ECONOMIC GROWTH AND SUSTAINABLE DEVELOPMENT

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Summary

So far, a “delinking” of economic growth from environmental burden has not taken place to the extent necessary for ecological sustainability. Hence, the delinking (or decoupling) of growth from environmental pressure is debated in the context of the so-called “Environmental Kuznets Curve” before we make some references to new developments in economic growth theory and in ecological economics. The political relevance of these debates stems from differences in the evaluation of possible technological trends, which might help to delink economic growth from environmental pressures, or not. In addition to technological potentials of decoupling, economic agents have opportunities to delink economic activities from individual well-being, which would enable human societies to increase their well-being without necessarily increasing environmental disruption. The final section makes some concluding remarks on how to bias economic development.

1. Introduction

"Limits to growth" was certainly *the* "buzzword" of the seventies in the discourse about environmental problems. The notion of "sustainable development", which resulted from this discourse, links environmental goals (the substantive reduction of environmental impact that endangers future potentials to satisfy human needs) to economic and social goals (especially economic growth and its distribution within and between societies). At the end of the twentieth century, "limits to growth" discussion turns out to be by no

means obsolete. Today, it is more the limited capacity of nature to buffer human interventions that endangers human development rather than the limited availability of resources. While in the eighties single problems and events were on the public agenda, such as the greenhouse effect, depletion of the ozone layer, the Chernobyl-accident and acid rain, the environmental debate has returned to a more general view of the core of the problems and the carrying capacity of ecological systems. So far, a delinking of economic growth from environmental burden has not taken place to the extent necessary for ecological sustainability. Therefore, humanity will have to come to grips with the growth issue if we are to achieve a development that is ecologically sustainable.

The globalization issue -- the keyword of the late 1990s -- is beyond the scope of this article, but it is of high relevance for both economic growth and sustainable development. This is of particular importance for the future possibilities of the developing countries. It is generally accepted that these countries need growth in order to develop. The World Commission on Environment and Development, however, argued in the "Brundtland Report" for what has been called an "engine-of-growth-thesis", i.e. that the North must grow in order to pull the economies of the South. This position ignores the fact that the "North" induces most of the global environmental impacts, which gives the issue a fundamentally global dimension. Hence, demands are raised in science, politics and society that the rich countries must start to reduce the ecological impacts of their economic activities in order to leave "environmental space" for the development of the South. This article is based on the notion that, due to their uneven global share in environmental use, rich industrialized countries have a special responsibility to reduce the environmental consequences of their economies. That is why the following investigations focus on rich countries.

We start the discussion with some references to the empirical debate on growth and the environment. Here, the “de-linking” of growth from environmental pressure is debated in the context of the so-called “Environmental Kuznets Curve” (section 2) before we make some references to new developments in economic growth theory and in ecological economics (section 3). The political relevance of these debates comes from differences in the evaluation of possible technological trends, which might help to de-link economic growth from environmental pressures, or not (section 4). In addition to technological potentials of delinking, economic agents have opportunities to delink economic activities from individual well-being, which would enable human societies to increase their well-being without necessarily increasing environmental disruption (section 5). The final section 6 makes some concluding remarks on how to bias economic development.

2. The Empirical Debate: Dematerialization, Growth and Structural/Technical Change

The empirical debate on the economy-ecology relationship is dominated by the so-called Environmental Kuznets Curve (EKC), i.e. the idea that environmental pressure increases with rising income and then, after a certain plateau, starts to decline. The idea is that "economies would pass through 'stages of development,' in which at least some aspects of environmental quality first deteriorate and then improve", as Selden/Song put it. Several empirical studies try to find evidence of the inverted U-hypothesis. The

results of a study by Jänicke/Münch/Binder show a delinking of resource intensity for industrial OECD countries. De Bruyn/Opschoor modify these results: Their analysis confirms the delinking-hypothesis for the years 1966-1984; for the period 1984 - 1990, however, they discover a *relinking* of resource use and economic growth for the most industrial countries. So far, the thesis of an empirically absolute delinking is doubtful, at least since the mid-80s.

If the EKC case holds, economic growth must be viewed as a positive long-run factor of environmental quality and not as a cause of unsustainability. Three things are important here: First, technological developments, substitution processes and changes in demand could indeed result in a reduced resource intensity of growth, especially in an open political system which is sensitive to public demands for environmental quality. Secondly, so far the EKC relationship has only been observed for certain substances. Thirdly, it could well be that the "turning point" of the EKC is on an income level much too high to be realized on a global level because the ecosystems would collapse before such a turning point is reached. As far as future developments are concerned, the EKC thesis gives no reason to be overly optimistic about an "automatic" delinking of economic activities and environmental pressures. Up to now, problems related to the use of indicators, to the question of explanatory variables other than income and the relevance of the models applied leave it an open question whether there is actually something like an EKC.

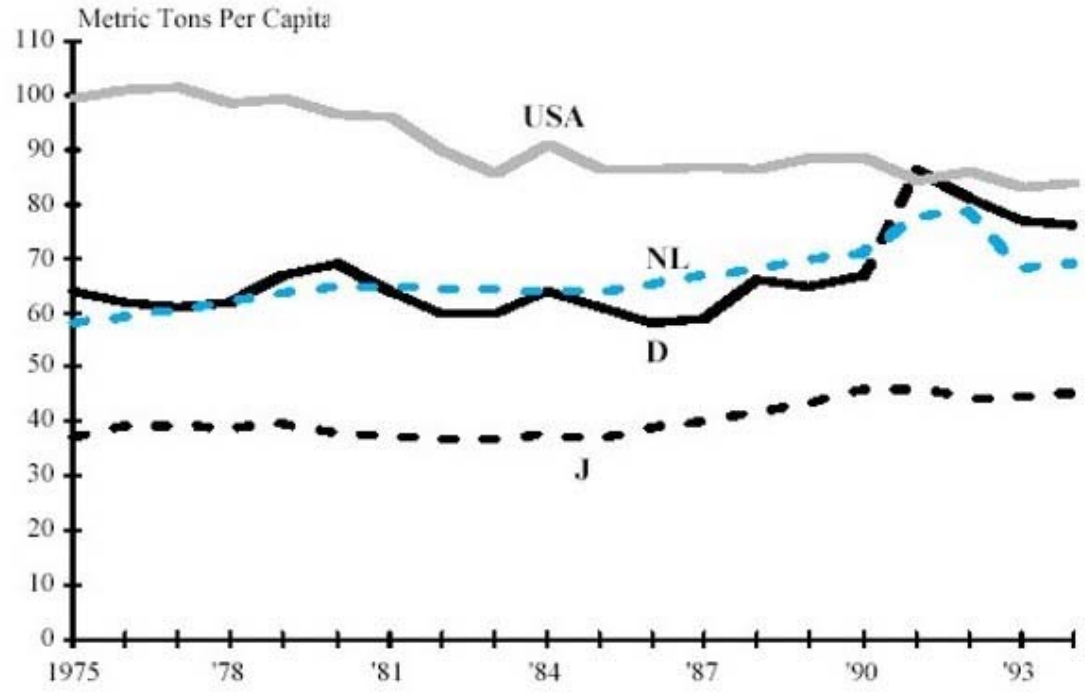

Figure 1: Total Material Requirement (TMR) for USA, Germany, Japan, Netherlands, 1975-1994
(Source: World Resources Institute and Wuppertal Institute)

Further information about the empirical relationship between growth and environmental degradation can be generated by a comprehensive indicator of environmental impact potential. Environmental policies over the last decades have largely shifted waste

emissions from one medium to another without reducing the overall burden. Adriaanse and others present time series which show the development of material flows activated by four industrialized countries (see figure 1). While the "total material requirement" (TMR) for the United States, Germany and the Netherlands have converged to about 70-80 tons annually per capita, the figures for Japan are considerably lower.

TMR includes not only the resources directly used in economic activities but also so-called hidden flows such as overburden in mining or drainage water in agriculture as well as all materials that are activated in foreign countries by imported goods which are used in a country under investigation. Therefore the magnitude of TMR would not change over time if:

- a shift of material-intensive production occurred from domestic production to imported goods and/or
- different materials were substituted for each other. At least within the paradigm of ecological economics, it is widely acknowledged that the physical scale of the economy is a central determining factor for ecological sustainability (see section 3 below). The material flow approach is a method that can operationalize this scale in a meaningful way.

The (West) German TMR, for example, grew by 55% between 1960 and 1990, four fifth of which were attributable to the first 15 years of that period of massive (re)construction of the German economy. After this, material flows activated by the German economy have remained largely constant, while economic activity grew by an average of 2.6 % p.a. This can be interpreted as a delinking of growth from economic activities, or (relative) dematerialization, which, however, cannot be attributed to conscious dematerialization policies. Investigating these developments in more detail, we can find counter-balancing effects. A study by Moll and colleagues at the Wuppertal Institute investigates the changes in level and structure of economic indicators and material throughput of the German economy between 1980 and 1990. While material flows (in terms of TMR) increased only by 0.8 % in that period, GDP grew by 25 %. A decomposition analysis shows that, *ceteris paribus*, this would have increased TMR by 13% while structural changes forced TMR to decrease (by 22 %).

Additionally, resource extraction technologies became more inefficient (which, again *ceteris paribus*, would have increased TMR by 8 %). These, together with some other (but minor) effects, resulted in keeping TMR in fact almost constant (+0.8%). In spite of this relative delinking of growth and TMR, a constant material flow implies a constant resource use and depletion of ecological systems.

These observations give the basis for demands that technical and structural changes of a growing economy must take a direction different from the past in order to contribute to sustainable development. There are several relevant linkages that can be de-linked, e.g. between the overall environmental impact of economic activities, the matter-energy-throughput of economies, Gross Domestic Product, services provided and well-being. Before we discuss possibilities for delinking in detail (see sections 4 and 5) we want to refer to some more theoretical considerations. We ask whether the economic growth theory can help us with identifying the effects of sustainable development on economic growth, and vice versa.

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Biographical Sketches

Friedrich Hinterberger, born 1959, economist. He studied at the Johannes Kepler Universität in Linz, Austria and received his doctorate at the Justus Liebig Universität Gießen

He is the founding President of SERI (Sustainable Europe Research Institute), has vast experience in the research of ecological economics, both in national and international projects. His domains include the economic aspects of material flows as well as the policy-oriented analysis of the Environment-Competitiveness inter-linkages. He worked as a Senior Economist and Officer in Charge of the Department Material Flows and Structural Change at the Wuppertal Institute for Climate, Environment and Energy, and has published on Environmental and Ecological Economics as well as on Social Policy. He is also a lecturer at various universities.

Fred Luks, born 1965, socio-economist. He studies at the Hamburg University of Economics and Politics (Germany) and the University of Hawaii at Manoa (Honolulu, USA). Research internships in Kuala Lumpur (Malaysia), at the New York University and at the University of California at Berkeley. Major research interests: sustainable development, methodological and historical aspects of ecological economics, growth and the environment. He is currently manager of an interdisciplinary research project on "Sustainable Development between Throughput and Symbolism" at the Hamburg University of Economics and Politics.

Marcus Stewen, born 1969, economist (Dipl. Volkswirt). He studied at the Johannes Gutenberg Universität in Mainz, Germany, as well as at the University of Glasgow; PhD in Economics. His research emphases are environmental economics, environmental policy, the economics of material flows and environment and distribution. He is currently working at the KfW (Kreditanstalt für Wiederaufbau) in the field of development economics and financial cooperation.