

ZAMBIA'S RESOURCE CURSE: WHAT THE NUMBERS SAY

Evidence from ARDL Analysis of Mineral Rents,
Governance, and Economic Justice Outcomes

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Governance, and Economic Justice Outcomes

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This policy brief was authored by Aquila Ng'onga of ActionAid Zambia with contributions from Shaun Tatenda Kudiwa of Zhejiang Sci-Tech University, Ucizi Ngulube of ActionAid Zambia, Chinoya Chipango of ActionAid Zambia and Tafadzwa R. Muropa of ActionAid (Zambia & Zimbabwe).

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Cover Photo by Artyom Korshunov¹

LIST OF ACRONYMS

ARDL	Autoregressive Distributed Lag
ASM	Artisanal and Small-Scale Miner(s)
CBAM	Cross-border Adjustment Mechanism
DTA	Double Taxation Agreement
EPRM	European Partnership for Responsible Minerals
GDP	Gross Domestic Product
IFF	Illicit Financial Flow(s)
MMMD	Ministry of Mines and Minerals Development
TIF	Transformative Impact Fund
UN	United Nations
WDI	World Development Indicators
ZEMA	Zambia Environmental Management Agency
ZRA	Zambia Revenue Authority

1. INTRODUCTION

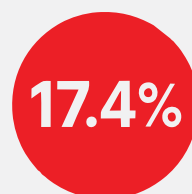
Mining remains the backbone of Zambia's economy. It accounts for 17.4%² of Gross Domestic Product (GDP), contributes about 70% of the country's foreign exchange earnings, and provides roughly 30% of government revenue.³

Despite this, for many Zambians, particularly women, youth, children, artisanal and small-scale miners (ASMs), the lived reality has often been one of exclusion, poverty prevalence, environmental damage, insecure livelihoods, limited access to social services, let alone amenities. While national income may rise during mineral prices booms or mining activity expansions, benefits have not been shared equitably⁴ with communities close to extraction points frequently experiencing greater costs as evidenced by the legacy Kabwe lead pollution⁵ including the Kafue River⁶ acid contamination in 2025.

This contradiction between resource wealth and persistent vulnerability resides at the center of Zambia's development challenge with scholars such as Boos and Holm-Müller (2016)⁷ confirming the existence of what is called the resource curse. The term resource curse refers to the paradox in which countries endowed with abundant natural resources, such as oil, gas, and minerals, often fail to translate that wealth into broad-based development gains⁸. For example, you would expect mineral rich Solwezi or Kalumbila to host a state-of-the-art cancer diseases hospital, but ironically, local patients in need of special care would have to seek better options in Lusaka or abroad.

From a justice and human rights perspective, the resource curse manifests not only through weak growth outcomes, but also through environmental harm, land insecurity, inadequate social sector spending, and deeply gendered impacts. Feminist political economy perspectives emphasise that women and children are often the first⁹ to feel the consequences of poor resource governance, through reduced access to services, unpaid care burdens, and exposure

ZAMBIA'S ECONOMY BACKBONE



**Gross
Domestic
Product (GDP)**



70%
**Country's
Foreign Exchange
Earnings**



30%
**Government
Revenue**

to environmental¹⁰ risks. From these dynamics critical questions about who benefits from mining, who bears the cost and whose rights are protected arise.

Against the backdrop of Zambia's planned mining expansion towards 3 million tonnes of copper annually¹¹, the development of the Lobito Corridor¹², including growing global demand for energy transition critical minerals, understanding these dynamics is increasingly urgent. This research brief therefore examines how income generated from mining activities and broader economic governance conditions shape development outcomes in Zambia, with the aim of informing human-centred, justice-oriented

policy choices in the extractive sector.

2. WHAT WAS DONE?

This study is informed by an econometric analysis utilising annual World Bank's World Development Indicators (WDI) data covering the period 1998 to 2021, examining how mining activity, governance, and macroeconomic conditions influence development outcomes in Zambia. The study applied an econometric Autoregressive Distributed Lag (ARDL¹³) model to analyse these relationships over time, expressed in simplified form as:

GDP per capita (growth) = f (mineral rents, rule, inflation, trade openness)

Formally, the estimated relationship is presented as:

$$\ln gdp_{pc} = \alpha + \beta_1 \cdot \text{rents} + \beta_2 \cdot \text{rule} + \beta_3 \cdot \text{infl} + \beta_4 \cdot \text{open} + \varepsilon$$

Economic performance was assessed using GDP per capita, while mineral rents¹⁴ as a percentage of GDP captured income generated from mining activities. The analysis also included a measure of rule of law proxy for governance and institutional quality, alongside inflation and trade openness. While other studies¹⁵ use total natural resource rents, we use mineral rents as a percentage of GDP, which better captures mining's actual contribution to the Zambian economy and its potential for financing social and development priorities, rather than just reporting absolute revenue amounts that may overstate or understate its relative importance

The ARDL framework allows short-term economic shocks to be distinguished from longer-term structural relationships, while an error-correction component captures how the economy adjusts back to its long-run development path. Full econometric specifications, including the ARDL (1,2,2,0,2) structure and diagnostic tests, are provided in the annex section.

3. FINDINGS

Using the methodology in section 2, this section 3 discusses the key findings whose details are highlighted in the table of part 7 of the annex section.

3.1. Mineral Wealth Can Support Growth, but not automatically justice

The results, in line with findings by Nondo et al. (2025)¹⁶ and Prempeh et al. (2025)¹⁷ for Ghana, indicate that mineral rents positively impact GDP per capita in Zambia in both the short and long term, confirming that mining can indeed drive economic growth.

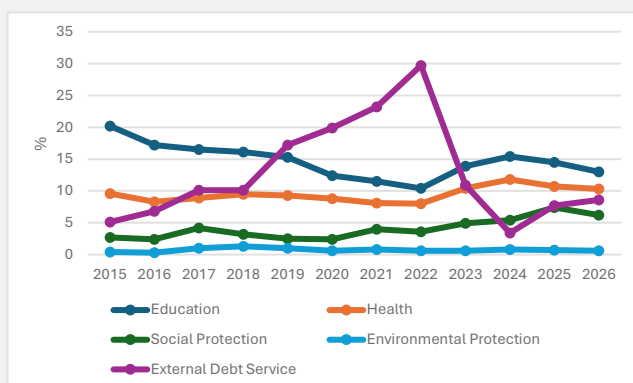
- **Short run:** A one-unit increase in mineral rents is associated with an increase of about 2.4% in GDP per capita, reflecting copper price booms when export earnings rise and economic activity temporarily accelerates. However, the negative lagged short-run effect (-2.2%) indicates that these gains are often followed by slowdowns, reinforcing Zambia's persistent boom-bust cycles in the mining sector.
- **Long run:** Mineral rents increase GDP per capita by approximately 6.5%, a meaningful contribution but insufficient to significantly reduce poverty, lower the high cost of living, expand decent employment, or ensure mining benefits are equitably shared across communities and regions. Around 60 % of Zambians remain below the poverty line, with women, youth, and children disproportionately affected¹⁸, while household evidence demonstrates that the cost of meeting basic needs consistently exceeds the incomes of low-income households, limiting access to food, transport, housing, and essential services¹⁹. This aligns with Unceta (2021)²⁰ showing that the exploitation of Zambia's mineral resources has not resulted in meaningful structural transformation or broadly shared development benefits, indicating that mining-led growth has been modest.

While the positive impact of mining on the economy indicates no resource curse, we conclude that Zambia has not fully escaped classic resource curse pattern.

3.1.1. Positive Growth Does Not Automatically Translate into Social Sector and Climate Adaptation Investment

While the econometric results show that mineral rents contribute positively to GDP per capita, budget allocation trends reveal a weak and inconsistent translation of growth into social sector and climate-related investment. Although mineral rents contribute positively to GDP per capita, budget allocation trends show that this growth has not translated into sustained investment in social sectors or climate adaptation. As shown in figure 1 below, spending on education declined from over 20% in 2015 to around 12% in 2026. For vulnerable groups - particularly low-

Figure 1: Trends in Social Sector, Environmental Protection Spending and External Debt Service as a share of the National Budget (2015–2026)



Source: Author constructions and calculations from National Budget Speeches²¹

income households, women, children, artisanal and small-scale miners, and mining-affected communities - this pattern has direct consequences. Limited investment in education and health constrains human development, while weak social protection leaves households exposed to inflation, income shocks, and environmental risks linked to mining and climate change. Persistent underinvestment in environmental protection further heightens vulnerability by weakening climate resilience and environmental safeguards in extractive regions.

At the same time, external debt service

absorbed a growing share of public resources, rising from 5.1% of the national budget in 2015 to nearly 30% in 2022, at its peak exceeding combined spending on health, social protection, and environmental protection. This demonstrates that the debt trap persists despite mineral wealth, crowding out social and climate investment even when mining contributes to economic growth.

From an economic justice and human rights perspective, these budgetary patterns mean that vulnerable groups continue to face under-resourced health systems, overcrowded schools, limited and adequate social protection coverage, and heightened exposure to environmental risks. Without deliberate fiscal policy choices to protect and expand social sector spending, positive mining-growth linkages will remain disconnected from improvements in lived welfare outcomes.

3.2 Governance Determines Who Benefits

The analysis shows that rule of law has a strong impact on GDP per capita, highlighting the importance of institutions in translating mineral wealth into tangible benefits:

- **Short-run effect:** The lagged short-run coefficient for rule of law is -13.3%, indicating that weak governance can quickly erode gains from mining.
- **Long-run effect:** The long-run coefficient is +21.8%, demonstrating that sustained improvements in institutional quality significantly amplify the growth benefits of mineral rents.

These results reflect the Zambian mining industry reality. Governance weaknesses, corruption, poor oversight, opaque licensing²², and limited community participation²³ reduce the justice dividend from mining, even where GDP grows.

Section 3.1.1 shows that, despite positive growth from mineral rents, spending on health, education, social protection, and environmental protection remains insufficient, while external debt absorbs a growing share of the national budget. This

indicates that mineral wealth alone is not enough: only when governance is strong can revenues be mobilized effectively to finance social and climate investments, protecting vulnerable households, women, children, and mining-affected communities. In other words, institutional quality determines whether economic growth translates into real human development and resilience.

It is therefore clear that the mining sector can generate growth, but equitable distribution of benefits largely depends on institutional quality. Studies²⁴ indicate that resource abundance depresses income when institutions are weak, but boosts income where institutions are strong. Effective institutions ensure that resource wealth reaches households and communities. More studies²⁵ show that resource courses tend to materialise where governments lack effective regulations and accountability to manage resource windfalls, facilitating rent-seeking and economic mismanagement. Enhancing the quality of Zambian institutions is therefore a matter of urgency.

3.3 Inflation Harms the Most Vulnerable

Inflation erodes the welfare gains from mining-led growth:

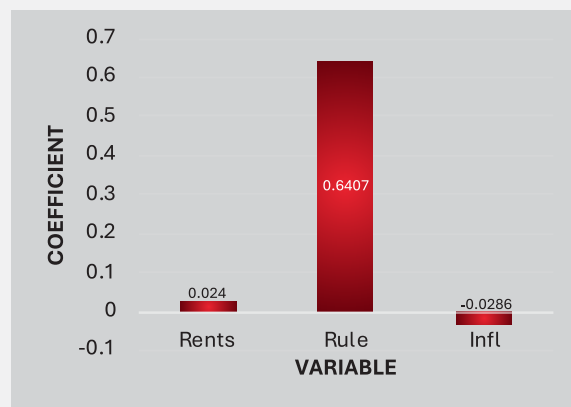
- **Short-run effect:** Inflation reduces GDP per capita by 2.9%, reflecting immediate pressure on household budgets.
- **Long-run effect:** The effect is even stronger at -4.5%, showing that sustained price increases significantly reduce household purchasing power.

These effects are not distribution-neutral. Inflation disproportionately harms poor households, women, and children, who spend a larger share of their income on essential goods such as food, energy, transport, and housing²⁶. For low-income households, rising prices translate directly into reduced food consumption, poorer nutrition, and constrained access to health, education, and other basic services. Women are particularly affected by inflation, because they are often responsible for household consumption and caregiving, and rising food and essential prices tend to exacerbate

existing gender inequalities in income and labour²⁷.

Mining driven growth without price stability cannot deliver justice, deepening vulnerability and inequality rather than

Figure 2: Visualisation of the short run coefficient

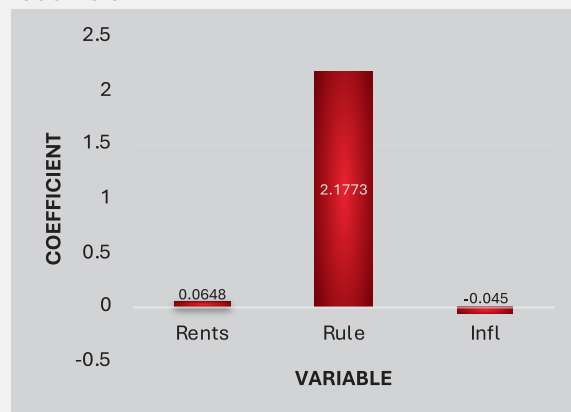


Source: Author's calculations from ARDL Regression

improving welfare. Even when GDP per capita rises, real incomes decline, leaving households worse off in practice. This pattern is consistent with evidence²⁸ that mining activity has been associated with increased local inflation, poverty, and inequality among communities near mines.

Controlling inflation is therefore not only a macroeconomic objective but a justice and human rights imperative. In the absence of price stability, the benefits of mineral wealth are absorbed by rising living costs, and the most vulnerable see little progress to live dignified lives.

Figure 3: Visualisation of the long run coefficient



Source: Author constructions from ARDL Regression

3.4. What matters most?

Having examined mineral rents, governance, and inflation individually, we now compare their relative importance in shaping GDP per capita and, by extension, the economic justice dividend for Zambians. Figures 1 and 2 illustrate the magnitude of influence of each variable on growth in both the short and long run.

The results from both figures are clear, institutional quality or governance (Rule) overwhelmingly dominates both the short- and long-term dynamics of growth, far outweighing the contributions of the mineral rents or the dampening effect of inflation. In other words, while mineral wealth provides potential, its translation into tangible economic justice depends crucially on strong governance. For example, our econometric results show that a long-run improvement in the rule of law could raise GDP per capita by over 20 %, whereas short-term governance weaknesses can erode gains by more than 13 %. This demonstrates that mineral wealth alone cannot deliver inclusive growth. Without strong, transparent, and accountable institutions, the benefits of mining are unlikely to reach households, especially the most vulnerable. Strengthening governance is therefore not only an economic priority but also the foundation for social justice, gender equality, and meaningful poverty reduction.

4. RECOMMENDATIONS

Based on our research findings, we recommend targeted actions to ensure that Zambia's mining sector delivers inclusive and justice-centered growth.

4.1. Strengthening governance (Rule of Law) as the Primary Lever for Mining-Led Development

Our analysis shows that governance has the strongest long-run effect on GDP per capita, far outweighing the contribution of mineral rents themselves. Zambia should therefore prioritise governance reforms in the mining sector by enforcing transparent licensing processes, enforcing public disclosure of mining contracts and beneficial ownership, and strengthening oversight institutions such as the Ministry of Mines and Minerals

Development (MMMD), the Zambia Revenue Authority (ZRA), and the Zambia Environmental Management Agency (ZEMA). Without credible enforcement and accountability, mineral revenues will continue to generate growth without delivering broad-based economic justice. Strong institutions would also ensure that government interventions, such as the newly introduced ASM Fund, reach intended beneficiaries. Additionally, illicit financial flows (IFFs), tax evasion and public revenue losses linked to mining can be curbed, expanding fiscal space for social spending and poverty alleviation.

4.2. Ring-Fence Mineral Revenues for Social Services in Mining-Affected Areas

Although mining contributes positively to growth, the magnitude is insufficient to significantly reduce poverty or improve living standards without deliberate redistribution. Government should legally earmark a defined share of mineral revenues for health, education, water, and sanitation in mining-affected districts, accompanied by transparent reporting on how these funds are spent. Directing mining income into visible gender responsive public services is essential for ensuring that extraction translates into tangible welfare gains for communities.

4.3 Reduce Volatility through Revenue Stabilisation and Local Value Addition

The short-run results show that mining-led growth in Zambia is volatile and frequently followed by economic slowdowns, reflecting the country's exposure to commodity price cycles. To break this boom-bust pattern, Zambia should strengthen mineral revenue stabilisation mechanisms and deliberately link mining expansion to local value addition, skills development, and decent employment creation. This requires strong enforcement of local content policies and legislation, alongside the promotion of technological spillovers that support the production of higher-value and more sophisticated goods that can compete on international markets. Smoother revenue flows and deeper economic linkages will enhance resilience and support more stable, long-term development outcomes.

4.4 Control Inflation to Protect Household Welfare and Justice Outcomes

Inflation significantly erodes the welfare gains from mining-driven growth, with negative effects in both the short and long run. Government should integrate cost-of-living considerations into macroeconomic and mining policy by supporting price stability measures, especially for food, fuel, and transport in mining towns. Without controlling inflation, increases in GDP per capita will fail to improve real living standards, particularly for low-income households.

4.5 Promote agroecology as a diversification strategy to reduce overreliance on mineral rents.

Given the volatility of extractive revenues and their limited transmission to broad-based welfare gains, government should scale up agroecological approaches that strengthen domestic food systems, rural livelihoods, and climate resilience. Investing in agroecology can help stabilise incomes, reduce exposure to external shocks, and support inclusive growth, particularly in rural and mining-adjacent communities.

4.6 Strengthen Mining Taxation and Revenue Collection

Zambia should reform mining taxation to ensure that mineral wealth translates into equitable development outcomes. This includes reviewing tax incentives and exemptions that reduce government revenue, strengthening tax compliance and monitoring, and ensuring that mining companies pay their fair share of royalties, corporate income taxes, and other statutory levies.

In addition, government should systematically review, renegotiate, or terminate double taxation agreements (DTAs) that facilitate base erosion, profit shifting, and illicit financial flows from the mining sector. Several existing treaties disproportionately favour investors and significantly constrain Zambia's taxing rights, particularly over capital gains, dividends, interest, and management fees arising from mineral extraction. Action at regional and international levels, inclusive of treaty

reviews, allows Zambia to reclaim taxing rights at a time when the United Nations (UN) Tax Convention negotiations are progressing and new instruments such as the European Union's Cross-border Adjustment Mechanism (CBAM)²⁹ remain threats through tax base erosion.

5. CONCLUSION

Our study examined whether Zambia's mineral wealth is translating into meaningful development and economic justice. The econometric evidence shows that while mineral rents contribute positively to GDP per capita (evidence of no resource curse), the gains remain modest, volatile, and unevenly distributed. In contrast, governance or institutional quality emerges as the most powerful long-run determinant of development outcomes, determining whether mining revenues are transformed into public value or lost through weak accountability, illicit financial flows, and unequal power relations. Persistent inflation further erodes household welfare, limiting the extent to which mining-led growth improves real living standards, particularly in mining-affected communities.

As Zambia pursues its ambition to produce three million tonnes of copper per year and to leverage strategic infrastructure such as the Lobito Corridor, the stakes could not be higher. From an ActionAid, rights-based perspective, scaling up extraction without strengthening institutions, stabilising revenues, and ensuring fair redistribution, risks deepening inequality, environmental harm, and social exclusion. The path forward must therefore place justice at the centre of Zambia's mining future - strengthening rule of law, curbing illicit financial flows and tax evasion, protecting household purchasing power, and guaranteeing meaningful participation of communities, especially women and marginalised groups. Only under these conditions can expanded mining and new trade corridors deliver a durable economic justice dividend that advances human rights and inclusive development for all Zambians.

END NOTES

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- 13 The Autoregressive Distributed Lag (ARDL) approach helps show how economic outcomes are affected by both recent changes and longer-term trends. It separates short-term shocks from long-term relationships, recognising that the effects of policies and economic factors often take time to fully materialise.
- 14 Mineral rents are the difference between the value of production for a stock of minerals at world prices and their total costs of production. Minerals included in the calculation are tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite, and phosphate.
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ANNEX: DATA, METHODOLOGY, AND ARDL ESTIMATION RESULTS

1. Summary of the parameters and their sources

Parameter	Description	Source
GDP per capita (lngdppc)	Log of real GDP per capita (constant 2015 US \$)	World Bank, World Development Indicators (WDI)
Mineral rents (rents)	Income from mineral extraction as % of GDP	World Bank, WDI
Rule of law (rule)	Governance and institutional quality index	Worldwide Governance Indicators (World Bank)
Inflation (infl)	Consumer prices (annual %)	World Bank, WDI
Trade openness (open)	Trade as % of GDP (exports + imports)	World Bank, WDI

2. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
lngdppc	26	6.767	.594	5.857	7.507
rents	26	6.173	6.573	.004	28.249
rule_	26	-.44	.109	-.648	-.225
infl	26	16.033	8.861	6.429	43.073
open	26	67.96	8.474	56.121	86.209

*Rule of law on World Governance Indicators has three missing values for years (1997, 1999, and 2001). We interpolate variables to correct for gaps with insignificant changes to other years.

3. Unit root results (ADF, PP)

Parameter	Test Type	Level (p-value)	First Difference (p-value)	Order of Integration
lngdppc	ADF	Non-stationary	0.0722*	I(1)
	PP	Non-stationary	0.0019*	I(1)
rents	ADF	Non-stationary	0.0868*	I(1)
	PP	Non-stationary	0.4054	Mixed / Weak I(1)
rule_	ADF	Non-stationary	0.0021*	I(1)
	PP	Non-stationary	0.0091*	I(1)
infl	ADF	Non-stationary	0.0029*	I(1)
	PP	Non-stationary	0.0000*	I(1)
open	ADF	Non-stationary	0.0009*	I(1)
	PP	Non-stationary	0.0000*	I(1)

* All variables passed the stationarity requirements for ARDL estimation, being I(0) or I(1), confirming that the model is appropriate for examining both short-run and long-run relationships.

4. Report Zivot–Andrews Test Results (Break in Intercept and Trend)

Parameter	Break Year	Test Statistic	1% CV	5% CV	Stationary at Break?	Order of Integration
lngdppc	2010	-2.930	-5.57	-5.08	No	I(1)
rule_	2013	-3.810	-5.57	-5.08	No	I(1)
rents	2004	-1.872	-5.57	-5.08	No	I(1)
inf	2013	-5.428	-5.57	-5.08	Yes (5%)	I(0)*
open	2011	-3.835	-5.57	-5.08	No	I(1)

*Zivot–Andrews tests allowing for structural breaks confirm that all variables satisfy the stationarity requirements for ARDL estimation, with most series I(1) and inflation becoming stationary (I(0)) after accounting for a break, supporting the use of ARDL for short- and long-run analysis.

5. Akaike Information Criterion (AIC) Lag order selection e(lags)[1,5]

R1	1	2	2	0	2
	lngdppc	rents	rule	Infl	open

*For robustness, AIC is used to choose the optimal number of lags for each variable in the ARDL model, balancing model fit and complexity.

6. Bounds test for cointegration

Test Statistic	Value	I(0) Bound (10%, 5%, 2.5%, 1%)	I(1) Bound (10%, 5%, 2.5%, 1%)	Conclusion
F-statistic	23.936	2.45, 2.86, 3.25, 3.74	3.52, 4.01, 4.49, 5.06	Reject H ₀ : cointegration exists
t-statistic	-6.270	-2.57, -2.86, -3.13, -3.43	-3.66, -3.99, -4.26, -4.60	Reject H ₀ : cointegration exists

*ARDL bounds testing confirms the existence of a long-run cointegrating relationship among GDP per capita, mineral rents, rule of law, inflation, and trade openness, supporting the use of the ARDL model to estimate both short- and long-run dynamics.

7. Short run and long run coefficients

VARIABLES	(1) ADJ	(2) LR	(3) SR
D.rents			0.0240*** (0.005)
LD.rents			-0.0222*** (0.007)
D.rule_			0.6407** (0.272)
LD.rule_			-1.3304*** (0.348)
D.infl			-0.0286*** (0.004)
D.open			-0.0066* (0.003)
LD.open			0.0085* (0.005)
L.rents		0.0648*** (0.010)	
L.rule_		2.1773*** (0.566)	
L.infl		-0.0450*** (0.009)	
L.open		-0.0038 (0.009)	
L.lngdppc	-0.6349*** (0.101)		
Constant			5.2727*** (0.534)
Observations	24	24	24
R-squared	0.944	0.944	0.944

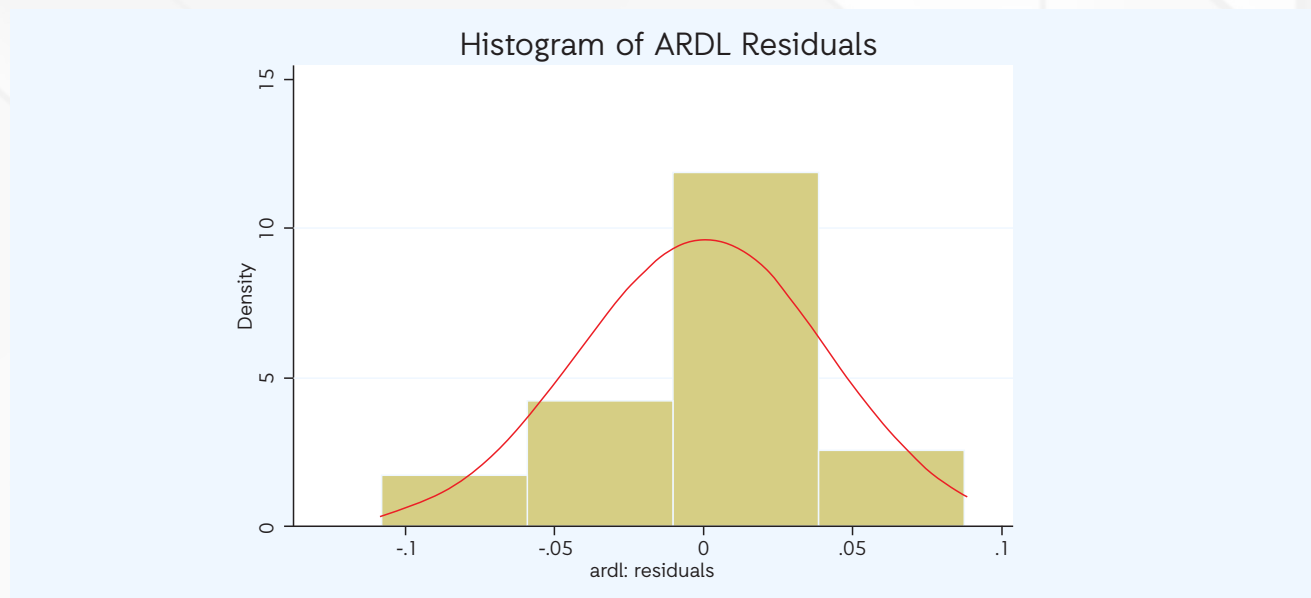
Standard errors in parentheses
 *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

8. Skewness and Kurtosis Test for Normality of Residuals

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	Adj $\chi^2(2)$	Prob > χ^2	Conclusion
ehat	24	0.8024	0.1068	2.97	0.2265	Residuals are normally distributed

**Skewness and kurtosis tests confirm that the ARDL model residuals are normally distributed, supporting the reliability of the estimated coefficients and associated statistical inferences.*

9. Histogram of Residuals



**The histogram of ARDL residuals shows a roughly symmetric distribution centered around zero, closely following a normal curve, confirming the normality of residuals and supporting the reliability of the model estimates.*

10. White's Test for Heteroskedasticity

Test	χ^2	df	Prob > χ^2	Conclusion
White	24.00	23	0.4038	Fail to reject H_0 : no evidence of heteroskedasticity

**There is no evidence of heteroskedasticity*

11. Autocorrelation Diagnostics (Breusch–Godfrey, multiple lags)

Test	Lags / df	Statistic	Prob > χ^2	Conclusion
Durbin–Watson d	–	2.229	–	Suggests no first-order autocorrelation ($d \approx 2$)
Breusch–Godfrey LM	1	23.503	0.0000	Reject H_0 : evidence of autocorrelation
Breusch–Godfrey LM	2	23.503	0.0000	Reject H_0 : evidence of autocorrelation
Breusch–Godfrey LM	3	23.503	0.0000	Reject H_0 : evidence of autocorrelation

**Evidence of autocorrelation in Breusch-Godfrey LM test, prompting Newey-West standard error correction.*

12. ARDL Regression Coefficients Corrected for Autocorrelation (Newey–West Ses)

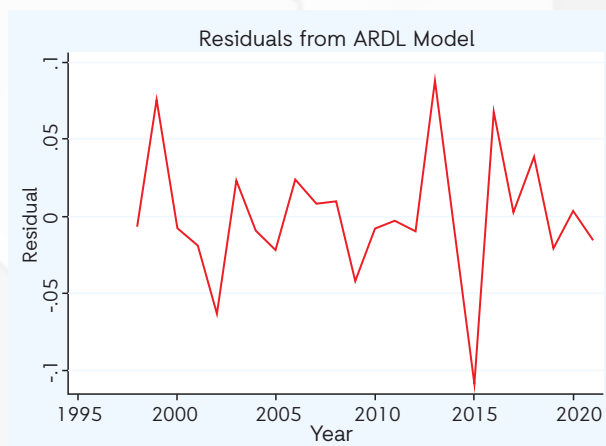
variables	(1) lngdppc
L.lngdppc	0.3651*** (0.057)
rents	0.0240*** (0.003)
L.rents	-0.0050 (0.010)
L2.rents	0.0222*** (0.004)
rule_	0.6407*** (0.157)
L.rule_	-0.5888** (0.237)
L2.rule_	1.3304*** (0.231)
infl	-0.0286*** (0.004)
open	-0.0066** (0.003)
L.open	0.0126*** (0.004)
L2.open	-0.0085* (0.004)
Constant	5.2727*** (0.136)
Observations	24

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

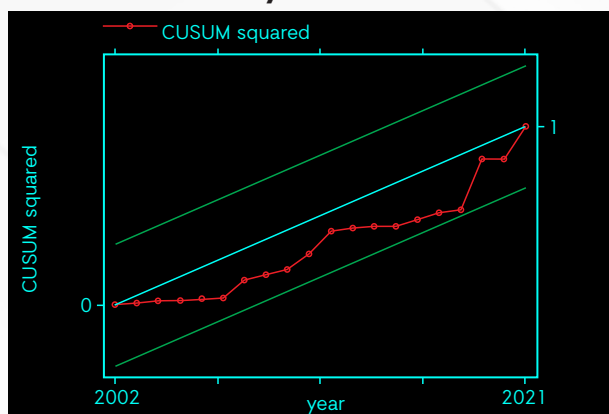
*The ARDL model, with Newey–West corrected standard errors, captures both short- and long-run effects, showing that mineral rents, governance, and inflation significantly influence GDP per capita, making the results robust

13. Residuals from ARDL Model



*ARDL model residuals show reasonable fit, mostly centered around zero, with a few extreme deviations that may reflect real-world shocks.

14. Model stability



*The graph of CUSUM squared is considered structurally stable implying that its parameters are consistent over the period.

act:onaid

ADDRESS

38G Kabulonga Road
Ibex Hill
Lusaka
Phone: +260 966 453 677

CONTACT INFORMATION

info.zambia@actionaid.org 

@ActionAidzambia 

@actionaidzambia 

@actionaidzambia_ 

<https://zambia.actionaid.org> 