International Review of Applied Economics

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/cira20

The Fiscal resource curse: What's China's natural resource appetite got to do with it?

Daniel Ofoe Chachu & Edward Nketiah-Amponsah

To cite this article: Daniel Ofoe Chachu & Edward Nketiah-Amponsah (2021): The Fiscal resource curse: What's China's natural resource appetite got to do with it?, International Review of Applied Economics, DOI: 10.1080/02692171.2021.1942438

To link to this article: https://doi.org/10.1080/02692171.2021.1942438

Published online: 22 Jul 2021.

INTERNATIONAL REVIEW OF APPLIED ECONOMICS
https://doi.org/10.1080/02692171.2021.1942438

The Fiscal resource curse: What's China's natural resource appetite got to do with it?

Daniel Ofoe Chachu and Edward Nketiah-Amponsah

Department of Economics, University of Ghana, Accra Legon

ARTICLE HISTORY Received 5 January 2021; Accepted 1 April 2021
KEYWORDS Resource revenues; fiscal capacity; taxation; public goods

1. Introduction

The literature on the natural resource curse is well known – countries with abundant natural resources fail to transform that advantage into favourable development outcomes (see Badeeb, Lean, and Clark (2017) for a recent review, and Ross (1999) for an earlier review). However, a related term, *fiscal resource curse*, is relatively less explored. The term refers to the inability of resource-rich countries to mobilize taxes from a broad base, particularly outside the natural resource sector (Masi, Savoia, and Sen 2018; Mohtadi, Ross, and Ruediger 2016; Jensen 2011; Knack 2009).

The importance of diversifying revenue sources stems from the fact that natural resources are subject to the Prebisch-Singer hypothesis. Primary commodities usually suffer inferior terms of trade over time compared to manufactured products. Moreover, they are subject to price volatilities, which destabilizes national budgets and undermines planning. The global revolution underway in the adoption of alternative energy sources as part of efforts to fight climate change means that the future of hydrocarbon fuels, for example, looms large. While maximizing revenues from the resource sector is desirable, its impact on the non-resource sector, and therefore non-resource revenues, becomes even more important with respect to securing a broad and sustainable domestic revenue base. The Sustainable Development Goal 17.1 seeks to achieve the latter.

This paper takes advantage of the Government Revenue Database developed by the International Conference on Taxation and Development and currently hosted by the United Nations University's World Institute for Development Economics Research (UNU-WIDER) to estimate a causal effect of resource revenues on non-resource tax revenues in developing countries. We contribute to the literature in a number of ways. First, we examine the impact of mobilizing revenues from both hydrocarbons and minerals on non-resource tax revenues with new data. Data challenges in the past meant that a number of previous studies lacked empirical rigour, focused on a particular type of natural resource, a limited set of countries, or a particular region (Prichard 2016; Prichard, Cobham, and Goodall 2014). Second, we focus on non-resource taxes as an outcome variable in order to shed light on fiscal capacity in developing countries unrelated to natural resource production. Thus, the outcome variable of interest does not include revenue sources such as fees,

CONTACT Daniel Ofoe Chachu doc.chachu@gmail.com; daniel.chachu@econ.uzh.ch

fines, returns on public investments and divestiture receipts, which do not effectively signal tax effort. Finally, we employ a novel instrumental variable strategy that allows us to look at the impact of external factors that mediate the relationship but had largely been ignored in earlier literature. To the best of our knowledge, none of the studies in this area has accounted for China's increased role in the natural resource trade since her accession to the World Trade Organization in 2001 and how that impacts on the relationship between resource revenues and non-resource tax revenues. Following her accession to the World Trade Organization in 2001, China's engagement in the non-renewable resource trade has increased several fold, driving up commodity prices and raising resource revenues among exporting countries (Fund 2016). We exploit this exogenous variation in China's non-renewable resource trade to examine the causal effect of resource revenues on non-resource tax effect using a Two-stage Least Squares Approach. Our identification strategy is inspired by the fact that China's scaled-up demand for non-renewable resources after 2001 was unrelated to non-resource tax effort across developing countries.

We do not find consistent evidence for a negative relationship between resource revenues and non-resource taxes. On the contrary, we find that, once we account for China's role in the non-renewable resource trade, a percentage point increase in resource revenues as a percentage of GDP leads to about a 0.3 percentage point increase in non-resource taxes as a percentage of GDP in some specifications, albeit with marginal statistical significance. China's demand for natural resources has contributed to increased resource revenues among developing countries. This development potentially offers leverage for developing countries to invest in critical infrastructure that expands the non-resource sector and increases non-resource revenues.

The rest of the paper is organized as follows. Section 2 sets a context by reviewing key empirical literature. We discuss the empirical strategy in section 3. The results are discussed in section 4. We conclude in section 5 with plausible policy implications.

2. The Fiscal resource curse: Exploring the theoretical pathways

In Table 1 we summarize seven key theoretical pathways through which the production of natural resources could impact adversely on domestic revenue mobilization.

These adverse theoretical predictions do not present a full picture given that natural resources do exert beneficial outcomes, as the latest evidence shows (Bhattacharyya and Mamo 2021; Mamo, Bhattacharyya, and Moradi 2019; Allcott and Keniston 2018; Haber and Menaldo 2011). Windfalls could constitute investible resources for building tax capacity and strengthening the administration of an effective tax system. This incentive can be triggered by the realization that natural resources are exhaustible. The resource sector could be developed to have forward linkages with other sectors of the economy. A widened tax base can be envisaged under such scenarios. Moreover, resource revenues can be used to provide essential public infrastructure that opens up the non-resource sector and further expands the tax base. These examples are by no means exhaustive. However, they do indicate that the relationship between natural resources and domestic tax effort need not be a tradeoff.

Table 1. Theoretical Pathways of the Fiscal Resource Curse.

Natural resource impact	Mechanism	Effect on Domestic Revenue Effort
Dutch Disease	Appreciation of local currency. Competitiveness reduces in non-resource sector thereby undermining diversification within the economy (Van der Ploeg and Venables, 2013; Klein, 2010; Gylfason, 2001).	Narrows the tax base and thus limits opportunities for revenue mobilization.
Poor Governance	Rent-seeking behaviour and redistribution of wealth in lieu of political support (Klomp and de Haan, 2016; Arezki and Gylfason, 2013). Other studies find adverse effect of resource rents on corruption, quality of institutions, rule of law and property rights (Mawejje, 2019; Knutsen, Kotsadam, Olsen, and Wig, 2017; Caselli and Tesei, 2016; Williams, 2011; Knack, 2009).	Weakens institutions in general and by extension, those responsible for domestic revenue mobilization. Less attention is paid to crafting appropriate tax policy.
Conflict	Provides resources for rebel activity (Lessmann and Steinkraus, 2019; Berman, Couttenier, Rohner, and Thoenig, 2017; Collier and Hoeffler, 2009; Humphreys, 2005; Fearon and Laitin, 2003).	Reduces business confidence, security of capital and thus incentive for business activity or investment. The result would be a narrow tax base.
Excessive Borrowing	Expectations induce governments to borrow less cautiously (Bawumia and Halland 2017). Other macroeconomic effects are discussed in the literature (Arezki et al., 2017; Ratti and Vespignani, 2016).	Risk of tax hikes in the future to tackle debt. High tax rates triggers Laffer-curve effect over time. Incentives are tilted towards borrowing, usually regarded as an 'easier' option.
Inequality	Perpetrates inequality as those who control resource rents hold on to it with little or no redistribution efforts (Parcero and Papyrakis, 2016; Carmignani, 2013; Fum and Hodler, 2010). Inequality could also stem from evolution of the economy from say peasant agriculture to resource sector, where wages are likely to increase and diverge (Lederman and Maloney 2007).	Reduces incentives among political elite for equity in tax policy. Undermines potential for widening the tax base. Creates a tax system with significant distortions.
Volatility	Commodity prices are hardly stable over time. The economy is thus exposed to volatility due to commodity price shocks (Mlachila and Ouedraogo, 2017; Kilian and Hicks, 2013; Cuddington and Jerrett, 2008). Davis and Tilton, (2005) indicate that prices of commodities could vary by at least 30 percent within a year or two.	Unpredictable revenue flow.
Excess Consumption	Citizens pressure populist governments into dysfunctional choices which leads to recurrent consumption at the expense of investment in the asset base of the economy (Collier 2017).	Undercuts productivity, narrowing revenue base.

Source: Authors' construct, 2021

3.1. The Fiscal resource curse: Exploring related evidence

Using longitudinal data covering a global sample of 30 oil-producing countries for the period 1992 to 2005, Bornhorst, Gupta, and Thornton (2009) employed Fixed-effects and Generalized Method of Moments estimators to investigate the relationship between hydrocarbon revenues and non-hydrocarbon revenues. They find that a percentage point increase in hydrocarbon revenues displaces non- hydrocarbon revenues by about 0.2 percentage points. More recently, the result has been confirmed by Chachu (2020) using an expanded dataset and a quasi-experimental approach. In a panel of twenty African countries and fifteen Latin American countries, Thomas and Treviño (2013) and Ossowski and Gonzales (2012) respectively engage in a similar analysis as Bornhorst, Gupta, and Thornton (2009) and Crivelli and Gupta (2014), albeit on a regional basis. They all confirm a negative and statistically significant relationship between resource revenues and non-resource revenues.

On the other hand, Venables (2016) finds that resource revenues could serve as a means of transferring funds from the public sector to the private sector. This transfer can either be through investment in public goods or direct support through targeted subsidies and other incentives. Such action could propel the private sector as the 'engine of growth' and boost employment in the non-resource sector. It is possible to expect this to impact positively on non-resource revenues over time. Bjornland and Thorsrud (2016) provide further evidence of the plausibility of such positive spillovers from the resource sector to the non-resource sector. More recent evidence on this is highlighted by Knebelmann (2017). In a global sample of 22 developing and emerging countries for the period, 1998 to 2012, Knebelmann (2017) does not find consistent evidence to support the eviction effect or a fiscal resource curse for that matter. Using a pooled Ordinary Least Squares (OLS) methodology for variations in non-oil taxes and oil taxes, she finds a 'weak synergy effect' in some specifications, albeit sensitive to evolution in the oil economy. The synergy effect suggests that improvements in revenue effort in the oil sector could extend positive externalities to non-oil revenue mobilization efforts.

3. Empirical strategy and data

As a starting point, we follow Crivelli and Gupta (2014) and Besley and Persson (2013), in defining a base model specification given by:

$$\left(\frac{R^{NR}}{Y}\right)_{it} = \beta_0 + \beta_1\left(\frac{R^{RR}}{Y}\right)_{it} + \omega' controls_{it} + \varphi_i + \tau_t + u_{it} (1)$$

The main explanatory variable $\left(\frac{R^{RR}}{Y}\right)_{it}$ is resource revenue as a percentage of Gross Domestic Product (GDP) for country i at time t. The explained variable is $\left(\frac{R^{NR}}{Y}\right)_{it}$ non-resource tax revenues as a percentage of GDP for country i at time t. The vector of control variables include trade as a percentage of GDP, agriculture value-added as a percentage of GDP, a natural log of GDP per capita and control of corruption. High income countries, also usually characterized by large trade openness, are more likely to attract significant non-resource revenues. International trade may however undermine non-resource revenues when developing countries sacrifice their trade tariffs in a bid to attract investment.

Furthermore, countries with a large share of agriculture to GDP often have a large informal sector which invariably limits tax effort. The same can be said of countries with high levels of corruption, which often depend on aid. On the other hand, aid can support reforms in improving tax effort.

The country-specific effects (φ_i) allow for unique intercepts for each country and thus captures unobserved country differences that might be correlated with our main explanatory variable as well as the dependent variable. The period dummies (τ_t) capture macro shocks that are likely to be correlated with both resource revenues and non-resource taxes. The error term (u_{it}) is assumed to exhibit white-noise characteristics. It is independently and identically distributed with zero mean and constant variance. Other control variables are introduced as part of robustness checks. These include the quality of political institutions, constraint of the executive, inflation and population.

We employ a set of panel data techniques including a Pooled Ordinary Least Squares (POLS) estimator, Random Effects Estimator (REE), and a Fixed Effects Estimator (FEE), taking inspiration from the literature. We also fit a Generalized Method of Moments (GMM) Estimator developed by Holtz-Eaken et al. (1988), Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998). The case for a dynamic specification is premised on a plausible argument that a shock to a country's non-resource tax revenues may take time to adjust and thus the variable can be persistent over time (Thomas and Treviño 2013; Bornhorst, Gupta, and Thornton 2009). We evaluate the evidence for developing countries, specifically, Low-Income Countries (LICs) and Lower-Middle-Income countries (LMICs).

3.1. Identification strategy

The base model specification is endogenous. While we present arguments on how resource revenues might affect non-resource tax effort, there is reason to expect that difficulties with generating non-resource tax revenues can push governments to focus on mobilizing revenues from the natural resource sector. This presents the case of a simultaneity bias. A Hausman test rejects the null hypothesis that resource revenues as a percentage of GDP is exogenous. Ordinarily, a GMM estimator should suffice, however, we account for a potential problem of an error-in-measurement bias of our main explanatory variable. We address the concerns with a Two-Stage Least Squares (TSLS) instrumental variable approach to obtain exogenous variation in the main explanatory variable.

We propose an instrument that exploits the effect of China's accession to the World Trade Organization (WTO) in 2001 on international trade in natural resources. Relative to the period before, the period after 2001 was characterized by rising commodity prices and vibrant commodity trade (Venables, 2016; Kilian and Hicks 2013).[1] Evidence from the October 2016 edition of the IMF's World Economic Outlook further suggest that the responsiveness of global commodity prices (crude oil and metals) to increases in China's demand was only statistically significant post-WTO period and not before. China's demand for metals skyrocketed from a pre-WTO status value of 3% of global demand to 40% by end of 2014 (International Monetary Fund 2016). Similarly, China's demand for crude oil surged from 1% to 11% over the same period (ibid.). It is also noteworthy that a third of China's energy imports and a fourth of her crude oil needs came from low and middle-income countries in Africa[2] (Alemayehu 2018). The reverberations around the world associated with China's entry into the WTO has been referred to as the 'China shock' (Autor, Dorn, and Hanson 2016; Bloom, Draca, and John 2016). For commodity-producing countries, this shock has led to an increase in the demand for their natural resource exports to feed China's manufacturing industries. As the largest net import of oil, China also accounted for about 50% of global growth in crude oil consumption in the decade leading to 2015 (Vasquez 2018).

We employ China's natural resource imports (fuel, ore and metals) as a percentage of GDP interacted with a WTO-status dummy as our main instrument. The evidence discussed demonstrate a plausible correlation between China's natural resource imports and resource revenues growth in developing countries that is unrelated to non-resource tax effort. The higher the demand for imports by China, the higher resource revenues for a resource exporting country, ceteris paribus. A threat to our exclusion restriction is whether this *China shock* has led to changes in other economic activities that impact on non-resource tax revenues. There are at least two reasons why this is less likely. First, the countries in our sample are mostly developing countries whose economies are dominated by natural resource production. More so, our key argument is the fact that any potential stimulus to the non-resource sector which impacts on non-resource revenues is most likely through leveraging on positive shocks to resource revenues. We test for the relevance and strength of our main instrument.

3.2. Data and descriptive statistics

Prior to the emergence of the ICTD GRD database in 2014, existing data sources on government revenues suffered a myriad of limitations. These limitations were largely related to data coverage (both across countries and over time); quality and consistency; and reporting and comparability (Prichard, Cobham, and Goodall 2014; Baunsgaard and Keen 2010; Keen and Mansour 2009). There were also challenges regarding the level of government over which the data was aggregated (for example, general government revenue versus central government revenue) and the GDP series used in normalizing revenue data (Prichard, Cobham, and Goodall 2014). Challenges with previous data also meant a preference for regional level studies for which data was relatively more comprehensive and consistent. These challenges with previous government revenues databases and their implications for research outcomes have been documented (Clist 2016; Prichard 2016; Prichard, Cobham, and Goodall 2014).

The new ICTD GRD database is a significant improvement over previous attempts to compile comprehensive global datasets on government revenues. It combines the previously existing datasets in a standardized classification system. The rubrics of the system has been transparently documented (Mcnabb 2017; Prichard, Cobham, and Goodall 2014) and available on the UNU-WIDER website.

Other data sources are from the World Development Indicators (WDI) database (World Bank 2017) and the International Country Risk Guide (ICRG) ((Political Risk Services 2015).

3.3. Descriptive statistics

The descriptive statistics is drawn from the data based on a pooled ordinary least squares estimation (POLS) of our base model in equation (1). The data covers 45 developing countries and spans the 1980s to 2015.

Table 2. Summary Statistics for key variables: 1984–2015.

Variable	(1) Obs.	(2) Mean	(3) St Dev.	(4) Min	(5) Max
Total Non-resource tax as % of GDP	660	13.47	5.83	1.58	34.84
Total resource revenue as % of GDP	660	6.45	8.88	0.00	46.48
Grants as % of GDP	660	1.21	2.12	0.00	24.71
Corruption Index	660	2.32	0.84	0.00	5.00
Agriculture value-added as % of GDP	660	17.89	11.67	2.03	61.97
Log GDP per capita in constant US$	660	7.6	0.91	5.72	9.28
Trade as % of GDP	660	79.42	36.79	12.01	220.41
Consumer Price Index	601	71.53	41.82	0.00	348.99
Chinese Resource Imports as % of GDP	660	20.25	5.06	9.51	28.44
N	660				

In Table 2, total resource revenue as a percentage of GDP ranges from zero to approximately 46% with a country-year average of 6.5% and a standard deviation of about 9 percentage points. Non-resource tax as a percentage of GDP ranges from between 1.6% to about 35% with a mean and standard deviation of about 13% and 6 percentage points respectively. The main instrument, China resource imports as a percentage of GDP, ranges from 9.5% to 28.4%, with a period average of about 20% and standard deviation of about 5 percentage points.

4. Empirical results and discussions

Table 3 reports POLS, REE, FEE and GMM estimates for the effect of resource revenues on non-resource tax revenues. The first column provides a POLS estimate. The second

Table 3. Results based on OLS, REE, FEE and GMM Estimators.

Dependent variable: Non-resource tax as a percentage of GDP (Nonres_tax)					
VARIABLES	(1) OLS	(2) REE	(3) FEE	(4) Diff-GMM	(5) Sys-GMM
Tot_resrev	−0.385***	−0.198***	−0.163***	−0.134**	−0.117**
	(0.017)	(0.041)	(0.047)	(0.061)	(0.048)
Nonres_tax $_{t-1}$				0.028	0.755***
				(0.266)	(0.132)
Grants	0.104	−0.002	0.008	0.000	−0.005
	(0.0859)	(0.0926)	(0.0916)	(0.139)	(0.236)
Corrupt	1.762***	0.615	0.538	0.482	−0.335
	(0.182)	(0.388)	(0.403)	(1.132)	(0.688)
Agric value-added	−0.118***	−0.014	0.005	−0.099	−0.042
	(0.020)	(0.069)	(0.079)	(0.066)	(0.040)
Log GDP per capita	1.116***	1.698**	1.962	0.977	0.352
	(0.213)	(0.737)	(1.423)	(1.470)	(0.403)
Trade openness	−0.003	0.003	0.004	0.006	0.003
	(0.004)	(0.011)	(0.012)	(0.012)	(0.004)
Country Effect	No	Yes	Yes	Yes	Yes
Time Effect	No	Yes	Yes	Yes	Yes
Observations	1,069	1,069	1,069	164	229
R-squared	0.556		0.187		
Number of id		66	66	53	65
# Instruments				19	38
AR(1) (P-values)				0.71	0.031
Hansen J (P-values)				0.08	0.6

Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1. The Hausman test rejects the null hypothesis of no systematic difference between REE and FEE. Lag of non-resource tax and corruption are instrumented for in columns 4 and 5. The grants variable is used as an additional instrument in column 5.

and third columns shows results from a REE and FEE. In the fourth and fifth columns we apply GMM estimators over the data transformed into a semi-decadal series. We find the negative offset in non-resource taxes for a percentage point increase in resource revenues as consistent across all five specifications. The results however depict a consistent reduction in the magnitude of the offset as one moves from a naïve OLS to a System GMM estimator, which accounts for endogeneity. In column 5, a percentage point increase in resource revenues offsets non-resource revenues by about 0.12 percentage points in the medium term. The contemporaneous effects estimated in columns 2 and 3 are however largely consistent with Chachu (2020) and Bornhorst, Gupta, and Thornton (2009) estimates for just hydrocarbon revenues.

Apart from the OLS results in column one, most of the covariates in the other specification turn out not to be statistically significantly different from zero.

A number of explanations can be provided for why a displacement in non-resource tax revenues in the presence of resource revenues is plausible. Duality in fiscal systems in developing countries where different fiscal regimes exist between the resource and non-resource sectors without meaningful coordination. Policy makers may also devote more attention to a new resource sector, where an appropriate fiscal regime might be introduced in a bid to get the most out of the sector. The latter may co-exist with a relatively weaker system in the non-resource sector (Venables, 2016). Revenue performance between the two sectors may vary as a result, with the non-resource sector getting less attention. The latter might be partly due to structural challenges relating to informality and productivity in the larger non-resource sector. Additionally, a boom in natural resource rents could inform transfers to the private sector through subsidies or generous tax incentives. In the short-term, this could dampen non-resource revenues. Nakyea and Amoh (2018) use Ghana as a case study to demonstrate how generous tax incentives do not necessarily translate to increased flows of foreign direct investment but rather reduces the domestic revenue potential of a resource-rich country.

Apart from the tax policy effects described above, there could also be the tax capacity effect. The theoretical argument is articulated by Besley and Persson (2013). In a country with a constrained human resource base, a booming resource sector attracts talent (highly skilled human capital) away from the non-resource sector. This leaves the human resource base in the non-resource sector severely constrained and diminished. There are also instances where resource booms birth a new resource politics. For instance, Chaudhry's work traces and documents Saudi Arabia's development of tax capacity before and after the oil boom in the 1970s (Chaudhry 1997; Knack 2009). The trajectory of improvement in tax capacity between 1930 and 1973 took a different turn when several billions of dollars in oil revenue began to accrue to the government. The boom was triggered by the quadrupling of international oil prices in 1973. As a policy response, most of the offices of the Department of Zakat (religious tithe) and Income Tax were closed during these boom years. The Yemeni government followed a similar path in dismantling a key part of its fiscal infrastructure. When oil prices plummeted in the early 1980s, both governments had to resort to inefficient and austere policies including retroactive taxation, which could not be sustained (Chaudhry 1997).

The discussions so far however, emphasize the interplay of factors within the economy. This presents a limited scope in attempts to understand the fiscal resource curse. In practice, many developing countries are exposed to various international and geopolitical dynamics that impact on the management of their natural resources and subsequently their fiscal capacity. China's rising influence in international trade in general and natural resource trade in particular provides one critical example. China's impact on international trade in natural resources has been felt much more among developing regions in SSA, Latin America and Asia with variations across specific countries (Alemayehu 2018; Vasquez 2018; Lin and Wang 2016). Thus we exploit a potential exogenous variation in this variable and also take advantage of the opportunity it presents for mitigating a potential error-in-measurement bias for our main explanatory variable – natural resource revenues.

4.1. An instrumental variable approach – Exploiting the China shock

The term 'China shock' as used in this paper represents an interaction term between two variables: China's non-renewable resource imports (fuels, ore and metals) as a percentage of GDP (China_Resimp) and a time dummy reflecting China's accession to the World Trade Organization (WTO). The WTO period dummy takes a value of one for all periods after 2001 and a value of zero otherwise. Columns 1 through 4 of Table 4 show the first-stage regression results with the full list of control variables for our sample of developing countries. They include specifications with and without the constituting variables of the China shock instrument, with our preference for the former (unrestricted model in column 4). A general rule-of-thumb is to include the constituting terms in an econometric specification with interacted terms (Wooldridge 2002).

The coefficient on the interaction term between China's resource import and the WTO time dummy (i.e. China shock) is positive across all specifications as expected. The effect is statistically significant at conventional levels for the specifications in columns 3 and 4 only. The latter are also characterized by F-values of 14.04 and 14.17 respectively,

Table 4. First Stage Regression – Developing Countries' Sample.

Dependent Variable: Resource revenues as percentage of GDP				
VARIABLES	(1)	(2)	(3)	(4)
China Shock	0.101	0.377	0.540***	1.577***
	(0.112)	(0.259)	(0.144)	(0.364)
China_Resimp		−0.338		−1.071***
		(0.332)		(0.379)
corrupt	−0.315	−0.219	−0.771***	−0.633**
	(0.219)	(0.251)	(0.256)	(0.258)
Log GDP per capita	−1.384	−1.235	−1.397	−0.928
	(1.709)	(1.748)	(1.652)	(1.684)
agricval2GDP	−0.334***	−0.333***	−0.354***	−0.358***
	(0.057)	(0.057)	(0.059)	(0.060)
WTOtime			−3.199***	−4.366***
			(0.727)	(0.847)
[Joint] F- test	0.81	1.36	14.04	14.17
Country Effect	Yes	Yes	Yes	Yes
Observations	633	633	633	633
No. of countries	45	45	45	45

Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Grant and trade variables are 'partialled out' in order to obtain full covariance matrix of orthogonal conditions necessary for an efficient estimator as well as subsequent overidentification tests. The effect of their inclusion on the coefficients above is however preserved.

exceeding the minimum benchmark. The F-values for columns 1 and 2 are positive but much lower in magnitude, yielding the sizes of 0.81 and 1.36 respectively. The results for columns 1 and 2 demonstrate the drawback of restricting the model.

In general, first-stage specifications with F-values above the benchmark of 10 are preferable as they are more likely to signify a robust instrumental variable set up (Stock, Wright, and Yogo 2002). However, even with positive F-values below 10 in just-identified models, instruments cannot be entirely dismissed. The conditions that need to be satisfied in such a situation are that the coefficient of the instrument at first stage is not zero, is statistically significant at conventional levels and of the expected sign (Angrist and Pischke 2008; Angrist and Pischke. 2009). The effect of weak instrument translates to larger standard errors at the second stage. The estimated effect, however, remains unbiased.

The low F-values in columns 1 and 2 of Table 4 are mirrored in the second-stage results presented in Table 5, where the coefficients of the main explanatory variable are imprecisely estimated. The lack of precision is also reflected in the R squared falling below the zero bound. Despite passing the instrument validity test, the just identified model in column 3 of Table 5 retains large standard errors. The coefficient on resource revenues is therefore not statistically significant from zero at conventional levels although it retains a positive sign. The most precisely specified model in column 4 passes both the instrument validity test as well as the Hansen J test of over-identifying restrictions with a P-value of 0.41. The coefficient of resource revenues turns statistically significant at the 10% level. The result suggests a positive effect of the resource revenues on non-resource tax revenue mobilization in developing countries, once the China shock is accounted for.[3]

To be sure that the results are not being driven by the richer set of developing countries in the sample, we take out all countries classified as Upper Middle Income Countries.[4] Thus in Tables 6 and 7, we restrict the sample to Lower-Middle-Income (LMICs) and Low-Income Countries (LICs) only. Table 6 presents the first-stage

Table 5. Second stage regression – Developing countries.

Dependent variable: Non-resource tax revenue as a percentage of GDP				
VARIABLES	(1)	(2)	(3)	(4)
tot_resrev	1.440	1.422	0.139	0.267*
	(1.818)	(1.040)	(0.159)	(0.158)
corrupt	0.901	0.894	0.628***	0.718***
	(0.751)	(0.610)	(0.208)	(0.227)
Log GDP per capita	4.591**	4.576**	2.794***	2.796***
	(2.170)	(2.185)	(0.720)	(0.854)
agricval2GDP	0.582	0.576	0.153**	0.199***
	(0.589)	(0.353)	(0.068)	(0.074)
WTOtime			0.954**	1.089***
			(0.382)	(0.365)
Hansen J (P-value)		0.99		0.41
Country Effect	Yes	Yes	Yes	Yes
China Shock	Yes	Yes	Yes	Yes
China_Resimp	No	Yes	No	Yes
Observations	633	633	633	633
R-squared	−0.081	−0.060	0.837	0.804
No. of countries	45	45	45	45

Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1. Grant and trade variables are 'partialled out' in order to obtain full covariance matrix of orthogonal conditions necessary for an efficient estimator as well as subsequent overidentification tests. The effect of their inclusion on the coefficients above is however preserved.

Table 6. First Stage Regression – Low Middle-Income Countries and Low-Income Countries.

Dependent variable: Resource revenues as a percentage of GDP				
VARIABLES	(1)	(2)	(3)	(4)
China Shock	0.275*	0.668**	0.585***	1.459***
	(0.150)	(0.277)	(0.186)	(0.436)
China_Resimp		−0.464		−0.884*
		(0.393)		(0.456)
corrupt	−0.173	−0.042	−0.419	−0.267
	(0.326)	(0.345)	(0.352)	(0.342)
Log GDP per capita	−5.053***	−5.004***	−4.809***	−4.618**
	(1.816)	(1.825)	(1.797)	(1.814)
agricval2GDP	−0.315***	−0.312***	−0.324***	−0.322***
	(0.059)	(0.059)	(0.060)	(0.061)
WTOtime			−2.167***	−3.037***
			(0.773)	(0.960)
[Joint] F-test	3.38	5.43	9.88	9.34
Country Effect	Yes	Yes	Yes	Yes
Observations	346	346	346	346
No. of countries	26	26	26	26

Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Grant and trade variables are 'partialled out' in order to obtain full covariance matrix of orthogonal conditions necessary for an efficient estimator as well as subsequent overidentification tests. The effect of their inclusion on the coefficients above is however preserved.

regression results for this sample. Unlike the full developing countries sample, the coefficient on the instruments turn out statistically significant at conventional levels across all specifications for the sample of LMICs and LICs. Once again, the validity tests suggest that the models in columns 3 and 4 of Table 6 are better specified with F-values of 9.88 and 9.34 respectively.

The corresponding second stage regression results in Table 7 show a positive coefficient on resource revenues. The estimated effect is however not statistically

Table 7. Second Stage Regression for Lower-Middle-Income and Low-Income Countries' Sample.

Dependent variable: Non-resource tax revenue as a percentage of GDP				
VARIABLES	(1)	(2)	(3)	(4)
tot_resrev	0.084	0.322	0.100	0.303*
	(0.281)	(0.213)	(0.179)	(0.175)
corrupt	−0.141	−0.032	−0.142	−0.058
	(0.205)	(0.248)	(0.210)	(0.241)
Log GDP per capita	2.548***	3.323***	2.633**	3.333**
	(0.930)	(0.870)	(1.051)	(1.289)
agricval2GDP	0.0267	0.107	0.032	0.1
	(0.0915)	(0.0702)	(0.0668)	(0.0693)
WTOtime			−0.031	−0.067
			(0.386)	(0.444)
Hansen J (P-value)		0.264		0.234
China Shock	Yes	Yes	Yes	Yes
China_Resimp	No	Yes	No	Yes
Country Effect	Yes	Yes	Yes	Yes
WTO Time Dummy	No	No	Yes	Yes
Observations	346	346	346	346
R-squared	0.805	0.736	0.802	0.743
No. of countries	26	26	26	26

Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Grant and trade variables are 'partialled out' in order to obtain full covariance matrix of orthogonal conditions necessary for an efficient estimator as well as subsequent overidentification tests. The effect of their inclusion on the coefficients above is however preserved.

significant except for our most preferred specification in the fourth column where the coefficient on resource revenues turns statistically significant at the 10% level. GDP per capita remains statistically significant at the 1% level across all specifications, indicating that it is an important determinant of non-resource tax revenues. The coefficients of the remaining covariates are not statistically significantly distinguishable from zero. The key result, suggests that, once we account for the 'China shock', a percentage point increase in resource revenues augments non-resource tax revenues by about 0.3 percentage points. This effect is however statistically modest given its significance at the 10% level of confidence. The observed positive relationship between resources revenues and non-resource tax revenues on the back of the exogenous shock to the global natural resource trade after year 2001 deserves further deliberation.

Global commodity prices have reacted significantly to the *China shock* leading to higher resource revenues in boom periods. Regions that have benefitted from China's natural resource imports are African, Asian and Latin America regions dominated by LMICs and LICs. There is a plausible reason that countries in these regions are leveraging on their natural resource revenues to attract infrastructure investment from China. China offers a bilateral infrastructure investment arrangement based on existing natural resource trade relationships, which compensate for financial market and governance challenges. The infrastructure investments may be offering opportunity for real sector diversification in resource-rich countries (Lin and Wang 2016; Halland et al. 2014; Zafar 2007). As Lin and Wang (2016) notes, these are bottle-neck releasing and crowding-in investments that potentially impact favorably on the expansion of the non-resource sector and therefore the tax base. In Africa, resource-rich countries such as Nigeria, Angola, Ethiopia and Sudan are among the largest beneficiaries of such arrangements (Alemayehu 2018; Fund 2016; Foster et al. 2008).

The results in Tables 5 and 7 convey the message that benefits from a thriving natural resource sector need not displace domestic tax revenues in the non-resource sector. The role of infrastructural development through natural resource trade is key to this result. The modesty that should go with the interpretation of our result lie in the following: First of all, it takes time to build fiscal capacity. Second, it will be naïve to expect that China's resource trade model would automatically convey positive benefits on non-resource tax outcomes in every case. The Chinese resource trade model is not equal in size and scale among the developing countries in our sample. While the number of countries partnering with China has been increasing, the large volume of transactions has been concentrated on fewer countries. Moreover, concerns have been raised about the nature of contracts alongside how they are implemented. Transparency around the contracts is an issue that has been raised by civil society organizations while some governments have described it as debt-trap diplomacy. The risk of opaque contracts on infrastructure projects is that there is greater likelihood for their revocation or review if new governments that take over power in these countries feel dissatisfied. Examples of this have already been witnessed in countries such as Malaysia. The cost of these resource-backed loans has also been raised. There is a fear that countries risk running into a debt crisis under these deals. Finally, concerns about the quality of some of the infrastructure projects elicit the need for effective project monitoring and evaluation, which eludes many developing countries.

4.2.. Further robustness checks for baseline model (Equation 1)

We do not find evidence for a non-linear e relationship between resource revenues and non-resource tax revenues. Our baseline results are also robust to the inclusion of additional control variables: quality of political institutions, constraint of the executive, inflation and population. These results are available on request. There is the concern that normalizing non-resource taxes with GDP is problematic. The argument is that changes to GDP arising from say increases in natural resource production diminishes our dependent variable automatically and thus biases our parameter estimates (Thomas and Treviño 2013; Bornhorst, Gupta, and Thornton 2009).[5] An approach suggested in the literature is to normalize non-resource taxes and resource revenues with non-resource GDP and resource GDP respectively. There are severe limitations to the suggested approach. First, non-resource GDP or resource GDP for that matter is generally difficult to measure precisely, over time and across countries. Building comparable data across countries is only now emerging. Additionally, normalizing non-resource taxes and resource revenues with non-resource GDP and resource GDP respectively is not consistent with the standard definition of a tax base (Thomas and Treviño 2013). Furthermore, this normalization approach or otherwise hardly contradicts the main findings of available studies that consider this issue (Thomas and Treviño 2013; Bornhorst, Gupta, and Thornton 2009).

5. Conclusion

In this empirical chapter, we investigate the validity of a variant of the fiscal resource curse. The latter conveys the idea that countries that have non-renewal natural resources perform poorly in mobilizing non-resource taxes. In effect, we examine whether natural resource revenues displace non-resource tax revenues. The study uses a new global dataset on resource and non-resource revenues developed by the International Centre for Taxation and Development and currently hosted by UNU-WIDER. With data covering over a hundred countries for the period 1980 to 2015, we test for both static and dynamic relationships between resource revenues and non-resource tax revenues using panel econometric techniques. What is novel in this study is that we exploit a variant of the so-called 'China shock' within a Two-Stage Least Squares instrumental variable framework to explore the relationship. We define the 'China shock' as our exogenous instrument, which interacts China's total non-renewable natural resource imports as a percentage of GDP with a time dummy that indicates the country's active participation in global trade after year 2001 when the country joined the World Trade Organization (WTO). China's global resource trade model was characterized by the so-called resource-for-infrastructure deals. Basically, China provides infrastructure in lieu of non-renewable natural resource exports from developing countries. Our identification strategy stems from the fact that China's global demand for natural resource imports constituted a global trade shock following her accession to the WTO in 2001. This transition has been unrelated to non-resource tax revenues in developing countries.

Our results suggest that the evidence of a displacement effect of natural resource revenues on non-resource tax revenues is neither consistent, conclusive nor a *fait accompli*, once one accounts for the 'China shock'. We find that, after assuming membership of the World Trade Organization, China's natural resource trade strategy with developing countries may have conferred some positive benefits on non-resource tax effort. In some specifications, we find that a percentage point increase in non-renewable natural resource revenues led to a 0.3 percentage point increase in non-resource tax revenues as a percentage of GDP. The evidence is only statistically significant at the 10% level and hence must be interpreted with caution. Through the resource-for-infrastructure deals, China's investment in critical social and economic infrastructure may have contributed to improving the environment for doing business and expanding the non-resource tax base in resource-rich developing countries. The effect of these infrastructure investments in Low-income and Lower-middle-income Countries may be in their contribution to reversing the fiscal resource curse.

The Hartwick rule suggests that countries should invest a part of their revenues from natural resources into the development of other forms of capital. Such investments should yield returns as it contributes to diversifying the economy and expanding the tax base. The prospects of maintaining a smooth tax rate and securing expanded revenue base long after the natural resources are depleted should merit the attention of policy-makers.

List of countries.

Algeria	Angola	Azerbaijan	Bolivia
Botswana	Bulgaria	Burkina Faso	Cameroon
Congo, Rep.	Ecuador	Egypt, Arab Rep.	Ethiopia
Gabon	Ghana	Guinea	India
Indonesia	Iran, Islamic Rep.	Jamaica	Kazakhstan
Liberia	Malaysia	Mali	Moldova
Mongolia	Namibia	Niger	Nigeria
Pakistan	Papua New Guinea	Paraguay	Romania
Senegal	Serbia	Sierra Leone	Sudan
Suriname	Thailand	Togo	Tunisia
Uganda	Vietnam	Yemen, Rep.	Zambia
Zimbabwe			

Notes

1. Other countries like Japan, India and Brazil contributed to this increased demand for commodities however relatively less so.
2. The seven countries that provide most of China's import (natural resource) needs in Africa are South Africa, Nigeria, Algeria, Sudan, Congo, Democratic Republic of Congo and Angola.
3. We find no evidence of a fiscal resource curse even after accounting for 'outliers' like Nigeria, Sudan, South Africa, Angola, Congo Rep., Democratic Republic of Congo, Algeria and South Africa.
4. The thresholds for the 2019–2020 World Bank income classifications for developing countries are: Upper Middle Income countries ($3996-$12,375), Lower-middle Income ($1026-$3995) and Low Income ($1025).
5. It is noteworthy that we normalize both the dependent variable and the explanatory variable by GDP. As a result, if the numerators increase by the same proportion as the denominators, the resulting ratio is unchanged. More so, the base model controls for GDP per capita.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

ORCID

Daniel Ofoe Chachu http://orcid.org/0000-0001-6256-3595

References

Alemayehu, Geda. 2018. “The Emerging Pattern of African Economic Engagement with China and the Rising South: Implications for Africa’s Structural Transformation.” *Journal of African Economies* 27 (suppl_1): i52–90. doi:10.1093/jae/ejy014.

Allcott, Hunt, and Daniel Keniston. 2018. “Dutch Disease or Agglomeration? the Local Economic Effects of Natural Resource Booms in Modern America.” *Review of Economic Studies* 85 (2): 695–731. doi:10.1093/restud/rdx042.

Angrist, Joshua D, and Jorne-Steffen Pischke. 2008. *Mostly Harmless Econometrics : An Empiricist ’ s Companion*. NJ: Princeton University Press.

Angrist, Joshua D, and Jorne-Steffen Pischke. 2009. “A Note on Bias in Just Identified IV with Weak Instruments,” No. C: 1–4.

Arellano,Manuel, and Stephen Bond. 1991. “Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations.” *Review of Economic Studies* 58: 277–97.

Arellano,Manuel, and Olympia Bover. 1995. “Another look at the instrumental variable estimation of error-component models.” *Journal of Econometrics* 68: 29–51.

Arezki, Rabah, and Thorvaldur Gylfason. 2013. “Resource Rents, Democracy, Corruption and Conflict: Evidence from Sub-Saharan Africa.” *Journal of African Economies* 22 (4): 552–569. doi:10.1093/jae/ejs036.

Arezki, Rabah, Valerie A. Ramey, and Liugang Sheng. 2017. “News Shocks in Open Economies: Evidence from Giant Oil Discoveries.” *Quarterly Journal of Economics* 132 (1): 103–155. doi:10.1093/qje/qjw030.

Autor, David H., David Dorn, and Gordon H. Hanson. 2016. “The China Shock: Learning from Labor-Market Adjustment to Large Changes in Trade.” *Annual Review of Economics* 8 (1): 205–240. doi:10.1146/annurev-economics-080315-015041.

Badeeb, Ramez Abubakr, Hooi Hooi Lean, and Jeremy Clark. 2017. “The Evolution of the Natural Resource Curse Thesis: A Critical Literature Survey.” *Resources Policy* 51 (December 2016): 123–134. doi:10.1016/j.resourpol.2016.10.015.

Baunsgaard, Thomas, and Michael Keen. 2010. “Tax Revenue and (Or ?) Trade Liberalization.” *Journal of Public Economics* 94 (9–10): 563–577. doi:10.1016/j.jpubeco.2009.11.007.

Bawumia, Mahamudu, and Håvard Halland. 2017. *WIDER Working Paper 2017/185 Oil Discovery and Macroeconomic Management the Recent Ghanaian Experience Mahamudu Bawumia * and Håvard Halland +*.

Berman, Nicolas, Mathieu Couttenier, Dominic Rohner, and Mathias Thoenig. 2017. “This Mine Is Mine! How Minerals Fuel Conflicts in Africa.” *American Economic Review* 107 (6): 1564–1610. doi:10.1257/aer.20150774.

Besley, Timothy, and Torsten Persson. 2013. *Taxation and Development. Handbook of Public Economics*. Vol. 5. Amsterdam: Elsevier B.V. doi:10.1016/B978-0-444-53759-1.00002-9.

Bhattacharyya, Sambit, and Nemera Mamo. 2021. “Natural Resources and Conflict in Africa: What Do the Data Show?” *Economic Development and Cultural Change*. 10.1086/704513 .

Bjornland, Hilde C., and Leif A. Thorsrud. 2016. “Boom or Gloom? Examining the Dutch Disease in Two-Speed Economies.” *Economic Journal* 126: 598. doi:10.1111/ecoj.12302.

Bloom, Nick, Mirko Draca, and Van Reenen John. 2016. "Trade Induce Technical Change? the Impact of Chinese Imports on Innovation, IT and Productivity." *Review of Economic Studies* 83: 87–117. doi:10.3386/w16717.

Blundell, R., and S. Bond. 1998. "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models." *Journal of Econometrics* 87: 11–143. doi:10.1016/S0304-4076(98)00009-8.

Bornhorst, Fabian, Sanjeev Gupta, and John Thornton. 2009. "Natural Resource Endowments and the Domestic Revenue Effort." *European Journal of Political Economy* 25 (4): 439–446. doi:10.1016/j.ejpoleco.2009.01.003.

Carmignani, Fabrizio. 2013. "Development Outcomes, Resource Abundance, and the Transmission through Inequality." *Resource and Energy Economics* 35 (3): 412–428. doi:10.1016/J.RESENEECO.2013.04.007.

Caselli, Francesco, and Andrea Tesei. 2016. "Resource Windfalls, Political Regimes, and Political Stability." *Review of Economics and Statistics* 98 (3): 573–590. doi:10.1162/REST_a_00538.

Chachu, D.O. 2020. "Domestic Revenue Displacement in Resource-Rich Countries: What's Oil Money Got to Do with It?" *Resources Policy* 66. 10.1016/j.resourpol.2020.101656 .

Chaudhry, Kiren A. 1997. *The Price of Wealth: Economies and Institutions in the Middle East - Kiren Aziz Chaudhry - Google Books*. London: Cornell University Press. https://books.google.com.gh/books?hl=en&id=OjFhOQMek4oC&oi=fnd&pg=PR9&ots=ua7RqRWXgs&sig=o_yYP6xjHJPyic1JmkIXH9IcnWY&redir_esc=y#v=onepage&q&f=false .

Clist, Paul. 2016. "Foreign Aid and Domestic Taxation: Multiple Sources, One Conclusion." *Development Policy Review* 34 (3): 365–383. doi:10.1111/dpr.12154.

Collier, Paul. 2017. "The Institutional and Psychological Foundations of Natural Resource Policies." *Journal of Development Studies* 53 (2): 217–228. doi:10.1080/00220388.2016.1160067.

Collier, Paul, and Anke Hoeffler. 2009. "Testing the Neocon Agenda: Democracy in Resource-Rich Societies." *European Economic Review* 53 (3): 293–308. doi:10.1016/j.euroecorev.2008.05.006.

Crivelli, Ernesto, and Sanjeev Gupta. 2014. "Resource Blessing, Revenue Curse? Domestic Revenue Effort in Resource-Rich Countries." *European Journal of Political Economy* 35: 88–101. doi:10.1016/j.ejpoleco.2014.04.001.

Cuddington, John T., and Daniel Jerrett. 2008. "Super Cycles in Real Metals Prices?" *IMF Staff Papers* 55 (4): 541–565. doi:10.1057/imfsp.2008.19.

Davis, Graham A., and John E. Tilton. 2005. "The Resource Curse." *Natural Resources Forum* 29 (3): 233–242. doi:10.1111/j.1477-8947.2005.00133.x.

Fearon, James D, and David D Laitin. 2003. "Ethnicity, Insurgency, and Civil War." *American Political Science Review* 97 (1): 75–90. https://web.stanford.edu/group/ethnic/workingpapers/Datapap1.pdf .

Foster, Vivien, William Butterfield, Chuan Chen, and Nataliya Pushak. 2008. "Building Bridges: China's Growing Role as Infrastructure Financier for Sub-Saharan Africa." *Trends and Policy Options*. doi:10.1111/j.1365-313X.2011.04497.x.

Fum, Ruikang Marcus, and Roland Hodler. 2010. "Natural Resources and Income Inequality: The Role of Ethnic Divisions." *Economics Letters* 107 (3): 360–363. doi:10.1016/J.ECONLET.2010.03.008.

Fund, International Monetay. 2016. *World Economic Outlook*. https://www.imf.org/en/Publications/WEO/Issues/2018/01/11/world-economic-outlook-update-january-2018 .

Gylfason, Thorvaldur. 2001. "Natural Resources, Education, and Economic Development." *European Economic Review* 45 (4–6): 847–859. doi:10.1016/S0014-2921(01)00127-1.

Haber, Stephen, and Victor Menaldo. 2011. "Do Natural Resources Fuel Authoritarianism? A Reappraisal of the Resource Curse." *American Political Science Review* 105 (1): 1–26. doi:10.1017/S0003055410000584.

Halland, Havard, John Beardsworth, Bryan Land, and James Schmidt. 2014. *Resource Financed Infrastructure: A Discussion on A New Form of Infrastructure Financing*. Washington DC: World Bank Group. 10.1596/978-1-4648-0239-3 .

Holtz-Eakin,Douglas, Whitney Newey, and Harvey Rosen. 1988. "Estimating vector autoregressions with panel data." *Econometrica* 56: 1371–95.

Humphreys, Macartan. 2005. "Natural Resources, Conflict, and Conflict Resolution: Uncovering the Mechanisms." *Journal of Conflict Resolution* 49 (4): 508–537. doi:10.1177/0022002705277545.

Jensen, Anders Ditlev. 2011. "State-Building in Resource-Rich Economies." *Atlantic Economic Journal*, no. June: 171–193. doi:10.1007/s11293-011-9269-z.

Keen, Michael, and Mario Mansour. 2009. *Revenue Mobilization in Sub-Saharan Africa : Challenges from Globalization." 09/157*. Washington, DC: International Monetary Fund.

Kilian, Lutz, and Bruce Hicks. 2013. "Did Unexpectedly Strong Economic Growth Cause the Oil Price Shock of 2003-2008?" *Journal of Forecasting* 32 (5): 385–394. doi:10.1002/for.2243.

Klein, Nir. 2010. "The Linkage between the Oil and Non-Oil Sectors: A Panel VAR Approach." *IMF Working Papers* 10 (118): 1. doi:10.5089/9781455200771.001.

Klomp, Jeroen, and de Haan Jakob. 2016. "Election Cycles in Natural Resource Rents: Empirical Evidence." *Journal of Development Economics* 121: 79–93. doi:10.1016/j.jdeveco.2016.03.002.

Knack, Stephen. 2009. "Sovereign Rents and Quality of Tax Policy and Administration." *Journal of Comparative Economics* 37 (3): 359–371. doi:10.1016/j.jce.2009.04.001.

Knebelmann, Justine. 2017. *Wider Working Paper 2017/10 Natural Resources ' Impact on Government Revenues*.

Knutsen, Carl Henrik, Andreas Kotsadam, Eivind Hammersmark Olsen, and Tore Wig. 2017. "Mining and Local Corruption in Africa." *American Journal of Political Science* 61 (2): 320–334. doi:10.1111/ajps.12268.

Lederman, Daniel, and William F. Maloney. 2007. "Natural Resources neither Curse nor Destiny." doi:10.1007/SpringerReference_5860. Palo Alto, CA: Stanford University Press.

Lessmann, Christian, and Arne Steinkraus. 2019. "The Geography of Natural Resources, Ethnic Inequality and Civil Conflicts." *European Journal of Political Economy*. doi:10.1016/j.ejpoleco.2019.01.005.

Lin, Justin Yifu, and Yan Wang. 2016. "New Structural Economics and Resource Financed Infrastructure." *Pacific Economic Review* 21 (1): 102–117. doi:10.1111/1468-0106.12154.

Mamo, Nemera, Sambit Bhattacharyya, and Alexander Moradi. 2019. "Intensive and Extensive Margins of Mining and Development: Evidence from Sub-Saharan Africa." *Journal of Development Economics* 139 (October 2018): 28–49. doi:10.1016/j.jdeveco.2019.02.001.

Masi, Tania, Antonio Savoia, and Kunal Sen. 2018. "Is There a Fiscal Resource Curse? Institutions." ESID Working Paper No. 96. Manchester. www.effective-states.org .

Mawejje, Joseph. 2019. "Natural Resources Governance and Tax Revenue Mobilization in Sub Saharan Africa: The Role of EITI." *Resources Policy* 62 (April): 176–183. doi:10.1016/j.resourpol.2019.04.001.

Mcnabb, Kyle. 2017. "WIDER Working Paper 2017/184 Toward Closer Cohesion of International Tax Statistics," no. November.

Mlachila, Montfort, and Rasmané Ouedraogo. 2017. "Financial Development Resource Curse in Resource-Rich Countries: The Role of Commodity Price Shocks." *IMF Working Paper*. https://www.imf.org/en/Publications/WP/Issues/2017/07/19/Financial-Resource-Curse-in-Resource-Rich-Countries-44938 .

Mohtadi, Hamid, Michael L Ross, and Stefan Ruediger. 2016. *Oil, Taxation and Transparency*. Vol. 55108. Mimeo, 2016.

Nakyea, Abdallah Ali, and John Kwaku Amoh. 2018. "Have the Generous Tax Incentives in the Natural Resource Sector Been Commensurate with FDI Flows? A Critical Analysis from an Emerging Economy." *International Journal of Critical Accounting* 10 (3/4): 257. doi:10.1504/ijca.2018.093064.

Ossowski, Rolando, and Alberto Gonzales. 2012. "Manna From Heaven." *IDB Working Paper Series No. ID-WP-337*, no. August.

Parcero, Osiris J., and Elissaios Papyrakis. 2016. "Income Inequality and the Oil Resource Curse." *Resource and Energy Economics* 45 (August): 159–177. doi:10.1016/J.RESENEECO.2016.06.001.

Political Risk Services. 2015. "International Country Risk Guide Methodology." *Country Reports*.

Prichard, Wilson. 2016. "Reassessing Tax and Development Research: A New Dataset, New Findings, and Lessons for Research." *World Development* 80: 48–60. doi:10.1016/j.worlddev.2015.11.017.

Prichard, Wilson, Alex Cobham, and Andrew Goodall. 2014. *The ICTD Government Revenue Dataset*. *ICTD Working Paper*. 10.2139/ssrn.2496442.

Ratti, Ronald A., and Joaquin L. Vespignani. 2016. "Oil Prices and Global Factor Macroeconomic Variables." *Energy Economics* 59 (September): 198–212. doi:10.1016/J.ENECO.2016.06.002.

Ross, Michael L. 1999. "The Political Economy of the Resource Curse." *World Politics* 51 (2): 297–322. doi:10.3200/DEMO.14.4.601-611.

Stock, James H., Jonathan H. Wright, and Motohiro Yogo. 2002. "A Survey of Weak Instruments and Weak Identification in Generalized Method of Moments." *Journal of Business and Economic Statistics* 20 (4): 518–529. doi:10.1198/073500102288618658.

Thomas, Alun H., and Juan P. Treviño. 2013. "Resource Dependence and Fiscal Effort in Sub-Saharan Africa." *IMF Working Papers* 13 (188): i. doi:10.5089/9781484391501.001.

Van Der Ploeg, Frederick, and Anthony J. Venables. 2013. "Absorbing a Windfall of Foreign Exchange: Dutch Disease Dynamics." *Journal of Development Economics* 103 (1): 229–243. doi:10.1016/j.jdeveco.2013.03.001.

Vasquez, Patricia. 2018. *China, Oil and Latin America : MYTH VS. REALITY*. Washington, DC: Atlantic Council.

Venables, Anthony J. 2016. "Using Natural Resources for Development: Why Has It Proven so Difficult?" *Journal of Economic Perspectives* 30: 1. doi:10.1257/jep.30.1.161.

Williams, Andrew. 2011. "Shining a Light on the Resource Curse: An Empirical Analysis of the Relationship between Natural Resources, Transparency, and Economic Growth." *World Development* 39 (4): 490–505. doi:10.1016/j.worlddev.2010.08.015.

Wooldridge, Jeffrey M. 2002. *Econometric Analysis of Cross Section and Panel Data*. Vol. 58 vols. Cambridge, Massachusetts, London, England: MIT Press. doi:10.1515/humr.2003.021.

World Bank. 2017. *World Development Indicators 2017*. Washington DC: World Bank.

Zafar, Ali. 2007. "The Growing Relationship between China and Sub-Saharan Africa: Macroeconomic, Trade, Investment, and Aid Links." *World Bank Research Observer* 22 (1): 103–130. doi:10.1093/wbro/lkm001.