

AN ECONOMIC THEORETICAL PERSPECTIVE ON GREEN AND SUSTAINABLE NATIONAL INCOME

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Summary

This contribution discusses several theoretical issues arising from the economics of green and sustainable national income accounting. A central question is under what conditions conventional national income can be modified so as to appropriately reflect green societal welfare, including environmental values, or the sustainability of an economy.

1. Introduction

Sustainable development is a widely accepted objective of economic policy making. In order to make decisions in accordance with this criterion there is great need for integrated indicators that provide a measure of sustainability in economic development. In the economic theoretical literature much attention has been given to the construction of such indicators related to national income accounting. In this article a survey will be given of this literature. Another objective is to report on the progress made in the practice of national income accounting.

Presently, many countries in the world experience a period of economic prosperity. Growth of domestic product in OECD countries, for example, amounts to more than 2% annually. Also other regions in the world show high growth rates of national income. However, it can be argued that these growth rates do not reflect the growth of well-being or welfare in the economies, for various reasons. In section 3 a number of

deficiencies of present national income accounting will be listed. In the sequel of this contribution emphasis will be put on those problems that are related to environmental issues and exhaustion of natural resources. In many developing countries welfare is to a large extent determined by the exploitation of renewable and non-renewable resources. The consequence of the exploitation of a non-renewable resource is that its stock decreases implying that less future income can be extracted. Hence, a high value of present national income goes at the expense of future national income. A similar phenomenon occurs in the case of renewable natural resources such as forests when the rate of exploitation exceeds the natural regeneration. Other examples relate to pollution. Suppose two countries have the same annual national income. If one of the countries produces in a much more polluting way than the other country, whereas they are similar in other respects, the first country enjoys less welfare, which, however, is not expressed in national income. So, national income does not always reflect social welfare. This type of considerations has been an impetus to develop the notion of green accounting, taking into account the depreciation of natural resources and pollution. The aim of these endeavors is to do justice to a broader welfare concept than is currently used. It has been put forward that green accounting can have an important impact on economic policy. Green accounting alters the objective of the policy maker: not just national income is the criterion for success of policy making but green national income which takes environmental aspects into account as well. In other words, growth of national income is only an appropriate indicator of economic success if it incorporates environmental aspects to a reasonable degree. Another current trend is to find an appropriate measure for sustainability. The data comprised now in the national accounts cannot be deemed to give insight in the long run into sustainable growth. It is sometimes argued that there are opportunities to correct conventional national income in order to achieve this goal.

Not only in economic theory attention has been paid to the questions raised here. Also attempts have been made to implement and actually calculate green and sustainable income. For example in the Netherlands, Norway and USA, considerable progress has been made in reorienting national income accounting. In this essay an overview is given of the present state of economic theory on the subject as well as a short survey of the practice of modifications in national income accounting.

The next section gives an introduction to the concept of national income. Section 3 deals with the welfare interpretation of national income. Sections 4 and 5 go into the theory of green and sustainable national income respectively, the difference being defined by the underlying welfare objective. Section 6 discusses statistical work in progress. The final section 7 concludes.

2. National income

The economy can be described as a system of flows of commodities and money. The French medical doctor François Quesnay was the first to represent this as a circular flow. In a simple economy with only consumers and firms it can be represented as in Figure 1.

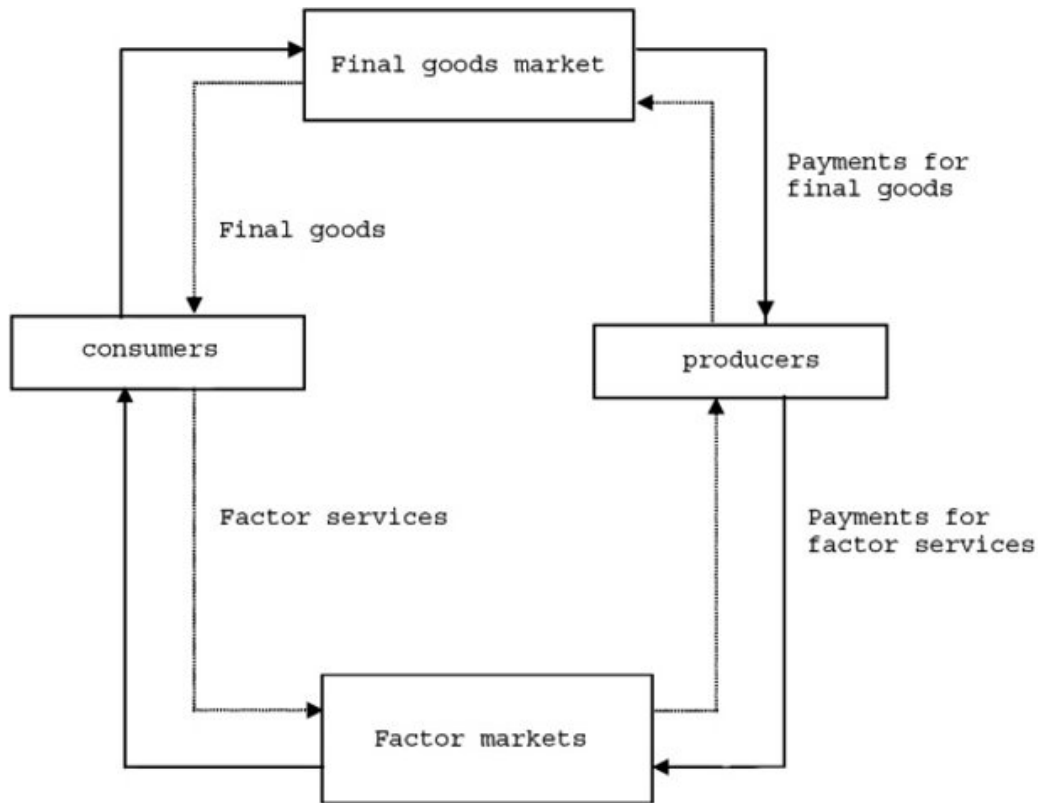


Figure 1. The Circular flow

The households supply factors of production, such as labor, land and capital, to the firms. In return they obtain income in the form of, e.g., salaries, rent on land and interest payments. The producers supply commodities and are paid for these by the consumers. The value of all factor services supplied by the households is the national income. Final production includes commodities for consumption purposes and investments. Deliveries among firms that are used in the current production process, such as electricity supplied by a power plant to an industry, are not considered final products. The value of final production constitutes the national product. It is easily seen that in this simple framework national income and national product coincide. Consumers do not only consume; they save as well. National income is also equal to the sum of consumption expenditures and savings. Actually, transactions in the economy take place on three types of markets: commodity markets, factor markets and financial markets. On the latter firms borrow money to finance their investments. The value of the transactions is calculated by means of the physical flows or functional units weighted by their market prices.

Extensions of this economy include adding a foreign sector, dealing with imports and exports, and a government levying taxes, providing public goods such as defence and schooling, and transferring money to households and firms. In an extended economy national income consists of income earned through the supply of factor services, possibly also abroad. National product is the sum of private consumption, private investments, government purchases of commodities and services and net exports (exports minus imports). The system in which national income and national product are

calculated, but which is more comprehensive than the simple setting described above (less aggregated) is called the national income and product accounts. The first to develop national accounts in a more or less systematic way was sir William Petty (1665). However, the rigorous development of the system began in the thirties, stimulated by the lack of data to conduct economic policy. Simon Kuznets, who was awarded the Nobel Prize for his work in this field in 1971, played a pioneering role. Richard Stone was awarded the Nobel Prize in economics in 1984 for his fundamental contributions to the development of systems of national accounts thereby improving the basis for empirical economic analysis.

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Biographical Sketch

Cees Withagen is professor of Environmental Economics at the Faculty of Economics at the Free University Amsterdam and at the Faculty of Economics at Tilburg University, both in the Netherlands. He is fellow of CentER (Tilburg) and the Tinbergen Institute (Amsterdam)

His fields of research is environmental economics. His present research concentrates on:

- the effect of environmental policy on competitiveness and location behaviour of firms
- natural resource economics
- the economics of backstop technologies
- evolutionary economics and sustainability

In the first topic he concentrates on the relationship between international trade and environmental policy, and the Porter hypothesis. In particular he has performed a meta-analysis of the empirical studies performed thusfar. He also is active in the theoretical aspects of the policy-competitiveness linkage through general equilibrium analysis. As for natural resource economics, he concentrates on the optimal allocation of natural resources over time and studies in particular pricing behaviour models of the oil market. His research on backstop technologies is concerned with the optimal timing of the introduction of backstop technologies under alternative cost assumptions. In the final topic mentioned he studies the applicability of concepts from evolutionary economics in questions regarding sustainability.

Publications have appeared a.o. in *International Economic Review*, *Economic Journal*, *Journal of Economic Dynamics and Control*, *Journal of International Economics*, *Oxford Economic Paper*, *Journal of Mathematical Economics*, and *Energy Economics*.

He participates in the project of the Dutch Science Foundation “Economics and the Environment”.

He is member of a.o. the European Association of Environmental and Resource Economists, The Econometric Society and the Royal Economic Society.