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Fiscal dependence on extractive revenues

Measurement and concepts

Kyle McNabb*

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United Nations University World Institute for Development Economics Research
wider.unu.edu

Abstract: The aims of this paper are twofold. It firstly identifies and discusses the extent to which public revenues from natural resources are adequately captured in existing cross-country revenue databases, before exploring the extent to which such data can be used to estimate countries' fiscal dependence on extractives. I first discuss key conceptual, definitional and measurement issues, before comparing the coverage of key existing databases, notably the UNU-WIDER Government Revenue Dataset (GRD). I then propose a new measure of fiscal dependence on extractive revenues (FDE). Whilst a number of existing studies have attempted to better quantify countries' resource dependence, to the best of my knowledge none has yet proposed an indicator that ties the idea of dependence to any outcomes. The FDE simply calculates the extent to which extractive-producing countries can fund day-to-day government spending with non-extractive revenues. I find that the FDE is strongly correlated with existing measures of extractive dependence but can ultimately tell us more about countries' fiscal positions and resulting vulnerability to shocks to revenue or government spending.

Key words: extractives, government revenues, taxation, resource curse

JEL classification: N5, P28, Q32, E62

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*Overseas Development Institute, London; k.mcnabb@odi.org.uk

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Information and requests: publications@wider.unu.edu

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Katajanokanlaituri 6 B, 00160 Helsinki, Finland

1 Introduction

Recent initiatives such as the Extractives Dependence Index (EDI) (Hailu and Kipgen 2017) and the Multidimensional Indicator of Extractives Based Development (MINDEX) (Lebdioui 2021) have gone to great lengths to estimate and quantify the extent to which economies are dependent on rents, revenues or export earnings from natural resource extraction. This study focuses specifically on the fiscal revenues from extractives, seeking to quantify whether countries are 'fiscally dependent' on them by understanding fiscal dependence as a relationship between revenue from extractives and government expenditure needs. The underlying premise is that for a country to be considered *dependent* on revenue from extractives, it must, naturally, require these revenues to fund something public expenditure.[1] Thus, simply collecting a high amount of extractive revenues as a share of gross domestic product (GDP) (or of total revenues) does not, in and of itself, say anything about what extractive dependence *implies*. Consider a simple example: if a government collects, say, 15 per cent of GDP in extractive revenues, 10 per cent of GDP in non-extractive revenue and total government expenditure is just 8 per cent of GDP, then it is fair to question whether that country is truly 'dependent' on the revenues from natural resource extraction for its spending needs. Yet when measured in absolute terms (15 per cent of GDP) or as a percentage of total revenues (60 per cent), dependence is the likely picture that emerges. I attempt to address this issue by constructing a simple index - Fiscal Dependence on Extractives (FDE)—that expresses general government consumption expenditure as a share of total *non-extractive* revenue. The FDE, therefore, captures the extent to which natural resource-extracting countries are dependent on revenues from that extraction to fund the day-to-day spending of government. In cases where FDE >1, countries do not collect enough revenue from non-extractive sources to cover this expenditure, whilst the inverse is true where FDE <1: it is the former group of countries that I define as fiscally dependent on extractives. The indicator is narrower in scope than the aforementioned efforts (EDI and MINDEX) to measure extractive dependence, in several ways:

(i) I consider only the *fiscal* element of dependence.
(ii) I focus only on revenue from *extractives* and how these are defined and
(iii) I build on the UNU-WIDER Government Revenue Dataset (GRD) to construct a more complete series of *non-resource* government revenue.

By linking the dependence on extractive earnings to some use of those revenues (namely government spending), the FDE goes somewhat further than previous efforts to quantify extractive dependence.

The paper proceeds as follows. Section 2 briefly reviews the resource dependence literature. In section 3, I unpack the different definitional issues around 'natural resources', 'extractives' and 'unearned income' and their associated revenues. A key precursor to measuring fiscal dependence is to agree upon: (i) the revenue base (i.e. the set of activities being taxed) and; (ii) the instruments used to tax that base. Having thoroughly mapped these issues, in section 4, I examine how they are captured across key cross-country data sources and consider whether there is potential for synthesis across sources. Section 5 introduces and discusses the FDE, and Section 6 concludes

[1] A most basic definition of *dependence* suggests that *one thing is required to achieve another.*

with a discussion of what the FDE can tell us about fiscal dependence on—and vulnerability to—extractive revenues.

2 Literature review

A voluminous literature has discussed the consequences of resource (extractive) dependence and abundance. It is not the intention to review this literature in depth in the present study; briefly however, findings from the so-called 'resource curse' (whereby a negative relationship is observed between resource wealth and economic growth) literature have found that natural resource dependence is negatively correlated with economic growth (e.g. Sachs and Warner 1995), positively correlated with higher rates of poverty and inequality (Ross 2001, 2004, 2007), negatively affects democratic outcomes (Ahmadov 2014) draws conclusions from a meta-analysis of 29 studies) and is related to the likelihood of violent episodes of conflict emerging (Collier and Hoeffler 1998). An important conceptual difference exists between resource *dependence* and resource *abundance*, and the way in which researchers have approached and defined these concepts matters greatly for the results and take-aways of some of the aforementioned studies (Lebdioui 2021). The difference emerges, broadly, between the size of natural resource stocks (*abundance*) and the reliance of an economy on the extraction of those stocks (*dependence*).

Dependence, which is the focus of this study, is most commonly proxied by the share of export earnings (Sachs and Warner 1995), or the share of fiscal revenues that come from natural resource extraction (Bornhorst et al. 2009; Baunsgaard et al. 2012; Chachu 2020). It is the latter measure that we focus on. Regarding the effects of dependence on fiscal revenues from extractives, a number of studies have attempted to better understand if there is a displacement effect: i.e., whether countries which rely on resource revenue subsequently collect smaller amounts of non-resource revenue. Bornhorst et al. (2009) found that in 30 hydrocarbon-producing countries, there is an 'offset' of around 20 per cent, implying that for a percentage point increase in resource revenue, non-resource revenue declines by 0.2 percentage points. Crivelli and Gupta (2014), meanwhile, carry out a similar exercise and find that the offset is closer to 30 per cent, whilst Chachu (2020) confirms these results, employing data from the UNU-WIDER GRD. Finally, Peres-Caijas et al. (2022) explore how and why fiscal dependence on extractive revenues emerges in Bolivia, Chile, Peru, Norway, and Sweden over a 90-year period. They find that the abundance of natural resources does not necessarily go hand-in-hand with eventual fiscal dependence, positing that both economic and political factors determine the likelihood of fiscal dependence emerging.

Several recent initiatives have attempted to create indices that bring together a number of different indicators to give a more holistic picture of countries' dependence on natural resources. For example, Hailu and Kipgen (2017) and Lebdioui (2021), who have constructed, respectively, the Extractives Dependence Index (EDI) and the Multidimensional Indicator of Extractives-Based Development (MINDEX). The value of such indices is that, when trying to understand 'dependence', the findings are less likely to be biased by country-specific institutional features: for example, a country with a large share of mineral exports in GDP that has an ineffective fiscal regime for extractives would appear as 'dependent' according to measures of export earnings but not so when examining resource tax revenues. The EDI incorporates information on export revenues, fiscal revenues and value added from extractives to create an index of 'aggregate dependence' on extractives. The EDI is calculated between 2000 and 2011, and for 2011 ranks Iraq, Equatorial Guinea and Libya as the three economies most 'dependent' on extractives. More recently, the MINDEX (Lebdioui 2021) incorporates information on export revenues, fiscal revenues, rents and reserves of extractives, creating a comprehensive indicator of resource

dependence and abundance.[2] The indicator introduced later in the present study, namely the FDE, is not quite analogous to either the EDI or MINDEX. It is, by design, more narrowly focused on the *fiscal* aspects of extractive dependence. However, before focusing on the ideas around what constitutes 'dependence', the following section takes the discussion back a step, by unpacking and exploring the different interpretations of what constitutes a 'resource' and then what constitutes a 'resource revenue'.

3 Conceptual issues

One objective of this study is to take a more in-depth look at the issue of how well government revenues from natural resources are captured in publicly available cross-country data. Currently only a select few 'composite' sources report data at the cross-country level, namely the NRGI Natural Resource Revenue Dataset (NRRD), the UNU-WIDER Government Revenue Dataset (GRD) and the MINDEX. However, before looking under the hood of each of these datasets, I first explore how the concepts of 'natural resources' and the associated revenues are defined.

3.1 What constitutes a 'natural resource'?

The question of 'what constitutes a natural resource' might seem somewhat high level, but it is the appropriate starting point for the present discussion precisely because it is not necessarily consistently defined or applied across current data sources. When one hears the term 'natural resource', often the extraction of fossil fuels (such as oil or natural gas) minerals or metals (gold, copper, iron ore, aluminium, and the like) spring to mind. And, indeed, often these extractive activities are what is implicitly being referred to. Yet, the manner in which '*natural resource –'* has been used to prefix concepts such as wealth, abundance, reliance or revenues, has led to a degree of inconsistency over measurement and concepts. The World Bank's (2021) taxonomy of 'natural capital', for example, is divided according to whether it is non-renewable (fossil fuels and minerals) or renewable (crop and pastureland, forestry and eco-services, protected areas, fisheries and mangroves). Thus, when economists consider resource *wealth* or *dependence,* the measures often extend far beyond non-renewables.

The World Banks' estimate of *total natural resource rents* (often incorporated in empirical work as a proxy for resource dependence) includes the sum of rents from oil, natural gas, coal, minerals and forestry, but not from fishing.[3] Thus, it already includes a mixture of (what might be considered) renewable (forestry) and non-renewable resources. The inclusion of forestry is, perhaps, a contentious choice: *timber* might best be described as a renewable resource as stocks can be fairly rapidly replenished with good management, however the extraction of rents from *forests* (such as the Amazon) might be considered as distinct and as non-renewable. The ecosystem services that emerge within a forest take many years, decades, if not centuries to develop and, thus, there is a strong case for considering forests as a non-renewable resource, even if, ultimately, the timber extracted is of similar value to that produced in a more 'renewable' setting.[4] Regarding ecosystem services, an interesting case is that of Gabon, which is now selling 'carbon offsets' (or carbon

[2] The MINDEX does not, however, attempt to distil the component parts into an index, like the EDI.

[3] This measure is often employed as a proxy for resource abundance/dependence in cross-country regressions attempting to explain other outcomes.

[4] Contrast this, however, with the treatment of fishing, where, again, good management might be key to ensuring that what is considered—at least by the World Bank—a *renewable* resource, is not extracted to the point where it might be best considered *non-renewable.*

credits) for reductions in deforestation and the ongoing ecosystem services provided by its forests which cover just shy of 90 per cent of its territory (UN 2021). Thus, there is potential that in some countries—such as Brazil, DRC, and Indonesia—the value of forests *in situ* will soon surpass the value of the timber from deforestation. In the future, such values might well be reflected in estimates of natural resource wealth, but today this is not the case.[5]

Another way in which revenues from natural resources have been distinguished is via the dichotomy of whether government revenue is *earned* or *unearned* (see, e.g., Moore 1998). Whether or not income is 'earned' depends on the extent to which states exert political and organisational effort in order to collect revenues, most often in the form of taxes. 'Earned income' requires significant effort from the state and may include an element of bargaining and negotiating of the so-called fiscal contract with citizens. 'Unearned income' in the form of foreign aid, or rents from extraction of non-renewables, often requires next-to-no bargaining with citizens and overall, much less effort from government. We can reasonably confidently argue that the extraction of non-renewable hydrocarbons, minerals or metals might best be considered as 'unearned income', but it is less clear where the issue of timber forestry or fishing might lie in this dichotomy. In many economies, it might be the case that they are considered as 'unearned income'—especially where these resources are depleted to dangerously low levels.

But the distinction is crucial for the present work: the variable capturing 'natural resource revenues' in the GRD, from which some of our best estimates come, is rooted in the idea of unearned income.[6] If we consider the definition of 'unearned income' as the litmus test of whether an item is a 'natural resource' or not, then the measure must surely extend to cover a broader range of goods and services. For example, Egypt collects a significant amount of revenue from ships that pass through the Suez Canal. One could argue that this is 'earned income', as significant investments were made in order to construct the canal. Yet, it was opened some 150 years ago, so there is a reasonable counter-argument that the hundreds of thousands of dollars paid per ship is 'unearned'.[7] Thus, whilst extractive revenues, or revenues from non-renewable resources constitute a large part of unearned income, they are not the sum total.

3.2 What constitutes a natural resource 'revenue'?

Notwithstanding the difficulty in defining what might be considered as a natural resource, there are further difficulties faced in accounting for natural resource *revenues* in government finance statistics. Taxes on corporate profits from firms engaged in the extraction of minerals or hydrocarbons are likely to be recorded as natural resource taxes (subject to adequate levels of transparency), as are any royalty payments made by these firms.[8] Similarly, signatory bonuses and the initial sale of exploration licenses/permits should be captured as non-tax revenues. However, cases where a country withdraws income from sovereign wealth funds (SWFs) are less clear cut. These might appear in government budget accounts as a *non-tax resource revenue*, but if the withdrawals essentially represent returns on investments from capital that was *initially* raised by extracting non-renewables, it is unclear whether this is a resource revenue *today*? There seems to

[5] Similarly, payments received for carbon credits could reasonably be considered as natural resource revenues

[6] Prichard (2016) in introducing the GRD, makes reference to the dichotomy when discussing natural resource revenues.

[7] Although, the canal has been upgraded at the cost of billions of dollars over the past decade or so (https://www.ship-technology.com/news/egypt-suez-canal-expansion-plan/).

[8] Whether a royalty is considered to be a *tax* or *non-tax* revenue is a separate issue, and there is variation across countries, although it is normally most akin to a non-tax revenue.

be little clarity on this issue. Similarly, there is significantly less consistency in reporting on other forms of tax or non-tax receipts associated with the extraction of natural resources. For example, pay-as-you-earn (PAYE) receipts from staff of the aforementioned firms or value-added tax (VAT), customs, or excise duties on goods and services imported or locally purchased to facilitate extractive operations. Typically, we do not see a detailed breakdown of such revenues accounted for in cross-country data sources (or even national sources), with the exception of those reporting to EITI standards.[9]

One could also argue that any tax receipts from support services to firms (e.g. transport, security, catering if provided by external firms) involved in natural resource extraction should be counted as natural resource revenues. Economists might even be interested in measuring the ultimate, overall, impact on the macroeconomy of the presence of firms involved in natural resource extraction and would thus seek to account for the (e.g.) VAT receipts from second, or third round spending effects of an individual employed locally in the industry. Whilst it is unrealistic to expect that such data could be consistently compiled across countries, it serves to highlight the point that it is difficult to establish an agreed-upon definition of where to 'draw the line', so to speak.

A further consideration which must be accounted for is the level of government at which resource revenues are reported. Most often, they accrue to the central government. However, where natural resource revenues accrue to local, or state governments, these might not be as consistently reported on, as many developing countries only publish government finance statistics at the central government level. Furthermore, in a number of countries, local government receives much of their revenue from intragovernmental fiscal transfers. In cases where natural resource revenues are collected by the central government and subsequently transferred to a local government, it is important to reconcile government accounts, in order that resource revenues are not 'double counted'.

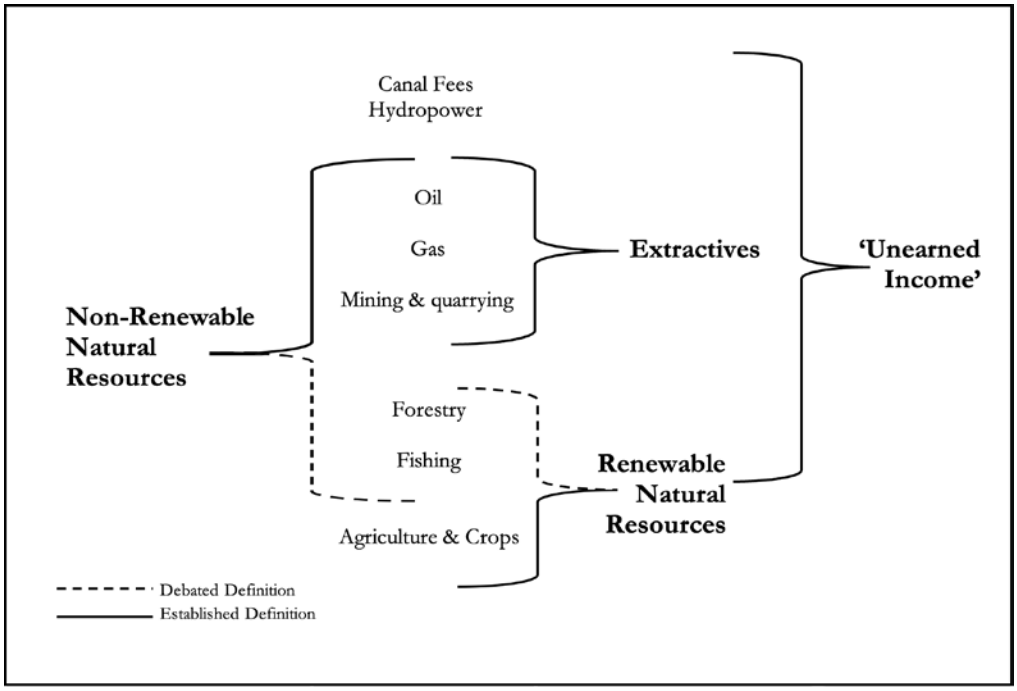
3.3 Toward definitional clarity

In order to better understand how well current data sources represent public revenues from extractives (and subsequently move toward a more complete picture of which countries are dependent on extractives), it is imperative to understand the *base* on which taxes and fees are levied. The above discussion has highlighted that a degree of inconsistency exists over what exactly might be considered a non-renewable resource, especially with respect to activities related to forestry / timber or fishing. Starting with a (non-exhaustive) list of resources, namely oil, gas, mining & quarrying, forestry, fishing, agriculture & crops, hydrocarbon revenue and canal fees, Figure 1 classifies each of these under different concepts, namely *Unearned Income*, *Non-Renewable Natural Resources*, *Renewable Natural Resources* and *Extractives*. A dashed parenthesis shows cases where there is a degree of debate (along the lines discussed above)—this pertains to forestry and fishing—whilst a solid parenthesis refers to more established definitions. I include 'Canal Fees' and 'Hydropower revenues' as they are specifically recorded in the UNU-WIDER GRD as streams of 'resource revenue', but the category of 'unearned income' might also extend to cover other usage or access fees charged on a particular resource.[10]

[9] See EITI (2019) for a breakdown of how extractive revenues are classified according to EITI standards.

[10] There are other income streams that fit the definition of 'unearned income', such as bilateral or multilateral grants, but these are not considered here.

Figure 1: Concept mapping



Source: author's exposition.

From Figure 1, we see that there is considerable potential for overlap between the four concepts. Crucially, given the potential for debate around whether forestry and fishing are, or are not, non-renewable resources, there exists a key difference between *non-renewable natural resources* and *extractives*. Yet when we consider the 'resource curse' or 'resource dependence', what is most often being discussed is the activity surrounding the extraction of oil, gas, minerals and metals, as these resources can generate large windfalls or rents that lead to lumpy increases in economic outcomes such as export earnings, tax revenue or GDP (Peres-Caijas et al. 2022) and might thus be more quickly 'captured', leading to negative knock-on effects. For the present study, therefore, I focus on extractives as the base of interest for studying fiscal dependence. This set of activities quite strictly follows that covered in EITI reporting[11] and also captures the vast majority of revenues currently earned under what might be more broadly considered as *resource revenues*, whilst avoiding the grey areas of timber, forestry and fishing.

4 Measurement

In this section, I take a closer look at the main sources of cross-country data on natural resource or extractive revenues currently available. Table 1 presents a high-level summary of coverage of the three main 'composite' datasets available, namely the GRD, MINDEX and NRRD, along with a summary of two key 'underlying' sources, the EITI and World Commodities Exporters Dataset (WCED).

[11] In very rare cases, however, EITI reports include revenues from groundwater extraction, forestry, agriculture and renewable energy. However, the EITI's stated objective is '…transparency in the oil, gas and mining sectors'. (EITI 2021)

Table 1: Cross-country data coverage

Source	# Obs.	Relevant variables	Concepts covered	Time period
UNU-WIDER GRD	1,674	Total resource revenue (% of GDP & LCU)	Unearned income (total 'resource' revenue')	1980–2021
NRGI NRRD	2,959 (1,928 unique)	Total resource revenue (US$, % of GDP, % of government revenue)	Natural resource revenues	1980–2020
MINDEX	1,395	Total extractives revenues (% of government revenue, US$, US$ per capita),	Extractives	1980–2019
EITI	473	Extractive revenues (LCU, US$) [both aggregate and broken down according to IMF GFS classification]	Extractives	1999–2019
WCED	925	Total 'Commodities' Revenue (% of GDP)	Extractives	1990–2014

Note: LCU = local currency units.

Source: author's computations.

4.1 The GRD (UNU-WIDER 2022)

The UNU-WIDER GRD (2022) contains 1,674 (non-zero) observations for total government revenue from natural resources, covering the period 1980–2020.[12] The data is presented in nominal local currency units (LCU) and as a percentage of GDP. Where data allows, this is broken into tax (n=1004) and non-tax revenue (n=1,142) from natural resources.[13] The source of resource revenue data in the GRD is most often IMF Article IV Staff Reports, the OECD's *Revenue Statistics* or, occasionally, individual country sources. EITI data is not systematically included in the GRD as it is difficult to reconcile EITI resource revenue data with total revenue from other sources. The GRD also, where possible, provides guidance on data sources and interpretation, e.g., if it is suspected that a country (i) collects substantial, or even marginal, revenues from natural resources but this is not accounted for in the underlying sources, or (ii) a figure is presented but there are reasons to doubt its validity, a note or flag will alert users of this.[14]

The GRD provides a complete picture of government revenues (including subcomponents of direct and indirect tax) and, where data allows, breaks these down according to whether they accrue from natural resources extraction or not. Only rarely does it merge two sources for one country-year observation (McNabb et al. 2021), thus if users need to calculate ratios of resource revenue as a share of total revenue, then both the numerator and denominator must come from the same source. The GRD does have some limitations as a source of resource revenue data. Specifically, the concept of what constitutes a natural resource is not strictly defined in the GRD. Indeed, it covers revenues from sources such as fishing license fees (e.g Kiribati) or Suez Canal (Egypt) revenues; thus, the concepts included are closer in nature to 'unearned income' than 'revenue from resources'.

[12] For further information on construction and contents of the GRD, see Prichard et al. (2014), McNabb (2017), McNabb et al. (2021), Oppel et al. (2021).

[13] For a limited number of observations this is even further disaggregated to the level of the individual tax (such as corporate income tax (CIT), or indirect taxes).

[14] Point (i) is of crucial importance; whilst datasets often present only data which is available, it is just as important to highlight the cases where we know, or suspect, that there are significant data gaps.

4.2 The NRRD[15]

The NRGI Natural Resource Revenues Dataset (NRRD) contains some 2,959 observations between 1980 and 2020. It presents resource revenues in U.S. Dollars, as a share of GDP, and as a share of government revenue. The data sources used to compile the NRGI dataset are the EITI, GRD and the IMF WCED. This latter source is not used by the GRD but contains resource revenue data for 51 countries whose exports of oil, gas, metals and minerals comprise at least 20 per cent of total exports (or whose resource revenues comprise 20 per cent of the total). There are numerous cases when the NRGI dataset offers two or more observations per country-year, which provides useful context for users, although no guidance is offered by the authors on which observation is 'preferred' or thought to be most accurate. Taking this into account, there are 1,928 unique observations in the dataset.

Table 2: Difference in resource revenue estimates in the NRRD

Country	Year	Dataset	Resource Revenue (US$)
Congo, Rep.	2014	EITI	5,243,748,000
		GRD	3,995,890,047
		WCED	4,549,400,792

Source: MINDEX.

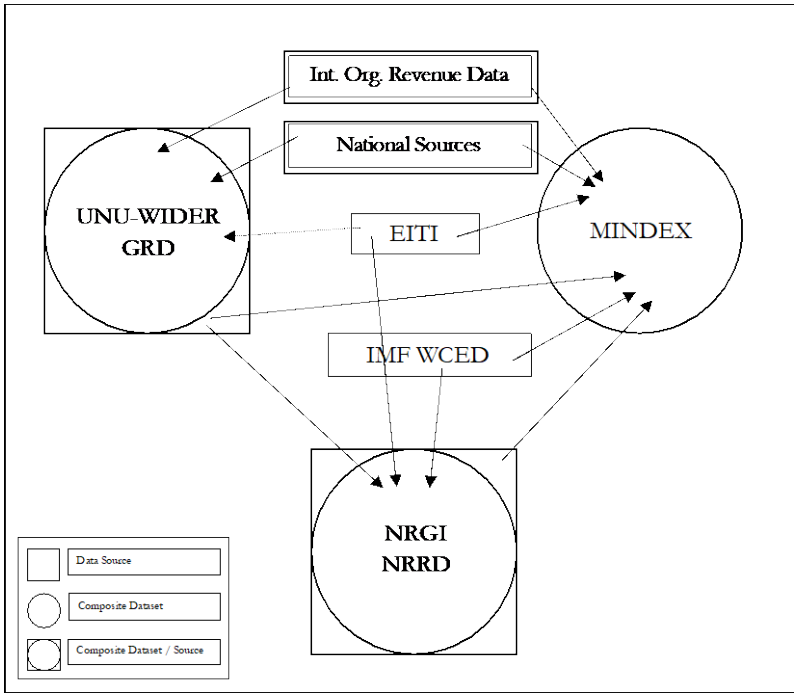
The fact that the NRRD presents estimates from two, or even three sources is insightful as it serves to highlight the significant differences present in each underlying source and the difficulty for researchers in knowing exactly which source to utilise. The example of Republic of the Congo in 2014 illustrates this: Table 2 highlights that estimates of resource revenues differ from between US$4bn in the GRD to US$4.6bn in the WCED to as much as US$5.2bn in the EITI. The difference between estimates in the GRD and EITI is, thus, some 30 per cent.

The MINDEX contains 1,395 observations of 'extractives revenues', presented as a percentage of government revenue, in US$ and US$ per capita. The data is drawn primarily from the GRD and NRGI, but is also complemented with further observations from EITI, African Development Bank (AfDB), CEPAL/ECLAC, WCED and numerous national sources. No interpretation of the figures is presented; however, an accompanying paper does provide further information on the construction of the variables contained within (Lebdioui 2021). It should be noted that the MINDEX dataset presents a multidimensional approach to measuring extractives-based development. Government revenues from extractives, whilst an important part of the approach, are not the sole focus of the dataset. Given that many of the observations in the MINDEX are sourced from either the GRD or NRRD, it suffers from the same inherent weaknesses as those sources (i.e., it mixes NRGI resource revenue share data with GRD resource revenue share data, where the denominators are often measured differently).

There is, thus, considerable overlap between the three composite datasets, and the input data they use. Indeed, both the NRRD and MINDEX use the GRD as an input source alongside other raw data such as EITI, whilst the GRD uses only raw data sources as inputs. This is summarised in Figure 2.

[15] https://www.resourcedata.org/dataset/natural-resource-revenue-dataset; Accessed October 2021

Figure 2: Composite data sources: interconnectedness[16]



Source: author's exposition.

4.3 Comparison of data sources

In this section, I look closer 'under the hood' of existing datasets to compare the data in the GRD with the raw data found in EITI and WCED (which represent alternative underlying data sources not included in the GRD), in order to better understand whether these may offer further information, and opportunities for harmonisation. In the name of consistency, I convert all data across sources to nominal LCU and divide by GDP from the April 2021 IMF World Economic Outlook (WEO). Turning firstly to a comparison between the GRD and EITI data, **Figure 3** plots each of the 288 common observations between the two datasets.[17] From the left-hand panel, we see that observations are clustered below the 45-degree line, implying that the EITI figure for resource revenue (percentage of GDP) is on average higher than that found in the GRD. Given that many the observations are quite low as a share of GDP, in the right-hand panel of figure 3, we consider only those data points where both observations lay at less than or equal to 10 per cent of GDP.

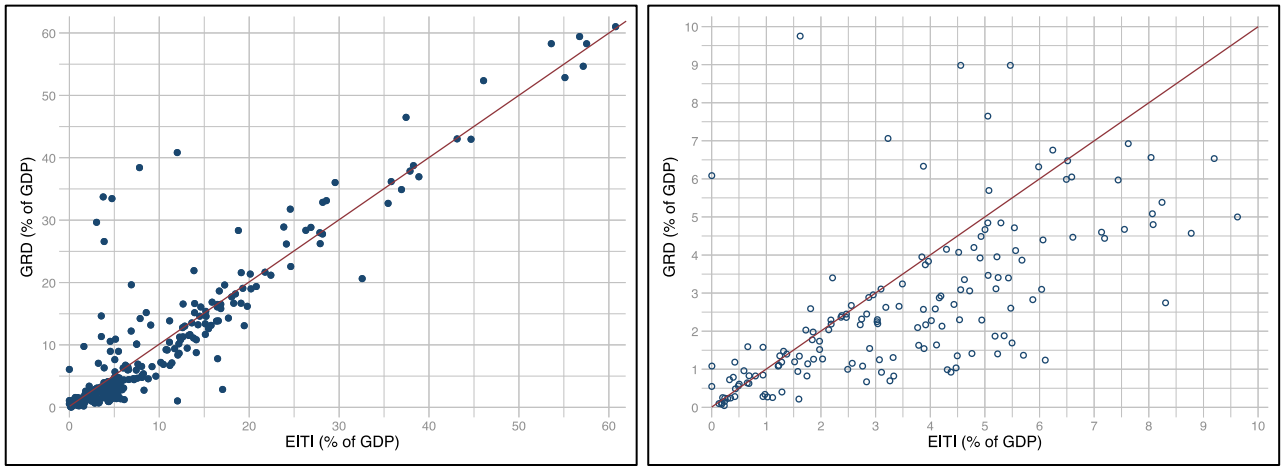
We see that for this subsample, the observations lie overwhelmingly below the 45-degree line. Thus, it appears that the data in the EITI is, on average, capturing a larger amount of resource revenue than that in the GRD (whose resource revenue data comes mostly from IMF article IV Staff Reports and OECD Revenue Statistics). Of the 288 common observations between both datasets, the average resource revenue as percentage of GDP in EITI was 10.2 per cent, whilst the commensurate figure from the GRD was 9.6 per cent. Thus, *on average*, Figure 3. Suggests that the GRD figures under-estimate resource revenue by some 6.25 per cent (or around 0.6 per cent of GDP), however in many cases the true magnitude of underestimation appears much higher. A few

[16] As stated, the GRD does not directly include EITI data, but does refer to it in cases where there is overlap between an EITI observation and one in the GRD. This is depicted by a dashed arrow.

[17] Appendix A provides a histogram comparing the ratio of GRD to EITI observations

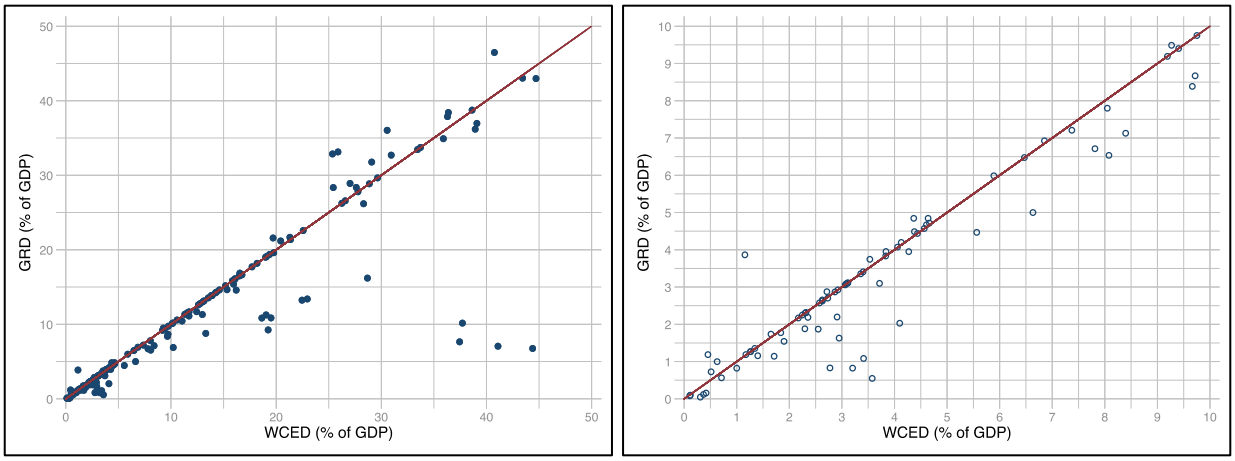
reasons as to why the GRD estimate of resource revenue is systematically lower on average might be that (i) historically, reporting standards on resource revenues were poorer (e.g., before the advent of the EITI) (ii) the data is in much more aggregated form and likely not subject to extensive scrutiny and (iii) off-budget payments are not accounted for.

Figure 3: EITI versus GRD



Source: author's computations from GRD and EITI.

Figure 4: GRD versus WCED



Source: author's computations from GRD and WCED.

In Figure 4, I carry out the same exercise for the GRD and WCED. In many cases, the data matches more closely between these two sources, which may reflect a shared use of underlying data found from the IMF Staff Reports.

4.4 Toward improved (non-)extractive revenue data coverage

From the brief comparisons in the preceding section, a few take-aways emerge. Firstly, *vis-à-vis* the EITI, the data in the GRD appears to (on average) systematically under-report the 'true' amount of resource revenue collected across countries. In some cases, the discrepancy is stark. Thus, it is clear that the data reported under the EITI is significantly broader in scope. Regarding the WCED, it appears that both it and the GRD draw from similar underlying sources and any differences are much more nuanced. The question then arises as to whether there is room to improve upon coverage in the GRD by incorporating data from either of these sources, to construct a more

'complete' and consistent series of extractive revenue. Given the interest of the present study in better understanding *non-extractive* revenue collections, it is not sufficient that additional observations of resource revenue are available in isolation: they must be consistent with surrounding and pre-existing data in the GRD. Two distinct scenarios were considered:

I. **Cases where the GRD is entirely missing data on resource revenue for a given country.** In this scenario, neither EITI nor WCED data can be incorporated. This is because it is not possible to verify if the *total* revenue figure (i.e. incorporating both resource and non-resource revenue) currently in the GRD includes (or excludes) the resource revenues from EITI or WCED. In some cases (where resource revenue as a percentage of GDP is large), it will be clear whether or not the existing total does include resource revenues, whilst in others (where resource revenue as a percentage of GDP is small or marginal) it is more difficult to assess. However, a key tenet of the GRD construction is that it does not merge data from two or more sources for a given country-year observation if there is insufficient information to do so without introducing inaccuracies. Given that the EITI and WCED data presents only resource revenue and do not set this in context against *non-resource* revenue, it is difficult to incorporate in the GRD, without introducing uncertainty surrounding the pre-existing *total revenue* and subsequent *total non-resource* figures.

II. **Cases where the GRD is missing just some years of resource revenue data.** If the data in either the EITI or WCED m with GRD data in surrounding years, it would in theory be possible to fill such gaps by merging data together with a reasonable degree of confidence. It was not possible, however, to isolate any examples where this was the case. This is unsurprising, given the depiction in Figure 3 above, which shows that the EITI and GRD only match on rare occasions. There were also no instances where the data existed for an observation that was missing in the GRD.

Thus, whilst both the EITI and WCED, in places, do offer some advantages over the GRD in terms of coverage and concepts covered, it is unfortunately not possible to use these data alongside one another to construct consistent series of non-resource revenue.

Beyond the datasets already considered, there is potential to improve on extractive revenue coverage in the GRD by incorporating data from national sources (such as ministries of finance, revenue authorities, central banks, or statistical authorities). Again, it would only be appropriate to do so where (i) these sources presented both total revenue and total extractive revenue and (ii) they matched with the existing data in the GRD. An internet search was carried out for countries where extractive revenue as a percentage of GDP is known to be significant, but where observations are currently missing from the GRD. The countries for which it was possible to improve on coverage (avoiding the pitfalls outlined in (i) and (ii) above) were Bahrain, Libya and Oman, where it was possible to merge 20, 2, and 31 observations respectively.[18] Further to these additions, 7 observations for Cote d'Ivoire were added from the OECD's Revenue Statistics (as the revenue totals in this source aligned with the totals in the GRD, which originate in the IMF country reports). The result of this process is a more complete series of observations for total non-

[18] The sources used to construct this data were: Bahrain, The 'Finance and Insurance' Tables available from the Bahrain Open Data Portal (https://data.gov.bh/en/). Libya, *Statistical Books* from the Ministry of Planning', (www.bsc.ly). Oman, *Statistical Yearbooks* from the National Center for Statistics and Information (www.ncsi.gov.om).

extractive revenue in the GRD, including for some key hydrocarbon producers (e.g. Libya, Oman etc.).

5 A measure of fiscal dependence on extractives

Given the preceding analysis of different estimates of resource or extractives revenue, the discussion now turns to utilising this data to understand at what point countries become 'fiscally dependent' on extractives. To shed light on this question, I propose a simple indicator of fiscal dependence on extractives (FDE) as follows:

$$FDE_{it} = \frac{GovExp_{it}}{[NERev + ODA_{it}]} \quad [1]$$

Where: $GovExp_{it}$ is General Government Final Consumption Expenditure, $NERev_{it}$ is total *non-extractive* revenue (excluding grants) and ODA_{it} is the sum of all overseas development aid. $\boldsymbol{FDE}$ is, then, simply the ratio of the sum of General Government Final Consumption Expenditure to *non-resource* revenue and ODA. Each of these variables is expressed as a percentage of GDP, whilst subscript *I* represents the country and *t* the time period. I compute 5-year averages of each of the variables to smooth shocks to revenues (e.g., driven by price shocks), spending or both; therefore *t* = 1981-1985… …2016-2020.[19] If $\boldsymbol{FDE}$ >1, then I define a country as being fiscally dependent on extractives for that period. The higher the score, the more fiscally dependent is a country for a given period. Simply put, this indicator captures the extent to which countries' non-resource revenue effort plus aid financing is sufficient to cover day-to-day spending of government.

Crucial to this exercise, however, is the availability of reliable data on total *non-extractive* revenue. Following the discussion above, I construct the non-extractive revenue variable from the GRD (UNU-WIDER 2022), subject to a number of augmentations. I firstly restrict the sample to countries that collect revenues from *extractives* as depicted in Figure 1 (namely oil, gas and mining) before including the additional data points explained in the preceding section. The data on ODA and general government final consumption expenditure are from the World Bank's World Development Indicators (WDI).

Table 3 summarises the results of the exercise. Out of a total of 296 country-periods, there are 97 where $\boldsymbol{FDE}$>1, covering 29 countries. These are depicted in bold. The results are shown only for countries where there was at least one period of extractive revenues captured in the GRD. I thus exclude countries that do not collect any resource revenues yet still face severe budgetary shortfalls. The scores are missing for country-year observations where the data on non-extractive revenue, government consumption expenditure or both is unavailable.

[19] This approach also has the advantage of accounting for missing observations: in cases where there are fewer than five observations for a 5-year period, I take a simple average of the *available* observations.

Table 3: Baseline FDE scores

Country	1981–85	1986–90	1991–95	1996–2000	2001–05	2006–10	2011–15	2016–20
Equatorial Guinea					0.73	2.78	4.00	6.67
Brunei			3.45	3.57	4.76	4.35	4.35	4.35*
Bahrain				1.92	1.92	2.86	4.76	3.45
Oman		5.00	3.13	2.50	2.38	2.17	2.86	2.78
Saudi Arabia	2.44	3.03	3.70	3.33	4.00	4.17	5.26	2.56
Sudan				0.78	1.02	1.00	1.61	2.44
Timor-Leste					2.27	2.44	2.94	2.13
Congo, Rep.	0.65	1.16	1.35	1.14*	1.20	1.22	1.54	1.54
Botswana	0.81	0.93	0.99	1.23	1.03	0.69	0.93	1.35
Myanmar							1.25	1.33
Kuwait	0.78	0.82	2.17	1.28	1.41	1.00	1.33	1.30
Nigeria			0.34	0.24	0.46	1.59	1.64	1.27
Angola					1.96	1.75	2.13	1.20
Gabon	1.18	1.23	1.01	0.88	1.22	1.12	0.99	1.08
Algeria	0.83	0.91	1.32	1.37	1.22	1.25	1.45	0.95
Malaysia	0.90	0.77	0.68	0.65	0.81	0.97	0.98	0.95
Guinea		0.81	0.49	0.51	0.50	0.71	1.01	0.93
Qatar			1.82	2.22	1.16	0.77	0.78	0.91
UAE					1.49	1.02	0.93	0.88
Azerbaijan				0.81	0.69	0.72	0.88	0.85
Indonesia	1.72	1.04	0.78	0.63	0.64	0.72	0.79	0.83
Namibia		0.90	0.72	0.70	0.76	0.71	0.75	0.83
Burkina Faso				0.83	0.63	0.65	0.66	0.78
Kazakhstan				0.65	0.62	0.68	0.88	0.77
Cameroon	0.72	1.03	0.89	0.78	0.75	0.69	0.82	0.75
Niger			1.11	1.20	0.92	0.92	0.80	0.72
Zambia						0.44	0.68	0.70
Russian Federation				0.60	0.61	0.74	0.75	0.69
Bolivia		0.75	0.58	0.57	0.60	0.51	0.52	0.68
Mexico					0.68	0.65	0.68	0.68
Cote d'Ivoire			0.59				0.56	0.66
Mali							0.74	0.65
Senegal					0.55	0.61	0.68	0.63
Colombia						0.56	0.58	0.63
Tunisia	0.57	0.62	0.63	0.65	0.66	0.61	0.56	0.59
Egypt			0.42	0.55	0.69	0.72	0.85	0.57
Mauritania			0.61	0.83	0.78	0.99	0.63	0.55
Mongolia				0.33	0.38	0.47	0.50	0.51
United Kingdom		0.56	0.58	0.47	0.52	0.55	0.54	0.51
Congo, Dem. Rep.				2.13	0.21	0.38	0.45	0.50
Norway			0.43	0.42	0.46	0.44	0.48	0.48
Ghana				0.66	0.54	0.52	0.64	0.47
Sierra Leone		0.49	0.32	0.46	0.33	0.35	0.37	0.33
Chad					0.46	0.65	0.64	0.28
Iran			2.00	1.39	0.89	1.19	1.82	
Papua New Guinea		0.91	1.00	0.83	0.83			
Suriname						0.60		
Trinidad and Tobago								
Vietnam								
Chile				0.63	0.64	0.68	0.68	
Ecuador	2.13							
Guatemala		0.64	0.58					
Iraq					1.25	1.67	4.76	
Jamaica	0.63	0.39	0.41	0.58	0.60			
Libya					1.75	1.67	9.09	
Syria				0.76	0.90	0.72		
Togo	0.68	0.60	0.72	0.70	0.93			
Turkmenistan				1.41	1.96	1.27		

Uganda							0.67
Venezuela	1.25	1.12	0.79	0.72	0.58	0.55	0.58
Yemen							
Zimbabwe							0.79

Note: the data is for any *i,t* where a positive amount of resource revenues was observed in the GRD. A blank entry denotes a case where either non-resource revenue, government consumption expenditure or both variables were missing. Country-year periods where *total* government revenue is less than government consumption expenditure are denoted by an asterisk.

Source: see text.

The FDE scores depicted in Table 4 show that—for the most recent period—the five countries with the highest FDE scores were (in descending order) Equatorial Guinea (6.67), Brunei (4.35), Bahrain (3.45), Oman (2.78) and Saudi Arabia (2.56). However, there are a few countries with similarly low scores in the preceding period (but for which there is missing data more recently)—namely, Libya (9.09), and Iraq (4.76). Of the top 10 most fiscally dependent countries (2016-2019), $\boldsymbol{FDE} > 1$ in 40 of 49 periods for which data is available. Thus, many fiscally dependent countries remain in this position throughout the study period. Some countries, however, have 'graduated' away from such dependence—notably: Niger whose FDE score drops from a high of 1.20 in 1996–2000 to 0.72 in 2016–20, Indonesia whose score falls from 1.72 in 1981–85 to 0.83 in 2016–20 and Qatar, where FDE was 2.22 in 1996–2000 and has fallen to 0.91 in the most recent period. Other countries, such as Botswana, Gabon, or Kuwait, however, show a more mixed performance. It is this kind of mixed performance that poses another pertinent question: are some countries fiscally *vulnerable* due to reliance on extractives?

In order to investigate this possibility, I amend and re-estimate equation [1] as follows:

$$FVE_{it} = \frac{(1+\delta).(GovExp_{it})}{[NERev+ODA_{it}]} \qquad [2]$$

where $\boldsymbol{FVE}$ stands for fiscal *vulnerability* to extractives; $\delta = 0.1$.[20] Equation [2], therefore, captures whether or not non-resource revenues and aid would be sufficient to absorb a 10 per cent increase in day-to-day government consumption expenditure. In the interest of space, the full results are shown in Appendix B. This moderate adjustment to government spending needs does change the findings in a number of cases. The total number of country periods where $\boldsymbol{FDE} > 1$ rises from 97 to 118 whilst, for a number of countries—notably Guinea and Malaysia—they now show multiple periods where $\boldsymbol{FDE} > 1$, including the most recent (2016–20). Therefore, it is possible to classify Algeria, Guinea and Malaysia to be 'fiscally vulnerable' due to reliance on extractive revenues.

5.1 Robustness checks, limitations and comparisons

Robustness checks

One factor which may drive the results above is different preferences for government spending in societies—or *by governments*—that are more reliant on extractive revenues.[21] The literature tells us (e.g. Ahmadov 2014) that resource-reliant countries might be less democratic and therefore potentially less responsive to the needs of their citizens or concerned with the provision of public goods. Thus, it stands to reason that government spending on essential services may be lower in such countries, increasing the likelihood that FDE is >1. However, I do not find that this is the

[20] Clearly, the exercise could be carried out for any value of δ.

[21] Although, it might be that such preferences are reflected in both spending and non-resource taxation, in which case the effects would likely cancel out in the FRE ratio.

case: in fact, the inverse is true: Government consumption expenditure is *higher* on average in countries that are more fiscally reliant on resources. Table 4 shows a two-way t-test of differences in means of general government final consumption expenditure between country-periods where FDE <1 and where FDE >1. Thus, there is no evidence that a high fiscal dependence on extractive necessarily goes hand-in-hand with lower government consumption spending.

Table 4: Two-tailed t-test: difference of means government consumption expenditure

	FDE <1	FDE >1	Diff	T
(Avg.) Government consumption expenditure	15.89	22.48	6.59	8.205***
Observations	833	103		

Source: author's calculations.

A further question exists over whether low FDE scores might represent a scenario whereby governments simply cannot afford to cover their day-to-day spending or run budget deficits for some other reason.[22] As a check on this, I examine cases where *total* government revenue (including aid) is lower than government consumption expenditure (implying that even with extractive revenues, the government still cannot cover its day-to-day expenditure for a given period). I find that this is not driving the vast majority of results, but there are a few country-year periods where this holds true. These are denoted by an asterisk in Table 3.

Limitations

The preceding discussion regarding data comparisons highlighted that the GRD likely under-measures extractive revenue on average. This may bias the results presented above: if the under-measurement of extractive revenues translates to an *over-measurement* of non-extractive revenues (holding constant total revenue), then the FDE scores are, in reality, *higher* than those presented here. With this in mind, the FDE scores should be viewed as conservative, on average. One limitation with the FVE indicator is that it is backward looking, but asks whether an increase in spending *would have led* to fiscal extractive dependence. This should be kept in mind when understanding the extent to which countries might be fiscally vulnerable *in future*.

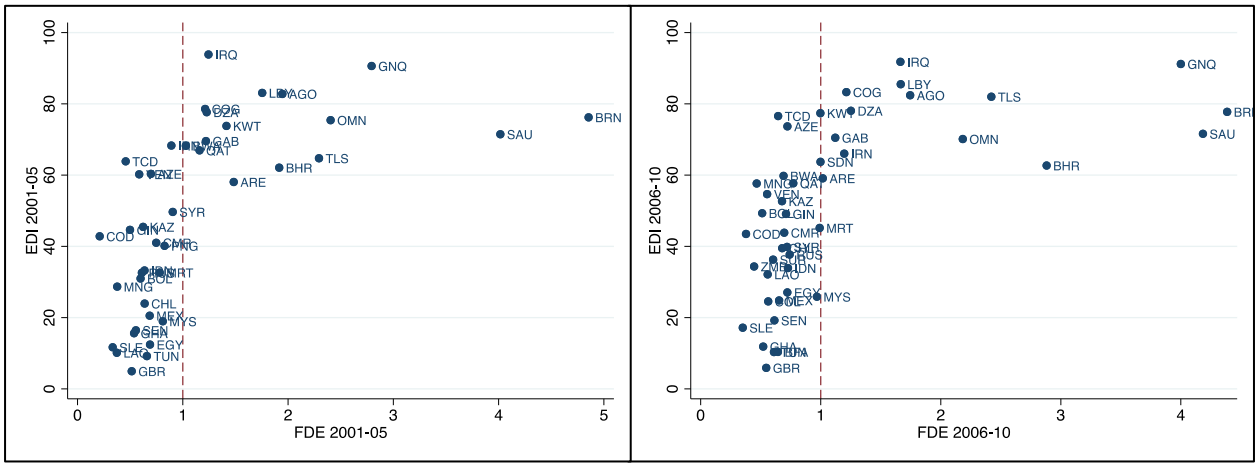
In many countries, only tax and non-tax revenue at the central government level are included in the GRD. This is most often due to data availability. Yet consumption expenditure is measured at the general government level. Thus, it might be that for some countries, the non-extractive revenue figure under-measures the total. This would specifically be the case in federal countries, where large shares of revenue accrue to state governments.

Comparisons

How, then, does the FDE compare to other measures of extractive dependence and does it tells us anything new? Below, the FDE is compared to the EDI (Hailu and Kipgen 2017). The EDI is a multidimensional indicator of extractive dependence, taking into account not only the share of revenues from extractives, but also export earnings and extractive value added. It is available for the years 2000–11. I average the EDI for 2001–05 and 2006–10 and compare with the FDE as estimated for these time periods. The scatterplot in Figure 5 compares the values for FDE and EDI.

[22] Of course, the final government budget balance takes into account all kinds of spending, not only final consumption expenditure which is considered here.

Figure 5: EDI and FDE compared, 2001–05; 2006–10



Source: author's calculations from Hailu and Kipgen (2017) and FDE.

As can be seen from the comparison, there is a strong correlation between the two measures, with countries found to be more dependent on extractives as measured by the EDI also more likely to be classed as *fiscally dependent* by this study. This can be seen by the cluster of countries appearing to the right of the dashed line, almost none of which has an EDI score of below 60. A few outliers are, however, present in these periods: Azerbaijan, Chad and Botswana for example score highly on the EDI but FDE is <1. It is not unexpected that a few outliers exist, as the EDI takes into account a number of other metrics beyond revenue, whilst the FDE is more narrowly focused on budgetary outcomes. However, the FDE and EDI indices do trend in the same direction. Interestingly, we see a wide range of results in the region to the left of the dashed line: where countries are *not* classed as fiscally dependent.

In this region, the EDI can be as high as around 60 or as low as around 10, in countries with comparable FDE scores. An interesting picture also emerges at between around 50 and 70 of the EDI, where a range of outcomes are observed for the FDE. For example, in 2006–10, Bahrain and Azerbaijan score almost identically on the EDI, but Azerbaijan's FDE score is 0.72, whilst that of Bahrain is 2.86. This implies that, at least for this time period, Azerbaijan was less dependent on extractive revenues to fund government spending and thus less likely to run into fiscal difficulties in the face of a shock to resource revenues, government spending, or both. One plausible take-away from these comparisons is that countries where EDI is quite high, but FDE is quite low (or, at least, < 1) have a more diverse range of revenue streams in place. This highlights one of the strengths of the FDE (either in isolation or alongside existing measures): despite being narrower in scope, its value comes to light as it ties dependence to a specific outcome, or *consequence* of dependence. So, we can posit that, countries such as Azerbaijan which score fairly highly on the EDI might not be likely to run into severe fiscal problems, should there be a shock to extractive revenues or government spending.

6 Conclusions

This study has aimed to shed light on the issue of fiscal dependence on extractive revenues. Firstly, it has mapped the various definitional issues related to the study of natural resource or extractive dependence, before assessing the extent to which existing cross-country data sources adequately capture the amount of government revenues (in the form of tax and non-tax revenues) that are garnered from such activities. Most often, when research is exploring the effects of resource wealth

or dependence on economies, it is the extractive industries (namely, oil, gas, mining and quarrying) that are being referred to. Yet I find that, depending on the source in question, key data sources might include revenues from 'extractives', 'natural resources' or 'unearned income', yet these each measure a different subset of activities. Turning to a more in-depth comparison between data sources, I map out the underlying sources (and potential areas of overlap) between three key composite sources of revenue data, namely the UNU-WIDER GRD, the MINDEX and the NRGI NRRD. Of crucial importance to the present study, however, is that data on extractive revenue be combinable with *total* revenue data to arrive at an accurate measure of non-extractive revenue. The UNU-WIDER GRD is the only source that allows for such comparisons. Thus, I then explore whether there is scope to use data from either the EITI, IMF WCED or national sources, to improve on the existing coverage in the GRD. I find that it is possible to achieve modest improvements in coverage for several key extractive-producing countries.

I then propose a new indicator of fiscal dependence on extractives, the ***FDE***. This indicator is simply the ratio of general government consumption expenditure to total non-extractive revenue (plus aid financing). I class countries as fiscally dependent on extractives for periods where ***FDE*** >1 (i.e. general government consumption expenditure exceeds non-extractive revenues). I find that, Bahrain, Brunei, Equatorial Guinea, Iraq, Libya, Oman and Saudi Arabia are those countries most 'fiscally dependent' in recent periods. Several countries have, in recent decades, graduated away from being fiscally dependent, whilst others show a more mixed performance over time. I also assess the extent to which some countries are fiscally *vulnerable* due to extractive revenues and find that, were general government consumption expenditure to rise by 10 per cent for a given period, Algeria, Guinea, and Malaysia are at risk of falling into fiscal dependence.

To the best of my knowledge, this study represents the first to provide an indicator that ties the idea of extractive dependence to some outcome—in this case government expenditure. Previous efforts to understand and quantify extractive dependence—such as the EDI, (Hailu and Kipgen 2017)—have taken a broader view of dependence (by incorporating data on facets beyond extractive revenue) but do not explore in depth the extent to which, or why, this dependence matters for specific outcomes. By comparing non-extractive revenue to government expenditure, the FDE allows us to highlight periods where countries are more - or less - dependent on extractive revenues to fund the day-to-day spending of government. Or, put another way, if extractive revenues were to suddenly decline (due to e.g., price or demand shocks), it highlights cases where governments would run into potentially significant budgetary shortfalls (albeit dependent on the presence of other backstops or other fiscal buffers such as stabilisation funds or SWFs, which we do not take into account in this work). Future work might seek to build on these ideas to explore other outcomes of dependence.

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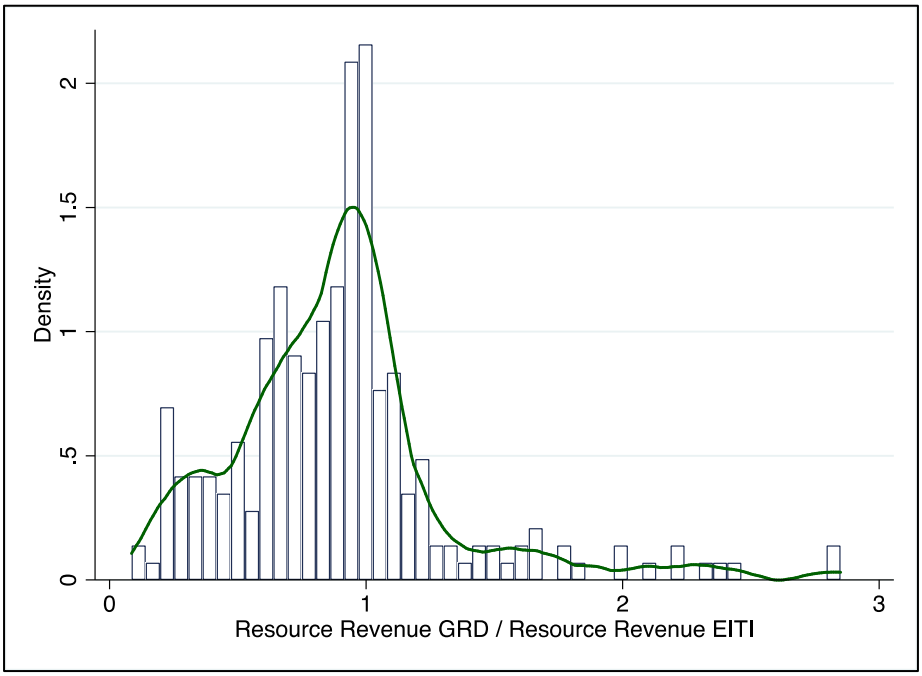
Appendix A

Figure A1: Histogram of the ratio of GRD (% GDP) to EITI (% GDP) observations



Source: author's calculations from GRD (2022) and EITI (2023).

Appendix B

Table B1: Baseline FVE scores

Country	1981–85	1986–90	1991–95	1996–2000	2001–05	2006–10	2011–15	2016–20
Equatorial Guinea					0.80	3.07	4.40	7.14
Brunei			3.83	3.87	5.34	4.83	4.87	4.75
Bahrain				2.11	2.11	3.17	5.22	3.84
Oman		4.49	3.39	2.79	2.65	2.40	3.15	3.04
Saudi Arabia	2.68	3.33	4.11	3.67	4.42	4.60	5.71	2.83
Sudan				0.86	1.12	1.10	1.77	2.67
Timor Leste					2.52	2.66	3.27	2.33
Congo, Rep.,	0.71	1.28	1.48	1.25	1.33	1.34	1.69	1.70
Botswana	0.89	1.03	1.09	1.36	1.13	0.76	1.02	1.49
Myanmar							1.37	1.47
Kuwait	0.86	0.90	2.39	1.41	1.55	1.10	1.47	1.42
Nigeria			0.37	0.27	0.51	1.74	1.81	1.39
Angola					2.14	1.92	2.33	1.33
Gabon	1.30	1.35	1.11	0.98	1.34	1.23	1.09	1.19
Algeria	0.91	1.00	1.45	1.51	1.35	1.38	1.59	1.05
Malaysia	0.99	0.85	0.75	0.72	0.89	1.07	1.08	1.05
Guinea		0.89	0.54	0.56	0.55	0.78	1.11	1.02
Qatar			2.01	2.47	1.27	0.85	0.86	1.00
United Arab Emirates					1.63	1.12	1.02	0.97
Azerbaijan				0.90	0.77	0.79	0.97	0.93
Namibia		0.99	0.79	0.77	0.83	0.78	0.82	0.91
Indonesia	1.90	1.15	0.86	0.69	0.70	0.80	0.87	0.91
Burkina Faso				0.91	0.70	0.71	0.73	0.85
Kazakhstan				0.72	0.69	0.75	0.97	0.85
Cameroon	0.79	1.13	0.99	0.85	0.82	0.77	0.91	0.82
Niger			1.23	1.32	1.01	1.01	0.88	0.79

Zambia						0.49	0.75	0.77
Russian Federation				0.66	0.67	0.82	0.83	0.76
Bolivia		0.82	0.64	0.62	0.66	0.56	0.57	0.75
Mexico					0.75	0.72	0.76	0.75
Cote d'Ivoire			0.65				0.61	0.72
Mali							0.81	0.72
Senegal					0.61	0.68	0.75	0.70
Colombia						0.62	0.64	0.69
Tunisia	0.63	0.68	0.70	0.71	0.72	0.67	0.62	0.65
Egypt			0.46	0.61	0.76	0.79	0.93	0.63
Mauritania			0.67	0.91	0.86	1.09	0.70	0.60
Mongolia				0.37	0.41	0.51	0.55	0.56
United Kingdom		0.62	0.64	0.52	0.57	0.60	0.59	0.56
Congo, Dem. Rep.,				2.36	0.23	0.42	0.49	0.55
Norway			0.47	0.46	0.51	0.49	0.52	0.53
Ghana				0.73	0.59	0.57	0.70	0.51
Sierra Leone		0.54	0.35	0.51	0.37	0.39	0.41	0.36
Chad					0.50	0.71	0.70	0.31
Iran			2.20	1.53	0.98	1.32	2.00	
Papua New Guinea		0.97	1.14	0.96	0.91			
Suriname						0.66		
Trinidad and Tobago								
Vietnam								
Chile				0.69	0.70	0.75	0.75	
Ecuador	2.34							
Guatemala		0.70	0.64					
Iraq					1.37	1.83	5.13	
Jamaica	0.69	0.43	0.45	0.64	0.66			
Libya					1.93	1.83	9.93	
Syria				0.84	0.99	0.79		
Togo	0.75	0.65	0.80	0.78	1.02			

Turkmenistan				1.56	2.17	1.39	
Uganda							0.73
Venezuela	1.38	1.24	0.86	0.80	0.64	0.61	0.64
Yemen							
Zimbabwe							0.88

Note: the data is for any *i,t* where a positive amount of resource revenues was observed in the GRD. A blank entry denotes a case where either non-resource revenue, government consumption expenditure or both variables were missing. Country-year periods where *total* government revenue is less than government consumption expenditure are denoted by an asterisk.

Source: author's calculations.