# Resource curse: natural resources and their divergent impact on development in Madagascar

Josué, ANDRIANADY

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Josué Ravahiny ANDRIANADY [1]

[1]National Institute of Bank and Management, Pune, India [*]

## Abstract

Madagascar, renowned for its rich biodiversity and abundant natural resources, faces a perplexing paradox: the very assets that hold promise for economic advancement often present formidable barriers to development. This study delves into the intricate dynamics of the "raw material curse" in Madagascar, where the exploitation of natural resources fails to translate into sustained economic growth and prosperity. Through an in-depth analysis of economic data and empirical evidence, we uncover the complex interplay between natural resource abundance, economic dependency, and development outcomes. Our findings underscore the urgent need for targeted policy interventions to mitigate the adverse effects of resource dependence and foster inclusive development. By shedding light on the challenges posed by the raw material curse, this research aims to inform policymakers, stakeholders, and the international community about the imperative of sustainable and equitable resource management in Madagascar's quest for socio-economic advancement.

**Keywords:** Madagascar, natural resources, raw material curse, economic development, resource dependency, inclusive growth.

**DISCLAIMER:** *The opinions expressed by the authors in this work are their own and do not represent the views or opinions of the organisation.*

## 1 Introduction

Madagascar, endowed with abundant natural resources, presents a common economic paradox observed in many developing countries. Although these resources theoretically can support robust economic growth, economic indicators such as GDP per capita remain low, suggesting a form of "resource curse." This phenomenon, well-documented by Sachs [9], describes how natural resource abundance can paradoxically hinder economic growth.

The volatility of commodity prices, a major contributing factor, complicates long-term economic and budgetary planning, rendering sustained and predictable growth challenging Auty ([1]). Madagascar, heavily reliant on exports of natural resources, is not exempt from this dynamic.

Furthermore, the intensive and often unsustainable exploitation of natural resources has serious ecological repercussions. Barbier [2] highlights that ecosystem degradation and biodiversity loss resulting from this exploitation can limit future development options and negatively affect the economic

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[*]Corresponding author: ravahiny.andrianady@dauphine.eu

well-being of local populations. The negative results for LOGRES suggest that these environmental impacts could be a contributing factor to the decline in GDP per capita in Madagascar.

The governance challenges represent another major obstacle. Revenues from natural resources are frequently associated with governance issues such as corruption and mismanagement. Ross [8] explores how these revenues can fuel ineffective governance practices, leading to suboptimal allocation of public resources and an increase in economic inequalities. The results of our study, showing a negative impact of revenues from natural resources on GDP per capita, may reflect these governance challenges in Madagascar.

Lastly, the Malagasy economy appears to suffer from structural disarticulation, where resource-rich sectors are not well integrated with the rest of the economy. [5] Hirschman argues that this disarticulation limits the positive multiplier effects that productive sectors could have on the overall economy. Consequently, the benefits of revenues from natural resources and merchandise exports do not translate into inclusive and equitable growth. Much of the population remains excluded from economic benefits, which may explain the observed negative relationship between these variables and GDP per capita.

This article examines the impacts of revenues from natural resources and merchandise exports on GDP per capita in Madagascar.

## 2    Methodology

To analyze the impact of revenues from natural resources and merchandise exports on GDP per capita in Madagascar, we adopted an econometric approach using the ordinary least squares (OLS) method. This section details the data, variables, and econometric model used in this study.

### 2.1    Data

The data used in this study were sourced from the World Bank . The analysis period spans from 1971 to 2021, thus covering 51 years of annual observations after adjustments.

Table 1: Data Sources

| Variable | Description | Data Source |
|----------|-------------|-------------|
| GDP | GDP per capita | World Bank (https://data.worldbank.org/indicator/NY.GDP.PCAP.CD) |
| RES | Revenues from natural resources | World Bank (https://data.worldbank.org/indicator/NY.GDP.PETR.RT.ZS) |
| XP | Merchandise exports | World Bank (https://data.worldbank.org/indicator/NE.EXP.GNFS.ZS) |

### 2.2    Econometric Model

The extended econometric model used in this study is specified as follows:

$$\log(\text{GDP}_t) = \beta_0 + \beta_1 \log(\text{RES}_t) + \beta_2 \log(\text{XM}_t) + \beta_3 D_1 + \beta_4 D_2 + \epsilon_t$$

Where:

- $\log(\text{GDP}_t)$ represents the natural logarithm of GDP per capita at year $t$.

- $\log(\text{RES}_t)$ represents the natural logarithm of revenues from natural resources at year $t$.

- $\log(\text{XM}_t)$ represents the natural logarithm of merchandise exports at year $t$.

- $D_1$ and $D_2$ are dummy variables representing other factors affecting GDP per capita. These variables capture additional structural or policy-related changes that may influence the relationship between the independent variables and GDP per capita.

- $\beta_0$ denotes the intercept, which represents the baseline level of GDP per capita when all independent variables are zero.

- $\beta_1$, $\beta_2$, $\beta_3$, and $\beta_4$ are the coefficients associated with the explanatory variables, indicating the marginal effects of changes in revenues from natural resources, merchandise exports, and the dummy variables on GDP per capita.

- $\epsilon_t$ represents the error term, capturing unobserved factors or random shocks that affect GDP per capita but are not included in the model.

Incorporating dummy variables $D_1$ and $D_2$ allows for a more comprehensive analysis of the factors influencing GDP per capita in Madagascar, beyond the direct effects of revenues from natural resources and merchandise exports. These dummy variables help account for any other significant factors that may affect the relationship between the independent variables and GDP per capita over time especially political crisis which is very frequent in the country.

## 2.3  Estimation and Significance Tests

The coefficients of the model were estimated using the ordinary least squares (OLS) method. For each coefficient, we calculated standard errors to test their statistical significance. Student's t-tests were used to determine whether the coefficients are significantly different from zero at 95% and 99% confidence levels.

# 3  Results

This section presents the results of the econometric analysis conducted to examine the impact of revenues from natural resources and merchandise exports on GDP per capita in Madagascar.

## 3.1  Coefficients and Significance

The results of the estimation of coefficients are summarized in the table 2.

## 3.2  Interpretation of Coefficients

The coefficients for LOGRES and LOGXM are negative, indicating that an increase in revenues from natural resources and merchandise exports is associated with a decrease in GDP per capita. These coefficients are statistically significant at the 95% confidence level, as indicated by the t-statistics and p-values.

Table 2: Regression Results

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| LOGRES | -0.222653 | 0.048042 | -4.634499 | 0.0000 |
| LOGXM | -0.068297 | 0.026199 | -2.606814 | 0.0122 |
| DUM | -0.089346 | 0.058641 | -1.523619 | 0.1343 |
| C | 7.975575 | 0.484906 | 16.44769 | 0.0000 |
| **R-squared** | | 0.674205 | | |
| **Mean dependent var** | | 6.265115 | | |

The constant term (C) represents the intercept of the regression equation and is statistically significant, indicating that other factors not included in the model also contribute to GDP per capita in Madagascar.

### 3.3 CUSUM Test and CUSUM Square Test Results

The CUSUM and CUSUM Square tests were conducted to assess the stability of the regression coefficients over time. The results indicate that there are no significant structural breaks in the relationship between the independent variables (LOGRES and LOGXM) and the dependent variable (LOGGDP) at the 5% significance level. Therefore, we can conclude that the linear regression model remains stable over the analyzed time period.
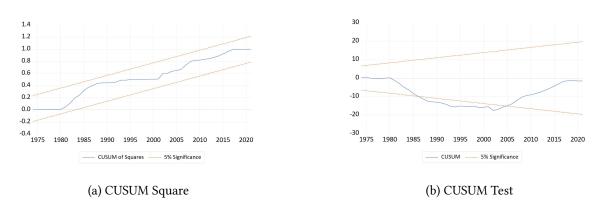


(a) CUSUM Square

(b) CUSUM Test

Figure 1: CUSUM and CUSUM Square Tests

## 4 Discussion

The results obtained from the econometric analysis show negative and statistically significant coefficients for revenues from natural resources (LOGRES) and merchandise exports (LOGXM) in relation to GDP per capita (LOGGDP) in Madagascar. These results provide important insights into the country's economic dynamics and corroborate several theories and empirical observations present in the economic literature.

### 4.1 Economic Dependency on Natural Resources

The results indicate that an increase in revenues from natural resources is associated with a decrease in GDP per capita. This negative relationship can be interpreted in light of the "resource curse," a phe-

nomenon widely documented by [9]. These authors argue that the abundance of natural resources can paradoxically hinder economic growth by inducing excessive dependence on these resources, thereby limiting economic diversification and increasing vulnerability to commodity price shocks.

## 4.2 Income Volatility

The volatility of commodity prices, and consequently revenues from their exploitation, can create macroeconomic instability. [1] highlights that this instability complicates long-term economic and budgetary planning, making sustained and predictable growth difficult. Unpredictable fluctuations in revenues from natural resources can lead to irregular economic cycles, undermining the stability and growth of GDP per capita in Madagascar.

## 4.3 Environmental Degradation

The intensive and often unsustainable exploitation of natural resources has serious ecological repercussions. Barbier [2] demonstrates that ecosystem degradation and biodiversity loss resulting from this exploitation can limit future development options and negatively impact the economic well-being of local populations. The negative results for LOGRES suggest that these environmental impacts could be a contributing factor to the decline in GDP per capita in Madagascar.

## 4.4 Governance Challenges

Revenues from natural resources are frequently associated with governance issues, such as corruption and mismanagement. Ross [8] explores how these revenues can fuel ineffective governance practices, leading to suboptimal allocation of public resources and increased economic inequalities. The results of our study, which show a negative impact of revenues from natural resources on GDP per capita, may reflect these governance challenges in Madagascar.

## 4.5 Lack of Inclusivity and Economic Disarticulation

The Malagasy economy also appears to suffer from structural disarticulation, where resource-rich sectors are not well integrated with the rest of the economy. [5] Hirschman argues that this disarticulation limits the positive multiplier effects that productive sectors could have on the overall economy. As a result, the benefits of revenues from natural resources and merchandise exports do not translate into inclusive and equitable growth. Much of the population remains excluded from economic benefits, which may explain the observed negative relationship between these variables and GDP per capita.

## 4.6 Implications for Economic Policy

Firstly, it is imperative for Madagascar to diversify its economy to alleviate its excessive dependence on natural resources and merchandise exports. This diversification strategy could entail the development of high-value-added sectors and the fostering of innovation and entrepreneurship.

Secondly, measures need to be implemented to mitigate the volatility of revenues derived from natural resources. Establishing stabilization funds and enhancing budget management are essential steps in ensuring macroeconomic stability.

Thirdly, in pursuit of sustainable development, Madagascar must adopt natural resource exploitation practices that prioritize environmental preservation and safeguard local ecosystems. Balancing economic growth with environmental conservation is crucial for long-term sustainability.

Moreover, governance reforms are necessary to address issues of transparency, accountability, and effective management of revenues generated from natural resources. Strengthening governance mechanisms can mitigate corruption risks and promote a more equitable and efficient allocation of resources.

Lastly, economic policies should prioritize inclusivity to ensure that the benefits of economic growth are shared more equitably among the population, particularly marginalized and vulnerable groups.

# 5  Conclusion

In conclusion, this study provides valuable insights into the economic dynamics of Madagascar, particularly regarding the impact of revenues from natural resources and merchandise exports on GDP per capita. The negative and statistically significant coefficients observed underscore the challenges facing the Malagasy economy and highlight the urgent need for targeted policy interventions.

The findings reaffirm the presence of the resource curse phenomenon, wherein the abundance of natural resources paradoxically impedes economic growth and development. Addressing this challenge requires concerted efforts to diversify the economy, reduce dependency on volatile commodity exports, and promote sustainable development practices.

Furthermore, governance reforms are imperative to improve transparency, accountability, and the effective management of natural resource revenues. Strengthening governance mechanisms can mitigate corruption risks and ensure a more equitable distribution of economic benefits, thereby fostering inclusive growth.

Moving forward, policymakers in Madagascar must prioritize macroeconomic stability, environmental sustainability, and social inclusivity in their policy agendas.

# References

[1]  Auty, R.M. (2001). "The Political Economy of Resource-Driven Growth." *European Economic Review*, 45(4-6), 839-846.

[2]  Barbier, E.B. (2005). "Natural Resources and Economic Development." *Cambridge University Press.*

[3]  Barrak, Ghanim, Algharabali., Saud, Asaad, Al-Thaqeb. (2023). *The Natural Resource Curse: Is It Really a Curse?. International Journal of Energy Economics and Policy*, doi: `10.32479/ijeep.14300`

[4]  Bruno, Ramamonjisoa. (2004). *Origines et impacts des politiques de gestion des ressources naturelles à Madagascar | Origins and impact of policies on the management of natural resources on Madagascar. Schweizerische Zeitschrift Fur Forstwesen*, doi: `10.3188/SZF.2004.0467`

[5]  Hirschman, A.O. (1958). "The Strategy of Economic Development." Yale University Press.

[6]  Matata, Ponyo, Mapon., Jean-Paul, K., Tsasa. (2019). *The artefact of the Natural Resources Curse. arXiv: General Economics*

[7]  Pietro, F., Peretto. (2009). *Is the "curse of natural resources" really a curse?. Research Papers in Economics*

[8]  Ross, M.L. (1999). "The Political Economy of the Resource Curse." *World Politics*, 51(2), 297-322.

[9]  Sachs, J.D., & Warner, A.M. (1995). "Natural Resource Abundance and Economic Growth." NBER Working Paper No. 5398.

[10]  Saeed, P., Langarudi., Michael, J., Radzicki. (2021). *Blessing or Burden? Another Look at the Natural Resource Curse.* doi: `10.1007/978-3-030-67190-7_12`