The Extractive Industries and Society xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

The Extractive Industries and Society

journal homepage: www.elsevier.com/locate/exis

Original article

Minerals are a shared inheritance: Accounting for the resource curse☆

Rahul Basu[1], Scott Pegg[2,*]

[1] Goa Foundation, India
[2] Department of Political Science, IUPUI, USA

ARTICLE INFO

Keywords:
Resource curse
Government accounting standards
Intergenerational equity
Public sector net worth
Shared inheritance

ABSTRACT

Many countries badly mismanage their natural resource endowments. We argue that a fundamental change in paradigm is needed. Specifically, we advocate treating non-renewable natural resources as a finite shared inheritance asset, and extraction as the sale of the inherited wealth. We identify several proposals that logically derive from treating mineral sale proceeds as intergenerational wealth rather than as revenues that can be spent. Wealth portfolio management suggests that mineral owners must strive for zero-loss when selling minerals, establish a passively invested future generations fund from the proceeds and distribute dividends from that fund to citizens as the rightful owners of the shared inheritance. The current dominant metaphor of proceeds from the exploitation of non-renewable mineral resources as being "windfall revenues" is underpinned by government accounting standards. The "windfall revenue" metaphor is not only inaccurate but also produces several pernicious effects that help explain the poor management of natural resource endowments in so many countries. We do not anticipate that our ideas will quickly overturn centuries of established practice. We do, however, believe that the case needs to be made.

1. Introduction

Subsoil and offshore minerals are usually the property of the state, through its national or sub-national governments (Venables, 2016: 162). Where land owners own sub-soil minerals, the state is a significant land owner. In many countries such as India, Portugal and South Africa, natural resources, including minerals, are a shared inheritance, owned by the state as a trustee for the people and future generations. In these countries, which we focus on, extraction of state-owned minerals is thus the sale of the inherited wealth. Our central argument is that the existing paradigm of mineral sale proceeds as *windfall revenues* to be spent is not only inaccurate but also produces several pernicious effects that help explain the poor management of natural resource endowments in so many countries. We argue that a fundamental change in paradigm is needed. Specifically, we advocate treating non-renewable natural resources as a finite shared inheritance asset that future generations have an equal right to inherit. Intergenerational equity implies that securing the conservation of capital over long periods of time is the primary objective. Income for consumption is the residual after capital is conserved (Hicks, 1946). Since the "*windfall revenue*" metaphor is underpinned by current international standards and customary practices for government accounting, which erroneously treat the proceeds of extraction as "*revenue*," "*income*," "*earnings*" or "*taxes*", this perspective change to a "*shared inheritance*" paradigm is impossible while the underlying error in government accounting persists.

Our work builds upon initial work done by one of the authors for the Indian non-government organization, the Goa Foundation (Basu, 2016; Basu, 2017a). It is an extension of the large academic literature on natural capital, which views natural resources as a form of capital, along with human and reproducible or manufactured capital; on environmental or green accounting, which sees natural resources as depletable and inherited capital which is currently not properly accounted for; and on intergenerational equity, which argues that conservation of this capital or its transformation into human or reproducible capital is necessary for sustainable development (Barbier, 2019; Blignaut and Hassan, 2002; Davis and Moore, 2000; El Serafy, 1989; Figueroa B. et al., 2010; Hartwick, 1977; Helm, 2019; Mardones and del Rio, 2019; Nordhaus and Kokkelenberg, 1999; Solow, 1974; Weiss, 1989).

Our argument is broadly consistent with much of the work on natural capital and intergenerational equity. We go beyond this literature, however, by directing our focus towards the government entities that legally own the minerals, their accounts and the incentives created. In

☆ We would like to thank two anonymous referees for their many helpful comments on an earlier version of this manuscript. Rahul Basu would like to thank Dr. Sudipta Basu for his help in developing the ideas in this paper.

* Corresponding author.
E-mail addresses: rahulbasu1@gmail.com (R. Basu), smpegg@iupui.edu (S. Pegg).

https://doi.org/10.1016/j.exis.2020.08.001
Received 9 June 2020; Received in revised form 3 August 2020; Accepted 3 August 2020

most countries, this is the sovereign state or national government. In India, sub-national entities (states like Goa) are the legal owners, and therefore responsible as public trustees to ensure the conservation of mineral wealth for future generations. We examine whether intergenerational equity is implemented. Does the mineral owner suffer a loss when selling the minerals (the difference between the in-situ value of the minerals extracted, measured as sale value minus full costs of extraction, including a reasonable profit for the extractor, and what the mineral owner actually receives for the minerals extracted and sold)? Does the mineral owner invest the entire proceeds from selling inherited wealth in "non-wasting" assets, i.e., assets that do not lose value over time such as land and precious stones/metals?

This analysis suggests a new public finance benchmark for mineral wealth management with a focus on the net worth of the public trust/public sector, which suggests mineral owners must strive for zero-loss when selling minerals, establish a passively invested Future Generations Fund (FGF) from the proceeds and distribute a Citizens' Dividend from that fund to the rightful owners and stewards of the shared inheritance. We also demonstrate how the "*shared inheritance*" metaphor can be effectively communicated, and if combined with effective government communication and constitutional safeguards with broad political and voter support, could act as a commitment device and produce much superior results as compared to current resource management practices.

There are some limits to our paper. First, we are only focusing on non-renewable or exhaustible resources. Forests can be clear cut and poorly managed farms can suffer severe soil erosion, but, in principle, agricultural and forest land is renewable and can be managed sustainably. Oil and mineral deposits, however, are finite. While new discoveries can be made, "The amount of these resources in the ground is finite because they are formed by extended geological processes and cannot be easily replenished" (Barma et al., 2012:14). Indeed, the growing academic literature on mine closures (Bergstrom, 2017; Knierzinger and Sopelle, 2019) and famous cases like phosphates in Nauru demonstrate the non-renewable nature of these reserves.

Second, our argument is consistent with what is often termed "weak sustainability." According to Barbier (2019:19), "weak sustainability assumes that there is no difference between natural and other forms of capital (e.g. human or reproducible), and thus as long as depleted natural capital is replaced with more valuable human or reproducible capital, then the total value of wealth available to current and future generations will increase." Strong sustainability, on the other hand, denies the possibility of substituting natural capital with other forms of capital.

Finally, we are not making a larger statement one way or the other on the existence of a generalized resource curse where the presence of lucrative natural resource rents causes a variety of problems in resource-rich countries including slow or negative economic growth, a failure to invest in human capital and increased levels of corruption which corrode the quality of institutions. The academic literature on the resource curse is vast and contested in several areas (Ross, 2015). Strong arguments, for example, have been advanced that natural resources do (Ramsay, 2011; Ross, 2015) or do not (Haber and Menaldo, 2011; Brooks and Kurtz, 2016) hinder the establishment or consolidation of democracy and that they do (Collier and Hoeffler, 1998), do not (Paine, 2016) or sometimes do and sometimes do not (Orihuelaa et al, 2019) increase the risks of civil war. We do not argue that there is or is not a generic resource curse. Instead, we merely argue that there is solid evidence that many resource-rich countries have badly mismanaged their resource wealth, captured a low percentage of resource rents (Barma et al., 2012:139; Blignaut and Hassan, 2002:97), spent their sale proceeds foolishly (Barma et al., 2012:1; International Monetary Fund, 2015:13; World Bank, 2006:43-46) and become poorer (International Monetary Fund, 2018a:8; World Bank, 2011:11). The system we propose would be a major positive intervention in addressing resource curse-like dynamics in those countries.

The remainder of the article proceeds as follows. Our next section discusses the importance of metaphors and framing and explains why different metaphors and frames can have dramatic effects. The third section sets out our preferred alternate metaphor which views the proceeds from natural resource extraction as the sale of a finite shared inheritance asset and outlines the proposed system of wealth management that we believe flows from this preferred alternative framing. The fourth section examines the currently dominant metaphor of mineral sale proceeds as "windfall revenues" and the government accounting error that underpins this metaphor, outlines the consequences that tend to follow and suggests further steps. A final section concludes our paper and addresses theoretical and policy implications.

2. The importance of metaphors and framing

A metaphor is an analogy that harnesses what we know well to understand something different, a target system. Metaphorical thinking is fundamental to our cognition. It is omnipresent, and usually works unconsciously. Multiple metaphors may be used to provide a fuller understanding of a concept. Since metaphors are only partial parallels, it is important to recognize the limits they impose on our understanding of the target system (Lakoff and Johnson, 1980). Metaphors are used extensively in accounting (Young, 2013). Indeed, accounting is perhaps the master metaphor for economics (Klamer and McCloskey, 1992).

Increasingly, social scientists use the term "framing" to describe how particular understandings are constructed, described, and explained (Benford and Snow, 2000:1). Entman (1993:52) argues that "Framing essentially involves *selection* and *salience*. To frame is to *select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation* for the item described. Typically frames diagnose, evaluate, and prescribe" (italics in original). Frames are usually constructed using metaphors (Burgers, Konijn and Steen, 2016). The impact of framing on decisions is potentially enormous. As Tversky and Kahneman (1981:453) explain, "The psychological principles that govern the perception of decision problems and the evaluation of probabilities and outcomes produce predictable shifts of preference when the same problem is framed in different ways." Mackenzie (2003:835) goes so far as to argue that the Black-Scholes option pricing equation "seems to have been performative in a strong sense: it did not simply describe a pre-existing world but helped create a world of which the theory was a truer reflection."

In their investigation of local energy policy in Finland, Åkerman and Peltola (2012:65) find that "There were several alternative framings which were contested" with each of the "diverging framings" being "supported by different calculative practices." They observe that even things as seemingly bland as accounting calculations "do not only and innocently represent the reality but they constitute it in a new form…. The politics of calculation comes with the fact that in practice, reality can be constituted and constructed by calculations in diverging ways" (Åkerman and Peltola, 2012:65).

2.1. Competing paradigms for mineral wealth

This article is premised upon the idea that changing how mineral wealth is framed and how the proceeds from mineral exploitation are accounted for will lead to significantly improved resource management practices. A long time ago, many minerals had low value due to the seeming infiniteness of the planet. However, precious stones and metals were always recognized to be rare and valuable. In the modern economy, most mineral deposits can be exhausted in relatively short periods of time and have significant value. Few minerals like silt and river sand are produced in an annual cycle.

Two metaphors are prevalent when we examine mineral receipts

from extraction in the context of governments. In one metaphor, minerals are a "*shared inheritance*", where governments are trustees on behalf of present and future generations, and therefore the mineral wealth must be conserved for future generations (e.g., World Bank 2011:9). In the dominant "*windfall revenue*" metaphor, minerals are windfalls or unexpected gains, and governments have traditionally treated mining royalties as "*revenue*", now codified into international government accounting and reporting standards, notably the International Monetary Fund's (IMF) Government Finance Statistics Manual 2014 (GFSM).

Thaler (1999) observes that the way individuals mentally account for money affects their behavior. Arkes, et al. (1994) find that windfall gains are spent more readily than other types of assets. Shefrin and Thaler (1988) provide evidence that the marginal propensity to consume is lower for accumulated wealth and for large inheritances.

Extraction usually results in the sale of the mineral. When minerals receipts are perceived as windfall revenue, it lets politicians argue for extracting more and more, and consuming the proceeds. Implicitly, we are free to consume our inherited planet. On the other hand, if mining is treated as the sale of inherited wealth, other questions arise. Why are we selling our shared inheritance? Is this the best time? Are we receiving the full value of our minerals? Are we saving the entire proceeds for future generations? Will we earn a higher return?

2.1.1. Example of Goa, India

The coastal state of Goa, India, legally the trustee-owner of sub-soil minerals, has been a significant exporter of iron ore from open cast mines to Japan and China. Basu (2015:4-8) found that for the period 2004-2012, mineral receipts that the state received were approximately nine percent of Goa's reported cumulative government revenues. Mining contributed fifteen percent to Goa's reported gross domestic product (GDP). The government reported a Net Operating Balance (NOB) (Revenue – Expense) deficit of 2.46% of GDP. Mining appeared to be a success, increasing government revenue and state GDP and reducing the deficit.

In reality the state received just five percent of the total economic rent (sale value minus full extraction costs, including a reasonable profit for the mining firm) (Figure 1). Put simply, Goa sold minerals worth one hundred dollars to the extractor for five dollars. The absolute loss was twice the size of the true government revenues. The true Net Operating Balance was a deficit of 41.47% of true GDP (Basu, 2017b). And since the receipts were treated as revenue, they were largely consumed. The wealth extracted accounted for an average of 28% of Goa's reported GDP over the period.[1] Extraction diminished the public trust corpus, reduced the wealth of the Goa public sector and Goa state, and left the people and future generations of Goa poorer. GDP and per capita income were over-stated. Goa is not an isolated case. The World Bank found all countries where mineral rents account for 15% or more of their GDP had underinvested – their Adjusted Net Savings (ANS) is negative (World Bank, 2011:11). In other words, these countries are simply using up their natural resources to finance consumption rather than investing in productive assets, thereby making themselves poorer in aggregate. Why?

The next section considers our preferred shared inheritance paradigm. It highlights a proposed system of wealth management that we believe flows from this alternative framing and would lead to dramatically improved resource governance.

3. The shared inheritance paradigm

Our preferred paradigm treats non-renewable mineral resources as a finite shared inheritance, with the state as a trustee on behalf of present and future generations. Future generations have an equal right to inherit the wealth on grounds of intergenerational equity. This is a wealth management problem. Minerals in the ground earn zero. Public trustees can convert minerals into other forms of wealth through extraction, provided the capital can be protected indefinitely, ownership kept unchanged and real income earned.

Mineral wealth attracts "rent seekers," people whose main aim is to capture the financial value of the minerals. Rent seekers include extractive companies, politicians, local governments, government officials, police, local strongmen, lobbies, civil society, etc., who compete for the value of the minerals. Protecting the shared inheritance for future generations is the central problem. This suggests that the corpus of the public trust, the public sector net worth and state/national wealth are key metrics to measure and manage. Further, it suggests that the reported revenue of the public sector as well as national income aggregates like GDP are overstated to the extent of the economic rent of the mineral wealth sold (Barbier, 2019: Yaduma, 2018).

3.1. The Goa Foundation Benchmark for public finance

The Goa Foundation (Basu, 2017a:12) has proposed a passive benchmark for evaluating fiscal performance with the shared mineral inheritance. It suggests that since capital maintenance is the first objective, losses must be avoided when selling the mineral wealth and the entire sale proceeds must be invested in a new "non-wasting" asset, specifically a Future Generations Fund (FGF) passively invested overseas in a global portfolio of low-cost index funds to earn the global market rate of return. The benchmark also proposes that after making good any losses including reinvesting for inflation, the real income of the FGF be distributed equally to all as owners.

The Goa Foundation Benchmark obviously follows property ownership principles – it conserves the capital in a "non-wasting" asset, ensures the non-mineral part of the corpus earns the global market rate of return, and maintains the distribution of ownership and benefits. To the extent the real income of the fund is saved, it provides a further growth impetus to the economy. This is a strong pareto improvement, a stronger standard than the Kaldor-Hicks criterion used in social cost-benefit analysis to justify extraction (Adler and Posner, 1999).

3.1.1. Widespread failure

It is apparent that most countries fail to achieve this benchmark. The resource curse literature posits that high levels of resource rents lower financial discipline and forestall state capacity to tax citizens. Politicians deliberately weaken institutions to increase their ability to misappropriate resource rents and mineral sale proceeds are received quicker than institutional capacity to manage them can be created (Ross, 2015:249).

Zero loss is difficult to achieve because of asymmetric information, volatile commodity prices, the difficulty of predicting future commodity prices and geological uncertainty (IMF, 2012:10). Yet, a more fundamental problem is that zero loss is rarely an objective. Since minimizing losses is not a goal, a World Bank report found that "Countries' low capacity in capturing revenues from the extraction of natural resources is usually the result of their inability to determine the amount of rents generated by private producers, and, in particular, to accurately assess their production costs" (Barma, et al., 2012:138). For many poor countries, the report emphasizes that "the government has almost no independent capacity to assess quantity or grades of extracted resources or their market prices, and it must rely almost exclusively on the information provided by extractive companies" (Barma, et al., 2012:139). Under-staffed, under-trained and under-resourced tax and regulatory agencies minimize the ability of many host country governments to achieve zero loss when selling their natural resource endowment.

Looking at South Africa, Blignaut and Hassan (2002:97) estimate

[1] Surprisingly, GDP from mining for the period is much lower than the economic rent, estimated from annual financial reports of the largest mining company, Vedanta (then Sesa Goa).

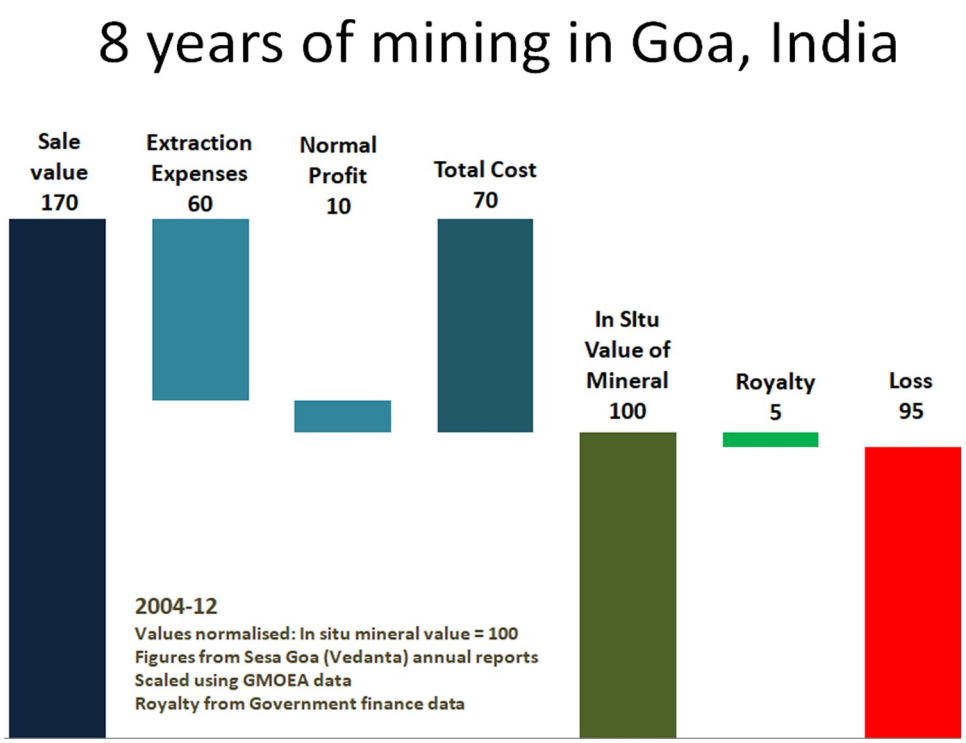

Fig. 1. Goa: Eight years of iron ore mining.

that "total tax collections (institutional royalties and profit taxes) captured approximately 13% of the resource rent of gold in 1993." With coal, they find the picture is even worse because "almost all the rent (98%) accrued as a windfall profit to private owners" (Blignaut and Hassan, 2002:97). The World Bank highlights the Democratic Republic of Congo as a particularly egregious case where the government is estimated to collect less than 20 percent of the mining royalties to which it is entitled (Barma, et al., 2012:138). In contrast, Botswana seems to have achieved losses in single digits (African Natural Resources Center, 2016:10). IMF data (2012:35) shows significant losses of the economic rent from mining are common – a minimum of 15% for oil and 35% for minerals.

Further, significant proportions of the mineral sale proceeds are consumed. Of the balance, a considerable proportion is wasted or stolen in low yielding public investment. Natural resource funds have had a poor empirical track record in countries like Azerbaijan, Chad, Nigeria, and Venezuela (Moss, et al., 2015:52; Birdsall and Subramanian, 2004:85). Alaska is the only example of a commons dividend, although oil-to-cash dividend schemes have been proposed generally (Moss, et al., 2015; Sandbu, 2006) and for specific countries like Iraq (Birdsall and Subramanian, 2004) and Somaliland (Pegg, 2018). Mongolia experimented with minerals-to-cash with disastrous results – politicians competed in promising increased extraction and the distribution of the mineral sale proceeds. The maximum promise was 65% of reported GDP before the political parties passed a law to ban such promises (Yeung and Howes, 2015:12).

Arguably public investment by talented politicians like Lee Kuan Yew (Singapore) or Seretse Khama (Botswana) could earn greater than the global market rate of return. However, as with active asset management, the overwhelming majority will underperform the benchmark. Further, the benefits of the investments are unlikely to be equally distributed like the dividend. Moreover, credible investments could be financed through the international capital markets and repaid through higher taxes.

3.1.2. Implementing the shared inheritance paradigm

We suggest a specific shared mineral inheritance management structure articulated as five principles (paraphrased for this paper) developed by The Future We Need (a global movement advocating that the intergenerational equity principle must be foundational to civilization and our economy), where one of the authors is a member:

1) Natural resources, including minerals, are owned by the state as a trustee on behalf of the people and especially future generations (Public Trust Doctrine/Public Domain).
2) As we have inherited the minerals, we must ensure future generations inherit either the minerals or their full value (Intergenerational Equity Principle).
3) If we extract and sell our mineral wealth, we must ensure Zero Loss, i.e., we must capture the full economic rent (sale price minus cost of extraction and a reasonable profit for the extractor). Any loss is a loss to all of us and all future generations.
4) The entire mineral sale proceeds must be saved in a Future Generations Fund, with the state as trustee for the people and especially future generations.
5) Distribute only the real income of the fund only as a Citizens' Dividend, equally to all as a right of ownership.

The five principles are likely constitutional in most countries. They are widely seen as fair, ethical, moral, just, and right, and promote equality, liberty, and fraternity. The fair extraction principles diversify risk while likely improving returns, positively impacting inequality and poverty. Reductions in losses are likely which in turn would reduce inequality (losses are captured as gains by rent seekers). Even if limited in size, the dividend would reduce extreme poverty, particularly in poorer countries. Pegg (2018:638-640), for example, calculates that if Somaliland received oil sale proceeds similar to what Ghana received early in its production history and distributed only 50% of them to its citizens, those dividend payments could still approximate Somaliland's current GDP per capita figures.

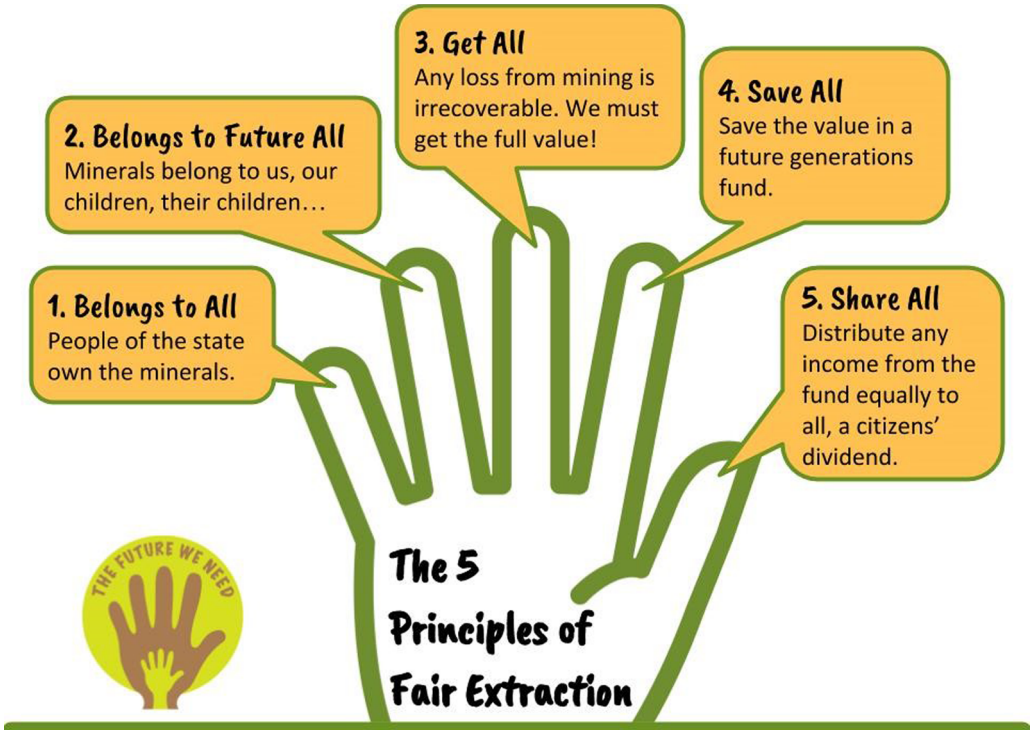

Fig. 2. The five principles of fair extraction.

3.1.3. Defending the wealth

The fair extraction principles are easy to understand, communicate, enact, and monitor. They avoid the multiple distinctions and complexities seen in the management system for mineral receipts in Chad which made it difficult to defend (Pegg, 2006:10-11). Only absolute fiscal rules can be defended – any other split is arbitrary, and susceptible to political attack. Instead of arguing for equity (disadvantaged get preference) through benefit sharing schemes, by treating everyone equally as a matter of property rights, the fair extraction principles make it harder for politicians to divide the voters and thus reduce the chances for clientelism, corruption and patronage. To reinforce this, distributions from the fund to citizens need to be made "in a regular, universal and transparent payment based on a set of agreed-on fiscal rules" (Moss et al., 2015:3). Dividends also need to be tied closely to the fund's investment returns which could go up or down in any given period.

Politically, the mineral wealth at extraction and later the corpus of the FGF is the real prize. The dividend is intended to create an endowment effect among the populace, leading to higher scrutiny over extraction, and an interest in protecting the dividend itself and the FGF corpus. The lack of a protective dividend for most FGFs suggest they will be susceptible to raids under the guise of fiscal emergencies, or as in Norway, where over-promising pension benefits implies a 10% of GDP fiscal consolidation is needed to keep public sector net worth stable relative to GDP (Cabezon and Henn, 2018). The scheme we propose here addresses at least two significant problems that have plagued natural resource funds in the past. The first is the critique that such funds presume the existence of strong state institutions (Weinthal and Jones-Luong, 2006:39). Our proposed scheme which involves states investing mineral proceeds in low cost index funds to earn a global market rate of return greatly minimizes the institutional demands made on states. Second, natural resource funds are often viewed as subject to political manipulation in the absence of a strong constituency to protect them (Moss, et al., 2015:52). Our proposal is simple to understand and defend. Because all citizens would benefit from it, all citizens would have an interest in defending it. Poor country governments have successfully implemented mass immunization campaigns. Paying citizens regular dividends should be easier, especially since they have strong personal incentives to comply (Birdsall and Subramanian, 2004:42; Shaxson, 2007:1138).

3.1.4. Mitigating some resource curse impacts

Commodity price volatility makes mineral sale proceeds difficult to manage (IMF, 2015:2-4; Shaxson, 2007:312; Weinthal and Jones-Luong, 2006:37). Indeed, van der Ploeg and Poelhekke (2010:52) claim that "the quintessence of the resource curse appears to be the notorious volatility of commodity prices." This issue is eliminated since the budget is fully insulated - the entire mineral sale proceeds are sequestered in the future generations fund. Similarly, since the mineral sale proceeds are only invested overseas, it limits the appreciation of the local exchange rate, as seen in Botswana (Sarraf and Jiwanji, 2001:10-11).

3.1.5. Strengthening the social contract

The five principles can be viewed as a commitment device, locking yourself into saving today to generate a higher income tomorrow. The credibility of the commitment can be increased by a strong national and political party consensus, evidenced by placing the key provisions outlined above into the Constitution, as well as effective government communication that minerals are a shared inheritance, and we are obliged to ensure future generations inherit the value of the oil or minerals we extract. If we earn a return after that, it is due to our good work, and must be shared equally with all as owners.

This would be a strong signal raising the credibility of the government to taxpayers, lenders, and other counterparties. This is clearly a prudent people, not one to squander their inheritance. Such a commitment could strengthen the social contract by forcing politicians to raise taxes to finance redistribution or public investment. Denying governments easy non-tax revenues and forcing them to tax their own citizens should ensure that "Relationships with government would tend towards ones of taxation and accountability, not of lobbying and corruption" (Shaxson, 2007:1135-1136). This should raise the efficiency of government.

3.1.6. Economically highly positive

In totality, the five principles we put forward raise the national savings rate as less is being consumed as "windfall revenue". Less is lost during extraction, and the corpus of the FGF is better protected as well. Returns on the larger body of investment are likely to be better. The returns from a passively invested FGF are difficult to beat even in the private sector, let alone government investment. A country with poor or even reasonable institutions will find it easier to buy and protect a global portfolio of low-cost mutual funds than to build roads that actually connect economically meaningful places together efficiently without theft or waste. A part of the dividends will also be saved, further increasing growth. In addition to achieving a global market rate of return on a larger corpus, the rise in inequality will be stemmed due to lower losses at extraction, equal ownership of the new investments, and equal distribution of the real income of the FGF. Finally, along with a global market rate of return on a larger body of investment, higher economic growth and lower inequality, the efficiency of public investment and taxation would also improve. This is a win-win-win-win-win over current practice.

3.1.7. Shared inheritance moving forward

Implementing the five principles would have a profoundly transformative effect on mineral wealth management. India, in particular, has taken the lead. Its National Mineral Policy 2019 says "*natural resources, including minerals, are a shared inheritance where the state is the trustee on behalf of the people to ensure that future generations receive the benefit of inheritance. State Governments will endeavour to ensure that the full value of the extracted minerals is received by the State.*" (GoI, 2019:11).

In the next section, we examine the "windfall revenue" paradigm, which is underpinned by historical government accounting practices, codified into international standards. Even if civil society adopts the shared inheritance paradigm, politicians will argue that extraction increases "revenue" until the government accounting standards change.

4. The dominant windfall revenue metaphor

The windfall revenue metaphor is all pervasive. Common discourse treats new discoveries, new commercial uses, and high commodity prices as "windfalls" (e.g. IMF, 2015; IMF, 2018b). Metaphorically, "windfalls" are unpredictable, ownerless, cannot be planned for or managed, and are therefore opportunities that should be seized. Further, it is customary for the proceeds from extraction to be termed "revenue." Mining "leases" generate "rent," "taxes," "income," and "earnings." In combination, they create the master metaphor of "windfall revenue" from the exploitation of natural resources. In this paradigm, the quantum of government "revenues" is an important goal of extraction.

Governments typically follow financial reporting practices mandated by the IMF's Government Finance Statistics Manual 2014 (GFSM). The GFSM (IMF, 2014:94) treats the consideration received in exchange for the exploitation of mineral resources as "rent", a component of government revenue. Since governments usually do not record sub-soil resources as assets, the reduction in mineral wealth is not recognized. Hence the revenue magically appears, a classic windfall.

4.1. "Windfall revenue" paradigm makes rational extraction difficult

The "windfall revenue" paradigm causes many of the symptoms associated with the poor management of natural resource endowments. Briefly, more revenues are good, which incentivizes rapid extraction. Revenue terminology breaks the link to the asset's value, thus hiding losses. The windfall terminology increases the urgency to extract and reduces the propensity to save. Viewing natural resource proceeds as windfall revenue "incentivizes extraction, when conservation may be a better path" (Basu, 2016:5).

Politicians love extraction "revenue" (Levi, 1988). It enables them to retain power by forming coalitions of corruption, clientelism and patronage, or through violence (Weinthal and Jones-Luong, 2006:38). Voters, hoping for a tax reduction, larger subsidies, or basic public services, are happy to support extraction. Government leaders worried about the possibility of losing elections or being removed from office have short time horizons. Such "short-term horizons are associated with faster rates of resource extraction and frontloading of taxes and underinvestment in the long run" (Barma, et al., 2012:147).

Mining ministries usually try to maximize extraction "revenue." With the sale of a shared inheritance, the goal should be to minimize loss, to capture the full economic rent. Unlike zero loss, maximizing revenue without a comparison with the underlying mineral value is a fuzzy goal. The "windfall" appellation reduces scrutiny - you take what you get. Governments compete to secure "windfall revenues," attracting extractors by undercutting royalty rates set in other countries, a global competition to sell off the family silver cheaply (Campbell and Hatcher, 2019).

Commodity booms and busts create dramatic volatility in government "revenues". When prices rise, government revenue rises and often spending rises as well. When commodity prices inevitably fall, government "revenue" crashes, leading to a budget crisis. Often the easiest option politically is to sell more of the minerals, at the worst time possible. The boom and bust nature of commodity prices is exacerbated because government spending is typically "procyclical— increasing when commodity prices rise and decreasing when prices fall" (IMF, 2015:4)

These dynamics provide fertile grounds for lobbying, political contributions, corruption, and crony capitalism leading to extractor friendly deals and large hidden losses. Rapid extraction is incentivized, potentially leading to violations of environmental and human rights, in turn leading to conflict and repression. Any loss is effectively a per-head tax on the people. As it is captured by various rent seekers, it drives rising inequality, and perpetuates the cycle.

In addition to not securing much of the mineral value they are entitled to, resource-rich governments also tend to consume most of the proceeds they receive, as opposed to saving or investing it. The World Bank notes that many resource-rich developing countries "pursue shortsighted, suboptimal policies for extracting resources and capturing rents, and they subsequently allocate those rents in ways that often privilege elite private consumption rather than public investments that enhance growth and collective social welfare" (Barma, et al., 2012:1). Blignaut and Hassan (2002:90) find that for most mineral-rich sub-Saharan African countries, "the biggest share of the resource rent from resource extraction is financing current consumption rather than being reinvested in replacement forms of capital."

4.2. Ethical government accounting

Government accounting obscures this in two different ways. First, accounting for mineral receipts as revenue falsely boosts government revenue and GDP. More mining implies more growth. Second, the loss of wealth is not disclosed. The revenue treatment reduces scrutiny on the terms of mining leases because losses are not explicitly accounted for. From a distribution perspective, these are also hidden per-head taxes, while the miners are getting unfairly rich. The propensity to consume revenue receipts is high, in effect unknowingly consuming capital. Further, in the absence of a Citizens' Dividend from mineral receipts, the money spent will not distribute benefits equally to all. It is, in effect, a per head wealth tax imposed by the government likely redistributed as patronage to the powerful.

If we treat minerals as a shared inheritance owned by states as a trustee, the public trust would report stand-alone financials. To our knowledge, this is not the case anywhere in the world. A key goal would be capital maintenance, keeping the inherited wealth at least constant. Mineral sale proceeds would be treated as a capital inflow, not revenue. Against this, the value of the mineral extracted (Economic Rent or

Resource Rent) would be the reduction in mineral wealth. The difference between the economic rent and the mineral sale proceeds is the Loss, which would be recognized as an expense and reduce the public sector net worth. These changes are required in the two international standards for public sector accounting and reporting, the IMF's GFSM 2014 and the standards of the International Public Sector Accounting Standards Board (IPSASB). Recently, the IPSASB has placed a new standard on Natural Resources as the top priority in its Work Plan 2019-2023 (IPSASB, 2019:11).

4.2.1. Related changes in international statistics

As Barbier (2019:21) observes, "official national account statistics for most economies do not routinely account for changes in stocks of natural capital—even fossil fuels, minerals, forests, and similar natural resources that can be bought and sold on markets." The problems with the standard accounting treatment of resource proceeds as "revenue" intersect here with the emphasis placed on GDP as the headline indicator of the health of a nation's economy. As Yaduma (2018:2726) notes, standard accounting and GDP measures of output treat "natural resource rents as a positive contribution to GDP without making a corresponding adjustment to the depleted natural capital stock. This accounting method fails to consider that the depletion of a natural resource stock is essentially the liquidation of an asset, and thus, natural resource extraction should not be treated as a positive contribution to GDP."

Work on several mining-dependent countries in South America shows how significant adjustments to GDP would be if mineral depletion were properly accounted for. Figueroa B. et al., 2010:163) estimate that in Peru, from 1992 – 2006, "the total gross loss of natural capital was between almost 2.0% and more than 4.9% of total-GDP and between 31% and almost 51% of metal mining-GDP." Mardones and del Rio (2019:144) find that the comparable figures for Chile from 1995 – 2015 are that "GDP and mining GDP were overestimated by 11.34% and 98.04%, respectively…." The World Bank (2006:40) emphasizes that after deductions to account for resource depletion, Bolivia's "genuine saving rate is negative" and it "is currently on an unsustainable development path."

As Daly (1994) suggests, for the purposes of balance of payment accounting, some portion of the exports of minerals "should be treated as the sale of a capital asset and entered on the capital account. If this were properly done, some countries would see their apparent balance of trade surplus converted into a true deficit, one that is being financed by drawdown and transfer abroad of their stock of natural capital. Reclassifying transactions in a way that converts a country's balance of trade from a surplus to a deficit would trigger a whole different set of IMF recommendations and actions."

4.3. Consequences for empirical macroeconomics and the resource curse

The Goa example shows that even for a moderately resource dependent economy, the changes to financial aggregates are significant. The change would vary across countries, as well as over time. Consequently, historical statistical aggregates for governments, national income (GDP/GNI) and balance of payments, as well as derived metrics like per capita income and growth rates are unreliable (Jerven, 2013), as are empirical studies based on these metrics, including on the resource curse. Further, the public sector net worth is an important indicator in resource rich nations.

5. Conclusion

We argue that framing matters and that changing the overarching metaphor from one of windfall revenues to the sale of a finite shared inheritance asset whose extraction is the sale of the inherited wealth that present and future generations should benefit from opens new and innovative ways to improve overall social, political, and economic outcomes in resource-rich countries. Specifically, we argue that five basic principles flow from this reconceptualization which are easy to understand and defend, consistent with principles of private property and compatible with the continued extraction of natural resources.

We recognize that putting these principles into effect faces significant hurdles. We have not gone into the weeds on specific calculations or details (see Davis and Moore, 2000; Nordhaus and Kokkelenberg, 1999 for impressive attempts to do this) because we believe it is fundamentally important to advocate based on first principles. We acknowledge that it is hard to implement zero loss for any number of reasons and the existing track record of most future generations funds is not enviable. We believe, though, that nothing short of a fundamental reconceptualization or re-framing of the accounting treatment of the proceeds from the sale of non-renewable natural resources is needed. Given that many poor countries may be looking at sharply narrowing windows for viable hydrocarbon production (Graham and Ovadia, 2019), the need for such a shift in accounting treatment is imperative.

The current accounting treatment of the proceeds from natural resource extraction as "revenue" is wrong because it produces faulty and misleading figures that suggest resource-rich countries' economic performance is better than it is and that their development path is more sustainable than it is. Treating non-renewable resource proceeds as "windfall revenue" also incentivizes or exacerbates several pernicious effects. It promotes rapid extraction and encourages short-term thinking. It leads to governments collecting a low percentage of the value of their minerals and then consuming those proceeds as opposed to saving or investing them. As long as finance ministries treat the mineral sale proceeds as "revenue", it will be impossible to implement the shared inheritance paradigm.

The re-framing we propose that treats the proceeds from natural resources as the sale of a finite shared inheritance asset requires buy-in from international financial institutions if it is to be widely implemented. We are cautiously optimistic here because some of the pioneering work highlighting problems with the existing system and suggesting an intergenerational asset perspective as a potentially preferable alternative has been done under the auspices of the World Bank (Barma, et al., 2012; El-Serafy and Lutz, 1989; World Bank, 2006; World Bank, 2011). We recognize that powerful actors – especially rulers, aspiring rulers, and their cronies, but also including state officials and transnational extractive industry corporations – benefit significantly from the existing system and have vested interests in preserving the status quo. Beyond this, as Shaxson (2007:1136) observes, "Under current arrangements citizens compete with each other to appropriate windfall benefits in a zero-sum game, fragmenting their belief in shared political participation, so mass movements don't happen." The fair extraction principles proposed here "would eliminate this unhealthy political competition; citizens would have a *shared* interest in confronting abuses, leading to the possibility of more broad-based participatory politics" (Shaxson, 2007:1136, italics in original). We do not anticipate that our ideas will quickly overturn millennia of established practice. We do, however, believe that the case needs to be made.

References

Adler, Matthew A., Posner, Eric A., 1999. Implementing Cost-Benefit Analysis When Preferences Are Distorted. University of Chicago Law School, Chicago John M. Olin Law & Economics Working Paper No. 88 (2d series).

African Natural Resources Center, 2016. Botswana's Mineral Revenues, Expenditure and Savings Policy: A Case Study. African Development Bank, Abidjan.

Åkerman, Maria, Peltola, Taru, 2012. How does natural resource accounting become powerful in policymaking? A case study of changing calculative frames in local energy policy in Finland. Ecol. Econ. 80, 63–69.

Arkes, Hal R., Joyner, Cynthia A., Pezzo, Mark V., Nash, Jane Gradwohl, Siegel-Jacobs, Karen, Stone, Eric, 1994. The psychology of windfall gains. Org. Behav. Human Decision Processes 59 (3), 331–347.

Barbier, Edward B., 2019. The concept of natural capital. Oxford Rev. Econ. Policy 35 (1), 14–36.

Barma, Naazneen H., Kaiser, Kai, Tuan, Minh Le, Viñuela, Lorena, 2012. Rents to Riches?

The Political Economy of Natural Resource-Led Development. World Bank, Washington, DC.
Basu, Rahul, 2015. Catastrophic failure of public trust in mining: case study of Goa. Economic and Political Weekly L (38), 44–51.
Basu, Rahul, 2016. Mitigating the resource curse by improved governmental accounting. Goa Foundation, Mapusa, India Available via. https://drive.google.com/file/d/0ByRZquhZqnQddmh0T25aUnhIcUU/view accessed 22 October 2019.
Basu R., 2017a. Government accounting and the resource curse – Response to FAQs. Goa Foundation, Mapusa, India. Available via https://drive.google.com/file/d/0ByRZquhZqnQdWTEyWG8xUVFzOGM/view, accessed 22 October 2019.
Benford, Robert D., Snow, David A., 2000. Framing processes and social movements: An overview and assessment. Ann. Rev. Soc. 26, 611–639.
Bergstrom, R.D., 2017. The curious case of Cuyuna: re–Envisioning former extractive sites to stimulate local communities. Extractive Indus. Soc. 4 (4), 860–868.
Birdsall, Nancy, Subramanian, Arvind., 2004. Saving Iraq from its oil. Foreign Affairs 83 (4), 77–89.
Blignaut, J.N., Hassan, R.M., 2002. Assessment of the performance and sustainability of mining sub-soil assets for economic development in South Africa. Ecol. Econ. 40 (1), 89–101.
Brooks, Sarah M., Kurtz, Marcus J., 2016. Oil and democracy: Endogenous natural resources and the political 'resource curse'. Int. Org. 70 (2), 279–311.
Burgers, Christian., Konijn, Elly A., Steen, Gerard J., 2016. Figurative framing: Shaping public discourse through metaphor, hyperbole, and irony. Commun. Theory 26 (4), 410–430.
Cabezon, Ezequiel, Henn, Christian, 2018. Counting the Oil Money and the Elderly: Norway's Public Sector Balance Sheet. International Monetary Fund working paper WP/18.190.
Campbell, Bonnie, Hatcher, Pascale, 2019. Neoliberal reform, contestation and relations of power in mining: Observations from Guinea and Mongolia. Extractive Indus. Soc. 6 (3), 642–653.
Collier, Paul, Hoeffler, Anke., 1998. On economic causes of civil war. Oxford Economic Papers 50, 563–573.
Daly, Herman E., 1994. Farewell speech at the World Bank. Available athttp://www.whirledbank.org/ourwords/daly.html, accessed 3 December 2019.
Davis, Graham A., Moore, David J., 2000. Valuing mineral stocks and depletion in green national income accounts. Environ. Develop. Econ. 5 (1), 109–127.
El Serafy, Salah, 1989. The proper calculation of income from depletable natural resources. In: Ahmed, Yusuf J., El Serafy, Salah, Lutz, Ernst (Eds.), Environmental Accounting for Sustainable Development. World Bank, Washington, DC.
El Serafy, Salah, Lutz, Ernst, 1989. Environmental and resource accounting: An overview. In: Ahmed, Yusuf J., El Serafy, Salah, Lutz, Ernst (Eds.), Environmental Accounting for Sustainable Development. World Bank, Washington, DC.
Entman, Robert M., 1993. Framing: Toward clarification of a fractured paradigm. J. Commun. 43 (4), 51–58.
Government of India (GoI), 2019. National Mineral Policy 2019. Accessed on 5-Jun-2020 athttps://mines.gov.in/writereaddata/Content/NMP12032019.pdf.
Figueroa, B., Eugenio, Figueroa B., Oriheula, R., Carlos, Oriheula R., Calfucura, T., Enrique, Calfucura T., 2010. Green accounting and sustainability of the Peruvian mining sector. Resour. Policy 35 (3), 156–167.
Graham, Emmanuel, Ovadia, Jesse Salah, 2019. Oil exploration and production in Sub-Saharan Africa, 1990-present: Trends and developments. Extract. Indus. Soc. 6 (2), 593–609.
Haber, Stephen, Menaldo, Victor, 2011. Do natural resources fuel authoritarianism? A reappraisal of the resource curse. Am. Political Sci. Rev. 105 (1), 1–26.
Hartwick, John M., 1977. Intergenerational equity and the investing of rents from exhaustible resources. Am. Econ. Rev. 67 (5), 972–974.
Helm, Dieter, 2019. Natural capital: Assets, systems, and policies. Oxford Rev. Econ. Policy 35 (1), 1–13.
Hicks, John, 1946. Value and Capital, 2nd Ed. Oxford University Press, Oxford.
International Monetary Fund, 2012. Fiscal Regimes for Extractive Industries: Design and Implementation. International Monetary Fund, Washington, DC.
International Monetary Fund, 2014. Government Finance Statistics Manual 2014. International Monetary Fund, Washington, DC.
International Monetary Fund, 2015. The Commodities Roller Coaster: A Fiscal Framework for Uncertain Times. International Monetary Fund, Washington, DC.
International Monetary Fund, 2018. Fiscal Monitor: Managing Public Wealth. International Monetary Fund, Washington, DC.
International Monetary Fund, 2018b. Guyana – 2018 Article IV Consultation. International Monetary Fund, Washington, DC.
International Public Sector Accounting Standards Board, 2019. IPSASB Strategy and Work Plan 2019-2023. Delivering Global Standards. Inspiring Implementation. International Federation of Accountants, New York.
Jerven, Morten, 2013. Briefing: For richer, for poorer: GDP revisions and Africa's statistical tragedy. African Affairs 112 (446), 138–147.
Klamer, Arjo, McCloskey, Donald, 1992. Accounting as the master metaphor for economics. The Eu. Account. Rev. 1 (1), 145–160.
Knierzinger, Johannes, Sopelle, Isaac Ter-Ibinibe, 2019. Mine closure from below: transformative movements in two shrinking West African mining towns. Extract. Indus. Soc. 6 (1), 145–153.
Lakoff, George, Johnson, Mark, 1980. Metaphors We Live By. University of Chicago Press, Chicago.
Levi, Margaret, 1988. Of Rule and Revenue. University of California Press, Berkeley.
MacKenzie, Donald, 2003. Exemplars, disunity and performativity in financial economics. Soc. Stud. Sci. 33 (6), 831–868.
Mardones, Cristian, del Rio, Ricardo, 2019. Correction of Chilean GDP for natural capital depreciation and environmental degradation caused by copper mining. Resour. Policy 60, 143–152.
Moss, Todd, Lambert, Caroline, Majerowicz, Stephen., 2015. Oil to Cash: Fighting the Resource Curse through Cash Transfers. Center for Global Development, Washington, DC.
Nordhaus, William D., Kokkelenberg, Edward C., 1999. Nature's Numbers: Expanding the National Economic Accounts to Include the Environment. The National Academies Press, Washington, DC.
Orihuelaa, José Carlos, Pérez, Carlos A., Huarotoc, César, 2019. Do fiscal windfalls increase mining conflicts? Not always. Extract. Indus. Soc. 6 (2), 313–318.
Paine, Jack, 2016. Rethinking the conflict 'resource curse': how oil wealth prevents center-seeking civil wars. International Organization 70 (4), 727–761.
Pegg, Scott, 2006. Can policy intervention beat the resource curse? Evidence from the Chad-Cameroon pipeline project. African Affairs 105 (418), 1–25.
Pegg, Scott, 2018. Oil to cash in Somaliland: A debate whose time has come. J. Modern African Stud. 56 (4), 619–643.
Ramsay, Kristopher W., 2011. Revisiting the resource curse: Natural disasters, the price of oil, and democracy. Int. Org. 65 (3), 507–529.
Ross, Michael L., 2015. What have we learned about the resource curse? Ann. Rev. Political Sci. 18, 239–259.
Sandbu, Martin, 2006. Natural wealth accounts: a proposal for alleviating the natural resource curse. World Dev. 34 (7), 1153–1170.
Sarraf, Maria, Jiwanji, Moortaza, 2001. Beating the Resource Curse: The Case of Botswana. The World Bank, Washington, DC Environment Department Working Paper # 83, Report # 24753.
Shaxson, Nicholas, 2007. Oil, corruption and the resource curse. Int. Affairs 83 (6), 1123–1140.
Shefrin, Hersh.M., Thaler, Richard.H., 1988. The behavioural life-cycle hypothesis. Econ. Inq. 26 (4), 609–643.
Solow, R.M., 1974. Intergenerational Equity and Exhaustible Resources. The Rev. Econ. Stud. 41, 29–45.
Thaler, Richard H., 1999. Mental accounting matters. J. Behav. Decision Making 12 (3), 183–206.
Tversky, Amos, Kahneman, Daniel, 1981. The framing of decisions and the psychology of choice. Science 211 (4481), 453–458.
van der Ploeg, Frederick, Poelhekke, Steven, 2010. The pungent smell of 'red herrings': subsoil assets, rents, volatility and the resource curse. J. Environ. Econ. Manage. 60 (1), 44–55.
Venables, Anthony J., 2016. Using natural resources for development: Why has it proven so difficult? J. Econ. Perspect. 30 (1), 161–184.
Weinthal, Erika, Jones Luong, Pauline, 2006. . Combating the resource curse: An alternative solution to managing mineral wealth. Perspectives on Politics 4 (1), 35–53.
Weiss, Edith B., 1989. In Fairness to Future Generations: International Law, Common Patrimony, and Intergenerational Equity. Transnational Publishers, Dobbs Ferry, New York.
World Bank, 2006. Where is the Wealth of Nations? Measuring Capital for the 21st Century. World Bank, Washington, DC.
World Bank, 2011. The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium. World Bank, Washington, DC.
Yaduma, Natina, 2018. Investigating the oil curse in OECD and Non-OECD oil-exporting economies using green measures of income. Environ., Develop. Sustain. 20 (6), 2725–2745.
Yeung, Ying, Howes, Stephen, 2015. Resources-to-Cash: A Cautionary Tale from Mongolia. Australian National University, Canberra Development Policy Centre Discussion Paper No. 42.
Young, Joni J., 2013. Devil's advocate: the importance of metaphor. Accounting Horizons 27 (4), 877–886.
Basu Rahul, 2017b. Accounting for the resource curse. The Future We Need. Available via https://medium.com/@thefutureweneed/accounting-for-the-resource-curse-b2a4a6d1612c, accessed 22 October 2019.