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# Natural resources, capital accumulation and the resource curse<sup>☆</sup>

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## ARTICLE INFO

### Article history:

Available online 17 October 2006

### Keywords:

Development  
Environmental accounting  
Natural resource rent  
Net saving index

## 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.

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## 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

<sup>☆</sup> The author gratefully acknowledges the helpful comments of the issue editor and an anonymous referee.

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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

**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.

infrastructure of a modern economy compared with a resource-poor (low-rent) country at a similar level of development (Auty and Mikesell, 1998).

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

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