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Natural Resource Wealth, Unemployment, Income Inequality and Absolute Poverty across Selected Malaysian States: Evidence from Panel Data

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ABSTRACT

This study examines the relationships between natural resource wealth, unemployment, income inequality, and absolute poverty in Sabah, Sarawak, Terengganu, and Selangor from 2001 to 2021. Using secondary data obtained from the Department of Statistics Malaysia (DOSM), the study employs correlation analysis and panel data regression, with the Chow, F-statistic, and Hausman tests used to determine the appropriate model specification. The Fixed Effects Model was identified as the most appropriate estimator. The empirical findings indicate a statistically significant positive relationship between unemployment and absolute poverty, suggesting that higher unemployment is associated with higher absolute poverty rates. In contrast, no statistically significant relationships were found between natural resource wealth and absolute poverty or between income inequality and absolute poverty across the selected states. The non-significant relationship between natural resource wealth and absolute poverty may be interpreted in light of the Resource Curse Theory, suggesting that resource abundance alone does not necessarily translate into poverty reduction without effective and inclusive resource governance. The findings highlight the importance of employment generation, economic diversification, skills development, and inclusive distribution of resource-related benefits in promoting sustainable poverty reduction at the subnational level in Malaysia. The study provides policy implications for strengthening employment opportunities and ensuring that natural resource wealth contributes more effectively to inclusive economic development.

1. Introduction

Natural resources have long been regarded as a catalyst for economic development. Globally, the question of whether resource wealth genuinely leads to poverty reduction or contributes to rising poverty has been extensively debated. Countries possessing resource wealth such as oil, gas, and minerals are logically expected to achieve rapid economic growth. However, this expectation frequently diverges from reality for several countries, despite abundant resource endowments, continue to experience high poverty rates. This situation is often attributed to the 'resource curse' phenomenon, wherein resource wealth leads to economic decline and rising poverty (Sachs & Warner, 2001).

Malaysia presents a compelling case study. Despite achieving remarkable progress in reducing absolute poverty from 49.3% in 1970 to 6.2% in 2022, income inequality and regional poverty disparities remain significant challenges. States with the richest natural resource endowments which is Sabah (19.7% poverty rate) and Sarawak (10.8%) ,paradoxically exhibit higher poverty rates compared to the less resource-dependent Selangor (1.5%) (Department of Statistics Malaysia, 2023).

From an economic standpoint, unemployment and poverty are closely associated. Unemployment is a primary driver of poverty as the loss of labour income directly impairs a household's capacity to meet basic needs (Filipenco, 2022).Studies by Abang Abdul Rahman et al. (2019) have examined the dynamic relationship between macroeconomic variables in Malaysia including unemployment. This suggests that unemployment is an important macroeconomic factor that may influence overall economic conditions including poverty.Income inequality, measured through the Gini coefficient, further compounds the problem by limiting economic opportunities for lower-income groups even during periods of economic growth (Kakwani, 1980).

Previous Malaysian studies have largely examined the resource curse at the national or single-state level. Doraisami (2015) questioned whether Malaysia has fully escaped the resource curse given its continued dependence on oil revenue, while Badeeb et al. (2016) examined the oil curse and finance-growth nexus in Malaysia, and Saari et al. (2018) analysed the economic impact of the petroleum industry specifically in Pahang and Terengganu. However, these studies have not jointly examined natural resource wealth alongside unemployment and income inequality as combined determinants of poverty at the subnational level, leaving this multi-state, multi-factor relationship comparatively underexplored.

This study focuses on Sabah, Sarawak, Terengganu, and Selangor because these four states represent the widest observable contrast in resource endowment and economic structure within Malaysia. Sabah and Sarawak are major timber- and petroleum-producing states with comparatively high poverty rates; Terengganu is a significant oil- and gas-producing state; and Selangor, Malaysia's most industrialised and urbanised state, has minimal resource dependence and the lowest poverty rate nationally. This deliberate selection enables a focused comparison across states with markedly different resource profiles, rather than a full national analysis that would dilute this contrast across states and territories with minimal resource activity

This study analyses the relationship between natural resource wealth, unemployment rate, and income inequality on poverty rates in four Malaysian states which is Sabah, Sarawak, Terengganu, and Selangor from 2001 to 2021. Malaysia’s natural resource endowment spans petroleum, natural gas, timber, and minerals, with substantial variation across states. However, consistent and complete state-level data covering all these categories over 2001–2021 are not publicly available; petroleum and natural gas royalty data are only selectively disclosed and mining and quarrying GDP breakdowns by resource type are incomplete across the four states. In contrast, timber log production data are consistently recorded by the Department of Statistics Malaysia (DOSM) for all four states throughout the study period. Timber production is therefore employed as a consistent proxy for natural resource wealth, as it is the most complete

and consistently available resource indicator across the four states. Despite this body of work, no study to date has jointly examined natural resource wealth, unemployment, and income inequality as combined determinants of poverty using subnational panel data for Malaysia. This represents a clear research gap, as existing studies tend to isolate either the resource-growth nexus or the unemployment/inequality-poverty nexus, rather than assessing their joint effect within a single subnational panel framework. The study aims to provide empirical evidence on how resource management structures influence poverty at the subnational level, thereby contributing to the body of knowledge on inclusive development policy in Malaysia.

2. Literature Review

2.1 Theoretical Framework

The Resource Curse Theory, pioneered by Sachs and Warner (2001), forms the primary theoretical basis of this study. The theory challenges the assumption that natural resource wealth ensures economic prosperity. Building on Corden and Neary's (1982) Dutch Disease model, Sachs and Warner empirically demonstrated a consistent inverse relationship between resource dependence and economic growth rates. The primary transmission mechanisms include Dutch disease effects that harm employment-intensive sectors, commodity price volatility causing fiscal instability, and weak governance that impedes equitable wealth distribution all of which perpetuate poverty.

Keynesian Theory further supports the unemployment-poverty nexus. Keynes (1936) argued that unemployment results from insufficient aggregate demand. Structural or cyclical unemployment pushes marginal households below the poverty line, justifying the inclusion of the unemployment rate as a key independent variable in this study.

2.2 Natural Resource Wealth and Poverty

Empirical literature consistently documents the ambiguous effects of natural resource wealth on poverty. Papyrakis and Gerlagh (2007) found a negative correlation between resource abundance and economic growth at the regional level in the United States, reinforcing the resource curse hypothesis. Doraisami (2015) cautioned that Malaysia has not fully escaped the resource curse. Ghavidel Doostkouei et al. (2023) demonstrated that resource wealth appreciation leads to Dutch Disease effects, harming employment-intensive industries and raising structural unemployment. Lopez-Feldman et al. (2007) found that resource extraction simultaneously increased income inequality in rural communities, while Tadadjeu et al. (2023) confirmed that resource dependence tends to worsen wealth inequality globally. Algharabali and Al-Thaqeb (2023) similarly questioned whether the resource curse is a deterministic outcome, arguing that institutional quality moderates whether resource wealth translates into positive or negative development outcomes. Gylfason (2001) further linked natural resource dependence to under-investment in education, identifying human capital neglect as an additional channel through which resource wealth can undermine long-term poverty reduction.

2.3 Unemployment and Poverty

Strong empirical evidence supports a positive relationship between unemployment and poverty, consistent with Keynesian theory. Powers (1995) and Hassan et al. (2016) documented significant positive relationships between unemployment and poverty rates, confirming that job loss directly erodes household income. Hasiholan et al. (2022) demonstrated this relationship across 33 Indonesian provinces, while Muhammad and David (2019) provided direct state-level evidence. Badu et al. (2020) and Robosiwi (2018) further confirmed that high unemployment significantly increases the number of people living in poverty. DeFina (2004) added nuance to this relationship, showing that the strength of the unemployment-poverty link depends on how poverty is measured, with unemployment exerting a stronger effect on relative

than absolute poverty rates. Similarly, Martínez et al. (2001) found that rising unemployment was a key driver of both inequality and poverty across OECD countries, reinforcing the relevance of labour market conditions beyond the Malaysian context. Within the Malaysian context specifically, Holidi and Abu Seman (2023) identified a persistent skills mismatch between employers and youth job seekers as a key structural driver of youth unemployment, underscoring that labour market frictions, rather than a simple shortage of jobs, can also perpetuate unemployment driven poverty.

2.4 Income Inequality and Poverty

Income inequality is a well-established determinant of poverty persistence. Ferreira and Ravallion (2008) concluded that income distribution is central to understanding and addressing poverty. Fosu (2010) critically demonstrated that the poverty-reducing effect of economic growth is significantly weakened in high-inequality contexts. Nasir and Mridha (2017) explicitly found that income inequality dampens the positive impact of growth on poverty using US county-level data. Piacentini (2014) highlighted that subnational inequality patterns differ substantially from national averages, reinforcing the importance of regional-level analysis. Sawadogo and Ouoba (2024) further showed that institutional quality moderates the relationship between resource rents and inequality. The foundational link between inequality and poverty is well established: Browning (1989) demonstrated analytically that a more unequal income distribution raises poverty for a given mean income level, while Forbes (2000) showed that the inequality-growth relationship varies by country income level and time horizon, cautioning against generalising a single direction of effect. Bergstrom (2022) found that the poverty-reducing effect of income growth is systematically weaker in more unequal societies, and Ritakallio (2002) documented that cross-national differences in poverty are closely tied to differences in income inequality, particularly in transition and developing economies. Howard and Carter (2020) provide a general definition of income inequality as the uneven distribution of income across a population, underscoring its role as a key structural determinant of economic wellbeing. In the Malaysian setting, Mohamed Yousop et al. (2020) found that income inequality among the B40 group constrains household savings capacity, illustrating how unequal income distribution can limit lower-income households' ability to build financial resilience against poverty.

3. Methodology

3.1 Research Design and Data

This study employs a quantitative research design based on secondary panel data. The dataset covers four Malaysian states — Sabah, Sarawak, Terengganu and Selangor — for the period 2001 to 2021 (21 years), yielding a balanced panel of 84 observations. These states were selected to represent diverse natural resource compositions and economic development levels. All data were sourced from the Department of Statistics Malaysia (DOSM).

The dependent variable is the absolute poverty rate (PR), expressed as a percentage. The independent variables are natural resource wealth (NRT), proxied by timber production volume (log-transformed) given its consistent availability across all four states.This proxy selection was made to ensure that complete and consistent annual data are available throughout the study period (2001–2021), thereby enabling the formation of a balanced panel. Although indicators such as the Mining and Quarrying GDP and natural resource royalty revenues potentially reflect natural resource wealth more comprehensively, annual data for these indicators are not consistently available at the state level for the entire study period. Therefore, timber production was chosen as the most appropriate proxy based on data availability and consistency. However, this proxy only represents forestry resources and does not fully encompass other natural resources such as petroleum and natural gas. Unemployment rate (UR), defined as the percentage of the labour force that is unemployed; and income inequality (INQ), measured by the Gini coefficient.

Linear interpolation was applied to address missing data points for poverty rates and Gini coefficients, which are reported at irregular intervals. While this approach smooths year-to-year variations , it potentially reducing sample variance and is acknowledged as a limitation of the study. Standard errors robust standard errors were employed in the regression models to ensure reliable and unbiased statistical inference.

Table 1. Description of Variables

Variable Name	Code	Data Description	Source
Poverty Rate	PR	Absolute Poverty Rate (%)	Department of Statistics Malaysia (DOSM)
Unemployment Rate	UR	Unemployment Rate (%)	Department of Statistics Malaysia (DOSM)
Natural Resource Wealth	NRT	Timber production (log volume, m^3) as proxy for natural resource wealth	Department of Statistics Malaysia (DOSM)
Income Inequality	INQ	Gini Coefficient	Department of Statistics Malaysia (DOSM)

3.2 Model Specification

The econometric model is specified as follows:

$$PRit = \beta_0 + \beta_1 NRTit + \beta_2 URit + \beta_3 INQit + \varepsilon it$$

Where PR is the absolute poverty rate, NRT is the natural resource wealth proxy (timber production), UR is the unemployment rate, INQ is the Gini coefficient, β_0 is the constant, β_1, β_2, β_3 are the slope coefficients, and εit is the error term. Subscripts i and t denote states and years respectively.

3.3 Model Selection

Where model specifications were estimated: Pooled Ordinary Least Squares (OLS), Fixed Effects (FE), and Random Effects (RE). The Restricted F-test (Chow Test) was used to compare Pooled OLS and FE models. The result (Cross-Section F p-value = 0.0121) rejected the null hypothesis that individual effects are jointly zero, favouring the Fixed Effects model. Subsequently, the Hausman Test was applied to choose between FE and RE models. The result (p-value = 0.0086) rejected the null hypothesis that the RE estimator is consistent, confirming the Fixed Effects Model as the appropriate specification for this study.

4. Findings and Discussion

Figure 1 below, illustrates the trend of poverty rates across Sabah, Sarawak, Terengganu, and Selangor from 2001 to 2021. Overall, Sabah consistently recorded the highest poverty rates throughout the study period, although a declining trend was observed from the early years before increasing again towards the end of the study period. Sarawak and Terengganu exhibited similar downward trends, with poverty rates gradually decreasing until the mid-2010s before experiencing a moderate increase in recent years. In contrast, Selangor maintained the lowest poverty rate throughout the study period, reflecting its relatively higher level of economic development. These differences highlight substantial variation in poverty levels across the selected states and provide preliminary evidence supporting the use of panel data analysis. The increase in poverty rates towards the end of the study period may be associated with the socioeconomic impacts of the COVID-19 pandemic, which adversely affected household income and employment opportunities across Malaysia.

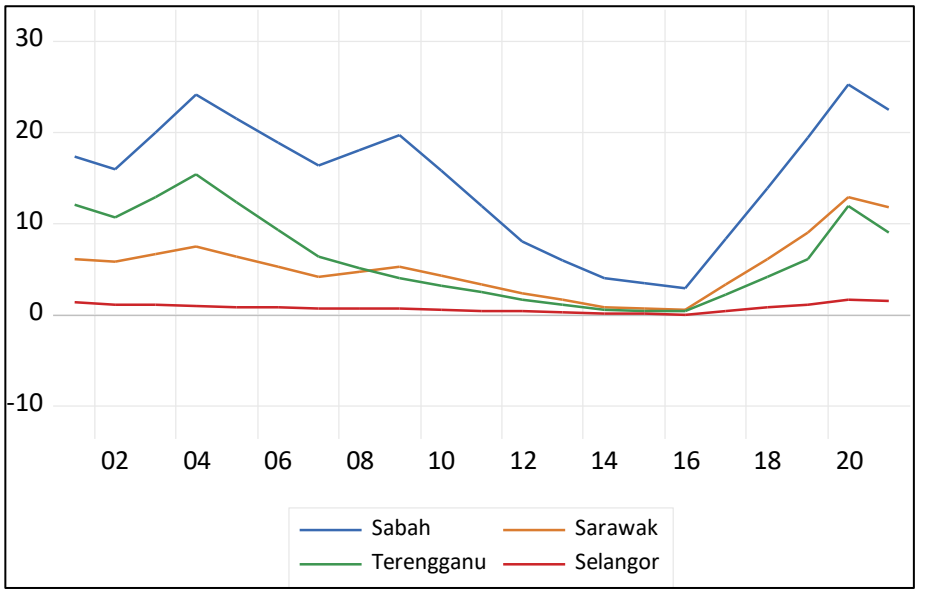


Figure 1. Trend of Poverty Rate in Sabah, Sarawak, Terengganu and Selangor (2001–2021

4.1 Descriptive Statistics

Table 2 presents the descriptive statistics for all variables across the selected states over the study period. The mean poverty rate (PR) is 6.77%, which is higher than the median value of 4.2000%, indicating a positively skewed distribution. This finding is consistent with the positive skewness value of 1.0425, suggesting that a number of observations recorded relatively higher poverty rates than the majority of the sample. The unemployment rate (UR) has a mean value of 4.0963% and a standard deviation of 1.2956, indicating moderate variation across the selected states and years. Meanwhile, the natural resource wealth proxy (NRT) records a mean value of 16.0080 with a standard deviation of 5.4747, reflecting differences among the selected states. The Gini coefficient (INQ) has an average value of 0.3312 with a standard deviation of 0.1540, indicating variation in income inequality across the panel. Overall, the descriptive statistics suggest sufficient variation among the variables, supporting the suitability of panel data analysis in this study.

Table 2. Descriptive Statistics

	PR	NRT	UR	INQ
Mean	6.7665	16.0080	4.0963	0.3312
Median	4.2000	20.0100	3.9000	0.3980
Minimum	0.0000	4.8900	2.0000	0.0000
Std. Dev.	6.8729	5.4747	1.2956	0.1540
Skewness	1.0425	-0.3496	0.9874	-1.2766
Kurtosis	2.9669	1.5698	4.0871	3.1136

Note: PR = Poverty Rate; NRT = Natural Resource Wealth; UR = Unemployment Rate; INQ = Income Inequality (Gini Coefficient)

4.2 Correlation Analysis

Table 3 presents Pearson correlation coefficients among the study variables. The poverty rate exhibits a strong positive correlation with unemployment (r = 0.730) and a moderate positive correlation with natural resource wealth (r = 0.538) and income inequality (r = 0.553), suggesting that states with higher unemployment, resource wealth, and income disparities tend to have higher poverty rates. Additionally, a strong positive correlation exists between natural resource wealth and income inequality (r = 0.755), indicating that as resource wealth increases, the Gini coefficient tends to increase significantly in the study sample.

Table 3. Pearson Correlation Matrix

	PR	UR	NRT	INQ
PR	1.000000	0.730287	0.537566	0.552943
UR	0.730287	1.000000	0.614397	0.551513
NRT	0.537566	0.614397	1.000000	0.755374
INQ	0.552943	0.551513	0.755374	1.000000

4.3 Fixed Effects Model Results

Table 4 reports the Fixed Effects Model results. The model explains approximately 62.3% of the variation in poverty rates ($R^2 = 0.623$), with an adjusted R^2 of 0.593, confirming robust explanatory power.

Table 4. Fixed Effects Model Estimation Results

Independent Variable	Coefficient	t-Statistic	Prob.
NRT	0.373847	0.722691	0.4721
UR	1.820491	2.538975	0.0132**
INQ	12.95679	1.516160	0.1336
R-squared	0.623551	Adjusted R-squared	0.593832
Constant	-10.9670		

*Note: ** significant at 5% level*

The unemployment rate (UR) is the only variable that demonstrates a statistically significant positive effect on the poverty rate (coefficient = 1.82; p = 0.0132). This indicates that a one percentage point increase in the unemployment rate is associated with a 1.82 percentage point increase in the absolute poverty rate, significant at the 5% level. This finding aligns with Keynesian theory and corroborates prior studies by Faturohim et al. (2023) and Tampubolon et al. (2021), which identify unemployment as the most dominant determinant of absolute poverty at the regional level. The result underscores that labour market stability is the primary mechanism through which households avoid falling below the absolute poverty line.

Natural resource wealth (NRT) shows a positive but statistically insignificant relationship with the poverty rate (coefficient = 0.3738; p = 0.4721). This finding provides empirical support for the Resource Curse phenomenon: although Sabah, Sarawak, and Terengganu are rich in natural resources, the income generated does not directly translate into poverty reduction. The extractive nature of the timber industry, concentrated among large corporations with limited spillover effects to rural populations, explains this

insignificance. This is consistent with Rahim et al. (2021), who argue that resource abundance without inclusive governance fails to eradicate poverty. It should also be noted that timber production captures only one dimension of natural resource wealth; states such as Terengganu and Sarawak also derive substantial revenue from petroleum and natural gas, which are not reflected in this proxy. The statistical insignificance of NRT may therefore partly reflect the limitations of timber production as a partial, rather than comprehensive, measure of natural resource wealth, in addition to the Resource Curse and Dutch Disease mechanisms discussed above.

Income inequality (INQ), proxied by the Gini coefficient, exhibits a positive but non significant relationship with absolute poverty (coefficient = 12.956; p = 0.1336). This lack of statistical significance may be attributable to the effectiveness of Malaysia's social safety net programmes including cash transfers and subsidies which ensure that basic needs of the extremely poor are met even amid income disparities. In states like Selangor, despite a higher Gini index, the absolute poverty rate remains low due to diverse economic opportunities and better urban social support systems. These findings suggest that in the Malaysian context, absolute poverty is more directly driven by labour market access than by income distribution patterns.

5. Conclusion

This study examined the relationships between natural resource wealth, unemployment, income inequality, and absolute poverty in Sabah, Sarawak, Terengganu, and Selangor from 2001 to 2021 using panel data analysis. The Fixed Effects Model was identified as the most appropriate estimator based on the Chow and Hausman tests.

The findings indicate a statistically significant positive relationship between unemployment and absolute poverty, suggesting that higher unemployment is associated with higher absolute poverty rates in the selected states. In contrast, no statistically significant relationships were found between natural resource wealth and absolute poverty or between income inequality and absolute poverty over the study period. The non-significant relationship between natural resource wealth and absolute poverty may be interpreted in light of the Resource Curse Theory, suggesting that resource abundance alone does not necessarily translate into poverty reduction without effective governance and inclusive distribution of resource-related benefits.

The findings have several policy implications. State governments, particularly those in resource-rich regions, should prioritise strategies that generate quality and sustainable employment rather than relying solely on extractive industry revenues. Investments in technical and vocational education and training (TVET), economic diversification into manufacturing and services, and mechanisms that promote the inclusive distribution of resource-related benefits may contribute to sustainable poverty alleviation. Strengthening mechanisms to ensure that resource revenues contribute effectively to development in resource-producing states could further enhance the local socioeconomic benefits of natural resource wealth. This study has several limitations. First, its geographical scope is limited to four Malaysian states, which may constrain the generalisability of the findings to other states. Second, the study relies on interpolated secondary data, which may affect the precision of the estimates. Third, natural resource wealth is proxied by timber production because consistent state-level data were available throughout the study period. This proxy does not fully capture other important natural resources, including petroleum, natural gas, and minerals. Future research could incorporate additional variables, such as governance quality, education levels, and rural infrastructure, and employ more advanced econometric approaches to capture the complex dynamics of poverty at the subnational level. Future studies should also consider more comprehensive measures of natural resource wealth when consistent state-level data become available.

Data Availability

Data are available from the corresponding author upon reasonable request.

Funding Information

This research received no external funding.

Ethics Approval

This study complies with the ethical standards of the journal and adheres to internationally recognized principles of responsible research and publication, including the guidelines of the Committee on Publication Ethics.

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Conflict of Interest

The authors declare that this research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Author Contributions

Rozaliza Peter: Conceptualization, Investigation, Data curation, Formal analysis, Methodology, Funding acquisition, Project administration. Resources, Software, Visualization, Validation. Writing – original draft, Writing – review & editing,

Nor Fatimah Che Sulaiman: Supervision, Validation, Supervision, Project Administration

Disclosure of AI Use

The authors used Claude (Anthropic) and Gemini (Google) as generative artificial intelligence (AI) tools for limited assistance with language editing and manuscript refinement. The AI tools were not used to generate research data, conduct data analysis or make scientific or scholarly decisions.

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