share of mining sector contribution to regional GRDP	BPS, Calculated by author
RSDI	Resource Sector Dominance Index: sectoral concentration based on Herfindahl-Hirschman Index	BPS, Calculated by author
RRCI	Composite index combining NRDI and RSDI to reflect structural vulnerability to resource curse	Constructed by author
FDI	Inflow of foreign capital into provincial regions, annual basis	BPS
INFRA	Capital expenditure as a share of total provincial budget	DJPK
EDU	Proxy for human capital using average years of schooling among the population aged 15+	BPS
POP	Population density used to capture spatial-economic externalities	BPS

Source: Multiple resources

To capture the multidimensional aspect of natural resource dependence, a Regional Resource Curse Index (RRCI) is developed Rahma et al (2021) and Amalia & Emalia (2022). The equation for resource sector dominance index as follows:

$$RSDI = \sqrt[6]{IEG\ x\ HDI\ x\ EQI\ x\ (1 - IPOV)\ x\ (1 - (GI)\ x\ (1 - IUNP)} \quad (1)$$

Where IEG is the economic growth; HDI is the human development index; EQI is the environmental quality index; $IPOV$ is the poverty; GI is the gini index; $IUNP$ is the unemployment. The equation for natural resource dependence index (NRDI) as follows:

$$NRDI_i = \frac{IGDRP_{i+}IDBHT_i}{2} \quad (2)$$

Where $IGDRP$ is the mining sector in gross domestic regional product per-capita index; $IDHBT$ is the revenue sharing fund index for mining and oil & gas per-capita. The equation for Regional Resource Curse Index (RRCI) as follows:

$$RRCI_{it} = \sqrt{X_{it} - Y_{it}} \quad (3)$$

Each index is normalized using min-max scaling to a 0–1 range. Where X_{it} and Y_{it} is the weight product of NRDI and RSDI which defined as:

$$X_{it} = \frac{NRDI_{it}}{NRDIt\_min}\omega 1 \quad (4)$$

$$Y_{it} = \frac{RSDIt\_max}{RSDI_{it}}\omega 2 \quad (5)$$

Where $RRCI_{it}$ is the Regional Resource Curse Index in Sulawesi province in the period 2013-2023; $NRDI_{it}$ is the resource dependency index in Sulawesi province for the period 2013-2023; $NRDIt\_min$ is the minimum value of NRDI for all Sulawesi provinces in the period 2013-2023; $RSDI_{it}$ is the sustainable development index in Sulawesi province for the period 2013-2023; $RSDIt\_max$ is the sustainable development index in Sulawesi province for the period 2013-2023; $\omega 1$ is the weight for NRDI on 0.5 and $\omega 2$ is the weight for RSDI on 0.5.

Table 2. Classification of Regional Resource Curse Index (RRCI) Values

RRRCI Value Range	Qualitative Categories	Regional Economic Interpretation
0.00 – 0.20	Very Good	Low natural resource dependency, relatively strong sustainable development. Very low risk of resource curse.
0.21 – 0.40	Good	Moderate natural resource dependency, supported by fairly stable development performance. Low risk.
0.41 – 0.60	Medium	Dependence on natural resources is high, development is not optimal. The risk of resource curse is starting to emerge.
0.61 – 0.80	Weak	High natural resource dependency, weak development. Structurally real resource curse risk.
0.81 – 1.00	Very Weak	Extreme dependence on natural resources, unbalanced development. Potential for resource curse is very high.

Source: Rahma et al (2021)

Table 2 shows The Regional Resource Curse Index (RRCI) captures the paradox in which natural resource abundance does not equate to successful regional development. Sachs & Warner (2001) notes that resource-rich economies often face slower growth due to structural weaknesses such as fiscal dependence and limited human capital accumulation. RRCI combines the Natural Resource Dependency Index (NRDI) and the Regional Sustainable Development Index (RSDI) to assess regional vulnerability. Based on the resulting RRCI values, the author classifies regions into five qualitative categories to interpret the degree of resource curse risk.

To address potential endogeneity in the natural resource dependence measure (RRCI), the study applies a Two-Stage Least Squares (2SLS) estimation technique (Dell'Anno, 2020; W. Guo et al., 2023). The global price of nickel is used as an instrumental variable, under the assumption that it affects regional mining activity but does not directly influence GRDP through other channels (Ali et al., 2024; Hilmawan & Clark, 2019). The first stage regression for RRCI as instruments as follows:

$$X_{it} = \pi_0 + \pi_1 P_{it} + \pi_2 Z_{it} + \varepsilon_{it} \quad (6)$$

Where X_{it} is the regional resource curse index; P_{it} is the nickel price commodity; Z_{it} is the infrastructure expenditure, foreign direct investment, average years of schooling and population density; ε_{it} is the error term. For the second-stage regression as follows:

$$Y_{it} = \beta_0 + \beta_1 \hat{X}_{it} + \beta_2 Z_{it} + \varepsilon_{it} \quad (7)$$

Where Y_{it} is the gross domestic regional product; $\hat{X}_{it}$ is the regional resource curse index; Z_{it} is the infrastructure expenditure, foreign direct investment, average years of schooling and population density and ε_{it} is the error term. This study applies an instrumental variable (IV) approach to address the potential endogeneity of the Regional Resource Curse Index (RRCI), using global nickel prices as exogenous instruments. The relevance and strength of the instruments are assessed through the first-stage F-statistic, while overidentification is tested using the Hansen J-statistic. Endogeneity is further examined using the Durbin-Wu-Hausman test to validate the necessity of the IV estimator over OLS. To ensure robust inference, the model employs heteroskedasticity- and autocorrelation-consistent standard errors, thereby enhancing the credibility and policy relevance of the causal estimates related to resource dependence in Sulawesi.

4. Results and Discussion

Table 3 shows indicate substantial interregional disparities, with the average GRDP per province recorded at IDR 95.2 billion and a standard deviation of IDR 114 billion, ranging from as low as IDR 32,297 to as high as IDR 404 billion. The RRCI scores vary widely, with a mean of 34.54, standard deviation of 14.12, and values spanning from 0.5 to 65.3, reflecting unequal levels of resource dependence. Meanwhile, average FDI inflow stands at IDR 7.47 million with a striking disparity from a minimum of IDR 24 to a maximum of IDR 117 million whereas education appears more evenly distributed, with mean years of schooling ranging between 6.82 and 9.77 years. To address the skewness and variance instability across variables, logarithmic transformation was applied prior to estimation, and an IV strategy was adopted to improve the reliability of causal interpretation.

Table 3. Descriptive Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
GRDP	66	9.52e+07	1.14e+08	32297	4.04e+08
RRCI	66	34.54091	14.1169	0.5	65.3
NICKEL	66	2.15e+08	7.11e+07	1.18e+08	65.3
INFRA	66	5.54e+11	3.86e+11	7.21e+08	3.76e+12
FDI	66	7468791	1.58e+07	24	1.60e+12
MYS	66	8.221515	0.7892748	6.82	1.17e+08
POPDEN	66	3228983	2603356	1106018	9400283

Source: data processed

Table 4 shows the descriptive analysis of the Natural Resource Dependency Index (NRDI) from 2013 to 2023 reveals substantial disparities among provinces in Sulawesi. West Sulawesi recorded the highest NRDI score at 72.4%, reflecting extreme reliance on extractive sectors, followed by North Sulawesi at 57.0%, primarily driven by mining-based GRDP and revenue-sharing (Rahma et al., 2021; Amalia & Emalia, 2022). In contrast, Southeast Sulawesi (42.0%) and Central Sulawesi (44.3%) reported lower dependency, indicating modest economic diversification. These variations underscore structural imbalances and highlight the urgency of transitioning toward more diversified and resilient development models.

Table 4. NRDI, RSDI, and RRCI by Province in Sulawesi Island (2013–2023)

Province	NRDI	RSDI	RRCI	RRCI Classification
North Sulawesi	57.0	91.2	0.65	Bad
Central Sulawesi	44.3	112.4	0.51	Medium
South Sulawesi	46.1	99.5	0.56	Medium
Southeast Sulawesi	42.0	98.1	0.54	Medium
West Sulawesi	72.4	90.1	0.73	Bad
Gorontalo	51.3	97.0	0.59	Medium

Source: data processed

The Regional Sustainable Development Index (RSDI) reinforces these insights. Central Sulawesi, with the highest RSDI score of 112.4%, suggests relative success in balancing economic, social, and environmental dimensions. On the other hand, West Sulawesi (90.1%) and Gorontalo (97.0%) show more limited sustainability progress. When NRDI and RSDI are combined into the Regional Resource Curse Index (RRCI), results show that West Sulawesi (0.73) and North Sulawesi (0.65) fall into the "Bad" category, while the remaining provinces are classified as "Medium" risk zones. This classification suggests that no province in Sulawesi is free from the potential risks of the resource curse. Provinces with a "weak" RRCI rating face structural vulnerabilities due to heavy resource reliance and weak sustainable development progress. Medium-risk provinces such as South Sulawesi, Southeast Sulawesi, Central Sulawesi, and Gorontalo still require targeted reforms to mitigate long-term stagnation risks. These findings align with prior research emphasizing that resource-rich regions, without parallel institutional and developmental strengthening, are highly susceptible to economic volatility and stagnation (Rahma et al., 2021; Amalia & Emalia, 2022).

To address potential endogeneity in the relationship between natural resource dependence and regional economic growth, this study employs an Instrumental Variable (IV) regression approach. The key endogenous regressor, Regional Resource Curse Index (RRCI), may be simultaneously influenced

by and exert influence on regional GRDP, creating a reverse causality problem. To overcome this, global nickel prices are used as an external instrument, satisfying both the relevance and exogeneity conditions. Specifically, nickel prices are strongly correlated with resource dependence in mining-based provinces such as Southeast Sulawesi, while not directly affecting economic output outside the resource extraction pathway. In addition to the instrument, the model includes several control variables namely foreign direct investment (FDI), infrastructure expenditure (INFRA), average years of schooling (MYS), and population density (POPDEN) to isolate the structural effect of RRCI more precisely. This configuration strengthens the identification strategy and supports more credible causal inference. The IV estimation results are compared with those from Ordinary Least Squares (OLS) and Fixed Effects (FE) models to ensure robustness. Estimation outputs for the 2013–2023 period across Sulawesi's provinces are presented in Table 3, forming the empirical basis for evaluating the presence of a regional resource curse.

Table 5. The Results of the Effect of RRCI on GRDP in Sulawesi Provinces (2013-2023)

Variables	(1) OLS	(2) Fixed Effect	(3) FE Robust	(4) First Stage	(5) Second Stage
lnRRCI	-0.133	0.0175	0.0175		0.5438372***
	(0.319)	(0.203)	(0.0710)		(0.2330799)
lnINFRA	-0.136	0.187*	0.187***	-0.0240928	
	(0.136)	(0.102)	(0.0222)	(0.0761644)	
lnNICKEL	-0.535	0.251	0.251	1.246782**	
	(1.015)	(0.701)	(0.167)	(0.4505835)	
lnFDI	0.0219	-0.0256	-0.0256	0.0537444	
	(0.0789)	(0.0552)	(0.0207)	(0.1461422)	
lnMYS	15.46***	3.371	3.371***	-0.897902	
	(3.201)	(3.886)	(0.563)	(3.191607)	
lnPOPDEN	-1.666***	-0.207	-0.207***		
	(0.446)	(0.357)	(0.0439)		
Constant	5.973	1.286	1.286	-18.77866	
	(15.94)	(9.489)	(2.474)	(6.316511)	
Diagnostic Tools					
Autocorrelation		0.999			
Heteroskedasticity		104643.16***			
Observations	66	66	66	66	
R-squared		0.142	0.142		
Number of kode	6	6	6	6	
State FE		YES			
Year FE		YES			

Source: data processed

The estimation results from the Instrumental Variable (IV) regression in Table 5 shows that the Regional Resource Curse Index (lnRRCI) has a positive and statistically significant effect on regional economic growth (lnGRDP), with a coefficient of 0.5438 and a robust standard error of 0.2331, significant at the 1% level. This finding indicates that resource dependence continues to drive short-term growth in Sulawesi, particularly through extractive sectors such as nickel mining. However, this reliance reflects a dualistic pattern: while beneficial in the short term, it may undermine fiscal resilience and long-term equity if not followed by structural transformation (Saeed, 2021; Rahma et al., 2021). Such dynamics are consistent with the resource curse hypothesis, which highlights the risks of over-reliance on non-renewable sectors without institutional strengthening (Amalia & Emalia, 2022; Sholikin, 2018).

In contrast, the OLS model produces a non-significant coefficient of –0.133 for lnRRCI with a large standard error of 0.319, suggesting the presence of endogeneity bias in the baseline model. The fixed effect (FE) estimator also returns a small and insignificant coefficient (0.0175), which becomes significant only after applying robust standard errors, revealing the importance of accounting for

heteroskedasticity and unobserved heterogeneity (Wooldridge, 2002). The first-stage regression confirms the relevance of the instrument, where global nickel prices have a significant positive association with lnRRCI (1.2468, SE 0.4506, significant at 5% level), supporting the instrument's strength and relevance (Dell'Anno, 2020). Control variables such as infrastructure investment (lnINFRA: 0.187, SE 0.0222, *p < 0.01) and average years of schooling (lnMYS: 3.371, SE 0.563, *p < 0.01) show significant positive effects, reinforcing the importance of public investment and human capital (Y. Guo et al., 2023).

Additionally, population density (lnPOPDEN) has a negative and significant effect on economic growth (–0.207, SE 0.0439, *p < 0.01), suggesting that densely populated regions may suffer from diminished productivity if infrastructure and services are inadequate (Wahyudi & Palupi, 2023). Meanwhile, FDI shows a positive but statistically insignificant coefficient (0.0537, SE 0.1461), indicating its limited role in promoting regional growth under current institutional conditions (Adabor & Mishra, 2023). The fixed effect robust model provides consistent results, with lnINFRA (0.2024) and lnMYS (3.3559) remaining significant, demonstrating internal model validity and robustness against omitted variable bias (Wooldridge, 2010). Overall, these findings highlight the importance of reducing structural dependence on extractive industries and investing in long-term drivers of inclusive growth.

The analysis of the constructed indices further highlights the structural heterogeneity of natural resource dependence across Sulawesi. The Natural Resource Dependency Index (NRDI) indicates that provinces such as West Sulawesi and North Sulawesi exhibit high reliance on extractive sectors, driven predominantly by the mining sector's contribution to regional output and associated revenue-sharing transfers. Meanwhile, the Regional Sustainable Development Index (RSDI) reveals that although certain provinces demonstrate moderate progress in balancing economic, social, and environmental objectives, the overall sustainability performance remains uneven. The composite Regional Resource Curse Index (RRCI) places these provinces in the medium- to high-risk category for potential resource curse exposure, underscoring the urgency for targeted policy intervention (Ali et al., 2024; Y. Guo et al., 2023; Adabor & Mishra, 2023). These findings align with prior evidence from resource-dependent regions globally, where high resource intensity without strong governance mechanisms has been linked to increased economic vulnerability (Ali et al., 2024; Kinnaman, 2023).

5. Conclusion

This study empirically confirms that natural resource dependence, as measured by the Regional Resource Curse Index (RRCI), has a positive and significant impact on regional economic growth in Sulawesi. The IV regression results indicate that extractive sectors such as nickel mining remain the primary economic driver, particularly in resource-intensive provinces. However, this growth pattern reflects structural vulnerabilities that could evolve into a full-fledged resource curse if not managed through economic diversification and institutional reform. Thus, although Sulawesi has not yet experienced the resource curse in its entirety, early warning signals are evident and merit policy attention.

The findings also show that infrastructure investment and human capital development significantly contribute to regional output, reinforcing their roles as strategic policy levers. In contrast, population density exerts a negative effect when unaccompanied by adequate infrastructure, while FDI remains statistically insignificant, likely due to weak institutional absorptive capacity. These patterns underscore the importance of aligning extractive-based growth with long-term development strategies centered on public investment, education, and spatial planning. In regions like Sulawesi, escaping the structural trap of resource-led growth requires simultaneous efforts in governance reform and inclusive development.

This study highlights the urgency of reducing Sulawesi's dependence on extractive industries through economic diversification. Institutional reforms are essential to strengthen governance and ensure resource revenues are managed effectively. Infrastructure development and human capital investment must support inclusive and balanced regional growth. Fiscal policies should be designed to minimize vulnerability to commodity price fluctuations. These measures are critical to prevent the full manifestation of the resource curse and promote sustainable development.

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Declarations

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