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The Impact of Oil Rents On Income Inequality: Does Fiscal Decentralization Matter?

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ABSTRACT

This paper explores the empirical effects of oil rents on income inequality and how the federal structure of a country influences this relationship. Although oil rents may help a country increase its nominal gross domestic product, at the same time, it may also increase income inequality. This paper uses panel data from more than 100 countries for the period 1996–2016 to find evidence that oil rents have a non-monotonic relationship with income inequality. Natural resource abundance may reduce income inequality in the short run but increase in the long run. This paper further tests the interaction effect of fiscal decentralization and oil rents on income inequality. Although fiscal decentralization is statistically insignificant, its interaction with oil rents is negative and significant. An interesting finding of the analysis is that the interaction of fiscal decentralization and oil rents eliminated the non-monotonic relationship between oil rents and income inequality.

Keywords: Income inequality, Oil Rents, Fiscal Decentralization, Oil Economics

1. INTRODUCTION

Over the past decades, many studies have tried to establish a connection between the resources of a State and its progress economically, socially, and politically. The primary area of research in these studies was the comparative analysis of resource-rich and resource-poor countries. Although, it might seem that resource abundance would help a country develop faster; however, between 1960 and 1990, the growth of per capita income of resource-abundant countries was significantly lower than that of resource-poor countries (Sachs et al., 2001). This phenomenon is the essence of resource curse literature (Polterovich et al., 2010; Niftiyev, 2021).

The oil boom in African countries raised their oil income significantly. In 2010, the oil rent as a percentage of GDP was 61% in the Republic of Congo and was above 40%

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in Gabon, Angola, Libya, and Equatorial Guinea. Many African countries experienced high GDP over the past decade due to oil rents, but at the same time, inequality in these countries also increased. For example, more than two-thirds of the Nigerian population is below the poverty line, and in the Democratic Republic of Congo, more than seven out of ten people are poor. In the case of Nigeria, between 1992 and 2010, an increase in oil rents from \$15 billion to \$58 billion resulted in an increase in the strength of poor people from 80 million to 130 million. These statistics may lead one to conclude that governments with high oil rents did little to improve the condition of the poor people (Ndikumana et al., 2012; Canare et al., 2020).

Apart from the discussion on oil rent and income inequality, many scholars have also tried to establish the relationship between decentralization and income inequality. Decentralization is the transfer of fiscal and political responsibility from the National to Sub-National government. According to Goerl and Seiferling (2014), decentralization may help achieve equal income distribution under certain conditions. Some of these conditions include that the government sector should be large, decentralization should be comprehensive, and the transfer of fiscal responsibilities should not only be limited to revenues but also expenditures as well (Goerl et al., 2014).

This paper aims to contribute to this research stream; to investigate the relationship between oil rents, fiscal decentralization, and income inequality. The interaction of oil rents and fiscal decentralization has been largely ignored in the literature, which gives enough room to research this important topic. Hence, the central question of this paper is to find out whether centralized states are more efficient than decentralized states in using oil rents to reduce income inequality. This paper will provide an empirical analysis of the intermediary role played by fiscal decentralization in the oil rent-inequality nexus. Therefore, this paper will test the following hypothesis:

H₁: *Oil rents have a negative and significant effect on income inequality.*

H₂: *Fiscal Decentralization is hypothesized to have a significant effect on income inequality after its interaction with oil rents.*

2. LITERATURE REVIEW

This paper discusses two separate strands of literature: on the link between oil rents and income inequality, and between fiscal decentralization and income inequality. In this section, theoretical arguments of each aspect are discussed separately.

2.1. Oil Rents and Income Inequality

The general view is that more natural resources may lead to lower welfare. This is the idea behind the phenomenon of Dutch disease. The concept shows that as one sector progresses (for example, the oil sector), other sectors may decline (like manufacturing) due to appreciation of a country's currency, which would leave oil as the only functioning revenue source (Bresser, 2013). Since resource usage does not require a lot of labour but requires human-capital intensive manufacturing, this may lead to inequality if the labour force is unprepared for it (Leamer et al., 1999). And Gylfason and Zoega (2003) found that increased dependence on natural resources was correlated with greater inequality in cross-country data (Gylfason et al., 2002).

Similarly, Ross looks at how mineral wealth impacts vertical and horizontal inequality. Where vertical inequality is the gap between rich and poor, Horizontal inequality is the gap between people living in mineral-rich regions and mineral-poor regions. His results indicated that an increase in mineral wealth was more likely to increase regional inequalities. (Ross, 2006). The direct link between resource revenue, income level, and demand for goods leads to the occurrence of Dutch Disease (Frankel, 2010). And when this happens, factors of production are moved from the manufacturing sector to the natural resource sector. This causes deindustrialization and a loss of employment opportunities, ultimately increasing inequality (Kim et al., 2020). This occurrence was also observed in Azerbaijan after their oil industry saw an increase in oil revenues (Niftiyev, 2021).

However, other scholars have found a non-monotonic relationship between resource rent and inequality. This view holds that after an oil boom inequality decreases in the short run and increases in the long run until this effect disappears (Goderis et al., 2011). Moreover, Berisha et al. (2020) used panel data from the United States to find

nonmonotonic consequences from the abundance of oil compared to dependency on oil. They found that the abundance of oil mitigated the inequality levels within U.S. states; however, as the level of oil production increased, the impact on inequality diminished. Finally, they also found the vulnerability of U.S. states with respect to oil dependency and income inequality.

2.2. Income Inequality and Fiscal Decentralization.

A line of literature also analyses the impact of fiscal decentralization on income inequality. Empirical analysis on the link between fiscal decentralization and income distribution for 11 economies of Central and Eastern Europe (CEE) from 1995-2011 suggested that the association between decentralization and inequality depended on intergovernmental transfers and the source of financing of subnational governments (Makreshanska et al., 2016).

Moreover, Cavusoglu et al. (2015) investigated the association between fiscal decentralization and inequality in the U.S. states over three and a half decades. They found that there was one-way causality from fiscal decentralization to income inequality, but only in rich states. However, using data from 23 OECD countries over 1971-2000, Sacchi et al. found that even if fiscal decentralization could promote efficiency, it may be bad for the equity side. They found that tax decentralization was linked to more household income inequality within a country (Sacchi et al., 2011). Another analysis of 20 OECD countries from 1996-2011 showed that fiscal decentralization had a decreasing effect on inequality using the GINI coefficient, but this effect was different for different income groups. Although the effect was significant for middle-income earners, it was insignificant for other income groups (Stossberg et al., 2016).

The main argument put forward in defense of decentralization is that the direct interaction of decentralized governments with the local population results in a better understanding of their needs. Canare et al. (2020) used panel and annually-averaged cross-section data of various countries to find a weak link between fiscal independence and income inequality. However, this relationship is strengthened when moderated by the effectiveness of government.

Using panel data set from 1980 to 2016, Bojanic et al. (2019) examined the effect of

political, fiscal, and administrative decentralization on income inequality in OECD and non-OECD countries. Their results showed that decentralization reduced income inequality until a certain threshold, and the extent of the effect diminished as economic development increased.

Finally, Christian Lessmann analysed 56 countries to find the impact of political and fiscal decentralization on regional inequalities. His study revealed similar results for both types of decentralization, i.e. decentralization reduced regional inequalities in rich countries, but in developing and emerging economies, it may lead to higher regional inequalities (Lessmann, 2012).

3. RESEARCH METHODOLOGY

The data used in the analysis has been taken from multiple sources. Several transformations have been made to meet OLS requirements and find meaningful results. These transformations are in line with the literature and econometric methods. The dependent variable is “Income inequality”, and the interest variables are Oil rent and Decentralization. Moreover, the set of control variables is mainly inspired by Mallaye et al. (2015) and Kaasa’s (2005) extensive work on the subject. Many factors impact income inequality, but these two works have identified major stimuli that explain the prevalence of inequality to a larger extent.

3.1. Income Inequality

The data for the variable “income inequality” is provided by Frederick Solt. His Standardized World Income Inequality Database (SWIID) has more extensive coverage than alternate datasets; so it is well suited for broad cross-country research on the inequality of income when compared to other sources (Solt, 2016). The income inequality measure used from the data set is Gini indices of disposable (post-tax, post-transfer) income for 192 countries.

3.2. Oil Rents

To measure resource rents, only oil rents are considered. The data on Oil rents as a percentage of GDP is taken from the database of the World Bank named “World Development Indicators”. The rent is the difference between the total cost of production

of crude oil and the value of crude oil production at world prices.

3.3. Fiscal Decentralization

Another variable of interest is fiscal decentralization. For this purpose, the paper uses data provided by International Monetary Fund (IMF). The Data set provides a variable that gives the subnational government's share of budget spending out of the total budget expenditure.

3.4. Other Variables

Other variables taken from Mallaye et al. (2015) include demographic effects, education, inflation, Gross Domestic Product per capita, and Openness. The data for all of these variables are taken from World Development Indicators (WDI). Demographic effects are proxied by the labour force participation rate. To measure the level of education, the variable primary completion rate is used, which measures total new entrants in the last grade of primary education. Furthermore, inflation is measured by Consumer Price Index (CPI). To capture Openness, the variable Trade (% of GDP) is used; it is the sum of exports and imports as a share of GDP. And finally, the log of GDP per capita is also controlled for in the regression.

4. RESULTS AND ANALYSIS

To test the hypothesis, we analyse the fixed effects panel data model of 117 countries over the period 1996-2016. Through these analyses, we establish the relationship between oil rents, fiscal decentralization, and income inequality. The basic regression model has the following form.

$$\text{Income Inequality}_i = \alpha + \sum_{j=1}^k \beta_j X_{j,i} + \delta_1 \text{Oil}_i + \delta_2 \text{DEC}_i + \delta_3 \text{Oil}_i \times \text{DEC}_i + \varepsilon_i \quad (1)$$

Here, Inequality_i has been taken from the Standardized World Income Inequality Database (SWIID). It represents the Gini indices of post-tax and post-transfer disposable income. To account for exogenous control variables affecting income inequality, we include $X_{j,i}$ exogenous control variables. The variable Oil_i in the equation represents the measure of Oil Rents, and to represent fiscal decentralization we use the variable DEC_i . Moreover, $\text{Oil}_i \times \text{DEC}_i$ represents the corresponding interaction variables, α is a constant, and ε_i is the error term.

We used the Hausman test to decide that the fixed effects panel data model would be appropriate to account for country fixed effects. The identifying assumption used to conduct this test is that the unobservable factors which might affect the LHS and RHS of the regression equation simultaneously are time-invariant; this would remove the omitted variable bias. Moreover, since the variables are time-invariant, the values of the variables do not change across time. These country-fixed effects include factors like Culture, Geography, historical differences, and common time shocks.

The results are presented in Table 1. The table predicts equation (1) using a fixed-effects panel data model. The results are found using the strategy of adding variables one by one to find the individual impact of each variable. First, we include the main interest variable; after that, control variables are added one by one to see the individual impact of each variable on the main interest variable.

The results in Model 1 show that there is a statistically significant and negative relationship between Oil Rents and income inequality. Hence, we fail to reject hypothesis 1, which states that oil rents have a significant and negative relationship with income inequality. This means that as oil rents increase over the panel of countries, income inequality decreases as a consequence. However, to capture the non-monotonic relationship between the two variables, the square of Oil Rents has also been controlled for. This strategy has also been used by Mallye et al. (2015) in their paper on Oil rents and Income Inequality in developing countries. The results in model 1 show that the variable Oil rents square is also statistically significant. Therefore, in the short run, an increase in oil rents decreases income inequality, but in the long-run income inequality increases.

Moving on, Model 2 predicts the impact of fiscal decentralization and its interaction with oil rents on income inequality. Although fiscal decentralization is statistically insignificant, its interaction with oil rents is statistically significant and negative. This means that although fiscal decentralization does not reduce income inequality on its own when it interacts with oil rents, it reduces income inequality. Another interesting result from model 2 is that the coefficient of the square of oil rents, which was significant in model 1, becomes insignificant in this model. This means that the interaction of fiscal

decentralization and oil rents reduces income inequality not only in the short run but also in the long run. Moreover, the AIC and BIC of Model 2 are significantly lower than Model 1, which indicates that Model 2 is far better than Model 1. Overall, we also fail to reject Hypothesis 2, as the interaction effect of fiscal decentralization and oil rents on income inequality is statistically significant.

Fiscal decentralization may help a country reduce the negative impact of oil rents on income inequality. High-value resources like oil are often distributed unequally, and if the distribution of revenues overlaps ethnic or based on some other group division, it may create horizontal inequality. Many resource-rich nations face secessionist movements to decrease (or increase) horizontal inequality (Lujala et al., 2007). Moreover, if the resource-producing area is in a specific region, this may impact the geographical distribution of income. The presence of regional inequality will mainly depend on the ability of the subnational government to capture income from the resource sector. Hence, the inequality between the producing region and the rest of the country will increase if the producing region is rich and vice versa if the region is poor (Lujala et al., 2007).

From Model 3 to Model 6, we add one variable at a time to see the incremental effect of each variable. These variables include Inflation rate, GDP per capita, Trade, and education level in a country. The final model is model 6, where oil rents and their interaction with fiscal decentralization are statistically significant. Moreover, the variable Trade is positive and significant, which means that as trade increases, income inequality also increases. However, other variables are statistically insignificant.

Table 1. Panel results: Income Inequality and Oil Rents.

Dependent Variable: Income Inequality	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Oil rents (% of GDP)	-0.115*** (0.0282)	-0.272*** (0.104)	-0.270*** (0.104)	-0.295*** (0.105)	-0.294*** (0.103)	-0.361*** (0.119)
Oil Rents square	0.00149*** (0.000554)	0.00833 (0.00536)	0.00838 (0.00536)	0.00921 (0.00538)	0.00922 (0.00528)	0.0121 (0.00592)
Fiscal Decentralization		0.0840 (1.267)	-0.134 (1.280)	-0.573 (1.306)	-0.295 (1.283)	-0.614 (1.481)
Oil Rents*Fiscal		-0.561*** (0.185)	-0.549*** (0.186)	-0.578*** (0.186)	-0.437** (0.185)	-0.415** (0.195)
Inflation rate			-0.00131 (0.00105)	-0.00111 (0.00106)	-0.00114 (0.00104)	-0.000890 (0.00105)
GDP per capita				0.146 (0.0892)	-0.0853 (0.0956)	-0.0479 (0.123)
Trade (% of GDP)					0.0146*** (0.00242)	0.0162*** (0.00331)
Education						0.00827 (0.00998)
Constant	38.49*** (0.0467)	33.45*** (0.180)	33.42*** (0.181)	31.99*** (0.892)	32.88*** (0.888)	31.02*** (1.434)
R ²	0.008	0.030	0.031	0.034	0.070	0.091
AIC	8734.6	2965.3	2963.7	2962.8	2926.5	1882.6
BIC	8752.1	2989.9	2993.2	2997.2	2965.8	1922.9

Standard errors in parentheses
 * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5. CONCLUSION

Over the years, scholars have empirically tested the impact oil rents have on a country's economy. The literature on resource curse points out that resource abundance in a country may turn into a curse, which can be seen from the fact that the growth of income per capita of resource-abundant countries was lower than those of resource-poor countries. One aspect that needed more attention was the impact of oil rents on income inequality. Hence, this paper looked at this relationship and also the impact decentralization had on this relationship.

This paper used a panel of 117 countries over the period 1996-2016 to establish the relationship between oil rents, fiscal decentralization, and income inequality. The results in model 1 show that there is a non-monotonic relationship between oil rents and income inequality. However, this non-monotonic relationship is eliminated when we introduce the interaction of oil rents and fiscal decentralization in model 2. This means that the interaction of fiscal decentralization and oil rents not only reduces income inequality in the short run but also the long run. Moreover, the estimate of fiscal decentralization is insignificant, but its interaction with oil rents is statistically significant.

Given the risk related to horizontal inequality, decentralization of resource revenues is preferred. Global trends hint towards decentralizing mineral rents because they can play a moderating role in easing horizontal inequality (Brosio, 2003). However, Ross (2006) thinks that central governments are better equipped than subnational governments to deal with mineral revenue volatility, implement countercyclical fiscal policies and absorb new investments from windfall spending. A carefully designed tax system allowing sub-national governments to levy relatively small and stable taxes, while national government levy other major taxes is a preferable option (Ahmad et al., 2002).

The policy implications from this study lead to the conclusion that governments should implement policies to reduce the income gap between regions from where the resource is extracted and the regions that are not dependent on resource wealth. Moreover, the government should also focus on reducing the gap between real and expected income in the regions where oil is extracted. Some of the measures to achieve

these targets could include fostering the role of NGOs, transparency of revenues, promotion of good corporate citizenship, restriction of migration to the regions where resources are being extracted, .etc. (Ross, 2006).

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