

FAQs on Accounting Metaphors

The IMF, UN & IPSASB standards for government accounting, statistics and disclosure treat receipts from minerals as “windfall revenues” rather than “capital receipts on account of the sale of a non-renewable natural resource asset.” In October 2016, Goa Foundation had sent [a note](#) on mitigating the resource curse by improving government accounting to the IMF, UN, WB, IPSASB, INTOSAI and others.¹ We had argued that the present accounting is a major accounting error similar to the funding of pension liabilities on a pay-as-you-go basis, but with even bigger and more dangerous implications. The World Development Indicators show that the total energy and mineral depletion between 1970 and 2013 amounts to \$27 trillion. Much of this has been consumed, aided in part by government accounting for mineral receipts as revenues rather than asset sales. We petitioned the IMF, UN & IPSASB to undertake a review of their treatment of mineral receipts in government accounting, statistics and disclosures, as well as take appropriate steps to modify the overall discourse from “windfall revenues” to “sale of non-renewable natural resource assets”.

We have received quite a few responses to our note. In general, commenters agree that accounting for mineral receipts as a sale of assets is reasonable. Their principal concern is that we are being naïve and overstating the likely impact on altering political behaviour as relates to resource exploitation/conservation. Several other secondary issues were also raised.

In response, we first provide our broad framework for thinking about minerals. We start with the accounting issues. We then deal with the confusion caused by the use of conflicting metaphors. We move on to discuss our suggestion for dealing with minerals in the context of alternative fiscal paths. Each section ends with a set of recommendations for the IMF. Annex 1 goes into the accounting issues in greater detail. Annex 2 deals with some residual issues.

IMF's work on minerals

We acknowledge upfront that the IMF has done much to promote the idea of minerals as capital. Substantial portions of our work are a direct result of reports from the World Bank and the IMF. We are aware that a number of sovereign wealth funds have been set up as a result of loan conditions. However, we believe the IMF can and should do more to mitigate the resource curse and our unsustainable global economy.

Boundary: Minerals, including fossil fuels

We are restricting our analysis to minerals (including fossil fuels), not all natural resources. Our perspective is that of an owner of minerals, whether a government, indigenous people or even an individual. We restrict our analysis to the case where the government is the legal owner of the minerals.

Our broad framework

A well-functioning economy increases wealth, with the change in wealth labelled income. All else equal, less inequality is better. In most economies, growth is increased by prudent investment.

¹ <http://goenchimati.org/wp-content/uploads/2016/10/2016-10-04-Mitigating-the-Resource-Curse-by-improving-Government-Accounting-Note-for-IMF.pdf>

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Natural resources are typically part of the commons, with the government usually the trustee of the shared inheritance on behalf of living people and future generations. The present generation has a duty to ensure that the next generation receives at least the capital – meeting Intergenerational Equity.² If we maintain the capital, we may consume the fruit, the income from the capital, although ideally, each generation would leave a growing bequest, a positive legacy.

Usually, mining leads to the sale of the mineral. A mining lease is effectively a long-term sale and purchase agreement for the mineral. Royalty and other mineral receipts are the consideration received for the mineral sold.

Consider the case of inherited family gold. Intergenerational equity can be met by keeping the gold as it is, but gold earns no income. An alternative is to sell the gold and invest the proceeds in land. Provided owners maintain the productivity of the land, by crop rotation or keeping it fallow, they can consume the harvests. And so could all future owners. Any loss of the initial capital is a permanent loss to all future generations.

In a similar vein, each owner must strive to sell the mineral for zero loss, i.e., its economic rent.³ Whatever the owner receives must be saved in a new “non-wasting” asset. Since this asset has been financed from the mineral commons, it should remain part of the commons. The owners must prevent theft or erosion of value of the new asset. Provided the capital is intact, the owners may consume the income. Since the minerals and the new asset constitute the commons, the income should be distributed equitably as a commons dividend.

This prescription meets Intergenerational Equity – the capital is at least held constant over time. If we assume that the new “non-wasting” asset earns income at the market rate of return, and that some of that income is saved each period, then the economy’s wealth will keep growing. The original property of the commoners (the minerals) remains the property of the commoners (in the form of the new asset) and the income earned on the capital is distributed to the owners. The prescription explicitly meets equality in distribution.

The recent history of mining is a tale of failures. Even the history of the few successes is short. Why is this?

Ants to honey

The fundamental challenge is that minerals are a concentrated source of common wealth. Consequently, they draw rent seekers. The quantum of wealth is so large that miners, politicians, bureaucrats and present citizens are tempted to consume it. The losers are future generations, who do not have a voice, today.⁴ This is the central problem – how can owners stop theft in various disguises and reduce the temptation?

Conceptually, there are 6 stages of mineral transformation to consider – as a mineral (before mining), when selling the mineral, when investing the proceeds, maintaining the new capital, earning income and distributing the income. At each stage, loss or theft must be prevented. If

² Otherwise, future generations will be worse off (assuming zero technological progress forever). In the limit, there may not be a future generation if the current generation consumes the planet or triggers a catastrophe.

³ Economic rent is the sale value minus cost of extraction minus reasonable profit for the extractor.

⁴ They will get their voice when they write our history!

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income can be increased or distributed better at no greater risk, that would be preferred. The wealth is most vulnerable when it is being converted from mineral to cash to investment. The table below lists the six stages and the corresponding goals for the two situations described above.

Stages	Gold to Crop	Mineral to income
1. Mineral in situ	Prevent theft	Prevent theft
2. Sale of inheritance	Zero loss	Zero loss
3. Investment (save all)	Buy land	Invest in new “non-wasting” assets 1. Real – infrastructure, education, public health, sometimes through a fund ⁵ 2. Financial – Future Generations Fund
4. Protect investment	Maintain land productivity	1. Real : Maintenance 2. Financial : Inflation proofing
5. Earn real income	Grow a crop	1. Real : Management 2. Financial : Investment management
6. Distribute income equally	Consume the crop	Distribute commons dividend

Resource protection failures occur at all stages. Resource wars are well known. We have documented very significant losses to mineral owners based on audited financial statements.⁶ Significant portions of mineral receipts are diverted to arms purchases and lining the pockets of ruling politicians. Of the rest, often substantial sums are consumed, not invested, driving patronage. When invested in real assets, there are numerous issues with corruption, patronage and poor project selection. Raiding a Future Generations Fund is common as well. For 2 consecutive years now, legislators in Alaska have voted not to pay the full permanent fund dividend.

Names matter

Importantly, the revenue metaphor obscures our moral failure. It is easy to rationalize that no rights of future generations are impacted when we earn revenue and dispose of it to benefit ourselves, as future generations will earn their revenue in their own time. In reality, the people alive are consuming their inheritance. By hiding the asset depletion and intergenerational inequity, the revenue metaphor removes future generations from the discussion.

This metaphor induces a multi-party struggle for the mining “revenues” by miners, politicians, local governments, government officials, police, local strongmen, lobbies, civil society, etc., all essentially rent seekers, with everyone arguing for more.

We want a clear communication of the underlying moral principle – Intergenerational Equity. “*We haven’t inherited the world from our ancestors, we’ve borrowed it from our children*”⁷ or “*the earth is essentially a shared inheritance*”⁸. Good accounting and transparent disclosure will help verify if current generations are failing in their duty.

⁵ In theory, a public investment management fund like Temasek could pay out a commons dividend.

⁶ From [Catastrophic Failure of Public Trust in Mining: Case Study of Goa](#).

⁷ Provenance of this quote is uncertain. See [Quote Investigator](#)

⁸ [Laudato Si](#) by Pope Francis

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Introducing our benchmark

Goa Foundation proposes a simple three-step policy as a benchmark for evaluating alternative ways to safeguard the capital, earn income and distribute equally. These are (a) if we mine and sell our mineral, we must have a zero loss rate; (b) everything we receive must be saved in a Future Generations Fund, invested in deep capital markets, with inflation proofing; and (c) any real income must be distributed only as a commons dividend, equally to all. We believe that this policy is politically implementable and will be difficult to out-perform. We discuss this benchmark in more detail later.

Standards for Statistics & Accounting

Natural resources can be grouped in 3 broad categories: (a) non-renewable stocks - minerals, fossil fuels; (b) regenerating stocks – fisheries, aquifers, forests, pasture; and (c) renewable flows – spectrum, rainfall, sunshine.

The current government/public sector accounting standards aimed at guidance for receipts from mobile telephony spectrum auctions. Unfortunately, this revenue treatment appropriate for renewable resources was extended to all receipts from government-owned natural resources. However, sale of asset treatment for receipts from owned minerals is likely better since this is a different class of non-renewable assets, which depletes when exploited.

Impact of revenue accounting

A real life example of Goa, India would help illustrate the impacts of the current accounting:

Amounts in Rs. billion				
Aggregate	As Reported		In Reality	
Transaction narrative	Revenue (mining)	23.87	Opening capital : mineral Mineral sold Capital receipt : cash Change in net worth : loss Closing capital : cash	516.55 -516.55 +23.87 -492.68 23.87
Government revenue		274.02	Net revenue Revenue Loss from mining	-242.53 250.15 -492.68
Government net worth	Increase	23.87	Loss	-492.68
Goa GDP		1,872.97	<i>(Subtracting the economic rent⁹)</i>	1,356.42
Goa net worth	Increase	23.87	Loss	-492.68
Goa commons wealth	Decrease	-23.87	Decrease	-516.55

We found in Goa, over the 8-year period 2004-2012, that the state as mineral owner received 5% of the economic rent (Rs. 23.87 billion out of Rs. 516.55 billion).¹⁰ The mineral receipts were approximately 9% of the cumulative Goa government revenues (Rs. 274.02 billion). Mining was 15%

⁹ If we subtract the mining contribution to GDP (instead of economic rent), real GDP is Rs. 1,598.53 billion.

¹⁰ From [Catastrophic Failure of Public Trust in Mining: Case Study of Goa](#), table 3.

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(Rs. 274.48 billion)¹¹ of Goa's GDP (Rs. 1,872.97 billion). End-of-period government debt was only Rs. 68.72 billion. Mining appears a success, increasing government revenue, and GDP too.

In reality, Goa suffered a decline in net worth to the extent of 95% of the economic rent (Rs. 492.68 billion), and the government suffering a loss of inherited capital of twice its true revenues (Rs. 250.15 billion). The wealth lost from the commons accounted for an average of 28% of Goa's GDP over the period (Rs. 1,872.97 billion), cumulatively 1.5 times exit GDP. True GDP is much lower. Per capita income is over-stated, and the people are actually poorer. The distribution impact is also significant. The losses are effectively a per-head tax, a negative basic income. A few miners and their cronies became super-wealthy.

Revenue accounting obscures this catastrophe in two different ways:

- 1) **Mineral receipts as revenue:** This accounting falsely boosts government revenue and GDP. More mining means more growth, which is the purpose of the economy. The propensity to consume revenue receipts is high, in effect unknowingly consuming capital. This undermines step 3, which is to save everything. Further, except for the rare situation of a commons dividend from mineral receipts (e.g. Iran, Mongolia), 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.
- 2) **Loss of wealth not disclosed:** IMF data shows significant losses of the economic rent from mining are common – a minimum of 15% for oil and 35% for minerals.¹² The revenue treatment reduces scrutiny on the terms of mining leases because losses are not explicitly accounted for. This makes zero loss mining, step 2, difficult to achieve. Crony capitalism blossoms in the shadows. From a distribution perspective, these are also hidden per-head taxes, while the miners are getting unfairly rich.

Opportunity for change

The System of National Accounts (SNA) 2008 and the Government Finance Statistics Manual (GFSM) 2014 recognise that accounting for minerals is problematic. "*Leases to use or exploit natural resources*" is on the SNA 2008 Research Agenda. "*Leases to use or utilise natural resources*" is on the GFSM 2014 Research Agenda. As in the mobile telephony spectrum case, clarifying guidance may be sufficient. In addition, IPSASB is currently examining its standards for Leases and for Revenue, creating an opportunity to improve the current situation.

The [GFSAC Research Agenda](#) item 13 "*Leases to use or utilise natural resources*" sets out the issues clearly (underlining ours):

"The GFSM 2014 provides guidelines on recording licenses and permits to use natural resources in Appendix 4, Box A4.1. These guidelines are based on the 2008 SNA guidelines. Current guidelines make a distinction between: payments treated as sales of assets; payments considered the payment of taxes; and payments that are treated as rent. Which treatment is applied affects GFS aggregates: sales of assets are not recorded as parts of government revenue at all, versus recording payments as taxes impacts the level of taxes/fiscal burden, and payments of rents that

¹¹ 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).

¹² [Fiscal Regimes for Extractive Industries: Design and Implementation](#), paragraph 64.

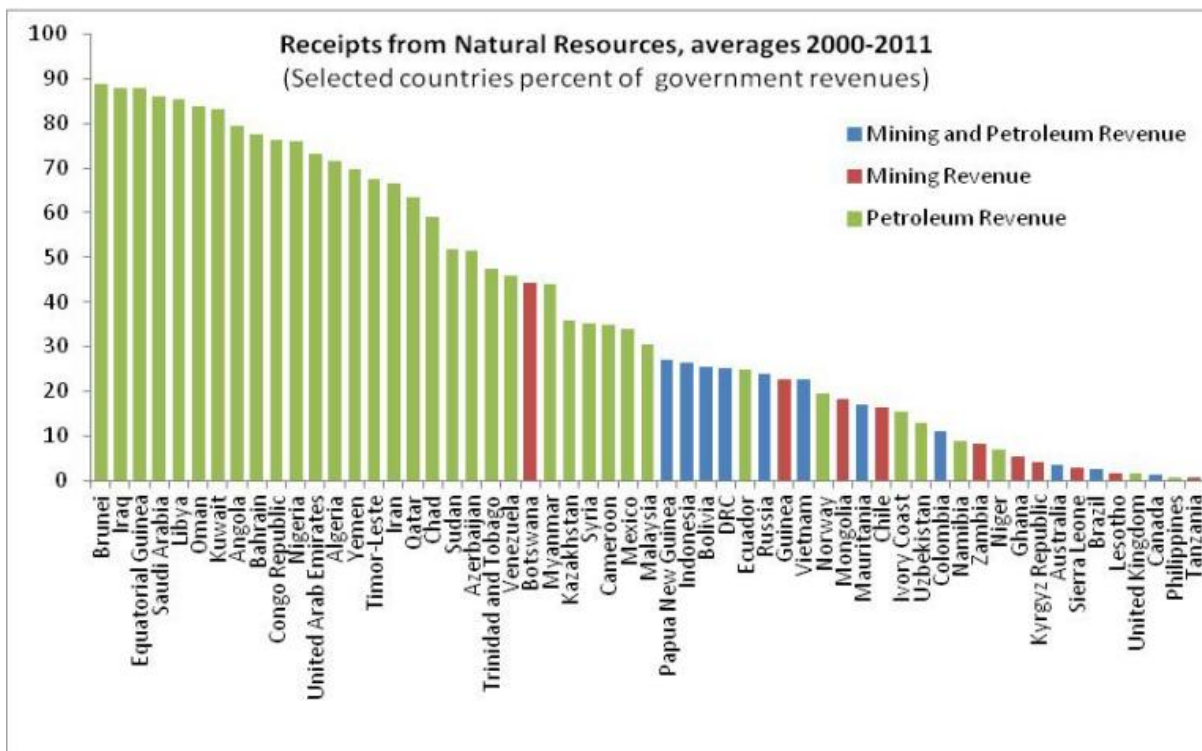
do not impact the fiscal burden but increase property income. The classifications of these transactions have significant impacts and changes to the treatment could significantly impact GFS aggregates for countries reliant on income from the exploitation of natural resources. However, it was found that in practice, making the distinction is not that easy. Therefore, further practical guidance on making these distinctions should be developed."

Treatment of receipts	Comments
Revenue	GFSM 4.23 " Revenue is an increase in net worth resulting from a transaction."
1. Payment of taxes	Ruled out because the payments are neither compulsory nor unrequited
2. Payment of rent	Current treatment. Assumes infinite life of asset - absurd with minerals
Capital	
3. Sale of an asset	Mineral leases are essentially master sale & purchase agreements

Of the three possibilities for treating receipts for non-renewable minerals (not all natural resources, especially those that are renewable), sale of assets seems to be the only reasonable choice.¹³

Impact on Government and National indicators

This chart from a 2012 IMF presentation shows the governments most impacted:



Under sale of asset accounting, these receipts would not form part of revenue. The government revenue deficits would be extraordinary. This would have significant political repercussions, as

¹³ In the case of Spectrum, "purchase of services" was a fourth option examined. Some studies of government finances treat royalty as an "economic service", part of "non-tax revenues", calculating the ratio of royalty "earned" and the expenditure of the controlling department.

politicians would have to argue for consumption of the family gold in normal times. Reported per capita income would also drop, reflecting the unsustainability of consuming mineral wealth.

Further, we would not be surprised to find loss rates exceeding 50% at the peak of the China boom. This was in evidence in India for coal as well as oil and gas as early as in 2005. Sale of asset accounting would have dramatically changed the fiscal picture for many of these countries. Not only would the government revenues have shrunk, the losses may well have exceeded the non-mineral revenues. It is no surprise that *The Changing Wealth of Nations* study by the World Bank (2011) found that that since 1970, all countries in which rent from minerals accounted for more than 15% of GDP had negative Adjusted Net Savings.¹⁴ In simple terms, they became poorer.

It would be a useful exercise to re-calculate key government and national indicators for nations around the world using sale of asset accounting to see what the impact on government accounts, budgets & national indicators would have been. IMF is the organisation best placed to undertake this.

Does accounting impact behavior?

As set out in our earlier note, the accounting treatment is driving perverse incentives. Politicians argue for new mines or increased extraction on the grounds of a boost to the government revenues. Since mineral receipts are accounted for as revenues, a derived goal is to maximise revenues, a fuzzy target. This drives increased extraction at lower prices, large losses, wasteful spending, declining wealth and increasing inequality.

If politicians had to disclose that they are selling inherited assets, significant losses would be politically untenable. This would squeeze the corruption and crony capitalism.

Arguments for consuming the capital would be difficult. Consequently, the savings rate is likely to rise, leading to further growth. This is the minimal argument for capital treatment in accounting.

Eventually, it is a judgment call whether these massive swings in government and national indicators would change political behaviour or incentives. IMF clearly has the most experience. However, if such large changes have minimal impact, then the GFSM 2014 and the SNA 2008 are likely exercises in futility. And the change should not face much opposition if it will have no impact.

Possible two-step accounting change

There are significant practical difficulties in estimating values of mineral deposits. We therefore propose a two-phase accounting change:

- 1) All countries could start accounting for mineral receipts as sale of assets by first recording the mineral receipt amount as an increase in net worth through the Other Changes in Assets account to the extent of the mineral receipt. The actual transaction (say the receipt of royalty) would be subsequently shown as a sale of assets – reducing the mineral asset created by the same amount, and increasing capital receipt from sale of non-produced assets. The national statistics would exclude the mineral receipts from the GDP. This treatment does not require an estimation of the loss in value. However, the risk of loss at extraction would remain.

¹⁴ [The Changing Wealth of Nations](#). (2011). Washington, D.C.: World Bank. Page 11.

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- 2) In a later phase, annual estimations of the value of mineral deposits should be required, and unrealized gains and losses would also need to be recorded. In other words, the mineral asset discovery and subsequent value changes would be recorded through the Other Changes in Assets account. When a mineral sale transaction takes place and royalty is received, the royalty would be treated as before. However, the assets would decline by the value of the mineral as previously estimated, and the difference between the mineral receipt and the recorded value of the mineral would be shown as a capital loss or gain.

An intermediate alternative to consider is valuing the mineral contemporaneously with extraction, and recognising the gain or loss, if any. This doesn't require valuing mineral deposits where extraction isn't planned in the future, but does reduce accountability for the management of the resources.

Action sought from IMF on statistics and accounting

1. Decision to move mineral accounting on a fast track, separate from all other natural resources. Spectrum for mobile phone telephony is a precedent.
2. IMF modifying both the GFSM 2014 as well as the SNA 2008 to require sale of asset treatment for mineral receipts instead of treating it as property income. This can be accomplished through clarifications or guidance.
3. Advocate follow-through changes to the IPSASB standards, potentially in the upcoming Revenues standard.
4. IMF should analyse how historical government and national indicators would have been reported under sale of asset accounting. In a similar vein, contemporary projections for the future could show results from both styles of accounting.

Conflicting metaphors

Our [initial note](#), especially pages 5-8, provides a number of channels by which the concurrent use of conflicting metaphors for mineral receipts – “windfall revenues” and “sale of asset” – causes many of the symptoms associated with the Resource Curse. Briefly, more revenues are good, incentivizing rapid extraction. Revenue terminology breaks the link to the asset value, hiding losses. Windfall terminology increases the urgency, and reduces the propensity to save. Commodity booms and busts create dramatic volatility in government revenues, which are difficult to manage.

Sale of asset treatment changes perspectives. Four questions immediately arise – (a) why are we selling our asset, (b) is this the best time, (c) are we incurring a loss, and (d) are we saving the money in a new asset? Consistent use of the “sale of asset” metaphor would change the way minerals are managed. We also argue for an extended “sale of common inherited assets” metaphor in order to recognize the rights of future generations to our shared inheritance.

The widespread use of conflicting metaphors confuses perspectives. This is not deliberate. However, it is so ingrained that eliminating confusing metaphors will need determined effort and leadership on the part of the IMF. As long as the accounting standards (GFSM, SNA, IPSASB) treat mineral

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receipts as revenue, a sale of asset metaphor will be continuously under-mined by the accounting terminology. We explain the impact of metaphors in shaping political narratives for minerals.¹⁵

Mineral receipts as “revenue”: Politicians argue for increased extraction on the basis that it creates jobs and generates income for the government and the nation. It becomes a national project, and those opposing are portrayed as seditious. The underlying political interest in extraction may be to distribute patronage, and more often, plain corruption and lining of pockets. Rent seekers frequently becoming politicians in turn.

Consumption (of the mineral receipts) is also promoted by the revenue metaphor. For the common person, it makes no sense to earn a lot of revenue from mining only to save most or all. What is so special about this revenue? Is there any other kind of revenue which we should be saving in its entirety? The myriad urgent needs today supersede savings for the long term when easy revenue is available. This becomes akin to a coalition of Bootleggers and Baptists¹⁶ - rent seekers look to extract value, and the present generation argue for the benefits that they will receive.

“Taxation” confuses further: “Revenue,” “tax” and “sale of asset” are all used in language analyzing minerals. The “taxes” terminology creates issues not raised in our note. Raising taxes are often politically unpopular. Labelling mineral receipts “taxes” makes the public support reducing the royalty rates, when it would often be in their interest to increase the royalty rate. In the US, this is exacerbated by the Taxpayer Protection Pledge of Americans for Tax Reform, which requires signatories, largely Republicans, to oppose any and all tax increases.¹⁷

We see this dynamic in Alaska. Increases in oil taxes, income taxes or sales taxes are opposed by the Republican controlled senate. On the other hand, drawing from the commons (diverting from the Permanent fund or dividend) is not considered a tax, when it is in effect a per-head tax – compulsory and unrequited. Just due to terminology, the Democrat controlled house finds it easier to advocate drawing from the commons by reducing the Permanent Fund Dividend. The inappropriate “taxation” terminology makes it even harder for ordinary citizens to uncover the reality.

“Windfall”: This appellation is given both to (a) new discoveries of large mineral deposits, as well as to (b) mineral receipts at times of commodity booms when the price of minerals, and by extension, the royalty, soars. Metaphorically, “windfalls” are unpredictable, cannot be planned for or managed, and an opportunity that should be taken. It is true that “windfalls” are not a part of any of the standards. However, it is a metaphor for minerals used in resource extraction discussions.

Discoveries as “windfalls”: Discoveries are called “windfalls”. Suppose someone inherits a huge estate from a distant uncle. After a few days, he notices a Picasso. Did he become richer when he “discovered” the Picasso? No, he was already the owner of the Picasso, and would eventually have noticed it. If someone stole it and our protagonist later found out, could he recover the painting? Of course he can, it was his property.

¹⁵ From real life experience, it is difficult to counter the revenue narrative.

¹⁶ https://en.wikipedia.org/wiki/Bootleggers_and_Baptists

¹⁷ <http://www.atr.org/about-the-pledge>

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Similarly, what we discover today, we inevitably would have discovered tomorrow. And we will likely discover more value within our mineral.¹⁸ As technology improves, less can stay hidden. The windfall label gives a licence to consume – we are wealthier. It also creates an urgency to act – someone else will pick up the windfall if we don't. But like the Picasso, we always owned the minerals, whether we knew it or not, and will continue to own it.

Commodity booms and “windfalls”: Commodity booms are also called “windfalls”, implying an unpredictable process, and by extension, one that cannot be managed. It is clear that a significant proportion of the economic rent is created during the boom in a commodity cycle, when prices are high. Selling more minerals at the peak of a boom is what a normal, logical, prudent investor would do. A “windfall” appellation distracts from the correct strategy of (a) sell when prices are high, and (b) ensure zero loss through the price cycle.

Examples of the mixed metaphors

We would like to open by saying each of the entities whose examples we use below have done stellar work on addressing the Resource Curse. Examples of the mixed metaphors are everywhere, the entities have been chosen as they are important. Underlining ours.

The titles of recent IMF reports include "*International Taxation and the Extractive Industries*"¹⁹; "*The Taxation of Petroleum and Minerals*"²⁰; "*Administering Revenues from Natural Resources*"²¹; & "*Template to Collect Data on Government Revenues from Natural Resources*"²². A quote from a 2012 IMF presentation on mining sums it up: "*Recognize revenues as transformation of finite assets in the ground into other assets.*"

The issue is widespread. EITI's principles include "(3) We recognise that the benefits of resource extraction occur as revenue streams over many years and can be highly price dependent. (4) We recognise that a public understanding of government revenues and expenditure over time could help public debate and inform choice of appropriate and realistic options for sustainable development. ... (8) We believe in the principle and practice of accountability by government to all citizens for the stewardship of revenue streams and public expenditure."

Publish What You Pay (PWYP)'s = Mission is to be: "*a global network of civil society organisations united in their call for an open and accountable extractive sector so that oil, gas and mining revenues improve the lives of women, men and youth in resource-rich countries.*"

The Natural Resource Charter includes: Precept 4 - Taxation; Precept 7 - Revenue Distribution; and Precept 8 - Revenue Volatility.

¹⁸ For example, Goa's iron ore also contains gold and rare earths. The material above the iron ore (overburden) has manganese clays, dolomite, red oxide, etc. Just mining for iron ore destroys these other values that may not be recognized today.

¹⁹ <https://www.routledge.com/International-Taxation-and-the-Extractive-Industries/Daniel-Keen-Swistak-Thuronyi/p/book/9781138999626>

²⁰ <https://www.routledge.com/The-Taxation-of-Petroleum-and-Minerals-Principles-Problems-and-Practice/Daniel-Keen-McPherson/p/book/9780415569217>

²¹ <https://www.imf.org/en/Publications/TNM/Issues/2016/12/31/Revenue-Administration-Administering-Revenues-from-Natural-Resources-A-Short-Primer-41604>

²² <http://www.imf.org/external/pubs/ft/gfs/manual/pdf/templatedata.pdf>

Action sought from the IMF

We would like IMF to resolve that treating mineral receipts as the sale of inherited capital is appropriate. Consequently, in future, the language used in its official publications must reflect this position consistently (except when unavoidable, but preferably within quotes). All references to “revenue”, “windfall”, “taxes”, etc. must be deliberately removed from report titles, content of reports, names of aggregates (no more “rent from minerals”), etc.

For the confusion to disappear, the treatment for statistics and accounting must also change quickly.

Fiscal policy and our passive benchmark

If minerals are a shared inheritance, a part of the commons, then mining is the sale of the family gold. The objective is to maintain the principal value while earning higher returns – otherwise, it is a consumption of capital. This policy has three steps: (i) sell the asset ideally without a loss, (ii) save everything in new non-wasting assets (hence converting one form of capital to another), and (iii) consume the income only if the capital has been kept whole. How is this to be achieved in practice?

Active management of fiscal policy

As with asset management, it is tempting to recommend active management of the fiscal policy. There are many credible proposals for improving either the growth rate itself (infrastructure) or a more progressive distribution (universal health / education / work / food). It is argued that in under-developed locations, the optimal fiscal path may even be to sell for a loss, as the returns on investment into physical / human capital assets will rapidly pay off. Alternatively, it is posited that since the government is capital starved, real investments are a better choice compared to either saving in a future generations fund or distributing the real income. We are sceptical.

Global disaster

We have documented extremely high loss rates over long periods for iron ore and fossil fuels in India. IMF data shows significant losses of the value of minerals are common – a minimum of 15% for oil and 35% for minerals.²³ In other words, mineral receipts do not exceed 85% of the value of the oil and 65% for minerals.

Saving rates from mineral receipts are far below 100%. In fact, IMF’s own estimates are that for 2000-2008, the average savings rate (in financial assets) for resource rich economies was around 35%.²⁴ Of the 65% spent, only around 33% was capital spending.²⁵ In other words, around 43% of the mineral receipts were spent. The efficiency of public investment was also very poor. Only about half of public investment effort translates into actual productive public capital.²⁶

If we use IMF data and assume a 10% loss rate, 35% of the amount captured saved in financial assets, 1/3rd of the balance utilised in public investment, whose efficiency in resulting in productive capital is 50%, then we see the following results:

²³ [Fiscal Regimes for Extractive Industries: Design and Implementation](#), para 64

²⁴ Figure 1.17 in the IMF [Fiscal Monitor – The Commodities Roller Coaster](#) (Oct 2015)

²⁵ Figure 1.12 in the IMF [Fiscal Monitor – The Commodities Roller Coaster](#) (Oct 2015)

²⁶ Figure 1.13 in the IMF [Fiscal Monitor – The Commodities Roller Coaster](#) (Oct 2015)

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Experience in converting mineral capital into other kinds of capital			
	Estimates based on IMF data		Our benchmark
Mineral capital extracted		\$100.00	\$100.00
Loss in value to extractors	10% loss rate	\$10.00	\$0.00
Mineral receipts		\$90.00	\$100.00
Of which: Financial assets	35% saved	\$31.50	\$100.00
Balance spent (by politicians)	65% spent	\$58.50	\$0.00
Of which: Public investment	1/3rd	\$19.50	\$0.00
Wasted investment	50%	\$9.75	\$0.00
Useful investment	50%	\$9.75	\$0.00
Consumption	Balance	\$39.00	\$0.00
(Bold rows add up to \$100)			
Summary			
Total investment		\$41.25	\$100.00
Loss to the economy		\$58.75	\$0.00
Loss to the commons		\$68.50	\$0.00
Useful public investment		\$9.75	\$0.00
Amount spent by politicians		\$58.50	\$0.00

For every \$100 of minerals extracted, \$31.5 is saved in financial assets (earning the market rate of return, like our benchmark) and \$9.75 of useful public investment achieved, for a decline in net worth of \$58.75. The estimates of wasted and useful investment would have assumed a discount rate, which is unlikely to be higher than the market rate of return. Hence, the useful public investment cannot recoup the loss.

In the example above, only \$31.50 is still a part of the commons. The distribution of wealth has likely deteriorated significantly.

Goa Foundation's Benchmark

We further argue that a specific program can mitigate much of the resource curse. The rationale is grounded on the Public Trust Doctrine (the state holds natural resources as a trustee on behalf of the people and especially future generations) and the Intergenerational Equity Principle (what we inherit, we must pass on).

The core can be simplified to “get all, save all, share all” – (i) zero loss mining (capture the entire economic rent), (ii) save all the capital receipts only in a future generations fund²⁷ with inflation-proofing, and (iii) distribute only the real income only directly to the people as owners, a commons dividend. A loss of the inherited capital is a loss to everyone alive now and all future generations.

If the financial markets are small relative to the mineral receipts, or the resource exports are large, then the Future Generations fund should be invested externally. This avoids both Dutch disease (exchange rate appreciation due to resource exports resulting in the uncompetitiveness of exporting sectors, especially manufacturing) as well as volatility on the capital account due to commodity price volatility.

²⁷ With real investments, some countries have an asset management structure that can retain the nature of the commons and pay out a dividend (eg, Temasek in Singapore).

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Our benchmark is likely to produce the market rate of return, and retains the nature of the commons. An active fiscal path has a stiff benchmark to outperform. Practically, Norway's Sovereign Wealth Fund (SWF) has been achieving real returns of 3.8%. Like an Index fund, our program can act as a benchmark for evaluating proposals for active fiscal paths.

Absolute standards easy to administer, monitor and defend: Our benchmark uses absolute standards (zero loss, save all (zero consumption, zero physical investment), share all). Miners and governments would find it administratively easier. The standards are easier to monitor by the people and defend from political attack. Even if we start with 1% of mineral receipts going to the government, with budget crises, real or manufactured, this proportion will tend to increase to 100%.

There are a number of other important reasons for our choice of absolute standards. Please read [Why 100% to Permanent Fund](#) and [Why income distribution only as Citizen's Dividend](#).

Implementable: We have made detailed proposals for how this framework could be implemented in the context of iron ore mining in Goa.²⁸ We have received broad support, including from a miner, a mining affected tribal leader and a mining dependent trade union leader.

Meets important criteria

Meets intergenerational equity & the sustainable yield principles: Under our policy, mineral capital is converted into a financial perpetuity. The capital is protected and the sustainable income is distributed equally to all. Each generation benefits from the income in its time. In economic terminology, it is a combination of a loss rate of 0%, a bird-in-hand rule fund²⁹, and distributing the real income only as a commons dividend.

Achieves growth and distribution objectives: The mineral commons become the financial commons, earns the market rate of return, and the income is distributed to the commoners as a commons dividend. As long as some of the distributed income is saved, the economy will grow and the capital we bequeath will increase. This meets both the growth and distribution objectives of the economy.

Follows principles of property rights: The Goa Foundation (GF) Benchmark is logical from the perspective of property rights – mineral commons are transformed into the Future Generations Fund commons, and the real income from the fund is distributed to the commoners. Nothing could be fairer, or more equal.

Reducing theft from the commons: Under the status quo, minerals are a concentrated source of great wealth. Consequently, minerals draw rent seekers such as miners, politicians and even citizens. Under our proposal, the commons dividend creates an endowment effect (ascribing more value to things merely because they know they own them) in citizens, creating an interest in maintaining the mineral / future generations fund commons. The zero loss target puts pressure on the miners benefiting unfairly. The capital is then sequestered from the politicians through the Future Generations Fund & the commons dividend.

Simplicity: Active fiscal paths require continuous decisions as to:

²⁸ [Intergenerational Equity Case Study: Iron-ore Mining in Goa](#) describes this framework as being argued at the Supreme Court (https://www.academia.edu/31511752/Intergenerational_Equity_Case_Study_Iron-ore_Mining_in_Goa.) The Goenchi Mati Manifesto (goenchimati.org/manifesto) provides a popular précis.

²⁹ Where the capital is invested and only the real income is spent – investor preferences for dividends

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- (a) how much of the mineral receipts to be consumed (either under the Permanent Income Hypothesis, or simply as revenue),
- (b) how much public investment (limited by the absorption capacity of the economy), and the balance to be saved (in Stabilization or Future Generations Funds).

These decisions become even more difficult with commodity price volatility (permanent income fluctuates!) Eventually, the powerful bend these decisions to suit their preferences, usually towards higher consumption (for patronage) and higher physical investment (to benefit from the associated corruption).

Systems of thinking & our passive benchmark	
Economics	Purpose is growth in consumption (average). A second purpose is inclusion, growth in consumption should be progressive (distribution)
- Private property	Mineral commons transformed to financial commons, income shared with commoners
- Mineral economics	Hartwick's Rule
- Ecological economics	Intergenerational equity, weak sustainability, polluter pays principle
Finance	Lump sum capital converted into perpetuity
Accounting	Stock of capital held constant; capital generates income
Law	Public Trust Doctrine (state is trustee for people and future generations); Intergenerational Equity Principle (inheritances should be transmitted); Equality; Common Good; Property law
- Inheritance	"entails" – part of inheritance law, even in the West until the last 200 years
- Endowments	Endowments; Waqfs; Permanent Funds
- Environment	Public Trust Doctrine; Intergenerational Equity; Sustainable Development
Customs	Inheritance customs of the rich "Selling the family silver" viewed negatively
Moral	Everyone treated equally, future generations at least as well off
Religion	Golden rule – treat everyone as you would want to be treated
Values	Fairness, fraternity, justice, equality, liberty & freedom

Broad roots: Interestingly, the GF Benchmark has support in law (combination of the Public Trust Doctrine & Intergenerational Equity Principle)³⁰, in consonance with environmental economics³¹, maintains the property rights of commoners, is seen as fair, ethical, just, right, and moral, is in keeping with many inheritance customs, and is arguably a partial implementation of the golden law of religions. The **moral and legal grounding** makes it easier to sell and easier to defend from political attack.

Improves the social contract: If the government needs money for good projects, it should convince the people to pay higher taxes. That will increase the discipline on the government, improving governance. The state may opt to tax the commons dividend explicitly. States which manage to follow the GF Benchmark are also likely to be viewed as better credit risks by the capital markets.

³⁰ See [Government of India's Economic Survey 2017-18](#)

³¹ [Intergenerational Equity Case Study](#)

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Basic income included: The commons dividend is a Universal Basic Income (but not a Minimum Income), with all its benefits. This may be the strongest reason to adopt the benchmark.

Cognitively easy: Our benchmark is relatively simple for ordinary people to understand. Inheritance customs and experiences with common pool resources, cooperatives and mutuals make mental analogies easy.

Broad appeal: A key part of our design is the equality of the commons dividend, which tends to promote fraternity. A progressive (unequal) distribution fractures the people into different interest groups that each argue for larger shares.

It should be acceptable across most of the spectrum of economic thought as well as political ideology.

People outside mining areas now have a reason to engage with mineral policy – mining losses impact them as well, both financially and in performing their duty to their children.

Mining companies with integrity would prefer to pay the economic rent directly into Future Generations Funds. This can make them more competitive in corruption-ridden economies.

Deals with “development vs. environment” and climate change skeptics: Even someone who wants development and is willing to risk climate change would want our benchmark implemented – mining continues, in a more positive way. If they accept that the mineral capital should be saved for future generations, the forests on top of the mineral are obviously also a part of the shared inheritance. Caps on extraction and compensation for the damage become integral to achieving intergenerational equity.

Politically feasible: Our benchmark is essentially a combination of zero loss (an unarguable target), the Norway oil fund, and the Alaska Permanent Fund Dividend.

Practical extensions

Integration with Ecological Economics³²: This framework can be extended to ecological economics and harmonised with sustainable development, weak and strong sustainability and the polluter pays principle and the precautionary principle. In essence, the first constraint is the precautionary principle – don’t cause a catastrophe, don’t even risk a catastrophe. This sets overall limits or caps on the factors causing damage to stay within safe limits. For damage caused within these limits, the approach is first to avoid, then minimise, create new assets (plant forests) in lieu of the damage, or finally compensate in monetary terms.

We can then look at mining holistically. In essence, we need to (a) list out all the assets impacted by mining; (b) analyze each one to see if a cap is required; (c) if there is a loss / reduction of an asset, then it must be valued and compensated for. In mining, a partial list of assets includes (i) the environmental being damaged, (ii) the economic rent, (iii) the income from the extraction activity

³² [Intergenerational Equity Case Study](#)

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(which depletes with the mineral)³³, (iv) real option of when to mine (see annex 2), and (v) the real option of what to do with the mineral³⁴.

Natural extensions: This framework also logically encompasses a family of alternatives such as carbon tax + dividend, pollution cap + dividend, spectrum auction + dividend, land tax + dividend, etc.

Strengthening the benchmark

How do we strengthen the motivation and ability of the people to protect their great wealth or their commons from enclosure. If we look at the problem of protecting great wealth, there are essentially 3 strategies:

- (a) Few trusted insiders protect the wealth. This almost always fails (“Indiana Jones”). If the sums are large enough, insiders can be tempted for themselves, or by thieves. Tutankhamun was a minor pharaoh, famous only because his was the first tomb with lots of gold that previous raiders hadn’t found.
- (b) Common responsibility. Keep our common wealth where everyone can see and protect it. The commons dividend gives the populace reason to protect the commons. Radical transparency on all stages of the value chain is required to stop the thieves.
- (c) Forget about it as wealth creates too many problems in society. Throw it away (“The Gods must be crazy”). Essentially, it’s better not to extract at all, it’s safer underground.

Transparency: The current push for increasing transparency in extractives is a natural fall-out of salience of the “sale of assets” metaphor, leading to the idea that we have to prevent losses to our assets. Losses caused by insiders are a prominent risk to be controlled. This applies especially to extractives as they are often the single largest store of wealth.

Control systems: As minerals are often the greatest wealth, the controls must be commensurate. More effort in developing strong control systems is required. Along with strong controls, we also need whistleblower rewards and protection.

Learning from our accumulated wisdom

A common strategy is to make the wealth sacred. Nature is sacred to traditional societies as it gives sustenance to the people. Kings ruled in the name of deities, and the royal treasuries were in the temple, protected by the deity. Some indigenous people deny the morality of private property rights.

Another strategy is the idea of the “rope of mankind³⁵”, creating a moral link across generations. The primary objective is the perpetuation of mankind. We worship our ancestors for bequeathing life, nature and society to us, and we hope that our future generations will venerate us in their turn. Or think favourably of us when they write their history of us. For that, surely we must achieve at least intergenerational equity (maintaining the capital stock) and ideally leave a bequest (accumulating capital). And of course have future generations to venerate us.

³³ Hence the calls for the incremental employment to be local

³⁴ Hence the calls for minerals to be processed or refined locally

³⁵ <http://maori.com/whakapapa/whakapap2.htm>

Open issues

We would be the first to concede that there are open elements in our benchmark that need further analysis. These include:

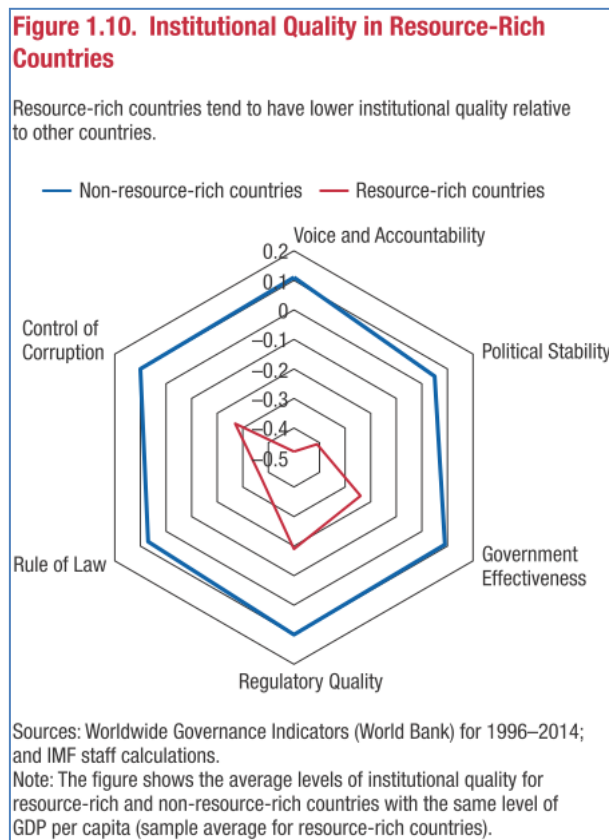
- 1) How to avoid situations like Kazakhstan where the wealth effect (increased consumption due to feeling wealthy) lead to a debt boom which lead to a bank bailout funded by raiding the Future Generations fund?
- 2) How should the Intergenerational Equity principle be applied to (a) the opportunity to earn income from mining and the real options of (b) when to extract, (c) how to use the mineral?
- 3) When and to what extent should we convert our minerals to other forms of capital? Presumably, part of this decision will involve portfolio theory (how much of the wealth to retain as minerals, given that it has different risk characteristics from financial wealth).
- 4) We posit that any theft from the 3-stage cycle creates incentives which tend to worsen the situation. The GF Benchmark seems to be a knife-edge equilibrium, any deviation leading to failure. How do we strengthen the system? Can we help it self-correct? What can we learn from behavioural economics, Ostrom’s principles, evolutionary economics, game theory, etc.?

There are many other open questions, and we would be happy to work with the IMF in developing a research programme to study them.

Benchmark vs active fiscal policies

The global experience is relatively short. Yet when we examine the numerous paths taken by countries which start with good intentions and eventually fall prey to the resource curse,³⁶ it seems that any deviation is corrosive (a knife-edge equilibrium). Losses upfront encourage corruption. Diversion from the fund or dividend is easy money to the government that encourages corruption and brings volatility to the government finances along with it.

In theory, governments with good institutions may exceed our benchmark through alternative fiscal paths in limited circumstances. However, good institutions are rare in resource-curse-stricken countries. The accompanying Figure 1.10 is from IMF’s Oct 2015 Fiscal Monitor.



³⁶ For example, Nauru, Alaska, Chad, Kazakhstan

Action sought from the IMF

At a minimum, alternative fiscal paths must be compared ex-ante with our program as a default. Ex-post analysis must be mandatory. The IMF could take the following steps:

1. Incorporate Loss Rates into the FARI model
2. Develop a model for the full fiscal cycle of converting minerals into other non-wasting assets of at least equal value and earning a real return in excess.
3. With estimates of loss rates (WB mineral depletion series – mineral receipts), savings rates (IMF) and returns on public expenditure (IMF), it should be possible to estimate how alternative fiscal paths have performed, and are likely to perform. Comparison with our benchmark program would be even more illuminating. This could be added to the IMF Natural Resource Fiscal Transparency Code.
4. IMF should consider creating a global asset management entity that can manage SWFs for smaller nations. They could provide an expropriation guarantee as well. Mineral receipts can be directly deposited into the fund, and commons dividends can be paid out as well.³⁷

Conclusion

Is changing accounting standards sufficient to stop the resource curse? No. Will changing accounting standards plus a shared inheritance metaphor solve the resource curse? No, but we hope it will lessen the severity of the curse. The changes will help see the problem clearly, and give better data for finding solutions.

Will the GF benchmark in addition be sufficient to solve the resource curse? No, risks like those witnessed in Kazakhstan still exist. There are likely other ways thieves will find to get their hands on this great wealth. We will need to be eternally vigilant.

However, we believe that the combination of the three will be a very significant improvement on the current management of minerals. Political change will occur as government budgets do not benefit directly from extraction. Commodity price volatility, which currently afflicts Venezuela, Alaska, Saudi Arabia, among many, would be tempered. Coupled with the commons dividend, corruption would likely be reduced. Commoners in resource rich economies are likely to be better off. And perhaps future generations may remember us for stopping the squandering of their inheritance.

³⁷ This could be adapted for Leif Wenar's Clean Hands Trust proposed as part of the [Clean Trade system](#)

Annex 1: Statistics & Accounting

Mineral accounting in the Government Finance Statistics Manual (GFSM) 2014

The treatment of natural resources in the [GFSM 2014](#) explicitly follows that from the SNA 2008. Rent is defined in 5.122, and would seem to include mineral receipts. Paras 5.124, read with 8.54, A4.19 and 10.52 indicate that when minerals are used to extinction, it should be treated as a sale of assets. Para A5.35

The GFSM Appendix 4 Some Cross-Cutting Issues discusses Resource Leases (A4.16) as well as Licences and Permits to use a Natural Resource. Mineral and energy resources are discussed in A4.35, and require recording mineral rents as rent and the asset depletion in the Other Changes in Assets Account. The footnote refers the rationale back to 17.343 of the SNA 2008. **Note that capital is converted into revenue!**

"A4.35 Mineral and energy resources differ from land, timber, and fish in that, although they also constitute a natural resource, they cannot be used sustainably. All extraction necessarily reduces the amount of the resource available for the future. This consideration necessitates a different set of recommendations for how transactions relating to their use should be recorded.

- *When a unit, such as government, owning a mineral or energy resource cedes all rights over it to another unit, this constitutes the sale of the resource classified as mineral and energy resources (3142). Like land, mineral resources can be owned only by resident units; if necessary, a notional resident unit must be established to preserve this convention.*
- *When a unit extracts a mineral or energy resource under an agreement where the payments made each year are dependent on the amount extracted, the payments (sometimes described as royalties) are recorded as rent (1415 or 2814). The depletion of the resource itself is recorded as other changes in the volume of assets.*

Footnote: The reasons for recommending the simple recording of payments each year from the extractor to the owner as rent and changes in the size and value of the resource as other changes in the volume of assets of the legal owner are given in the 2008 SNA, paragraph 17.343.

Development of mineral accounting in the System of National Accounts (SNA) 2008

The [analysis of Spectrum in 2000](#) forms the basis of natural resource accounting in the SNA. This was issued as a clarification for SNA 1993, and then incorporated into [SNA 2008](#). Underlining ours.

"Four options were considered for the treatment of the purchase of the licence:

- (i) payment of taxes*
- (ii) purchase of services*
- (iii) payment of rent*

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(iv) the purchase of an asset.

Treatment as taxes was ruled out because the payments for licences are neither compulsory nor unrequited; indeed there is fierce competition to make the payment. The purchase of a service was also ruled out because the payments made are clearly out of all proportion to the costs to government of making the spectrum available to the licensee. By elimination, therefore, the licensee is acquiring access to an asset. The asset could be either rented by the owner or sold to the licensee. The first question was the nature of the asset involved because the radio spectrum is not explicitly included in the 1993 SNA classification of assets. The ISWGNA considered it fits best into the category of tangible non-produced assets, which are described as covering "mainly land and subsoil assets" (paragraph 7.87). In addition, the right to use the spectrum could be treated as a new asset separate from the spectrum itself. This asset, the licence in a narrow sense, is a legal construct and thus would be classified with other legal constructs as an intangible non-produced asset. The choice between options (iii) and (iv) above is thus between the rent of the spectrum (option (iii)) and the creation and purchase/sale of the licence as an asset in its own right (option (iv)). Payments for the licence can consist of (1) an upfront payment, (2) regular payments at specified intervals, or (3) a combination of these two.

The means of payment does not directly affect the classification as rent or purchase of an asset. The ISWGNA considered that the licence should be regarded as the acquisition of an asset if it is issued for a term of more than one year; if the licence is for one year or less, then it does not represent an asset and the payments should be recorded as rent.

The ISWGNA reviewed this decision on 21 September 2000 at its regular bi-annual meeting in the light of papers being presented at the OECD meeting of national accounts experts in the following week. The ISWGNA considered that no new arguments were being advanced and thus the decision taken at the June meeting should remain its collective view. Also it considers there is no need to formally change the 1993 SNA specifically to handle this case though some clarification of the issues may be helpful.

Extracts from the SNA 2008 (bold in original, underline ours)

The key paragraphs on accounting for minerals are 7.109, 13.50 & 17.343. The SNA 2008 Research Agenda includes Leases to use or exploit natural resources (Annex 4 E 2, paras A4.48-A4.51) due to inconsistent treatment of different natural resources.

7.109 Rent is the income receivable by the owner of a natural resource (the lessor or landlord) for putting the natural resource at the disposal of another institutional unit (a lessee or tenant) for use of the natural resource in production. The terms under which rent on a natural resource is payable are expressed in a resource lease. A resource lease is an agreement whereby the legal owner of a natural resource that the SNA treats as having an infinite life makes it available to a lessee in return for a regular payment recorded as property income and described as rent. A resource lease may apply to any natural resource recognized as an asset in the SNA. For resources such as land it is assumed that, at the end of the resource lease, the land is returned to the legal owner in the same state as when the lease started. For resources such as subsoil assets, though the resources potentially have an infinite life, they are not all returned to the legal owner at the

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end of the lease since the purpose of the lease is to permit extraction and disposal of the resource. Although the resource may suffer depletion in excess of any new discoveries or re-evaluations (or natural replenishments for renewable resources) the fact that rent is shown without deduction for any consumption of natural resources means that, in the SNA, the resource is effectively treated as having an infinite life as far as income generation is concerned.

This is obviously problematic for minerals, as the para itself indicates.

13.50 It is frequently the case that the enterprise extracting a resource is different from the owner of the resource. In many countries, for example, oil resources are the property of the state. However, it is the extractor who determines how fast the resource will be depleted and since the resource is not renewable on a human time-scale, it appears as if there has been a change of economic ownership to the extractor even if this is not the legal position. Nor is it necessarily the case that the extractor will have the right to extract until the resource is exhausted. Because there is no wholly satisfactory way in which to show the value of the asset split between the legal owner and the extractor, the whole of the resource is shown on the balance sheet of the legal owner and the payments by the extractor to the owner shown as rent. (This is therefore an extension of the concept of a resource rent applied in this case to a depletable asset.)

There is a valid issue with splitting the value of the asset. However, it is not clear why this requires the payments to be shown as rent. The [UN SNA 2008](#), Ch 17: Cross-cutting and other special issues, Q Licences and permits to use a natural resource, para 17.343 says (underlining ours):

17.343 The owner (in many but not all circumstances government) does not have a productive activity associated with the extraction and yet the wealth represented by the resource declines as extraction takes place. In effect, the wealth is being liquidated with the rent payments covering both a return to the asset and compensation for the decline in wealth. Although the decline in wealth is caused by the extractor, even if the resource were shown on the balance sheet of the extractor, the rundown in wealth would not be reflected in the extractor's production account because it is a non-produced asset and thus not subject to consumption of fixed capital. (The SEEA 2003 describes a form of satellite account where such a deduction from national income can be made for minerals as well as for other natural resources used unsustainably.) For these reasons, simple recording of payments each year from the extractor to the owner as rent and changes in the size and value of the resource as other changes in the asset accounts of the legal owner is recommended.

It is not clear to us how there is a return on an asset where mineral leases are concerned.

Annex 2: Other issues raised

The future will be richer, technological progress, PIH

A frequent argument is that technological progress @ [0.5%] per annum is likely, and hence the future will be richer, and therefore we may consume from our capital today. If we assume our species will last for millions of years, this is at best a conjecture as it ignores volatility in the path.

We only have to look at nations such as Nauru and Iraq to see that the future is not always richer. Surely they would have been better following the GF Benchmark. It is of no comfort to people of these nations that the world as an aggregate has become richer. Empirically, the World Bank found resource dependent countries were becoming poorer.

The future will be richer conjecture also assumes that there are no large scale set-backs to technological progress. The dark ages are a recent example of large parts of the world being poorer than their ancestors were. Colonisation made many parts of the world poorer, even technologically.

We should also note that there are wildly diverging forecasts for future growth. Here are 4 examples (a) singularity, when growth becomes exponential, (b) 0.5% technological progress, (c) those alarmed by climate change, expecting widespread disruption (negative growth), and (d) the doomsday clock, that is currently the closest ever to midnight. It is not apparent why 0.5% is a superior long term forecast. Is it simple anchoring?

Even if we accept the future will be richer, and the present can therefore consume capital, then logically we should be continuously dis-saving across the entire economy, so that we equalise consumption over time. The dis-saving recommendation is at odds with the general recommendation for economies to boost savings rates and thereby growth rates. If growth & bequests are objectives, consuming capital is clearly its anti-thesis.

From a utilitarian perspective, since the market rate of return is likely to be higher than the social discount rate³⁸, the GF Benchmark has positive utility. Consumption would have negative utility.

These objections also apply to fiscal paths based on the Permanent Income Hypothesis (PIH), which argues that with a discovery, people feel richer, and since extraction takes time, it is better to consume some of the capital initially in order to balance out consumption over time.

Reservation prices and when to sell

People alive today inherited the minerals because no previous generation extracted them. If the present generation extracts the minerals, no future generation can do so. An analogy may help. Imagine a person running a marathon, and has a bar of chocolate that can provide an energy boost. When in the race does this person consume the bar of chocolate?

³⁸ [How should Benefits and Costs be discounted in an Intergenerational Context? Views of an Expert Panel](#) by Arrow, et al., *Resources for the Future Discussion Paper No. 12-53 (2013)*

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Now consider a relay race of marathons, and the previous generation has handed the present generation the bar of chocolate. Does the present consume it, or does it hand it on for the millions of following generations to manage? The present generation must be sure that it can implement, in real life, a path that will make the commons whole again, and earn income over that for the risk and trouble. Future generations must not be cheated.

Technically, this is a decision of the optimal time to exercise a real option to sell the minerals. Commodity price volatility and the long time to expiration make it valuable. Extraction exercises the option.³⁹ Different assets have different risks. Part of the decision should include portfolio diversification.

We hypothesize that in this perspective, owners of minerals would be less disposed to sell their inheritance, and are likely to require a reservation price on their minerals. While an ad-valorem royalty also effectively sets a reservation price linked to the cost of extraction of the mineral, there is no guaranteed minimum amount. If costs reduce, the minimum royalty can reduce as lower prices can be economic for the extractor.

We note that a producer cartel for a fossil fuel reservation price would have impacts similar to a consumer carbon tax. Happily, it would extend to other unsustainable uses such as for plastics and fertilizer. The IMF should explore this possibility.

Government Take

Questions were raised why we critique "Government Take" as a flawed metric & prefer "Loss Rates". We are drawing on the detailed critique in [Catastrophic Failure of Public Trust in Mining: Case Study of Goa](#).

If we are earning revenues, maximising revenues is the logical objective. While setting tax rates, the optimal taxation level is the objective. When selling an asset, we seek to avoid a loss, i.e., get the full value. Government Take is designed to maximising revenues for governments, in keeping with the revenue metaphor. We argue Loss Rate is more appropriate for selling assets such as minerals.

Government Take is inferior as (a) it doesn't have an ex-ante target, while the target Loss Rate is 0%, and (b) Government Take rates are not comparable across projects (e.g., which mine should we start, which auction / contracting structure should we use), while Loss Rates are.

In order to calculate Loss Rates from Government take, we need the desired rates of return by the investors of capital. There could be errors in estimating the desired rates of return, but they can be estimated.⁴⁰ Financial investors and researchers do it all the time. The FARI model itself has numerous other inputs with probably similar estimation issues.

³⁹ It is possible to extract the mineral and stock pile it in anticipation of commodity booms. This separates the exercise of the option to extract (consume the chocolate) and the option to use the mineral (create products).

⁴⁰ Weighted Average Cost of Capital (WACC) is a frequently used metric.

Our calculations of Loss Rates

A related objection is to our calculation of loss rates in Goa, India.⁴¹ Only 5% of the economic rent has been captured by the owner, the state of Goa. This is clearly a loss of 95%, for which Goans should hold the Goa government accountable.

If we include the capture by the national government of 35%, the loss rate is still an unacceptable 60%. However, this is misleading. We are conflating the consideration received by the state government for the minerals it has sold, and the recovery by the national government as a taxation authority. The fiscal transfers from the national government to Goa state are not linked to the amount of taxes collected from Goa. Consequently, from the standpoint of the property rights of the owners, it is a loss of 95% of the value. Redistribution cannot be ignored or brushed away.

Thought experiment: would you sell gold jewellery to purchase a mutual fund, if the government imposed a 35% tax at the point of sale? Most likely, you would opt to keep the gold as is, awaiting a more favourable tax regime. Goa is selling its family gold. Its objective must be to receive and save 100% of the value of the mineral. This may require financial structuring to avoid the taxes, or it may require keeping the minerals in the ground.

⁴¹ The detailed critique is in [Catastrophic Failure of Public Trust in Mining: Case Study of Goa](#).