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Overconsumption and Sustainable Development in Denmark and Globally

Anders Chr. Hansen

Roskilde University, Denmark

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Abstract

The present paper amplifies developments in genuine savings in the Danish economy, as an expression of whether national capital stocks are adapted in parallel with the reduction in oil and gas capital, or economic overconsumption is in evidence. It is concluded that Denmark, as other high-income nations, has not seen any lasting problems in terms of genuine savings over the last three decades. New analyses are introduced, presenting global patterns in genuine saving, and it turns out that a number of low-income nations have had a permanent economic overconsumption over one or more of the preceding decades. Thus, the major issue facing Denmark in terms of sustainable development is not a deterioration of the capital basis of our economy, but its conversion to an ecologically sustainable one. Another important issue is how high-income nations can contribute to ensuring the capital basis of developing nations.

Keywords: Sustainable development, genuine savings, capital adaptation, global inequality, Danmark.

Address for correspondence: anders@ruc.dk

Overconsumption and Sustainable Development in Denmark and Globally

By Anders Chr. Hansen, associate professor, Roskilde University, Denmark

This paper is an English translation of Anders Chr. Hansen: "Overforbrug og bæredygtig udvikling" in P. Andersen, J.B. Mortensen, and H.Ø. Nielsen (eds.):"Bæredygtighed, økonomi og velfærd". Det Strategiske Miljøforskningsprogram, 2001.

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Global sustainable development

During the 2002 World Summit on sustainable development in Johannesburg, each of the world's nations will present their national strategies on how they can each contribute towards creating a more sustainable global future. Denmark will present "Denmark's Strategy for a sustainable development. Development with forethought – a shared responsibility", adopted by the Danish government in June 2001.

The backdrop of the summit is the 1992 World Summit in Rio, during which participant nations agreed on some principles and a few first steps towards rendering the global development sustainable.

One chief problem in global development was envisaged already then – the projected doubling of the global population and a multiplying of economic activities over the 21st century. It goes without saying that if following the patterns of the 20th century, such a development could entail great environmental problems.

Another chief problem was that many developing countries had been caught in a state of poverty, from which – notwithstanding the independence they achieved in the 1950s and the 1960s, and the development aid provided in the 1970s and the 1980s – they were unable to extricate themselves. The Rio Declaration has as its ambitious goal to root out poverty on Planet Earth.

In the absence of a global regulatory body, each country will ensure, by their individual strategies, that these problems are both solved.

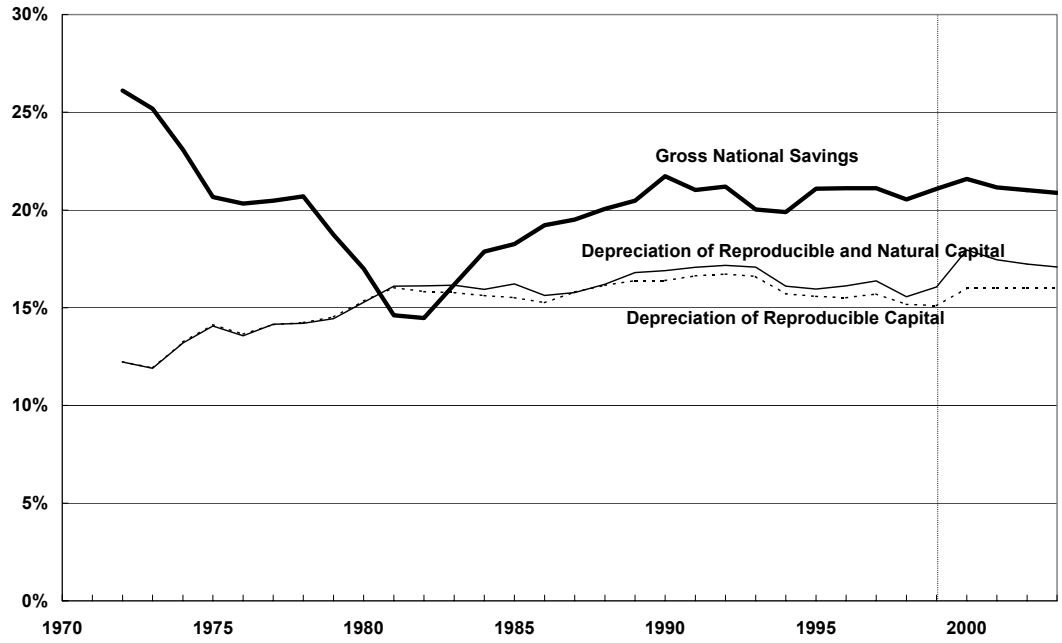
These national strategies encompass a number of different sub-strategies, which fall into two main categories. One is *conversion strategies*, the general idea of which is to convert production and consumption patterns into patterns resulting in environmental impacts that are often far below their present levels, even at a much greater production and consumption. In Denmark, this is done via national action plans for the environment.

Another category is the *capital adaptation strategy*, the essence of which is to adapt a country's stocks of produced assets (machinery, buildings, and plants) and financial capital (net receivables abroad) to outweigh the decrease in natural capital (e.g. oil and gas reserves). In many cases, however, deliberations only address the reduction of foreign debt.
Neither type of strategy is dispensable if the idea is to ensure that future generations will be able to share the assets constituted by natural resources. The capital adaptation strategy is needed because resources such as oil and gas only have a value when irreversibly consumed. The conversion strategy is needed because other resources have to be preserved at a certain level in order to maintain their specific values.
The economic aspects of both strategies are treated in-depth by Hansen (2000b). Yet, for reasons of space, we will only deal with the capital adaptation strategy in the following.

Capital adaptation in Denmark

Extractable reserves of fossil fuel have two significant macroeconomic functions. In part, they represent a capital that compares to a country's financial assets and real capital apparatus. In part, energy supply is an essential input to any economic activity. Therefore, some degree of self-sufficiency is often made part of a strategic goal for security of supply.
Per their *capital* properties, oil and gas are directly substitutable with less foreign debts, more foreign assets, or larger stocks of machinery, building, or infrastructure capital. Per their *supply source* properties, they can be substituted by oil and gas imports, or by other sources of energy. Per their *national energy source* properties, they can only be substituted with renewable energy sources (provided that nuclear power remains out of the question in Denmark).
Thus, it is their *capital* properties that let us use the genuine saving to determine if the other parts of our national capital are adapted sufficiently to make up for our consumption of natural capital and real capital.
A positive genuine saving implies that the national capital will grow – also when we set off the consumption of oil and gas reserves (hence *genuine*). If we wish to secure the living conditions of future generations, it would be appropriate to do so by providing them with a capital basis at least as good as the present one.
Thus, the size of our genuine saving can be used as an indicator showing if the consumption level is economically sustainable. If negative, it indicates *overconsumption*, meaning that the level of consumption cannot be upheld in the future, unless technology and other factors are able to make up for a smaller national capital.
Analyses of genuine saving in Denmark have been carried out by Hansen (1995, 1997c) and the Danish Economic Council (1998b). The findings of these analyses are unequivocally that genuine saving in Denmark has been positive over the latest decades. Still, Hansen (1995) points out that for a few years in the early 1980s the sustainable saving was negative. That did not happen because of gross overconsumption of natural capital, but as the result of negative net savings. These were the days when Danes were warned that our economy was heading towards an abyss.
Natural capital consumption in Denmark largely amounts to using the oil and gas reserves of the North Sea. Hansen (2000a) demonstrates that they can be accounted in several, and very different, ways – according to the desired balance between present-day and future consumption.

Figure 1. Depreciation (capital consumption) with and without natural capital as percentage of disposable gross national income in Denmark, 1972-2003.



Source: Hansen 2000b.

The genuine saving is simply the difference between gross saving and depreciation of real and natural capital. In other words, the saving beyond the annual "drawing" demand on the national capital.

The calculations show that although, at the turn of the century, Denmark's natural capital consumption was the greatest seen in the last decades, the core issues of sustainable development in Denmark do not lie with the accumulation of capital. The accumulated capital is more than sufficient to ensure that future consumption possibilities will be at least as great as today, even if no improvements in productivity take place.

Phrased differently, our future improvements in productivity can thus be used merely to ensure increased consumer welfare, social welfare, and conversion to sustainable production and consumption patterns. We do not need to use them for compensating for a fall in consumption possibilities resulting from natural capital use in previous years.

The oil and gas capital can be made up as the present value of the resource interest accrued until now, plus the present value of the projected resource interest accruing in the future. In the present analysis, the resource interest is made up as the production value of oil and gas, minus the cost of prospecting, development, extraction, and freight to port. The Danish Economic Council (1999) used a different approach, namely the sum of national tax revenues from North Sea activities and the profits of the foreign-based companies tax paid. As could be expected, the two methods produce largely identical results. The 1998 value of the aggregate resource interest extracted so far is, according to the Danish Economic Council DKK 45.3 billion, and according to the present analysis DKK 46.1 billion.

To calculate the natural capital consumption in the figure, a zero discount rate has been applied. In other words, the future value of saving up oil revenues of DKK 1 million is exactly DKK 1 million. Obviously, this is hardly realistic, and a number of alternative assumptions are discussed in Hansen (2000a). However, since all imply a *lower* capital consumption than shown in the figure, there would be no point in showing them. They merely

serve to corroborate the conclusion that Denmark's natural capital has very little bearing upon her future consumption possibilities. That does not imply that oil and gas incomes are not greatly significant, especially in the form of foreign exchange incomes. Still, the industriousness and skill of the labour force remains all-important.

Moreover, a number of experiments have been carried out on integrating environmental assets in the concept of natural capital. Thus, e.g. Daly and Cobb (1989), The World Bank (1998) and the Danish Economic Council (1998) have tried to make calculations of genuine savings using a broader definition, in which consumption of natural capital also included the cost of pollution caused by the consumption of oil, gas, and coal.

However, these extended versions typically presuppose that a marginal environmental impact will lead to marginal environmental damage. Hence, they are not suited for analysing environmental issues where this is not the case. What is more, the economic values produced by different research teams, using different – although equally recognized – methods are miles apart. This makes the uncertainty related to the figures so great that they hardly lend themselves as the basis of advice on strategic decisions.

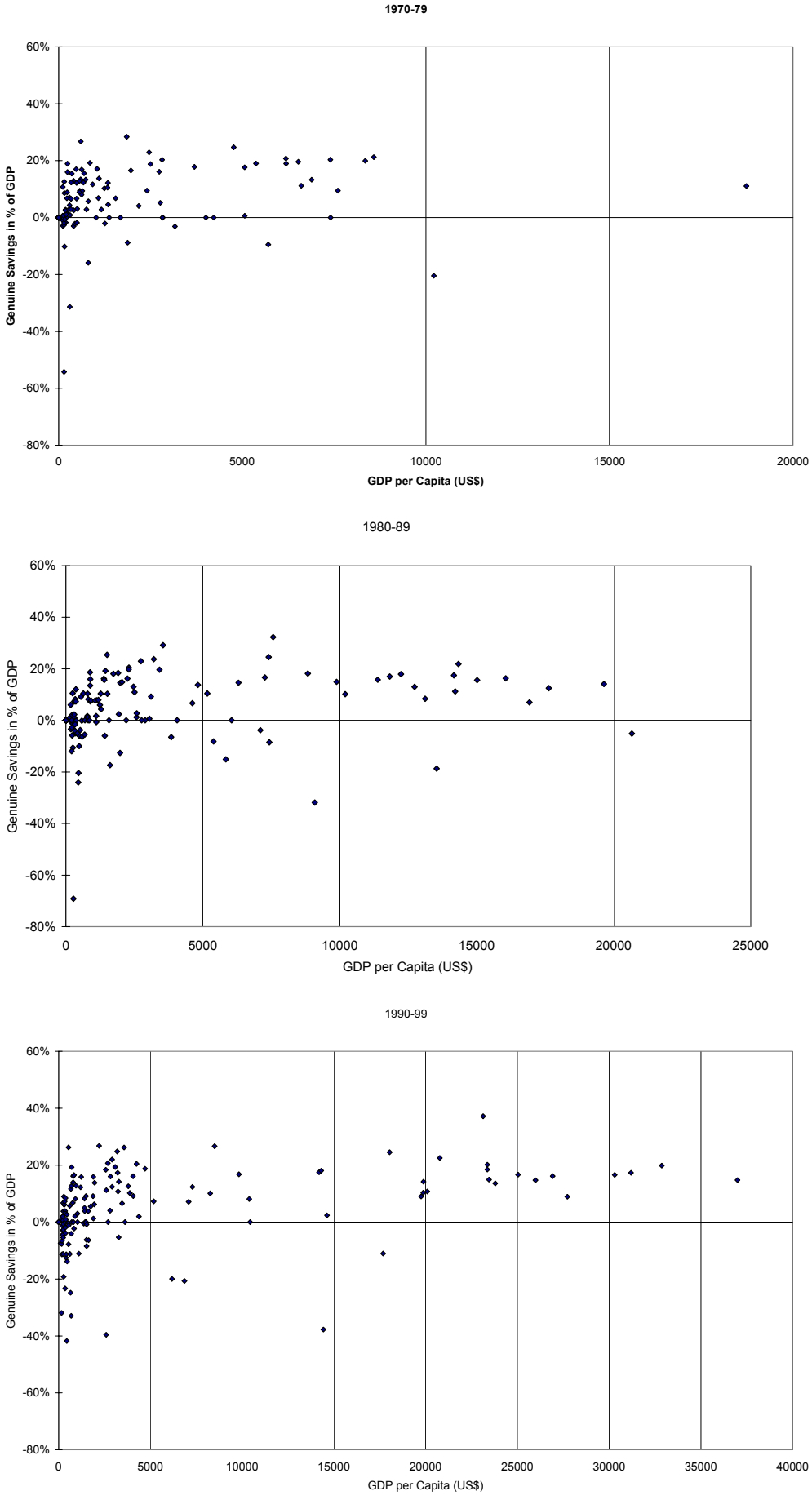
Capital adaptation in the rest of the world

In the 1980s and 1990s, a number of pilot studies on natural capital consumption were carried out in selected countries. (For an overview, comp. e.g. Pearce and Atkinson 1995). However, the applied methods were rather different, thus making direct comparison difficult. But now comprehensive statistical material, prepared by The World Bank (1998), is available, showing the consumption of real and natural capital in 140 countries. The natural capital consumption comprises available statistics on the value of extraction of oil and a great number of other mineral resources, and the net consumption of timber reserves. Natural capital consumption is defined as the aggregate resource interest (and is thus a high-end estimate, comp. Hansen 2000a):

Resource interest = world market price – extraction costs – other on-site costs – transport to port – normal capital returns (Hamilton and Clemens 1998).

When trying to identify patterns of capital adaptation it is relevant to compare average genuine savings rate with average income (i.e. average over the decade and per capita). This has been done in the below figure, for each of the 140 countries in the database of The World Bank, and separately for the 1970s, the 1980s, and the 1990s.

Figure 2. Average genuine savings rate according to average incomes in 130 countries, in the 1970s, 1980s, and 1990s.



Source: The Genuine Savings Database of The World Bank and own calculations.

In high-income countries – which for all three decades typically included western industrial nations (OECD countries), some oil countries, and Israel – per capita average incomes were at nearly USD 10,000 in the 1990s. In the 1980s, the limit was at around USD 6,000 and in the 1970s some below USD 3,000.

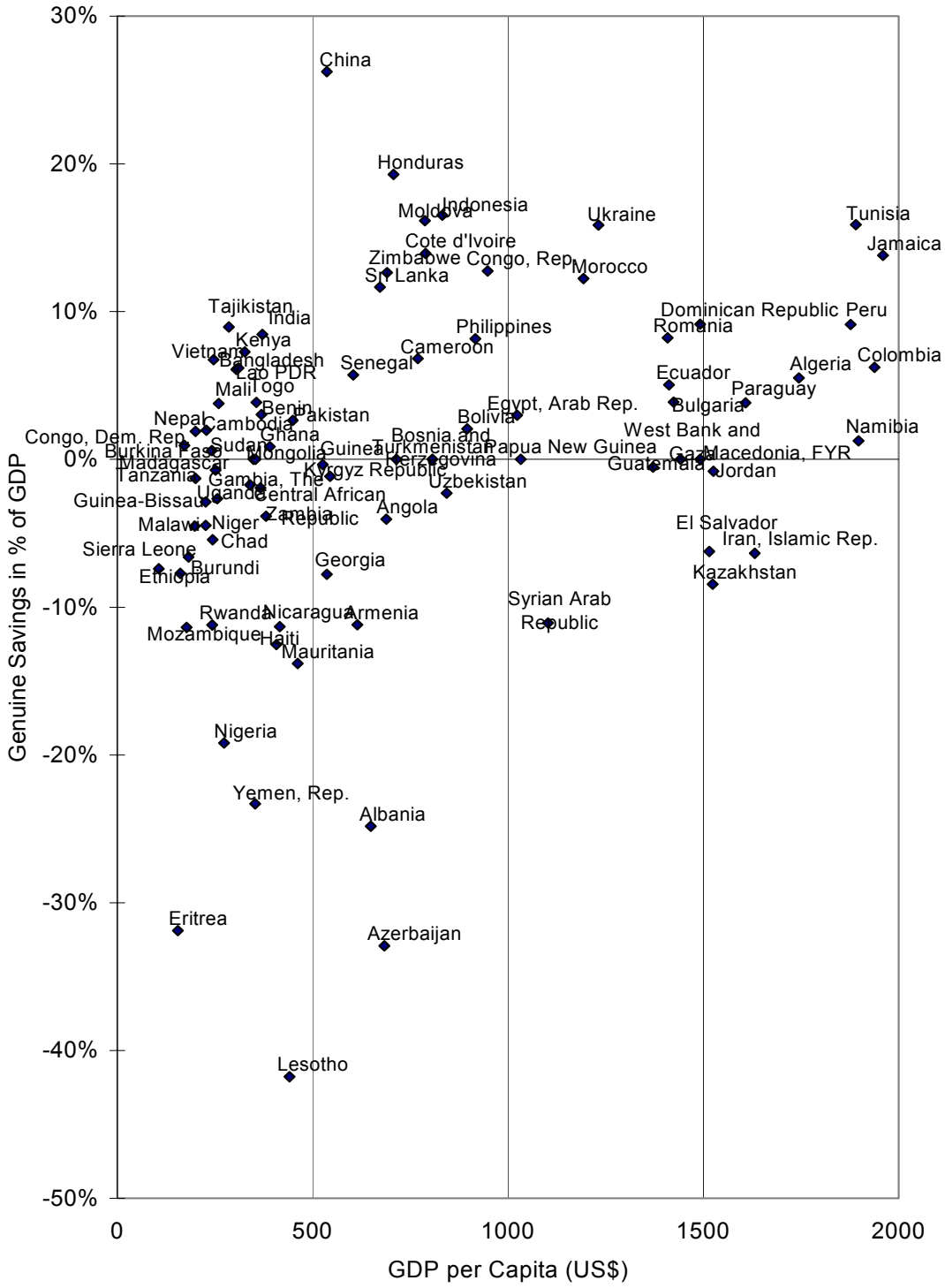
The figures show a rather consistent pattern in the development of the world's national capital in high-income countries and low-income countries respectively. Generally, the rich countries have no problems with their genuine savings. Figures are positive for each of the three decades, and thus the national capitals of the rich countries are climbing steadily over time. They did *not* have an overconsumption in the sense that they have been spending at the cost of future consumption possibilities.

With a few exceptions, namely Saudi Arabia, Kuwait, Oman, The United Emirates, and Israel such overconsumption is – paradoxically – only seen in the poorest countries. The world's poor have an overconsumption, and not the rich.

This pattern of rich countries with a steadily rising national capital and poor countries with a shrinking national capital can hardly be considered sustainable. Still the pattern appears to be ominously stable, and nothing seems to indicate that development aid over the three decades was able to break the pattern.

The following figure is a close-up of the pattern of the 1990s, showing the countries with the lowest average incomes.

Figure 3. Genuine saving rates and average incomes in the 1990s for the world's poorest countries.



Note: The incomes scale corresponds to the one used in Figure 2. In order to improve comparability average incomes can be adjusted using the atlas method of The World Bank. However, the resulting pattern does not differ significantly.
Source: The Genuine Savings Database of The World Bank and own calculations.

Figure 3 shows that countries to have a negative saving in the 1990s were in the main African states. In addition, they include two Arab countries, three

Central American, one European, and some southern Caucasian countries that became independent in the 1990s.

It is hard to glimpse a general feature explaining why precisely these countries had negative genuine savings. Many also did in the preceding decades. In some cases, it would be obvious pointing to protracted civil wars as the cause, in others to the collapse of economic and political institutions, and in still others to downright economic mismanagement. The only general conclusion to be drawn is that low per capita income and great economic dependency on resource extraction appear to be a risky combination.

These patterns in savings and genuine savings let us conclude that the problem of natural capital consumption with respect to the welfare of future generations is more than anything a serious problem facing low-income countries. The problems of rich countries in terms of sustainable development do not lie with the extent of their savings. Of course keeping an eye on the savings rate is also important to the richer countries, but still they are not facing a threat of declining consumption possibilities due to low savings. Instead, for many countries, the problem lies with the declining labour force in proportion to the population.

For developing countries, the problem of lacking savings is a real one. Implications are that once oil and other mineral reserves are depleted, the population's average standard of living will go down from a level that is already too low, unless technological advances can outweigh the pressure of both population growth and a shrinking resource basis.

The fact that there is a concurrent degradation or direct eradication of irreplaceable environmental assets does nothing to change the fact that the impact of resource consumption on the future standard of living is a separate problem that a national strategy for a sustainable development must take heed of. In that context, analyses of genuine saving could provide an invaluable basis of information.

In many countries the national capital would also have shrunk, even leaving out the consumption of natural capital. As a result, several of the poorest countries have accumulated foreign debts they will never be able to repay. Against that background, the international organizations The World Bank and The International Monetary Fund are now working on a debt relief scheme.

In that context integrating natural capital consumption into ordinary national accounting concepts, as mentioned above, could prove to hold great promise. In part because the debt burden of some countries could be underestimated, since no allowance has been made for the fact that the country's mineral or timber reserves have been greatly reduced in order to limit foreign debts. In part because the reinforcement of export efforts, to which those countries typically have to commit themselves in order to be granted debt relief, could prove to be a very short-term solution if overly reliant on the export of those reserves.

The critical issues of the Danish strategy

Thus the great challenge regarding a national sustainability strategy for Denmark's future development does not lie with capital adaptation, but with the conversion and in the role played by Denmark in terms of the capital build-up of developing countries.

Contrarily, for developing countries, the capital adaptation strategy is all-important, yet not the problem of those countries alone. Although, paradoxically, the poor countries are the ones to overspend, the solution would hardly be for them to spend less. Eliminating the overconsumption of

these countries would rather presuppose sizeable capital transfers, investments, and economic growth.

Much rather than having developing countries cut their raw material imports, the potentialities of bolstering capital adaptation in developing countries would lie with allowing them more access to the markets of the developed countries, and to export goods other than raw materials. Augmented, of course, by official development aid and debt relief. These targets are key elements of the global agreement that Denmark will work for in relation to the Johannesburg Summit.

This set of problems is generally underexposed in the national strategies of other high-income countries; however, it is hard to envisage a sustainable development in which rich countries grow richer, while (some) poor countries grow poorer. The solution to those fundamental skews in global economy is a hackneyed, yet the inevitable prerequisite to a sustainable development in the world.

References [English translation in brackets]:

Daly, HE, Cobb J(1989): *For the Common Good.*

Det Økonomiske Råd (1998b): *Dansk økonomi, efterår 1998.* [The Danish Economic Council: Danish Economy, Autumn 1998]

Hamilton, K and M Clemens (1998): *Genuine Savings Rates in Developing Countries.* The World Bank.

Hansen, AC (1995): Bæredygtig opsparing og dansk økonomi. In P. Lübcke (ed.)(1995): Miljøet Markedet og velfærdsstaten. [Hansen AC: Sustainable savings and Danish economy. In: Lübcke P (ed.) (1995): Environment, Market, and Welfare State]

Hansen, AC (1997c): Ægte opsparing - et operationelt bæredygtighedskriterium? Økonomi og Politik **70**(3):34-48. [Hansen AC (1997c): Genuine savings – an operational sustainability criterion? Economy and Politics **70**/3):34.48].

Hansen, AC (2000a): *Critical Assumptions in Estimation of Non-Renewable Resource Capital Consumption.* Research Paper, Department of Social Sciences, Roskilde University.

Hansen, AC (2000b): *Målsætninger i en national strategi for bæredygtig udvikling. Miljøøkonomisk analyse i et tværfagligt perspektiv.* I Hansen, A.C: Økonomisk analyse af bæredygtig udvikling. Upubliceret Ph.D.-afhandling. Institut for Samfundsvidenskab og Erhvervsøkonomi, Roskilde Universitetscenter. [Hansen AC (2000b): *Targets of a national strategy for sustainable development. Environmental economic analysis in an interdisciplinary perspective.* In: Hansen AC: Economic analysis of sustainable development. Unpublished PhD thesis. Department of Social Sciences, Roskilde University]

Miljø- og Energiministeriet (2001): Danmarks Strategi for bæredygtig udvikling. Udvikling med omtanke – fælles ansvar. Kan nedtages fra http://www.mst.dk/udgiv/publikationer/2001/87-7944-604-3/pdf/87-7944-572-1.pdf [The Danish Ministry of Environment and Energy (2001): Denmark's Strategy for a sustainable development. Development with forethought – shared responsibilities. Downloadable from http://www.mst.dk/udgiv/publikationer/2001/87-7944-604-3/pdf/87-7944-572-1.pdf]

Pearce, DW and GD Atkinson (1995): *Measuring Sustainable Development.* In: DW Bromley (red.): T*he Handbook of Environmental Economics,* Oxford: Blackwell.

The World Bank (1998): *Genuine Savings Database.* GenSav.xls.
Weizsäcker, Ev, AB Lovins and LH Lovins (1997): *Factor four: doubling wealth - halving resource use: the new report to the Club of Rome.* London: Earthscan.

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