

Abstract

Danmarks grønne nationalprodukt

Foreword by the editor: From GNP to the Green GNP – Why and How?

Peter Birch Sørensen, professor, Department of Economics, University of Copenhagen, pbs@econ.ku.dk

The conventional measure of Gross Domestic Product (GDP) is often criticized for its failure to account for the environmental costs of economic activity and for the gains from investments in a better environment. The “Green GDP” – or more precisely the Green Net National Income (GNNI) – seeks to accommodate this criticism. This article explains the principles underlying the estimation of the GNNI. Just as the Net National Income (NNI) derived from GDP equals the sum of conventional consumption and conventional net saving, GNNI is the sum of the environmentally adjusted consumption and environmentally adjusted net saving. Adjusting consumption and investment for environmental factors such as the costs of pollution, climate change and biodiversity loss and accounting for the recreational services from nature requires use of various methods of valuing non-market environmental goods which are discussed in the paper.

The value of Danish Natural Resources

Ole Gravgård Pedersen, Senior Consultant, Statistics Denmark, ogp@dst.dk

Peter Birch Sørensen, Professor, Department of Economics, University of Copenhagen, pbs@econ.ku.dk

The article explains the method used to estimate the value of Danish natural resources for inclusion in Denmark’s Green Net National Income. At their peak in 2002, the value of the Danish

natural resources amounted to 360 billion DKK (2010 prices), but in 2021 their value had declined to about half that amount. The evolution has been dominated by the oil and gas reserves in the North Sea. The second largest contribution to the real value of natural resources comes from the Danish fish stock which declined from a value of 24 billion DKK in 1990 to 16 billion DKK in 2021. During the same period the real value of the biomass in Danish forests increased from 11 billion DKK to 17 billion DKK. Including the value of natural resources in the national accounts for the total Danish asset stock does not significantly change the trend in the evolution of total asset values.

Outdoor recreation in the Green Net National Product

Jette Bredahl Jacobsen, professor, Department of Food and Resource Economics, University of Copenhagen, jbj@ifro.ku.dk

Thomas Lundhede, Associate Professor, Department of Food and Resource Economics, University of Copenhagen, thlu@ifro.ku.dk

Lasse Læbo Matthiesen, post. Doc. Department of Economics, Copenhagen Business School, llm.eco@cbs.dk

Hans Skov-Petersen, professor, Institut for Geovidenskab og naturforvaltning, Københavns Universitet, hsp@ign.ku.dk

The paper explains how the value of outdoor recreation in Danish forests and open nature areas is calculated for use in the estimation of the Green Net National Income. Data from a survey in 2017 are used to conduct a multi-site travel cost study. Assuming stable preferences, a time series is created from observations of changes in the availa-

bility of recreational sites, as well as the numbers of site visits from studies in other years. Results show annual recreational values of 10-12 billion DKK, slightly increasing, and notably higher in 2020, when covid19 caused lock-down of the country in periods, and outdoor recreation became very popular. The value of investment in recreational areas has recently fluctuated around 4 billion DKK annually.

The Cost of Loss of Biodiversity in the Green Net National Income

Jette Bredahl Jacobsen, professor, Department of Food and Resource Economics, University of Copenhagen, jbj@ifro.ku.dk

Thomas Lundhede, Associate Professor, Department of Food and Resource Economics, University of Copenhagen, thlu@ifro.ku.dk

This paper describes how the loss of biodiversity is calculated in the Danish green net national income. Emphasis is on the non-use value of biodiversity, mainly to avoid double counting. The official red list indicator is used to calculate the loss of species over time. This is combined with results from a study of the general public's marginal willingness to pay for species conservation to estimate the cost of species loss. We estimate that the cost of the current threat to biodiversity constitutes a bit more than 60 billion DKK (2022 level) per year, while the cost of the annual species loss is almost 50 billion DKK. The cost of biodiversity loss is one of the biggest annual reductions in Denmark's natural capital.

Socio-economic costs of air pollution in Denmark

Mikael Skou Andersen, professor, Department of Environmental Science, University of Aarhus, msa@envs.aau.dk

Jørgen Brandt, professor, Department of Environmental Science, University of Aarhus, jbr@envs.aau.dk

Lise Marie Frohn, senior researcher, Department of Environmental Science, University of Aarhus, imf@envs.aau.dk

Air pollution is a burden to human health in terms of diseases and premature deaths, entailing socio-economic costs. The model system EVA (Economic Valuation of Air pollution) facilitates detailed estimations of such costs from individual sources and sectors contributing to air pollution, based on the 'impact-pathway' methodology. It combines our best knowledge of health burdens with economic valuation, underpinned by fine-meshed atmospheric models that can keep track of air pollution emissions. The methodology is presented, including considerations on how the value of a statistical life can be applied for such estimations. In addition, we provide estimates of the costs of air pollution to Denmark since 1990, as well as of current costs arising domestically and abroad from Denmark's emissions.

Costs of Water Pollution in Denmark

Thor Donsby Noe, Ph.D. student, Department of Economics and Business, Aarhus University, thor.noe@econ.au.dk

Jette Bredahl Jacobsen, professor, Institut for Fødevare- og Ressourceøkonomi, Københavns Universitet, jbj@ifro.ku.dk

Peter Birch Sørensen, professor, Økonomisk Institut, Københavns Universitet, pbs@econ.ku.dk

According to the EU Water Framework Directive, water bodies in EU member states must be kept in "good ecological status". Using key indicators of water quality, we trace the evolution of the share of Danish water bodies that did not live up to this requirement in the period 1990-2020. The costs of water pollution are measured as the Danish population's estimated willingness to pay to ensure that all Danish water bodies would have attained a good ecological status throughout the period. Although the physical water quality apparently improved since 1990, the willingness to pay to avoid water pollution has increased even more due to real income growth, so the estimated total annual costs of pollution of Danish groundwater and surface water rose from a little less than 9 billion DKK in 1990 to more than 12 billion DKK in 2020. The value of annual investments in

water quality improvements fluctuated substantially, largely due to natural variation.

The Costs of Greenhouse Gas Emissions Seen From A Danish Perspective

Peter Birch Sørensen, professor, Økonomisk Institut, Københavns Universitet, pbs@econ.ku.dk

Rasmus Kehlet Skjødt Berg, post.doc., Økonomisk Institut, Københavns Universitet, rasmus.kehlet.berg@econ.ku.dk

The article explains how we have estimated the future damage costs for Denmark of the ongoing global warming. Since the GNNI seeks to describe how changes in the Danish environment affects the welfare of the Danish population, we calculate the costs of global warming for Denmark as Denmark's estimated share of the global damage costs caused by global greenhouse gas emissions. The global damage costs are estimated using the average carbon price in a recent survey among international experts on carbon pricing, and Denmark's share of the global damage costs is assumed to equal Denmark's share of global GDP, since a large part of the damage costs will take the form of output losses. We find that Denmark's share of the global costs of global greenhouse gas emissions increased from roughly 1 percent of net national income (NNI) in 1990 to more than 3 percent of NNI in 2020.

The development in Denmark's green net national income, 1990-2020

Peter Birch Sørensen, professor, Department of Economics, University of Copenhagen, pbs@econ.ku.dk

Ole Gravgaard Pedersen, chief consultant, Statistics Denmark, ogp@dst.dk

Jette Bredahl Jacobsen, professor, Department of Food and Resource Economics, University of Copenhagen, jbj@ifro.ku.dk

Drawing on findings in the other papers in this special issue, we establish a time series for Denmark's Green Net National Income (GNNI). We do so by adjusting the conventional national ac-

counts measures of consumption and saving for various environmental costs of economic activity while adding the value of recreational services from nature. We find that the GNNI has evolved roughly in parallel with the conventional Net National Income (NNI) in the period 1990-2020, reflecting a rough constancy of net environmental costs. Towards the end of the period, NNI exceeded GNNI by about 10 percent, indicating that NNI significantly overstates Denmark's prosperity when the costs of pollution and of the depletion of natural capital are accounted for. The roughly constant level of real environmental costs suggests that Denmark has not experienced "green growth", since the growth in conventional national income has not been accompanied by a notable fall in environmental costs.

Beyond GDP? Development and implementation of alternatives to the GDP in Denmark and abroad

Jens Villiam Hoff, Professor Emeritus, Department of Political Science, University of Copenhagen, jh@ifs.ku.dk

Martin Møller Boje Rasmussen, Ph.D. and CEO, Danish Competitiveness Council, nomo@nordicmodelinstitute.com

The focus of this contribution is the critique of the traditional GDP, which with increased intensity has been voiced for the last 20-30 years, and alternative GDP indicators, which have been developed in the same period. Furthermore, the article looks at the barriers and opportunities for implementing "Beyond GDP" indicators in political and administrative decision-making in Denmark and abroad. It is concluded that what is needed to ensure the integration of one or more alternative GDP indicators in national political decision-making is not the development of (still) more alternative indicators, or a composite of these, but rather determined political and administrative "entrepreneurs" with capacity to make this happen.

Green GDP from an ecological economics perspective

Inge Røpke, *professor emeritus, Department of Sustainability and Planning, University of Aalborg, ir@plan.aau.dk*

The article presents a critical perspective on the green GDP based on ecological economics. The green GDP is promoted as an attempt to increase the awareness about environmental problems and to improve the basis for political decisions. However, the indicator is problematic because it is a monetary measure, and because it reflects a nationalistic perspective. Market prices do not provide a good foundation for decisions because they are based on inequality and skewed power relations. Neither does valuation of environmental goods in parallel with consumer goods contribute to clarity regarding the decisions that need to be made. Instead, a set of biophysical and social indicators that can encourage responsibility and justice is needed.

The Green GDP – Limitations and Opportunities

Jørgen Elmeskov, *former deputy chief economist in the OECD, former director general Statistics Denmark, former member of the Climate Council and the Climate Commission, jorgen.elmeskov@gmail.com*

The construction of a time series for Danish Green GDP is a breakthrough, which in due course can give greater prominence to environmental concerns in policy discussion and enhance prioritization among these concerns. It is argued that the main results of the analysis appear to be qualitatively intuitive but that, as is natural, there is scope for reconsidering and improving elements of the analysis. It is also argued that establishing an appropriate political process and institutional framework are important to give future calculation results the wished-for influence on policy discussions.

The Green GNP – A Useful Instrument for the Politicians?

Niels Fuglsang, *Ph.d., Member of the European Parliament, niels.fuglsang@europarl.europa.eu*

This article argues that the newly developed Green GDP can get a significant influence on the political decisions in Denmark. The article explains how the Green GDP may serve as a policy target for the economic policy and thereby promote an agenda for policy reforms, which differs from the labor supply agenda that has dominated Danish politics during the last decades. The article proceeds to provide some examples of how politicians use economic forecasts and calculations as weapons to advance their ideological agendas, and the article reflects on how we can expect politicians to also use the Green GDP in political power struggles. Finally, the article argues that for the Green GDP to wield influence is has to be incorporated in the Finance Ministry's set-up of economic models that is being used to assess new policy proposals.

Prime Minister Power has created Sloppy Ministerial Reshuffles

Tim Knudsen, *lic. adm. pol. et cand. mag., professor emeritus in political science, timk@privat.dk*

Danish prime ministers have for a long time enjoyed a growing freedom to allocate ministers from ministry to ministry. In the past, it was expected from ministers that they had some level of knowledge about their resorts. This is no longer the case. Especially on minor posts within the cabinet we have seen cavalcades of ministers, where each of them had held the position for too short a while essentially preventing them from acquiring a deeper knowledge about the affairs of their ministry. As a matter of fact, this leads to a hollowing out of political leadership and accountability. Therefore, Danish prime ministers should prepare the hiring and firing of ministers more carefully. They should also avoid poorly planned and impulsive reshuffles of the cabinet. The Danish parliament could also regularly organize hearings of incoming ministers about their

background and their intentions. That could be a preemptive measure with a view to avoiding careless appointments of unqualified ministers.

The Foreign Service and the Danish Municipalities – a relationship in development

Martin Marcussen, *professor, Department of Political Science, University of Copenhagen, mm@ifs.ku.dk*

The Danish municipalities are engaged in a broad variety of international activities. The majority of this work is carried out as an answer to an inter-

nal demand. It is the local business enterprises, educational institutions and sports clubs who in cooperation with the subnational public administrations define an appropriate level of “internationalization”. Occasionally, the Foreign Service is reaching out to the municipalities. This happens when there is a need for sending practitioners out in the field, most recently in relation to the Danish government’s engagement in the rebuilding of Ukraine. The municipalities are willing contributors to Danish foreign policy – in particular, if they are generously paid for their services.