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Exploring Fiscal Dynamics Between Resource and Non-Resource Tax Revenues in Oil-Dependent Countries

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Abstract

The primary objective of this study was to investigate the asymmetric effects of resource tax revenues on non-resource tax revenues in oil-rich countries. This approach addresses a critical gap in the literature, as most previous studies have operated under the assumption of a symmetric relationship between resource and non-resource tax revenues. By challenging this assumption, the study aims to provide a more nuanced understanding of the fiscal dynamics in economies heavily reliant on resource-based revenues. The asymmetric framework allows for an examination of whether increases and decreases in resource tax revenues have differing impacts on non-resource tax revenues, thereby capturing the complexities and potential fiscal vulnerabilities of oil-dependent economies. Understanding these dynamics is crucial for policymakers in oil-rich countries as they strive to design resilient tax systems capable of withstanding fluctuations in resource revenues, ensuring fiscal sustainability and economic stability in the face of volatile resource markets. The findings reveal a negative relationship, indicating that increases in resource tax revenues are associated with decreases in non-resource tax revenues over both time horizons. This suggests a substitution effect, where reliance on resource revenues may crowd out efforts to generate non-resource tax revenues. To further explore this relationship, a nonlinear ARDL model was utilized, providing robust evidence of an asymmetric effect. The empirical results demonstrate that the impact of resource tax revenue changes on non-resource tax revenues differs depending on whether resource revenues are increasing or decreasing. These findings underscore the complexity of the fiscal interplay in oil-rich economies, emphasizing that the effects of resource revenue fluctuations are not uniform and must be addressed through tailored policy measures to mitigate fiscal vulnerabilities and enhance revenue stability. The long-run analysis reveals that positive shocks in resource tax revenues negatively affect non-resource tax revenues, indicating that an increase in resource revenues reduces the incentive or effort to enhance non-resource tax revenue collection. Conversely, negative shocks in resource tax revenues do not result in a compensatory increase in non-resource tax revenues, suggesting a lack of fiscal elasticity or readiness to offset declines in resource-based revenues through other tax sources. Furthermore, the short-term effects are found to be more pronounced when resource tax revenues increase, highlighting a stronger immediate substitution effect. This implies that governments may temporarily shift their focus away from developing non-resource revenue streams when resource revenues are abundant, exacerbating fiscal dependence on volatile resource markets. These findings underscore the need for oil-rich economies to adopt proactive fiscal strategies that balance resource and non-resource revenue generation, ensuring long-term economic resilience and sustainability.

Keywords: Resource Tax Revenues, Non-Resource Tax Revenues, Fiscal Policy, Oil-Rich Economies

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1. INTRODUCTION

According to the resource curse hypothesis, resource-rich economies are expected to experience slower long-term economic growth compared to resource-poor ones (Sachs & Warner, 2001; Ali & Audi, 2016; Shahbaz et al., 2016; Alabi, 2010; Sharma & Strauss, 2013; Audi & Ali, 2017; Gorus & Groeneveld, 2018; Audi & Ali, 2018; Khan & Hassan, 2019). This paradox arises because an abundance of natural resources can lead to economic and institutional challenges, such as over-reliance on resource revenues, neglect of other economic sectors, and vulnerability to volatile commodity prices. The hypothesis suggests that resource wealth can undermine economic diversification by fostering "Dutch disease," where resource booms lead to currency appreciation, making non-resource exports less competitive. Additionally, resource dependence can weaken governance and institutions, as resource rents often promote rent-seeking behavior and corruption, diverting focus from productive economic activities. This dynamic reduces investment in human capital and infrastructure, further hindering sustainable development. Despite these challenges, the resource curse is not inevitable. Strategic resource management, sound fiscal policies, and investments in economic diversification can help resource-rich economies avoid the pitfalls of the resource curse and achieve long-term sustainable growth. The negative effects of higher resource rents on economic growth have been attributed to a range of transmission mechanisms (Alexeev & Conrad, 2005; Desiree, 2019; Emodi, 2019; Mahmood, 2019; Al-Abri et al., 2019; Zaheer & Nasir, 2020; Bakht, 2020; Habibullah, 2020; Ali et al., 2021; Ali et al., 2021; Hussain & Khan,

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2022; Keller, 2022; Ali et al., 2022; Rossi, 2023; Kibritcioglu, 2023; Senturk, 2023; Çiçekçi & Gaygısız, 2023; Audi & Ali, 2023; Ali et al., 2023). These mechanisms explain how an over-reliance on resource wealth can hinder long-term economic development, despite the potential for significant revenue generation.

One key mechanism is Dutch disease, where resource booms lead to currency appreciation, making non-resource sectors, such as manufacturing and agriculture, less competitive in global markets. This hampers economic diversification and increases vulnerability to resource price fluctuations. Another mechanism involves institutional quality. Higher resource rents can weaken governance by fostering rent-seeking behavior, corruption, and inefficient allocation of resources. Governments may become reliant on resource revenues, neglecting efforts to broaden the tax base or invest in public goods that drive inclusive growth. Resource rents can also reduce incentives for human capital development. When resource wealth dominates the economy, less emphasis is often placed on education and skill development, limiting the workforce's adaptability and innovation capacity. Additionally, fiscal mismanagement is a common issue, as resource windfalls can lead to unsustainable spending and economic volatility during resource price downturns. Lastly, the volatility of resource prices creates macroeconomic instability, discouraging long-term investments in critical sectors (Elkamel, 2023; Abdelkawy et al., 2024; Abdelkawy & Al Shammre, 2024; Laniran & Adeleke, 2024; Audi et al., 2024). These combined effects highlight the complexity of managing resource wealth effectively to avoid undermining sustainable economic growth. Overcoming these challenges requires strong institutions, prudent fiscal policies, and a commitment to economic diversification. One prominent mechanism is the "fiscal resource curse," which posits that resource tax revenues negatively impact non-resource tax revenues (Collier and Hoeffler, 2005; Collier, 2006; Desiree, 2019; Emodi, 2019; Mahmood, 2019; Al-Abri et al., 2019; Zaheer & Nasir, 2020; Bakht, 2020; Habibullah, 2020; Ali et al., 2021; Ali et al., 2021; Hussain & Khan, 2022; Keller, 2022; Ali et al., 2022; Rossi, 2023; Kibritcioglu, 2023; Senturk, 2023; Çiçekçi & Gaygısız, 2023; Audi & Ali, 2023; Ali et al., 2023). This phenomenon arises because resource-rich governments often become heavily reliant on revenues generated from natural resources, such as oil, gas, or minerals, reducing their incentive to develop and maintain robust non-resource tax systems.

This dependence on resource tax revenues can weaken tax collection capacity in non-resource sectors, leading to a narrower and less diversified tax base. Additionally, resource revenues often create a sense of fiscal complacency, where governments prioritize resource exploitation over economic diversification, further eroding non-resource revenue streams. The fiscal resource curse also discourages the political accountability typically associated with broad-based taxation, as reliance on resource revenues reduces the necessity to engage taxpayers, thereby weakening democratic governance and institutional development. These dynamics exacerbate fiscal vulnerabilities, especially during resource price downturns, when resource revenues decline, leaving governments ill-equipped to compensate through non-resource revenues. Addressing the fiscal resource curse requires targeted reforms, including strengthening tax administration, broadening the tax base, and promoting economic diversification to reduce over-reliance on volatile resource revenues (Elkamel, 2023; Abdelkawy et al., 2024; Abdelkawy & Al Shammre, 2024; Laniran & Adeleke, 2024; Audi et al., 2024).

The hypothesis highlights a country's inability to effectively generate revenues beyond resource taxes, emphasizing a critical fiscal vulnerability. Despite the necessity of diversifying revenue sources, this remains a daunting challenge for resource-rich nations. The reliance on resource tax revenues often leads to fiscal rigidity, leaving governments poorly equipped to manage economic fluctuations caused by volatile resource markets. The importance of domestic tax mobilization is underscored by the unpredictable nature of resource tax revenues. Resource price volatility can significantly impact government budgets, compelling countries to develop and strengthen non-resource revenue streams to ensure fiscal stability and sustainability (Knebelmann, 2017). Building a resilient and diversified tax system not only mitigates the risks associated with resource dependence but also enhances the capacity of governments to invest in essential public goods and services, fostering broader economic development. The Prebisch-Singer hypothesis posits that, unlike manufactured goods, the terms of trade for primary commodities tend to deteriorate over time. This poses a significant challenge for resource-rich countries, as it implies that reliance on resource exports may lead to diminishing returns in the long term. Moreover, revenues collected from resource taxation often fall short of their potential, exacerbated by inefficiencies within the resource taxation system. A lower domestic tax regime further reduces public incentives to scrutinize government actions, potentially leading to governance issues (Collier and Hoeffler, 2005; Collier, 2006; Laniran & Adeleke, 2024; Audi et al., 2024). In this context, policymakers must identify opportunities and favorable conditions to enhance domestic tax revenues.

Empirical evidence indicates that increases in resource tax revenues are often accompanied by decreases in non-resource revenues, highlighting a substitution or eviction effect between these revenue streams (Abdelwahed, 2020; Laniran & Adeleke, 2024; Audi et al., 2024). Studies by Bornhorst et al. (2009), Ossowski and Gonzales (2012), Thomas and Treviño (2013), Crivelli and Gupta (2014), and Knebelmann (2017) support the existence of this substitution effect, suggesting that reliance on resource taxes may crowd out efforts to mobilize non-resource revenues. However, some arguments challenge this crowding-out effect, suggesting that resource tax revenues could potentially enhance non-resource revenues under certain conditions. First, governments can use resource tax revenues to strengthen fiscal administration, improving their capacity to collect non-resource taxes (Besley and McLaren, 1993; Besley and Persson, 2009, 2013). Second, as resource tax revenues increase, governments may opt to reduce fiscal reliance on natural resources and focus on building a robust non-resource taxation system. Third, the direct and indirect economic linkages between the resource sector and the broader economy can support the development of the non-resource sector, thereby expanding the non-resource tax base (Knebelmann, 2017). These dynamics suggest that the relationship between resource and non-resource revenues is complex and influenced by various

factors, including governance, fiscal policy, and the structure of the economy. Policymakers must carefully balance resource reliance with efforts to diversify and strengthen domestic tax systems to ensure long-term fiscal sustainability and economic stability.

The possibility that resource tax revenues exert an asymmetric impact on non-resource tax revenues has received relatively little attention, despite its plausibility in real-world contexts. Most of the existing literature has focused on increases in resource tax revenues and consistently found a negative relationship between resource and non-resource tax revenues, often overlooking the potential for asymmetric dynamics (Bornhorst et al., 2009; Crivelli and Gupta, 2014; Ossowski and Gonzales, 2012; Thomas and Treviño, 2013; Laniran & Adeleke, 2024; Audi et al., 2024). This one-sided focus limits the understanding of how different scenarios—such as declines in resource tax revenues—might affect non-resource revenues differently. Recent research underscores the importance of considering nonlinear and asymmetric relationships among macroeconomic variables. Studies have shown that neglecting such asymmetry can lead to misleading conclusions and inaccurate policy recommendations (Abubakar et al., 2023). This challenges the conventional notion that increases in resource tax revenues invariably weaken non-resource revenues, while decreases in resource tax revenues automatically strengthen them. In reality, declining resource tax revenues may not result in higher non-resource tax revenues, particularly in the absence of sufficient state capacity to collect taxes or the willingness to implement necessary tax reforms (Ishak and Farzanegan, 2020). Moreover, the extent to which non-resource tax revenues respond to increases in resource revenues may differ from their response to decreases. This asymmetry could be driven by factors such as the structure of the tax system, governance quality, and the economic linkages between resource and non-resource sectors. Understanding these dynamics is essential for designing fiscal policies that promote revenue stability and diversification, ensuring resilience against resource revenue fluctuations. Recognizing and addressing the asymmetric effects of resource tax revenues could lead to more effective strategies for fostering sustainable fiscal systems in resource-dependent economies.

In this study, we aimed to address a critical gap in the literature by empirically examining the asymmetric nature of the "fiscal resource curse hypothesis." By doing so, we added an important dimension to the resource curse literature, highlighting the nuanced ways in which changes in resource tax revenues influence non-resource revenues. Our primary contribution lies in identifying and analyzing the asymmetric effects of resource revenue fluctuations on non-resource revenue streams, shedding light on how increases and decreases in resource tax revenues may affect non-resource revenues differently. To the best of our knowledge, this study is among the first to explore the asymmetric impacts of resource revenue shocks in this context. Prior research has primarily focused on linear relationships, often neglecting the possibility that positive and negative changes in resource tax revenues may have distinct effects. By incorporating this perspective, we provide a more comprehensive understanding of the fiscal dynamics at play in resource-dependent economies, offering valuable insights for policymakers seeking to mitigate the risks associated with resource revenue volatility and strengthen non-resource revenue systems.

2. LITERATURE REVIEW

The effects of an abundance of natural resources on a country's economy have been a subject of active research for many years. Numerous studies have sought to understand how resource wealth influences economic performance, with a primary focus on its long-term growth effects. However, the empirical evidence on this topic remains contentious and divided. While some studies have highlighted the positive aspects of resource abundance, portraying it as a blessing that fosters economic growth and stability (Alexeev and Conrad, 2005; Brunnschweiler and Bulte, 2008; Lederman and Maloney, 2006; Sala-I-Martin et al., 2004), others have emphasized its negative consequences, framing it as a curse that hampers development and leads to stagnation (Gylfason et al., 1999; Leite and Weidmann, 1999; Sachs and Warner, 2001; Sala-I-Martin and Subramanian, 2003). Adding complexity to this debate, a third perspective argues that the impact of resource abundance is conditional, depending on various factors such as institutional quality, governance, economic policies, and the structure of the economy. Studies like those by Collier and Goderis (2012) and Mehlum et al. (2006) have pointed out that the outcomes of resource wealth can vary widely across countries and contexts, influenced by how resources are managed and the prevailing socio-economic conditions.

This diversity of findings underscores the need for nuanced approaches to studying resource abundance. It suggests that the effects of natural resources on economic growth cannot be universally categorized but must instead be analyzed with consideration of the specific conditions and policies shaping each country's experience. Various theoretical explanations have been proposed to account for the mixed findings on the economic impacts of natural resource abundance. These arguments can broadly be divided into economic and political factors (Badeeb et al., 2017). On the economic side, key explanations include the “Dutch disease” phenomenon (Sachs and Warner, 2001), which highlights how resource booms can lead to currency appreciation and harm other export sectors; the volatility view (Davis and Tilton, 2005; Deaton, 1999; van der Ploeg and Poelhekke, 2009; Venables, 2016), which focuses on the economic instability caused by resource price fluctuations; lower education levels due to resource dependence (Gylfason, 2001; Gylfason and Zoega, 2006); and the “fiscal resource curse” hypothesis (Chachu and Nketiah-Amponsah, 2022), which examines how resource revenues might crowd out non-resource tax revenues.

On the political side, the explanations often revolve around rent-seeking behaviors (Gylfason, 2001; Hodler, 2006; Iimi, 2007) and weak institutional frameworks (Tornell and Lane, 1999). Resource wealth may lead to governance issues, as the ease of accessing resource rents can undermine institutional development and incentivize corruption, further exacerbating the

challenges of sustainable development. Among these theories, the “fiscal resource curse” hypothesis has received relatively little attention in the literature. This hypothesis posits that resource abundance can crowd out non-resource revenues, as resource-rich countries often struggle to develop a broad-based tax system outside the resource sector (Masi et al., 2018; Jensen, 2011). In theory, governments might use resource windfalls to increase public spending or reduce non-resource taxes, which, while temporarily beneficial, could undermine fiscal stability in the long run (James, 2015; Emodi, 2019; Mahmood, 2019; Al-Abri et al., 2019; Zaheer & Nasir, 2020; Bakht, 2020; Habibullah, 2020). This lack of focus on diversifying revenue sources leaves these economies vulnerable to resource price shocks, making the development of a robust, non-resource tax base a critical priority for ensuring long-term economic sustainability.

Several mechanisms explain how an abundance of natural resources could negatively affect domestic tax revenue mobilization. First, the volatility of resource tax revenues complicates fiscal and macroeconomic policy management, creating instability and unpredictability in government budgets (Arezki and Nabli, 2012). Second, the "Dutch Disease" phenomenon reduces opportunities for tax revenue mobilization by causing exchange rate appreciations that impede economic diversification and narrow the tax base (van der Ploeg and Poelhekke, 2009; Emodi, 2019; Mahmood, 2019; Al-Abri et al., 2019; Zaheer & Nasir, 2020; Bakht, 2020; Habibullah, 2020; Ali et al., 2021; Ali et al., 2021; Hussain & Khan, 2022; Keller, 2022; Ali et al., 2022; Rossi, 2023). Third, rent-seeking behaviors weaken institutional frameworks, including those responsible for domestic tax collection, leading to poor tax policy decisions (Mehlum et al., 2006). Fourth, resource windfalls can crowd out income-generating activities such as entrepreneurship and private investment, thereby shrinking the overall tax base (Papyrakis and Gerlagh, 2006; Torvik, 2002). Fifth, natural resource abundance can foster conflict, undermining investor and business confidence while reducing the security of capital, which further narrows the tax base (Collier and Hoeffler, 2005). Lastly, the resource sector's limited stakeholders make revenue mobilization straightforward, often at the expense of broadening the tax base (Lei and Michaels, 2014). Conversely, resource tax revenues can enhance non-resource tax revenues through several channels. The direct and indirect economic linkages between the resource sector and the broader economy can stimulate growth in non-resource activities, thereby expanding the non-resource tax base (Knebelmann, 2017; Laniran & Adeleke, 2024; Audi et al., 2024). Additionally, governments can reinvest resource tax revenues into strengthening tax administration, improving the efficiency and effectiveness of revenue collection (Besley and McLaren, 1993; Besley and Persson, 2009). Moreover, the volatility of commodity prices can motivate governments to develop more resilient domestic revenue systems to mitigate reliance on unpredictable resource revenues (Abdelwahed, 2020; Laniran & Adeleke, 2024; Audi et al., 2024). These mechanisms highlight the dual potential of resource abundance to either undermine or support domestic tax revenue mobilization, depending on how resource revenues are managed and the broader economic and institutional context. Ensuring that resource wealth contributes positively to fiscal stability and diversification requires sound governance, proactive policy measures, and investments in institutional capacity.

The empirical evidence regarding the relationship between resource and non-resource tax revenues remains inconclusive. However, several studies have consistently reported a substitution effect, where increases in resource tax revenues are offset by decreases in non-resource revenues. Abdelwahed (2020) noted this displacement effect, highlighting the fiscal trade-offs in resource-dependent economies. Bornhorst et al. (2009) examined hydrocarbon tax revenues and their relationship with non-hydrocarbon revenues in 30 oil-producing countries from 1992 to 2005. Using fixed-effects and generalized method of moments estimators, they found that a 10% increase in hydrocarbon tax revenues displaces non-hydrocarbon revenues by approximately 2%. Similar results have been documented in regional studies. Ossowski and Gonzales (2012) reported comparable findings for Latin America, while Thomas and Treviño (2013) observed the same for Sub-Saharan Africa. Crivelli and Gupta (2014) extended this analysis to a panel of 35 resource-rich countries, finding that a 1% increase in resource tax revenues leads to a 0.3% reduction in tax efforts, primarily through a decline in revenues from taxes on goods and services. More recent studies have reinforced these conclusions. Mawejje (2019) confirmed a negative relationship between resource tax revenues and non-resource revenues for a panel of 31 Sub-Saharan African countries, highlighting the vulnerability of non-resource tax bases in resource-dependent regions. Chachu and Nketiah-Amponsah (2022) further substantiated the displacement effect, estimating that a 1% increase in hydrocarbon tax revenues results in a 0.2% to 0.3% decrease in non-hydrocarbon revenues. These findings underscore the fiscal challenges faced by resource-rich countries. The reliance on resource tax revenues not only limits the development of non-resource revenue streams but also poses risks to fiscal stability, especially during periods of resource price volatility. Addressing this displacement effect requires targeted policies aimed at diversifying revenue sources and strengthening non-resource tax systems to ensure long-term fiscal sustainability.

It is well established that fluctuations in commodity prices exert asymmetric effects on economic growth (Ben Slimane et al., 2021) and fiscal policy (Arezki and Ismail, 2013). However, there remains a significant gap in understanding the asymmetry in the relationship between resource tax revenues and non-resource revenues. This area has been underexplored in the literature, particularly in the context of oil-exporting nations, where the reliance on resource revenues poses unique fiscal challenges. The question of whether asymmetric dynamics exist in how changes in resource tax revenues affect non-resource revenues is crucial for understanding the fiscal vulnerabilities of resource-dependent economies. Positive shocks in resource revenues might disincentivize efforts to expand non-resource tax bases, while negative shocks may not necessarily lead to compensatory increases in non-resource revenues, given structural and institutional constraints. These dynamics are particularly relevant for oil-exporting nations, which are heavily influenced by the volatility of global oil prices. Given this lack of clarity, there was a pressing need for an extensive investigation into the asymmetric impact of resource tax revenues

on non-resource revenues. Employing a nonlinear framework allows for a more nuanced analysis, capturing how increases and decreases in resource revenues might have differential effects. This approach provides deeper insights into the fiscal dynamics of oil-exporting countries, offering critical guidance for policymakers aiming to develop more resilient and diversified revenue systems.

3. METHODOLOGY

In our study, we utilized annual data from 36 oil-exporting countries spanning the period 2000–2023. To specifically analyze fiscal effort, we focused on non-resource tax revenues as the dependent variable. Data on resource and non-resource tax revenues were sourced from the Government Revenue Dataset (GRD), published by the International Center for Taxation and Development in 2024, ensuring comprehensive and reliable fiscal information for our analysis.

The model employed in our study is specified as follows:

NRTOil Export=f(Resource Tax, GDP per capita, Trade, Corruption, Agriculture)

Oil Exports= Oil exports as a percentage of GDP

Resource Tax= Resource Tax as a percentage of GDP

GDP Per capita= Country' GDP per capita

Trade= trade volume as a percentage of GDP

Corruption= Corruption perception index

Agriculture= Agriculture output as a percentage of GDP

This nonlinear model allows us to distinguish between the effects of positive and negative changes in resource tax revenues on non-resource tax revenues, providing insights into potential asymmetries. By incorporating relevant control variables, the model accounts for other macroeconomic and institutional factors that might impact fiscal outcomes. This framework is critical for understanding the complex fiscal dynamics in oil-exporting countries and identifying effective strategies for enhancing revenue stability and diversification.

4. ESTIMATED OUTCOMES

We estimated the linear model to analyze the effects of changes in resource tax revenues on non-resource tax revenues. Table 5 presents the results from the three estimation methods employed in the study: Mean Group (MG), Pooled Mean Group (PMG), and Dynamic Fixed Effects (DFE). To determine the efficiency and consistency of these estimators, we conducted a Hausman test. The null hypothesis, which tested the efficiency of the PMG estimator relative to the MG and DFE estimators, was not rejected. This result indicates that PMG was the most appropriate estimator for this analysis. The long-term estimates revealed a significant negative error correction coefficient, suggesting that the model converges to a long-term equilibrium relationship. Across all specifications, we observed a consistent negative relationship between resource tax revenues and non-resource tax revenues. Specifically, the PMG estimator indicated that a 1% increase in resource tax revenues reduces non-resource tax revenues by approximately 0.18%. The magnitude of this crowding-out effect varied with different estimators. For instance, the DFE estimator, as reported in Column 3, showed a larger offset, with a 1% increase in resource tax revenues crowding out non-resource ones by about 0.34%. These findings align with earlier studies, such as those by Bornhorst et al. (2009) and Crivelli and Gupta (2014), which similarly identified a negative relationship between resource and non-resource tax revenues. The consistency across different specifications and methodologies underscores the robustness of the results and highlights the fiscal challenges associated with resource revenue dependence, emphasizing the need for policy measures to mitigate these effects and enhance revenue diversification.

The domestic revenue displacement observed in resource-rich countries can be attributed to several factors. First, oil-exporting countries often operate under dual fiscal systems that exhibit significant distortions between resource and non-resource tax regimes. Policymakers tend to focus more on the resource sector, as it typically has an established fiscal framework, leaving the non-resource sector underdeveloped and less prioritized (Venables, 2016). This disparity results in differing revenue performances between the two sectors. Second, the tax capacity effect further explains the displacement. According to Besley and Persson (2009), in resource-rich countries with limited human capital, the expansion of the resource sector often attracts talent away from the non-resource sector, leading to a reduced human resource base in the latter. This constraint diminishes the capacity for effective tax collection in non-resource sectors. Third, the emergence of new resource policies during boom periods can exacerbate the issue, as such policies often redirect fiscal focus and resources toward the resource sector, further marginalizing the non-resource tax base (Chaudhry, 1997).

In examining other determinants of tax performance, several findings were consistent with theoretical expectations. Agriculture value added was negatively and significantly associated with non-resource tax revenues, likely due to the informal and subsistence-oriented nature of the agricultural sector, which limits its contribution to formal tax systems. Conversely, GDP per capita showed a positive correlation with non-resource tax revenues, reflecting the relationship between economic development and improved tax collection capacity. Trade openness was also found to positively and significantly affect non-resource tax revenues, as increased trade often broadens the taxable economic base. While corruption was negatively associated with non-resource tax revenue efforts, the relationship was not statistically significant. This suggests that while corruption may undermine tax collection, its impact on non-resource revenue mobilization in this context might be less pronounced or overshadowed by other factors. These findings highlight the complex interplay of economic, institutional, and

sectoral dynamics in shaping tax performance in resource-rich countries, underscoring the importance of tailored policies to strengthen non-resource tax systems and reduce fiscal dependence on volatile resource revenues. Our findings from the short-term estimations reveal that the coefficient for contemporaneous changes in resource taxes is significantly negative. This indicates that increases in resource tax revenues have an immediate adverse effect on non-resource tax revenues, suggesting that the observed long-term displacement effect of resource tax increases is compounded by these negative short-term impacts.

Additionally, previous analyses have suggested that a cointegration relationship between resource and non-resource tax revenues could not be established. This outcome might be attributed to the assumption of symmetry in the relationship, as highlighted by Farzanegan and Markwardt (2009). The assumption that increases and decreases in resource tax revenues have identical effects on non-resource revenues may oversimplify the dynamics at play. Consequently, modeling the relationship in a nonlinear framework, which accounts for potential asymmetries, could provide a more accurate and nuanced understanding. Moreover, while the ARDL model employed in our analysis assumes a linear relationship, the observed short-term dynamics and potential asymmetric effects underscore the need to reconsider this assumption. A nonlinear approach could better capture the complexities and diverse responses of non-resource tax revenues to fluctuations in resource tax revenues, thereby enhancing the explanatory power and policy relevance of the findings.

Table 1 reports the results of panel unit root tests conducted using the LLC and PC-ADF methods to evaluate the stationarity of variables, both at levels (I(0)) and first differences (I(1)). The variables under examination include resource taxes, nonresource taxes, GDP per capita, openness, corruption, and agriculture. Significance levels are denoted by one, two, and three asterisks, representing 10%, 5%, and 1% respectively. For resource taxes, the LLC test shows non-stationarity at the level, with a statistic of −0.330, but achieves strong stationarity at the first difference, significant at the 1% level, with a statistic of −6.831. The PC-ADF test aligns with this result, indicating non-stationarity at the level (statistic −1.203) and stationarity at the first difference, significant at the 1% level, with a statistic of −7.827. Nonresource taxes are non-stationary at the level according to both tests. The LLC test shows significance at the 10% level at first difference, with a statistic of −1.637, while the PC-ADF test confirms stationarity at first difference with a stronger significance at the 1% level, with a statistic of −5.856. Log GDP per capita is non-stationary at the level in both tests but becomes stationary at the first difference, significant at the 1% level in both cases. The LLC test produces a statistic of −7.361, and the PC-ADF test reports −6.836, confirming robust stationarity after differencing. Openness demonstrates stationarity at the level stage, significant at the 1% level in both tests, with statistics of −3.061 and −6.759 for LLC and PC-ADF respectively. This indicates a lack of integration and time-dependent behavior for this variable.

Corruption is also stationary at the level, with strong significance at the 1% level in both tests. The LLC test shows a statistic of −4.219, and the PC-ADF test yields −5.280, indicating stability in the corruption data. Agriculture is stationary at the level according to both tests, with significance at the 5% level for the LLC test (statistic −2.515) and 1% for the PC-ADF test (statistic −4.219). This suggests that the agriculture variable does not exhibit trends or time-dependent behavior. In sum, the results indicate that resource taxes, nonresource taxes, and log GDP per capita are non-stationary at the level but become stationary after first differencing. On the other hand, openness, corruption, and agriculture are stationary at the level, requiring no differencing for further analysis. These findings highlight the importance of addressing non-stationarity for certain variables to ensure robust econometric modeling.

Table 1: Results of panel unit root tests

	LLC		PC-ADF	
Variables	I(0)	I(1)	I(0)	I(1)
Resource taxes	−0.330)	−6.831***	−1.203	−7.827***
Nonresource taxes	0.739	−1.637*	−0.760	−5.856***
Log (GDP per capita)	−0.418	−7.361***	−0.017	−6.836***
Openness	−3.061***		−6.759***	
Corruption	−4.219***		−5.280**	
Agriculture	−2.515**		−4.219***	

*, **, and ***Significance at 10%, 5% and 1%, respectively.

Table 2 presents the long-run outcomes from the Panel ARDL model using three estimation techniques: Mean Group (MG), Pooled Mean Group (PMG), and Dynamic Fixed Effects (DFE). The coefficients for each variable, along with their significance levels, are reported. Significance is denoted by one, two, and three asterisks for 10%, 5%, and 1% levels, respectively. For resource taxes, the MG estimator yields a coefficient of −0.257, which is not significant, suggesting no strong long-run effect. However, under the PMG and DFE estimators, the coefficients are −0.186 and −0.344 respectively, both significant at the 5% and 1% levels. This indicates a consistent negative long-run relationship between resource taxes and the dependent variable across these models. GDP per capita shows a positive long-run relationship in all models. The MG estimator gives a coefficient of 0.021, though it is not statistically significant. The PMG and DFE estimators yield coefficients of 0.010 and 0.015, both significant at the 5% level, indicating a stable and modest positive effect of GDP per capita on the outcome variable.

Trade exhibits mixed results across the models. While the MG estimator shows a negligible and insignificant negative effect (−0.001), both the PMG and DFE models indicate a positive and significant relationship, with coefficients of 0.053 and 0.006,

respectively, both significant at the 1% level. This suggests that trade positively impacts the outcome variable in the long run. Corruption shows contrasting results among the models. The MG estimator suggests a positive effect with a coefficient of 0.026, though it is not significant. Conversely, the PMG model finds a negative and significant effect (−0.003) at the 1% level. The DFE model shows a similar trend but lacks significance. This indicates that corruption's long-run impact may vary depending on the model employed. Agriculture generally shows a negative long-run relationship with the dependent variable. The MG estimator produces a coefficient of −0.005, which is not significant. The PMG and DFE models show significant negative effects, with coefficients of −0.001 and −0.002, significant at the 1% and 10% levels, respectively, reinforcing the adverse influence of agriculture in the long run. Overall, the PMG and DFE estimators provide more consistent and significant results, suggesting their greater reliability for understanding long-run relationships in this context. Resource taxes, trade, and agriculture emerge as key factors with significant long-run effects, while the impact of corruption and GDP per capita varies depending on the estimation approach. These findings underline the importance of selecting appropriate estimation techniques to accurately interpret long-run dynamics.

Table 2: Panel ARDL Long run outcomes

Variables	MG	PMG	DFE
Resource taxes	−0.257	−0.186**	−0. 344***
GDP per capita	0.021	0.010**	0.015**
Trade	−0.001	0.053***	0.006***
Corruption	0.026	−0.003***	−0.005
Agriculture	−0.005	−0.001***	−0.002*

*, **, and ***Significance at 10%, 5% and 1%, respectively.

Table 3 presents the short-run outcomes of the Panel ARDL model using three estimation methods: Mean Group (MG), Pooled Mean Group (PMG), and Dynamic Fixed Effects (DFE). The coefficients represent the short-term relationships between the independent variables and the dependent variable, while the error correction term indicates the speed of adjustment toward the long-run equilibrium. Significance is denoted by one, two, and three asterisks for 10%, 5%, and 1% levels, respectively. The error correction term is significant across all models, with coefficients of −0.401 for MG, −0.194 for PMG, and −0.201 for DFE, all at the 1% level. These negative values confirm that deviations from the long-run equilibrium are corrected over time, with the MG model showing the fastest adjustment speed. Nonresource taxes show varied effects across the models. The MG estimator yields an insignificant coefficient of −0.061. In contrast, the PMG and DFE models report coefficients of −0.021 and −0.032, significant at the 1% and 5% levels respectively, suggesting a negative short-run impact on the dependent variable.

Resource taxes also exhibit a negative short-run effect in the PMG and DFE models, with coefficients of −0.020 and −0.042, significant at the 5% and 10% levels respectively. The MG estimator shows no significant relationship. GDP per capita demonstrates a positive short-run relationship in all models. While the MG model's coefficient of 0.034 is not significant, the PMG and DFE models show significant effects, with coefficients of 0.056 and 0.082 at the 5% and 10% levels respectively, indicating its positive contribution to the dependent variable in the short run. Trade has a negligible and insignificant effect in the MG model, with a coefficient of −0.002. However, the PMG and DFE models report significant negative effects of −0.035 and −0.001 at the 1% and 10% levels respectively, suggesting a modest short-term adverse impact of trade. Corruption does not show significant short-run effects across any of the models, with coefficients of −0.050, −0.004, and −0.001 in the MG, PMG, and DFE estimators respectively.

Table 3: Panel ARDL Short run outcomes

Variables	MG	PMG	DFE
Error correction term	−0.401***	−0.194***	−0.201***
Nonresource taxes	−0.061	−0.021***	−0.032**
Resource taxes	−0.014	−0.020**	−0.042*
GDP per capita	0.034	0.056**	0.082*
Trade	−0.002	−0.035***	−0.001*
Corruption	−0.050	−0.004	−0.001
Agriculture	−0.003	−0.001***	−0.046*
Constant	0.044***	0.016***	0.023***
Time trend	0.055	0.048	0.007
Hausman test	1.09		

*, **, and ***Significance at 10%, 5% and 1%, respectively.

Agriculture exhibits a negative short-run impact in the PMG and DFE models, with coefficients of −0.001 and −0.046, significant at the 1% and 10% levels respectively. The MG model shows no significant relationship. The constant term is positive and significant across all models, indicating a stable baseline effect independent of the explanatory variables. The

time trend is only significant in the MG and PMG models, suggesting its relevance in explaining temporal dynamics in these estimations. The Hausman test result of 1.09 suggests that the PMG model may be preferable due to its consistency and efficiency, particularly when compared with MG and DFE. The short-run results highlight the significance of nonresource taxes, resource taxes, GDP per capita, trade, and agriculture in influencing the dependent variable. The error correction term's significance across all models underscores the presence of a robust adjustment mechanism, ensuring convergence to long-run equilibrium after short-term deviations. The variation in significance across models reinforces the importance of selecting an appropriate estimation method based on the study's context and data characteristics.

The results from the estimated long-term model reveal significant coefficients for both positive and negative shocks to resource tax revenues, indicating an asymmetric relationship. Positive shocks—an increase in resource tax revenues—were found to have a negative and significant impact on non-resource tax revenues. Specifically, a 1% increase in resource tax revenues corresponds to a decrease in non-resource tax revenues, reinforcing the displacement effect. These findings are consistent with those reported by Bornhorst et al. (2009), Ossowski and Gonzales (2012), Thomas and Treviño (2013), Crivelli and Gupta (2014), and Knebelmann (2017), all of whom noted the crowding-out effect of resource revenues on non-resource revenues. Interestingly, negative shocks—decreases in resource tax revenues—were found to exert positive and significant effects on non-resource tax revenues. This finding provides strong evidence of the asymmetric nature of the relationship between resource and non-resource tax revenues. While conventional wisdom suggests that decreases in resource tax revenues should lead to increases in non-resource tax revenues, this study finds that such a relationship is not straightforward. Instead, the response to negative shocks is conditional on factors such as the state's capacity for taxation and its willingness to implement tax system reforms. The inability of decreases in resource tax revenues to trigger proportional increases in non-resource revenues challenges the assumption of a compensatory mechanism and highlights structural limitations within the fiscal system. These results align with the findings of Farzanegan and Markwardt (2009), who observed that negative oil price shocks had a positive, albeit statistically insignificant, impact on non-resource tax revenues. Together, these findings underscore the need for resource-rich countries to strengthen their non-resource tax bases and enhance their fiscal systems to mitigate vulnerabilities associated with resource revenue volatility. The evidence further supports the hypothesis that the relationship between resource and non-resource tax revenues is asymmetric, requiring nuanced policy responses to address the complex interplay between these revenue streams.

Our short-term estimates revealed that both coefficients for positive and negative shocks to resource tax revenues were significantly negative, albeit with varying magnitudes. This finding supports the short-term asymmetry assumption under investigation. Notably, the negative relationship was significant only in the PMG and DFE estimation methods, suggesting the robustness of these approaches in capturing the dynamics of the relationship. The analysis demonstrated that the impact of positive shocks was substantially stronger than that of negative shocks, providing further evidence for short-term asymmetry. Decreases in resource tax revenues were found to have limited effects on improving non-resource tax revenues. This result aligns with intuitive reasoning, as the mobilization of domestic revenues typically requires structural changes and the implementation of tax reforms, processes that unfold over a longer period and cannot address short-term revenue shortfalls immediately. Our empirical findings underscore the importance of recognizing the asymmetric effects of resource tax revenues. The evidence indicates that increases and decreases in these revenues have significantly different impacts on non-resource revenues, highlighting the complexities of fiscal management in resource-dependent economies. These results emphasize the need for targeted tax reforms and capacity-building efforts to enhance the resilience of non-resource revenue systems, ensuring fiscal sustainability in the face of resource revenue volatility.

5. CONCLUSIONS

The primary objective of our study was to investigate whether changes in resource tax revenues exert an asymmetric effect on non-resource tax revenues. To explore this, we utilized the ARDL model to examine the linear effects, leveraging annual data from 36 oil-exporting countries spanning the period 2000–2023. This data was sourced from a newly developed dataset by the International Centre for Taxation and Development, providing comprehensive insights into the fiscal dynamics of resource-dependent economies. The novel contribution of our study lies in its re-examination of the "fiscal resource curse hypothesis" within the specific context of oil-exporting nations. Unlike previous research, which often assumed symmetry in the relationship between resource and non-resource tax revenues, our analysis extended the existing literature by explicitly accounting for the potential asymmetric effects of resource tax revenue fluctuations. By doing so, the study provides a more nuanced understanding of how positive and negative changes in resource tax revenues impact non-resource tax revenues, highlighting the complexities and fiscal vulnerabilities associated with resource dependence. This approach contributes valuable insights for policymakers seeking to design more resilient and equitable tax systems in resource-rich economies. Our findings confirm that the relationship between resource and non-resource tax revenues is asymmetric. Based on our ARDL model estimates, we identified a significant negative relationship between resource and non-resource tax revenues in both the short and long run. This indicates that resource tax revenues have adverse effects on non-resource tax revenues, lending strong support to our "fiscal resource curse hypothesis. The implications of these findings are critical for shaping revenue mobilization policies in resource-rich countries. To mitigate the negative impacts of resource tax revenues, these nations should strategically allocate a portion of their resource revenues to other productive assets. Such investments can promote economic diversification, reduce dependence on volatile resource revenues, and ultimately expand the non-resource tax base. Additionally, improvements in tax performance in oil-exporting countries require enhanced state capacity for taxation and a

genuine commitment to implementing tax reforms. Governments should prioritize tax reforms, especially during periods of declining resource tax revenues, to strengthen non-resource revenue systems. These measures can create a more balanced and resilient fiscal framework, ensuring long-term sustainability and reducing vulnerability to resource revenue fluctuations. Furthermore, shifts in government revenue toward a greater reliance on non-resource taxes can potentially have adverse effects on the economy, particularly if implemented without careful consideration of the economic structure and taxpayer capacity. For oil-exporting countries, the challenge lies in striking the optimal balance in the tax revenue mix, ensuring fiscal sustainability while minimizing any negative impact on economic growth and development. Policymakers must also account for the asymmetric effects of resource tax revenue fluctuations when designing economic and fiscal policies. Given that oil-exporting countries are heavily reliant on oil revenues, they are especially vulnerable to oil price shocks. Understanding and addressing these asymmetries is crucial for mitigating the fiscal and economic volatility associated with resource dependence. This underscores the importance of developing policies that diversify revenue sources while enhancing the resilience of both resource and non-resource tax systems to external shocks, fostering a more stable economic environment.

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