Natural resources, capital accumulation and the resource curse☆

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ABSTRACT

Early concern by economists for the effect of natural capital on economic growth gave way to complacency and neglect during the nineteenth century. Evidence has emerged, however, that since the 1960s the economic performance of low-income countries has been inversely related to their natural resource wealth. This relationship is not a deterministic one so policy counts. SEEA can help improve the policy and performance of resource-abundant low-income countries by reinforcing the rationale for the sound management of natural resources and also by providing an index of policy sustainability in the form of the net saving rate. This policy index, along with other measures such as a capital fund for sterilizing the rent, initiatives to increase the transparency of rent flows and the rigorous evaluation of alternative uses of additional public sector revenue can improve the efficiency by which natural resource rent is transformed into alternative forms of capital to sustain rising social welfare. Chad and Mauritania provide case studies to illustrate how SEEA and net saving can be used to diagnose policy failure and improve economic performance.

1. The neglect of natural resources in models of economic growth

Although classical economists voiced concern in the early-nineteenth century that natural resources, notably land, might constitute a limit to per capita GDP growth, the profession has tended to regard natural resources as generally less important to economic growth than capital and labor. By the close of that century most believed that society could overcome the Malthusian population trap and the law of diminishing returns, so that sustained economic growth seemed likely, if not assured. Mainstream economists came to believe that increased capital and technological progress would prevent natural resources from ever constraining global economic growth.

Natural resources therefore played little role in the growth models that were formulated in the mid-twentieth century, like the Cobb–Douglas and the Harrod–Domar models. The neo-classical model dominated mainstream economic growth theory from the mid-1950s to mid-1980s and is attributed to Solow (1957). In its most basic form, the model specifies that output is a function of capital and labor, constrained by the prevailing level of technology. The model shows that capital accumulation can raise the rate of economic growth over the medium-term (i.e. 50–100 years) but that long-term growth is limited by the rate of growth of the labor force, assuming that the production function exhibits diminishing returns to capital; output has constant returns to scale and technological change is absent (Snowden and Vane, 1997).

Two common criticisms of the neo-classical model are, first that a large part of the observed differences in the rate of economic growth are unexplained by the contributions of capital and labor. For example, the World Bank (1993) study of the East Asian economies found that capital and labor explain

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barely one-third of the growth differential between the economies of East Asia and those in Latin America. The large unexplained residual is attributed to total factor productivity (TFP), which is believed to be profoundly important. Second, the predicted convergence in the productivity of economies across the globe has not materialized and some observers detect continuing significant divergence (Pritchett, 1997), at least when the data are analyzed by country rather than aggregate population.

More recently, a third criticism has emerged, namely that variations in a country's endowment of two additional forms of capital, natural capital (Sachs and Warner, 1995) and social capital (Acemoglu et al., 2002), play a significant role in differentiating economic performance. This paper focuses on how natural capital and SEEA can strengthen growth theory and refine development policy. It begins by measuring the contribution of natural capital to growth and then reviews three policy instruments to improve that contribution before evaluating the policy applications in two newly emerging oil producing economies.

2. Measuring the relative importance of natural capital

The emergence of environmental accounting tended initially to reinforce mainstream economic thinking on natural resources. For example, Pearce et al. (1996) argue that if governments correct market failure then the apparent paradox of achieving sustainable development from finite resources can be realized. It requires the current generation to pass on to future generations either the same total stock of capital or a larger stock, by substituting produced and human capital for the diminishing natural capital. Many economists also remain skeptical of claims about the long-term risks from global warming. They oppose policies like the Kyoto Protocol that set targets for emissions abatement without considering the welfare losses of such policies compared with incremental market-driven adjustments (Manne, 2004).

Despite such concern for the efficiency of resource use, most of the literature on growth models neglects differences in the efficiency of investment among national economies. Yet there is emerging evidence that in recent decades the efficiency of capital accumulation in developing countries has been inversely related to the reliance on natural resources. This reflects the so-called 'resource curse', which has seen the median per capita income of the resource-rich developing countries slip below that of the resource-poor countries whereas a generation earlier, in 1960, it was 50% higher (Auty, 2001, 5). Both the nature and the timing of this reversal imply that the resource curse is not a deterministic phenomenon, but rather that it may be policy-related. Indeed, economic theory suggests that the larger natural resource rent of the resource-rich countries relative to GDP ought to benefit their economic growth. This is because the natural resource rent can be viewed as a gift from Nature that can be taxed away by an effective government without depressing producer incentives. Rent that is taxed away and deployed efficiently can sustain both a higher rate of investment and a higher flow of imports of capital goods with which to build the infrastructure of a modern economy compared with a resource-poor (low-rent) country at a similar level of development (Auty and Mikesell, 1998).

Table 1 – Per capita wealth, by major global region 2000

Region	Total wealth ($ per capita)	Natural capital (%)	Produced assets (%)	Intangible capital (%)
OECD	439,063	2	17	80
Latin America + Caribbean	67,955	12	16	72
Europe and Central Asia	40,209	27	31	42
Middle East + N. Africa	22,186	36	20	44
East Asia Pacific	11,958	21	27	52
Sub-Saharan Africa	10,730	24	13	63
South Asia	6906	25	16	59
World	90,210	5	18	77

Source: World Bank (2006a,b), 26.

The current framework for national income accounts does not provide the information necessary to monitor either the value of natural capital, or its transformation into other forms of capital. Recent improvements in the SEEA (UN et al., 2003) are therefore timely for measuring the contribution of rent to economic growth. Under the 'capital approach to sustainable development', the SEEA defines methods for valuation of mineral reserves, resource rent and the cost of depletion (see article by R. Smith in this journal issue). From this information the SEEA provides macro-economic indicators of sustainable development, notably Adjusted Net Savings, which adjusts National Savings for depletion of natural capital and indicates whether the depletion of minerals is compensated for by investments in other forms of capital (see next section for further discussion and also World Bank (2005)).

Relatively few countries have implemented the SEEA asset accounting framework so far, but the World Bank (2006a) has provided rough estimates of total wealth for nearly 120 countries. Table 1 summarizes World Bank data for 2000 that calculate the relative contributions of produced capital, natural capital and intangible capital to the stock of wealth of the principal regional groups of countries. The estimates of natural assets and produced assets are based upon net present value calculations while intangible capital is a residual including human, social and institutional capital. Although the estimates are broad-brush they furnish a standardized index for comparison. Table 1 shows that as the per capita stock of assets rises, natural capital tends to contribute relatively less to the stock of wealth. The Middle East along with Europe and Central Asia are anomalies, however, because the large hydrocarbon reserves of some countries in these regions boost the contribution of natural capital to the stock of wealth-generating assets.

Rent may also be used to compare natural capital endowments. Table 2 uses a World Bank database to measure natural resource rent relative to GDP. It draws from a larger study (Auty, 2001) that compares the growth performance during 1960–1997 of six categories of developing country, classified according to their natural resource endowment. The

Table 2 – Share of rent in GDP 1994 and GDP growth 1985–1997, by natural resource endowment

Resource endowment	PCGDP growth 1985–97 (%/year)	Total rent (% GDP)	Pasture and cropland rent (% GDP)	Mineral rent (% GDP)
Resource-poor[1,2]				
Large	4.7	10.5	7.3	3.2
Small	2.4	9.9	5.4	4.5
Resource-rich				
Large	1.9	12.8	5.8	6.0
Small, non-mineral	0.9	15.4	12.9	2.5
Small, hard mineral	−0.4	17.5	9.6	7.9
Small, oil exporter	−0.7	21.2	2.2	19.0
All countries		15.1	8.8	6.3

Source: derived from World Bank (2005). Note: comprehensive data on rents available for 1994 only.
[1]Resource-poor = 1970 cropland/head < 0.3 ha.
[2]Large = 1970 GDP > $7 billion.

classification first distinguishes resource-rich countries from the resource-poor countries on the basis of their per capita cropland endowment in 1970. A further distinction is made on the basis of country size, using GDP to measure size rather than land area. This is because GDP affords a measure of the market potential for industrial diversification: the larger the GDP the greater the potential agglomeration and localization economies and the higher the potential for industrial diversification (Corsetti et al., 2005). The classification assigns the majority of developing countries to the small resource-abundant category, which is therefore further subdivided to distinguish the crop-driven economies from the mineral economies. The latter group is split into ore-exporters and oil-exporters on the basis of mining's share of exports. Table 2 compares for the resulting six-country classification the relative scale of the rent in 1994 with PCGDP growth during 1985–1997, following a period of heightened commodity price volatility. It shows an inverse relationship between natural resource rent and PCGDP growth.

This inverse relationship was not always the case. Table 3 compares the six sets of countries during three time periods in terms of their rates of growth in GDP, population, PCGDP and investment and also their levels of investment efficiency. The three time periods cover: the second half of the 'Golden Age' of post-war economic development from 1960 to 1973; the period of heightened commodity price volatility during 1974–1984, when many resource-rich countries experienced a growth collapse; and finally the years between the oil price crash of 1985 and the Asian financial crisis in 1997. The data show that GDP expanded quite strongly during the 1960–1973 period in all six categories of developing country and since population growth rates were similar, the principal cause of the different rates of GDP growth is the rate of investment. The average rate of investment was 18% of GDP, but slightly higher for the oil-exporters and large resource-rich countries and slightly lower for the small crop-driven economies. The latter category, along with the small resource-poor countries, deployed capital the most efficiently during this time period, whereas the ore-exporters were least efficient.

During the years of heightened price volatility, 1974–1985, the rate of PCGDP growth slowed in all but the large resource-poor countries where a sharp rise in the rate of capital investment caused it to accelerate. The small oil-exporters also sustained a rate of PCGDP growth that was high relative to the two other categories of small resource-rich country. Finally, during 1985–1997 PCGDP growth remained low or turned negative in all three small resource-rich country groups as they struggled to recover from growth collapses. This slower growth is not so much due to lower investment as to a combination of disappointing capital efficiency (notably in the oil-rich countries) and rates of population growth that remained high, whereas population growth rates decelerated in the more dynamic economies. Among the resource-rich countries, the growth recovery proceeded fastest in the larger countries, thanks to their more diversified economies. However, both sets of resource-poor country coped with the price shocks and their aftermath more effectively than any of the four resource-rich groups: their decelerating population growth helped lift the investment share of GDP and combined with high investment efficiency to sustain rapid *PCGDP* growth.

Differences in the size and deployment of the natural resource rent help to explain the divergence in development performance. Two stylized facts models of resource-driven development, the low-rent competitive industrialization model and the high-rent staple trap model, capture the basic reasons for the observed differences (Auty, 2006). They show that low rent tends to encourage governments to promote wealth creation (so they can boost their revenue by taxing the higher output) by providing public goods and maintaining incentives for efficient investment. In consequence the interests of the government and of the broader population are more closely aligned than is often the case in resource-rich countries. In addition, the low-rent development trajectory encourages early competitive industrialization, which is labor-intensive and also entails earlier urbanization. This process triggers a virtuous economic cycle that fosters rapid capital accumulation, efficient investment and high GDP growth rates that can double PCGNI within a decade or less. There is also a virtuous social cycle because the early rapid expansion of manufacturing quickly eliminates surplus rural labor to promote a relatively egalitarian income distribution; while rapid PCGDP growth strengthens three key sanctions against anti-social governance to foster democratization that is incremental and endogenous (Auty, 2006). Moreover, the competitive industrialization trajectory associated with low-rent countries yields high net saving rates, indicating strong sustainability (Hamilton, 2001).

The corollary is that high natural resource rent relative to GDP can have two adverse effects on the political economy. First, high rent deflects the incentives of governments away from the efficient creation of wealth and into rent re-distribution, which confers greater and more immediate political rewards. Second, the development trajectory of resource-rich countries prolongs reliance on commodity exports and fails to absorb surplus labor so that income inequality widens. Rent-rich governments frequently respond by using rent to provide

Table 3 – Investment, GDP growth and investment efficiency, six natural resource endowment categories 1960–1997

Resource endowment category	Investment (% GDP)	GDP growth (%/year)	ICOR	PC GDP growth (%/year)	Population growth (%/year)	Number of countries
	(1)	(2)	(3)	(4)	(5)	(6)
Small non-mineral resource-rich						
1960–73	14.8	4.2	3.5	1.6	2.6	24[a]
1973–85	20.5	3.4	6.9	0.7	2.7	29[b]
1985–97	21.9	3.5	6.0	0.9	2.6	27[c]
Small oil-exporting resource-rich						
1960–73	24.5	6.6	3.7	4.0	2.6	8[d]
1973–85	31.0	6.5	5.7	2.3	4.2	8[d]
1985–97	23.9	1.9	12.4	– 0.7	2.6	8[d]
Small ore-exporting resource-rich						
1960–73	17.5	4.9	5.7	2.2	2.7	10[e]
1973–85	21.8	3.0	7.3	0.1	2.9	10[e]
1985–97	17.1	2.3	7.5	– 0.4	2.6	10[e]
Large resource-rich						
1960–73	20.3	5.4	4.0	2.7	2.7	8[f]
1973–85	21.8	3.1	7.1	0.7	2.4	10
1985–97	20.1	4.0	5.0	1.9	2.1	10
Small resource-poor						
1960–73	18.8	6.1	3.2	3.5	2.6	8[g]
1973–85	24.8	4.0	6.2	1.8	2.2	8[h]
1985–97	23.0	4.4	5.2	2.4	2.0	8[h]
Large resource-poor						
1960–73	17.7	5.0	4.2	2.4	2.6	7
1973–85	25.5	5.8	4.4	3.7	2.1	7
1985–97	26.3	6.0	4.4	4.7	1.3	7

Note 1. Countries classified as in Table 2, but due to data deficiency it *excludes*:
a) Ethiopia, Gambia, Morocco, Panama, Swaziland, Tunisia, Uganda.
b) Ethiopia and Uganda.
c) Ethiopia, Guyana, Nicaragua, Panama, Uganda.
d) Kuwait.
e) Bolivia, Liberia, Namibia, Peru, Sierra Leone, Suriname.
f) India and Turkey.
g) Haiti, Jordan, Somalia, Taiwan, Tanzania.
h) Jordan, Somalia, Taiwan, Tanzania.
Note 2. Data points are missing for some years for some countries, but they tend to average out so that this does not inject an intolerable bias. Some discrepancy also arises from the use of constant 1995 US dollars because the more the inflation rate the greater the degree of the uncertainty that is added. Although there are large differences between countries in the starting level numbers, the trends within groups remain similar when these differences are allowed for with reduced samples or country-specific fixed effects. The comparative analysis in this table between the different points and a fixed effects continuous growth regression both yield similar results for the growth differences between resource endowment categories. Overall, therefore, the figures lack some precision, but the magnitude of the changes in the growth rates is large enough to be robust in the face of the statistical discrepancies.
Source: World Bank (1998).

jobs by over-expanding the civil service and protecting 'infant' industry that rarely matures. The resulting development trajectory tends to accumulate all forms of capital, whether produced (Auty and Kiiski, 2001), human (Birdsall et al., 2001) or social (Woolcock et al., 2001), more slowly than that of the resource-poor countries. This is especially so for the small resource-rich countries, which face a high risk of becoming locked into a staple trap of increasing dependence on a primary export with declining viability. Such economies are acutely vulnerable to external shocks that trigger growth collapses from which recovery is protracted because the dynamic of the staple trap causes all forms of capital to run down. But the resource curse is not an inevitable outcome of resource-abundance: the success of mineral-rich Botswana, Chile, Indonesia and Malaysia shows that policy counts.

3. Policy implications from SEEA for mineral-rich countries

Indonesia is a notable exception to the resource curse as a country that sustained rapid GDP growth and falling poverty for more than three decades. Its development strategy, like that of Malaysia exhibits three positive characteristics, namely (i) the priority accorded to sound macro-economic management (Hill, 1996); (ii) control (but by no means

Table 4 – Changing export structure, Indonesia and Malaysia 1970–2000 (% total exports)

	1970	1980	1990	2000
Indonesia				
Agricultural raw materials	34.8	14.1	5.0	3.6
Food	19.6	7.7	11.2	8.9
Fuel	32.8	79.8	44.0	25.4
Manufacturing	1.2	2.3	35.5	57.1
Other	11.6	3.9	4.3	5.0
Share of exports in GDP (%)	13.5	29.0	25.3	42.9
Malaysia				
Agricultural raw materials	50.0	31.0	13.8	2.6
Food	12.6	15.0	11.7	5.5
Fuel	7.3	24.7	18.3	9.6
Manufacturing	6.5	18.8	53.8	80.4
Other	23.6	10.5	3.2	1.9
Share of exports in GDP (%)	41.4	56.7	74.5	124.4

Sources: World Bank (2005).

elimination) of rent-seeking activity (Auty, 1990; Macintyre, 2000) and (iii) an explicit concern to raise the welfare of the rural poor, mainly by expanding rural infrastructure and diffusing green revolution techniques to drive labor-intensive agricultural growth (Timmer, 2004). The combined effect in both Indonesia and Malaysia was to limit the Dutch disease effects. This facilitated a smooth transition through the 1980s and 1990s from resource-driven growth to manufacturing-driven growth (Table 4), evading the staple trap and associated growth collapses of many resource-rich countries.

The achievement of these positive features (prudent macro-economic policy, constraining wealth-damaging rent-seeking and channeling resources to enable less prosperous citizens to participate in competitive activity) is facilitated by adopting three institutions. First, a capital fund smoothes the absorption of rent into the economy at a rate that matches domestic absorptive capacity. This helps to stabilize the economy and maintain a competitive real exchange rate. Second, espousal of the Extractive Industries Transparency Initiative (EITI), along with increasingly competitive markets, shrinks scope for the rent-seeking activity that represses broad-based wealth creation. Third, a public sector investment evaluation unit can objectively compare the prospective returns to alternative applications of the rent such as offshore investments, domestic capital formation (including human capital and rural infrastructure) and social safety nets to cushion the vulnerable against the hardship of economic restructuring.

SEEA reinforces the rationale for establishing all three of these institutions. A guiding principal in exploiting finite resources is to invest sufficient rent to replace the wealth-generating capacity of the depleting mineral asset so future generations can enjoy the same income stream in perpetuity as the present generation draws from mineral extraction. Net saving provides an index to inform such policy. It measures gross saving plus the net increase in human capital, minus the depreciation of produced and natural capital. Positive net saving connotes net wealth creation and implies that the development trajectory is sustainable. Many mineral economies exhibit negative indices, often substantial, indicating that their growth is depleting the aggregate capital stock and is therefore not sustainable. Policy changes are therefore required, including the establishment of a capital fund, constraints on rent seeking and more efficient rent allocation.

The capital fund is based in the central bank and ideally, in line with SEEA receives that fraction of the revenue identified as the rent. The remaining revenue accrues to the Finance Ministry as 'normal' taxation. In practice, various rules of thumb are adopted, which typically allocate part of the revenue above a cautious estimate of the 'normal' world price to the capital fund. In this way the rent, or more often a sizeable fraction of it, is isolated so that its role as a form of capital rather than a source of recurrent expenditure is identified. Moreover, the central bank can hold the rent offshore to accumulate in interest-bearing assets until such time as domestic absorptive capacity has been expanded to allow its efficient application within the domestic economy. Over-rapid domestic absorption is inflationary and risks triggering Dutch disease effects that weaken the future growth potential of the economy. By sterilizing the rent, the capital fund helps to competitively diversify the economy so that the staple trap is avoided.

The utility of capital development funds has been challenged, however, by a group of researchers at the IMF (Davis et al., 2001). The criticisms are that (i) such funds 'can be' poorly integrated with the budget and so lose control of public spending; (ii) they encourage off-budget spending that undermines fiscal integrity; (iii) they complicate coordination between fund management and budget management; and (iv) they tend to function with even less transparency than the government budget and thereby increase the likelihood of the political deployment of the revenues. In fact, these problems are all associated with poorly designed funds and are not inherent in the system. Moreover, an earlier IMF study (IMF, 1998) shows that even a well-managed country like Norway benefited from the establishment of its Social Provident Fund (SPF) in 1990. Prior to that, the real costs of Norwegian producers rose 15–40% more than the costs of their competitors during 1973–1985; manufacturing output and exports stagnated (so that primary products accounted for 80% of Norwegian exports compared with only 20% for Sweden and Finland); public sector employment rose by 70% during 1970–1991 and social transfers jumped to 17% of GDP by the early-1990s when they absorbed the bulk of government oil rent. Finally, when oil prices fell, Norway experienced a recession that lasted through 1986–93. A capital development fund improves macro-economic management and SEEA informs the pro-fund case.

The adoption of codes of practice such as the Extractive Industries Transparency Initiative (EITI) helps to constrain the scope for growth-repressing rent-seeking, which high levels of natural resource rent (and also aid, which may be conceived as geopolitical rent) tend to attract. By using SEEA to measure the potential rent (defined as the surplus revenue after meeting all the costs incurred by an efficient producer, including a risk-related return on investment), it becomes possible to monitor the deployment not only of the fraction of rent that is captured by governments through taxation, but also the leakage of rent to: companies via excess profits; unionized workers that exploit the high fixed investment of mines to maintain a

Table 5 – Index of institutional quality 2004, oil-rich countries and some comparators

Country	PCGDP (US$PPP 2004)	Voice+ accountability	Political stability	Effective governance	Regulation burden	Rule of law	Graft	Overall index
Oil-rich								
Nigeria	1113	−0.65	−1.48	−1.02	−1.26	−1.44	−1.11	−6.96
Angola	2308	−1.02	−0.95	−1.14	−1.40	−1.33	−1.12	−6.96
Azerbaijan	3390	−0.97	−1.52	−0.81	−0.57	−0.85	−1.04	−5.76
Indonesia	3485	−0.44	−1.38	−0.36	−0.68	−0.91	−0.90	−4.67
Venezuela	4750	−0.46	−1.10	−0.96	−1.24	−1.10	−0.94	−5.80
Algeria	5930	−0.91	−1.42	−0.46	−0.93	−0.73	−0.49	−4.94
Kazakhstan	6280	−1.21	−0.11	−0.63	−0.89	−0.98	−1.10	−4.92
Trinidad+Tobago	10,360	0.49	0.04	0.47	0.61	0.17	0.02	1.80
Saudi Arabia	13,230	−1.63	−0.60	−0.06	−0.34	0.20	0.15	−2.27
Comparators								
Malawi	632	−0.50	−0.33	−0.81	−0.57	−0.29	−0.83	−3.33
Chad	1337	−1.09	−1.20	−1.29	−0.84	−1.15	−1.14	−6.71
Mauritania	2241	−1.16	0.26	−0.22	0.04	−0.62	0.02	−1.68
Moroco	4253	−0.55	−0.23	0.03	0.26	0.05	0.02	−1.14
El Salvador	4894	0.26	0.25	−0.22	0.20	−0.34	−0.39	−0.24
Malaysia	8970	−0.36	0.38	0.99	0.44	0.52	0.29	2.26
Chile	9810	1.09	0.89	1.27	1.62	1.16	1.44	7.47

Source: World Bank (2006b).

worker aristocracy; and consumers through subsidized prices, of food and energy for example. The EBRD (2001, 81) provides for the hydrocarbon producing countries of the FSU, examples of revenue leakage that not atypically amount to tens of percent of GDP. At a global level, the typical scale of potential mineral rent relative to GDP (Table 1) confers substantial scope for undermining governance so that maladroit deployment of natural resource rent distorts the economy and dissipates wealth generating assets. For example, the high-rent oil-driven economies display significantly poorer governance (Table 5) than other countries at similar income levels.

The EITI seeks to limit the worst abuses of rent-seeking. Basically, it requires international accountants to identify the revenue transferred by the companies to the government to allow comparison with government accounts that show where it lodged the revenue (and how it was allocated). The reconciliation of the two sets of accounts is highly technical so a tripartite committee is formed, representing the oil companies, the government and civil society, to scrutinize the process. It is assumed that approval by the committee will satisfy the general public about the propriety of this part of the public finances. The EITI can be criticized on the grounds that it is voluntary and that it cannot prevent arbitrary political intervention if a government is so-minded, but it does increase revenue transparency and it also serves to inform public debate regarding the deployment of rent to secure broad-based and sustainable development.

Finally, the establishment of a public investment evaluation unit can accelerate capital accumulation by improving mineral rent deployment by comparing the projected rates of return to offshore assets with those for domestic applications such as human capital, economic infrastructure and directly productive activity. Without such information governments have shown themselves to favor large public sector investments that enhance scope for servicing patronage networks by padding construction contracts and providing employment to favored groups. Striking features of efforts to 'sow the oil' during the 1974–1978 and 1979–1981 oil booms were the high frequency of cost overruns and low investment efficiency that transformed many such investments into public sector revenue sinks instead of vehicles to competitively diversify the economy (Auty, 1990). These investments also tended to be capital-intensive, creating relatively little employment per unit of investment after the construction stage. Rather, the successful strategies of Indonesia and Malaysia suggest that most mineral economies would benefit by expanding more labor-intensive activity, provided it is competitive, because that allows the poorest to acquire assets and skills and so helps reduce poverty. The net section explores how SEEA can be applied to improve the management of capital assets in two newly emerging oil producers.

4. Potential policy applications: Chad and Mauritania

Chad and Mauritania are two low-income Sahelian countries embarking upon a phase of oil-driven growth with similar per capita endowments of oil reserves, similar-sized economies and expectations of oil revenues of similar proportions to their GDP. Mauritania, however, has less than half the population of Chad and its per capita income is correspondingly higher. The net saving rates (Table 6) indicate that Chad's economy suffers from a low capacity to save, especially during adverse weather, but its development trajectory is sustainable, albeit only just. In contrast, although Mauritania has a higher net national saving rate, its net saving rate indicates a markedly non-sustainable use of capital, primarily as a consequence of failing to compensate for the depletion of iron ore reserves.

Worse, Mauritania's economy already exhibits clear signs of Dutch disease effects. Its agricultural sector generates barely half the share of GDP expected (only 16%) for an economy with

Table 6 – Net saving indices, Chad and Mauritania 1990–2003 (% GNI)

Country (PCGNI US$PPP)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Chad ($1010)														
Consumption of fixed capital	5.7	5.7	5.7	5.2	4.8	7.1	7.2	7.1	7.1	6.9	6.8	7.0	7.2	8.3
Net national saving	5.9	−2.7	−2.8	2.2	7.8	−3.9	0.9	−1.0	−0.8	−12.5	−6.1	−1.8	1.2	3.7
Education expenditure	1.2	1.6	1.9	2.3	1.7	1.6	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Carbon damage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Energy depletion	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mineral depletion	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net forest loss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net saving$_1$	7.1	−1.1	−0.8	0.0	9.4	−2.4	2.3	0.4	0.6	−11.1	−4.7	−0.4	2.6	5.1
Mauritania ($1790)														
Consumption of fixed capital	6.3	7.2	7.2	6.8	6.8	8.4	8.4	8.4	8.2	8.1	7.5	7.7	6.8	7.4
Net national saving	11.6	5.4	3.0	−0.0	14.3	3.2	12.0	8.8	12.3	−4.6	9.1	5.9	9.9	1.3
Education expenditure	4.5	4.2	4.0	4.0	3.9	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Carbon damage	1.2	1.3	1.3	1.7	1.7	1.6	1.5	1.6	1.8	1.9	1.9	2.2	2.0	2.1
Energy depletion	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mineral depletion	21.5	22.2	16.3	17.6	13.3	17.5	19.2	20.4	22.2	20.2	19.9	19.6	17.4	18.8
Net forest loss	0.4	0.4	0.5	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8
Net saving$_1$	−7.0	−14.3	−11.1	−16.0	2.6	−12.8	−5.7	−10.1	−8.8	−23.8	−9.7	−13.1	−6.5	−16.7

Source: World Bank (2005). Note 1: Net savings excluding particulates damage cost (data not available).

its per capita income, while manufacturing with 8% of GDP is also under-developed and no bigger than that of Chad, a lower-income country. This may partly reflect the fact that Mauritania has since 1974 received a sustained and relatively high flow of aid equivalent to 25% of GNI annually (World Bank, 2005). This is double the level of aid secured by Chad and it has reduced the incentive for Mauritania to revive drought-stricken herding and farming. Consequently, Mauritania skipped an important early stage of development during which the socio-economic linkages from rising productivity in the rural sector drive economic growth and reduce poverty (Timmer, 2004). It is therefore ironic that the Mauritanian government cites the rural poverty caused by the country's past lop-sided development to justify rapid absorption of the oil rent. In fact, rapid absorption will exacerbate the Dutch disease effects and increase the dependence of the poor on finite rent transfers that are not sustainable.

In an attempt to achieve sound deployment of its oil revenues, Chad in 1999 established rules for the allocation of the government's share. One-tenth of the revenue flow is allocated to an offshore fund for the future to accumulate in value and provide a source of capital when the oil runs out. Of the remaining 90%, some 80% (71% of the total) is allocated to social expenditure in priority sectors that are identified as education, health, infrastructure, rural development, environment and water supplies. Some 15% (13.5% of the total) goes into the government budget, but from 2007 it too will be allocated expressly, in this case to poverty reduction. Finally, 5% (4.5% of the total) is assigned to the producing region in order to compensate for the additional social and environmental costs of the production complex and to help diversify the local economy when oil production ceases. Export levels were projected at 200,000 bpd during the early years of oil shipment through the mid-2000s. This level of output was initially projected to confer government revenue equivalent to 6% of non-oil GDP annually. The bulk of this modest rent stream was allocated to domestic capital accumulation by boosting public investment by half to 16% of non-oil GDP while current expenditure inched up to 11% of non-oil GDP.

However, even if it succeeds in its prime aim of limiting the theft of oil revenue, Chad's revenue allocation scheme may depress the overall efficiency of rent deployment because it is inflexible. Oil prices were several times higher than projected so over-rapid domestic absorption may occur unless a larger fraction of the revenue is saved abroad until it can be invested effectively within the national economy. Moreover, the allocation fragments the budget by establishing a parallel budget system. In 2004, for example, delays in revenue accruals to the Treasury prevented the government from meeting its debt repayments within the formal budget system while unused funds existed within the oil revenue system (IMF, 2005).

Mauritania can learn from the experience of Chad and other countries, given its unpropitious initial conditions, which in addition to diminished absorptive capacity (due to existing Dutch disease effects), include a dependent form of social capital and the deliberate and large-scale under-reporting of public expenditure by the government to the IMF. It should first, use SEEA to explicitly identify the oil rent within the sector revenue stream and sterilize it in an overseas capital fund. Second, the government should restrict increases in its already high current public expenditure to ensure that the non-oil budget deficit can be funded from the NPV of the oil assets. This will automatically shrink the deficit to maintain a sustainable level as the oil is depleted. Moreover, any extra current expenditure should be pro-poor, principally on health and education, which build human capital. Third, non-inflationary increases in public investment should, subject to confirmation by the investment evaluation unit, rehabilitate the neglected rural sector. This will promote not only poverty-alleviating labor-intensive growth that can quintuple the commercial value of rural output, but also further boost non-oil GDP by expanding scope for agro-processing and generating multipliers to domestically-

supplied rural manufactures and services. Finally, all three policy initiatives will be undermined without effective constraints on rent-seeking, as provided by increased domestic competition and the adoption of the EITI.

While sound rent management depends on many factors, the SEEA has an important role to play. Over the next few years the SEEA's methods for accounting for mineral resources will be raised from the (current) level of recommendations to that of statistical 'standards' to which, like the SNA for national income accounts, all countries are expected to comply. Internationally accepted standards for mineral accounting will make it easier and more acceptable for countries to implement, and make the monitoring of mineral revenues more transparent.

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