A systems view on concepts of income in the national accounts

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A SYSTEMS VIEW ON CONCEPTS OF INCOME IN THE NATIONAL ACCOUNTS*)

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Abstract

In this paper, concepts of income are explicitly linked to the purposes of use and to actual circumstances. Main choices in defining income are presented in a general system. The National Accounts is a multi-purpose framework. It should therefore contain several concepts of income, e.g. differing with respect to the production boundary. Furthermore, concepts of national income do not necessarily constitute an aggregation of income at a micro-level.

Contents

1. Introduction

Concepts of income are central to micro and macro-economic analysis. Income has been defined for such heterogeneous units as individuals, enterprises and nations. Many definitions have been used side by side, e.g. gross domestic product, net domestic product, gross national income, net national income and net disposable income. National income figures have been calculated tentatively for several production boundaries and alternative modes of valuation (e.g. by Nordhaus and Tobin, 1972). The concept of income has also been defined and used for taxation purposes and for judging the performance of enterprises and governments. Nearly all these concepts have been critized for being misleading and not suited to their task. For example, national income has been blamed for not being a welfare measure and traditional accounting profit is commonly recognized as being inappropriate under inflationary circumstances. However, despite ever continuing criticism, concepts of income still remain central in economic analysis and practice.

By way of a systems approach, this paper intends to reveal the common grounds covered by (most) concepts of income, to discuss micro-macro linkages between concepts of income and to show some inevitable limitations of theoretical and practical concepts of income in the National Accounts. The approach chosen has to deal with both concepts of income in economic dynamics and concepts of income constructed for widely varying purposes and entities. In order to attain these ends, a very general framework is devised. This framework is applied to concepts of income in the National Accounts.

The systems approach does not exist in the sense that there is not one well-defined approach. (see for a general view on systems thinking e.g. Beishon and Peters, 1972 and Von Bertalanffy, 1971) The systems approach consists essentially of a way of structuring and analysing problems. It is not more -but also not less- than a general attitude towards problem-solving. A systems approach may stress all kinds of interdependencies, mechanisms, conflicting objectives and counteracting

forces. In solving a problem many systems approaches are in principle possible. And indeed, usually several ways of 'systemizing' the problem make sense.

In this paper, concepts of income are regarded as being a part of the conceptual system of economics, which implies that they should also be discussed as such. A more conventional discussion of concepts of income would amount to an enumeration of basic choices without such a general framework (e.g. Eisner, 1988, p. 1612). Criteria for the selection of a concept of income are given in section 2, i.e. four purposes and two requirements are distinguished. The relation between concepts of income and the choice of the system, the production boundary and the transaction categories transfer and exchange is discussed in section 3. The role of expectations and risk is the topic of section 4. In this respect much attention is paid to the distinction between concepts of income ex ante and ex post. In section 5, the importance of the requirements comparability and measurability for concepts of income is examined. Linkages between concepts of income in the National Accounts, e.g. between individual income and national income, are discussed in section 6. Main conclusions are drawn in section 7.

2. Criteria for the selection of a concept of income

A useful general definition of income is: income equals the sum of final consumption and the net increase in the value of capital stocks. This definition will prove to be broad enough to encompass a wide variety of concepts of income, such as accounting profit, value added, national income, constant wealth national income, disposable income, "real" income and Hicksian (or "economist's" or "standard stream") concepts of income. For example, increase in capital stock can be defined including or excluding heterogeneous items as transfers, windfall gains and war damage. However, the general definition excludes Fisher's concept of income as actual consumption. (Fisher, 1930) Although Fisher is famous for advocating his consumption-concept of income, he acknowledged that also concepts of "income" enclosed in our definition are needed in economic analysis. (Fisher, 1939)

One of the reasons for different concepts of income is that they serve different purposes. In this paper four purposes of income measurement are distinguished:

1. judgment of performance
   a. efficiency
   b. effectiveness (e.g. welfare)
2. description of economic processes
   a. integrated
   b. partial
3. determination of the financial strength
4. forecasting

Income figures can be used, firstly, to judge the performance of governments and managers. To this end, the notions of efficiency and effectiveness can be used. Efficiency or productivity refers to the ratio between inputs and outputs of production processes. Effectiveness relates to the extent in which the objectives of the organization have been met. The objective of a government can be the maximalization of the well-being of the country's inhabitants and the objective of an enterprise is, e.g., maximalisation of its profit under some

constraints. Hicks made a famous distinction between national income as a measure of productivity (efficiency) and as a measure of welfare (effectiveness). National income as a measure of productivity intends to indicate changes in the production frontier (or: 'production possibility curve'), national income as a measure of welfare should also include changes along the production frontier, i.e. changes in allocation.[1)] (Hicks, 1940) For example, a doubling of world grain production is an outward shift of the production frontier of the world and therefore an increase in world income as a measure of productivity. However, world income as a measure of welfare need not be increased by the same amount e.g. due to an unequal distribution of the increased resources. On the other hand, more equal distribution of the same output of grain may well increase world welfare.

A second purpose which a concept of income may serve is the description of economic processes. In this respect, it is important to distinguish between an integrated and a partial description. In the former case, income figures together with figures on e.g. final consumption and investments are also used as an integrated description of economic processes. In such descriptions overall consistency of concepts is of prime importance. However, income figures can also be used in describing some specific part of the economy. For example, national income figures can be used in explaining fluctuations in final consumption and business profit figures can be used in understanding investments. For partial explanation purposes, overall consistency of concepts is not important.

A third purpose of income measurement is the use of these figures to determine the financial strength of a subject, which is then used to fix e.g. tax obligations, corporate dividend policy or household expenditure.

As a fourth possibility, income figures of the present period can be used to forecast e.g. future income, future consumption and future tax receipts. Such forecasts can be used in deciding on economic policy.

Different purposes justify some differences in concepts of income. A case in point are changes in interest rates. Unexpected changes should be disregarded for judgment of performance purposes. Expected as well as unexpected changes in interest rates may be of importance in describing; this depends on the actual behaviour of subjects. All changes in interest rates actually occurring in the period of income measurement should be included in determining the financial strength. In forecasting all changes which are supposed to be transitory must be removed.

Despite the differences in concept caused by another purpose of measurement, two very important requirements should be imposed on concepts of income: firstly, some degree of comparability in time and space, and secondly, measurability at a reasonable cost. For example, a business profit figure is only a good judgment of performance, when it is measured reliably and comparable to profit figures of previous years and to those of other, similar, enterprises.

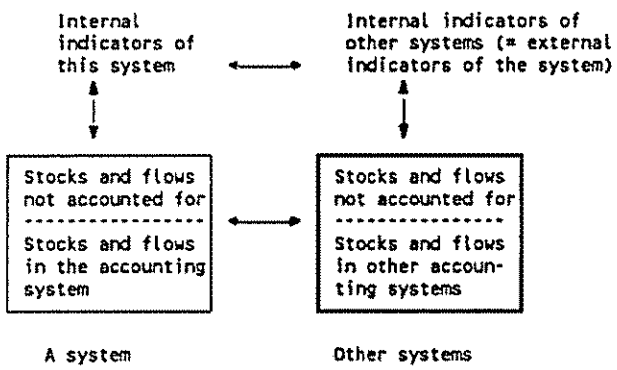
Concepts of income are conditional upon the system considered. Changing the delineation of the system therefore implies changing the definition of income. More knowledge of existing interdependencies can lead to a more fruitful choice of systems. A case in point is the national accounting practice to delineate a national economy by dividing multinationals in resident and non-resident parts. This disregards the strong interactions between these parts and as a consequence isolating the resident part(s) involves taking many arbitrary decisions.

Economic processes can be described fully in terms of 'stocks' and 'flows'. Stocks refer to all situations at a given moment in time, and flows to all changes in these situations during a given period of time. In this way the amounts or values of machine equipment, consumer durables, financial assets, water of a certain quality and a man's physical or mental condition at a given moment in time are stocks. All changes in these stocks due to e.g. purchase, sale, production, consumption and destruction can be conceived of as flows. The stocks and flows which pertain to a particular economy and their interrelationships

can be denoted as the system of that economy. The word 'economy' should be interpreted here in a broad sense. It may even refer to a single household.

In figure 1 a system and its environment are presented. This environment consists of other systems and -internal and external- indicators. The system can exchange stocks and flows with other systems. For example, some country imports goods and services from another country or an enterprise hires labour from households. The indicators of a system are the variables which are used by a unit in deciding on its stocks and flows, e.g. prices, wants and expectations. When the indicators belong to a system, they are internal with respect to this system; internal indicators of other systems are the external indicators of this system. For example, market prices in a national economy are internal indicators of the national economy as a system and world market prices are its external indicators. The role of indicators is discussed more extensively in sections 4 and 5.

Figure 1. The system and its environment



The income of an economy can be expressed in terms of the stocks and flows which are included in the accounting system, viz. as the sum of final consumption and the value of the increase in stocks. The boundary of the accounting system is generally known as the production boundary (cf. the dotted line in figure 1).

Concepts of income can differ with respect to the definition of terms within the system's stocks and flows and with respect to the indicators used. These could be called the two aspects of concepts of income. The first aspect relates to the choice of the system, its production boundary and its main transaction categories.

The choice of the production boundary is important for concepts of income, e.g. because it determines whether unpaid household services and pollution are taken into account. The distinction between the transaction categories transfers and exchanges is also significant, because intermediate expenditure should be distinguished from e.g. tax payments and voluntary transfers. For example, in judging performance the latter need not be measured at all.

The second aspect of concepts of income relates to its use of indicators like prices, preferences and expectations. For example, concepts of income like income ex ante, income in current prices and income in constant prices explicitly employ these indicators.

3. Choice of the system, production boundary and transaction categories

3.1 Concepts of income in a closed economy

This section explores the delineation of a concept of income with respect to the choice of the system, production boundary and some main transaction categories. A simple system without any interactions with its environment (a closed economy) is presented in this subsection. This simple system suffices to discuss the interrelation that exists between the concepts of various parts of the system, like income, final consumption, capital and factor services. In subsection 3.2, the view is broadened by also taking account of exchanges between systems (economies).

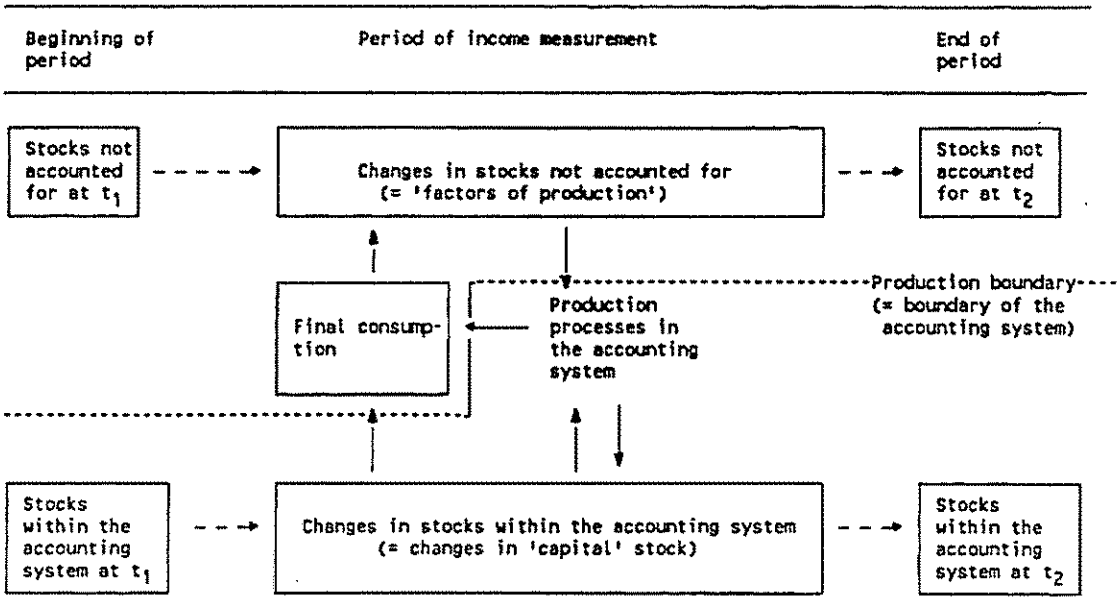
3.1.1 Capital stock

Income has been defined above as the sum of final consumption and the value of the increase in capital stock. Final consumption can be conceived of as a flow leaving the accounting system while an increase in the value of capital stocks is recorded within the accounting system.[2)]

The production boundary divides the system's stocks into those inside and those outside the accounting system. The distinction between both kinds of stocks is to some extent a matter of definition. In principle, capital can include any 'good'. For example, machine equipment, raw materials, work in progress, buildings, consumer durables, financial claims and liabilities, intangible assets and even a man's physical or mental condition can be viewed upon as capital. By changing the definition, net increase in 'capital', and also income, changes.

An example can illustrate further the relation between the production boundary, the concepts of capital and income. Suppose an actor's sole action during the period of income measurement is barter trade of its copy-right for a dwelling. If only dwellings are part of the concept of capital (i.e. fall within the production boundary chosen), income equals

Figure 2. A closed economy[3)] during a given period of time.



the dwelling. If both dwellings and copy-rights are capital, income is zero. If only copy-rights are capital, income is even negative by amount of the traded copy-right!

According to a classic economic-theoretical point of view, capital involves all scarce resources. Consequently, a pure concept of income must be defined fully in terms of scarce stocks and flows. However, such a concept of income can not be measured at all, because -due to the absence of perfect markets- not all (shadow-) prices of scarce resources can be known. For example, without perfect foresight and information the 'real' scarceness of natural resources can not be known and goods like 'spare time' are only to a very limited extent marketed. Another objection to this scarceness-criterion is that it is too vague even for very general analysis. For example, feelings like happyness and pain might also be considered as 'scarce'. So, for analysis and description of real life other -more pragmatical- dividing lines must be chosen, e.g. capital being defined as all marketable resources, either privately or through a public budget mechanism (e.g. clean air).

The concept of capital can be restricted by including only the outputs of 'economic production processes'. For example, Samuelson and Nordhaus argue that inputs like labour and land are not capital but primary factors of production, "for the reason that neither land nor labor is regarded as an output of the economic process, but instead exists primarily by virtue of physical and biological, rather than economic, factors." In contrast to other factors of production, primary factors of production are not "thought of as being themselves produced by the economic system... Some qualifications will be evident. Land can sometimes be made by drainage or filling in...Natural resources such as minerals are laid down by nature, but it may take much economic effort to locate, use, and process them. Therefore, they come to have some of the properties of capital goods." (Samuelson and Nordhaus, 1985, p.51-52) However, whether or not a stock is produced by economic production processes is not essential for the concept of capital. A system is always analysed during a given period of time. At the beginning of the period, both stocks inside and outside the accounting system are available for use in the production processes. Whether these stocks originate from the accounting system itself, from other systems (e.g. when they have been generated by nature) is not important for analysis of the system in the current period. Some stocks may even be produced by nature as well as by economic production processes, e.g. forests. Consequently, regarding natural resources as capital stock and depletion/exhaustion of natural resources as a decrease in available capital stocks is entirely justifiable even if hardly any economic effort is involved to locate, use and process them. Similarly, it makes not much sense for analysis to treat windfall gains on natural resources and those on 'economic' resources differently.

3.1.2 Final consumption

Final consumption has been defined as a flow leaving the accounting system. The concept of final consumption can be approached from two sides. Firstly, final consumption can be conceived of as a flow changing a stock outside the accounting system. Such changes can be regarded as the end of the system's production processes. From this point of view,

it is of importance to have a clear notion of these stocks, because interpretation of final consumption, and therefore income, is fully dependent on such a clear notion. Unfortunately, what stocks are chosen as the ends of the system is a matter of opinion. E.g. for a politician these stocks will probably be the well-being of all or some groups of (present and future) inhabitants; animal lovers may even defend inclusion of the well-being of animals. Next to defining some specific end, it still has to be decided which goods and services are capable of reaching this end. For example, is the well-being of inhabitants increased by huge military expenditure? Or are travel, entertainment and similar expenses by employees which are reimbursed by their employers to be regarded as net benefits to employees? (see also Sen, 1979, p. 12,13, on changes in "man's efficiency as a pleasure machine", which is important for welfare interpretations of income)

Kuznets (1945, p. 17-19) and Stone suggest (1947, p. 57) that the concept of final consumption flows changing non-economic stocks may well change in time. Kuznets argues that military expenditure are intermediate consumption in peace time; however in wartime preferences of habitants change: military expenditure should then be recorded as final consumption. Stone remarks " It seems clear that what is normally regarded as a net benefit is dependent on social valuations and changes as these valuations change. Thus, for example, the existence of pit-head baths at a coal mine would, a hundred years ago, have been something quite exceptional, in no sense a cost of doing business, and would doubtless have been regarded as a net benefit to the employee rather than as a compensation for the particular disadvantages of his trade. Nowadays, perhaps, the matter would be differently regarded, as such amenities would hardly be regarded as income in kind." The arguments of Kuznets and Stone can be used to justify differences between concepts of final consumption in time and in space (e.g. between developed and developing countries).

Final consumption might also be regarded as a <u>flow not changing the value of the stocks within the accounting system</u>. This implies that when the value of the stock of capital has been defined properly, final

consumption is also defined. An example from this point of view is "the empirical rule" (Studenski, 1958, p. 188): final consumption equals all goods and services which will never be part of the production costs of other goods and services. In this view, the notion of the changed stock outside the accounting system need not be clear for interpretation of concepts of final consumption and income, because the latter are not defined in terms of explicit ends. This relates e.g. to recording expenditure on consumer durables as final consumption. In this way interpretation of income figures e.g. in terms of 'welfare' is hampered.

The amounts of final consumption as well as the increase in capital are defined by, and therefore depend on, the production boundary chosen. The production boundary therefore performs two functions:
a) The production boundary determines whether increases in human capital, other intangible assets and consumer durables and depletion of natural resources are interpreted as changes in capital or as changes in stocks not accounted for; the latter changes are ignored in concepts of income.
b) In a similar way, the amount of final consumption depends on whether unpaid household services, do-it-yourself activities, pollution and spare time fall within or outside the production boundary.
Thus, all concepts of income are independent of (changes in) goods and services that fall outside the production boundary chosen. Income can be changed by changing the boundary of the accounting system.

3.1.3 Three ways of measuring national income

In national accounting three ways of measuring national income are distinguished. Distinguishing three ways is only valid when it is assumed that the sum of all inflows in the economic production processes is equal to the sum of all its outflows (e.g. in money terms).[4] Under this assumption, income can be formulated: first of all, as the sum of final consumption and the net increase in capital (including investments), secondly, as the sum of all inflows from outside the accounting system (= factor services) and thirdly, as the sum of all output from the production processes minus all use of capital (= net output).

Adopting the inflow-outflow identity leads directly to the notion that income is fully "explained" by, or originates totally from, the accounting system's inflows. So, all income may be regarded as a payment for factor-services. However, it is very obscure what the factor-services are that are actually paid for. For example, it is evident that wages are (to some extent) payments for labour-inputs, but is profit a payment for organization, waiting, risk taking, property rights, exhaustion of natural resources, monopoly power or somewhat else? The list of actually used inputs can always be extended by including many merely metaphysical items. Explaining income generation by way of inputs inside and outside the accounting system is also problematic, because total output depends on all inputs used; (marginal) productivity of some kind of input is not independent of the other inputs used. In recent years, the discussions therefore centred on explaining the growth in income by way of changes in inputs, instead of explaining income itself by way of inputs. This much more modest aim is still problematic, because firstly, how can changes in inputs be measured, and secondly, how can other causes of changes in income be disentangled (e.g. changes in rates of monopoly or changes in income distributions). (see e.g. van der Wee, 1987, p. 138-149)

3.2 Concepts of income in an open economy

In this section, the view on concepts of income is broadened by also taking into account flows between systems, e.g. imports and exports of goods and services.

Flows between systems can be subdivided into transfers and exchanges. In contrast to transfers, exchanges are a 'quid pro quo'. The distinction should be made, because otherwise the concepts of intermediate and final consumption and factor services, and therefore also the concept of income, become meaningless. For example, putting tax payments and gifts on a par with expenditure on machine equipment and raw materials does not make much sense in most cases. The same applies to treating tax payments and gifts as final consumption expenditure and

to recording a redistribution of income by the government similar to expenditure on wages. Nevertheless, the distinction is not clearcut for all cases. For example, some gifts might be better regarded as consumer expenditure on 'luxuries', some tax payments as a payment for the use of infrastructure or as a compensation payment for pollution, EC-membership contributions as payments for EC-regulations and some wage payments of the government as redistribution of income. When one is interested in concepts of income employing the "real" tax burden and the "real" amount of subsidies received, taxes and subsidies are to be disentangled into exchange and the "real" transfer.

Gross Domestic Product can be defined as the aggregate of gross value added of all resident producers. This definition makes clear that GDP depends on the concept of residency employed for producers. For example, a multinational enterprise can be regarded as being resident to one country if all important decisions are made there, but it can also be split up into resident and non-resident units corresponding to the amounts of production taking place in the specific countries. Another case in point is production taking place in international waters like fishing and exploration of minerals: should it be attributed to the production of a specific country? If so, on what grounds?

Gross National Income can be defined as GDP plus the balance of primary income flows with the rest of the world. An example of a primary income flow with the rest of the world is the payment of wages to non-residents. In the SNA, residency is defined in terms of the "general centre of interest", i.e. in general the country in which one lives for more than one year. A different concept of residency results into a different concept of primary income flows with the rest of the world and consequently into a different concept of national income. For example, Turkey could consider a concept of national income including all wages of Turkish people living and working in Western-Europe, but who intend to return someday to Turkey. The choice of the residency of labour amounts to choosing to which system these 'not-accounted-for stocks' belong. Payments of wages in exchange for non-resident labour and all other primary income flows with the rest of the world can be regarded as

an exchange of resident capital for non-resident not-accounted-for stocks. So, the difference between GDP and GNI is fully determined by the concept of residency as well as by the production boundary. An example of the importance of the production boundary is that some wage payments to non-residents can be recorded as payments for human capital, i.e. as imports of goods and services.

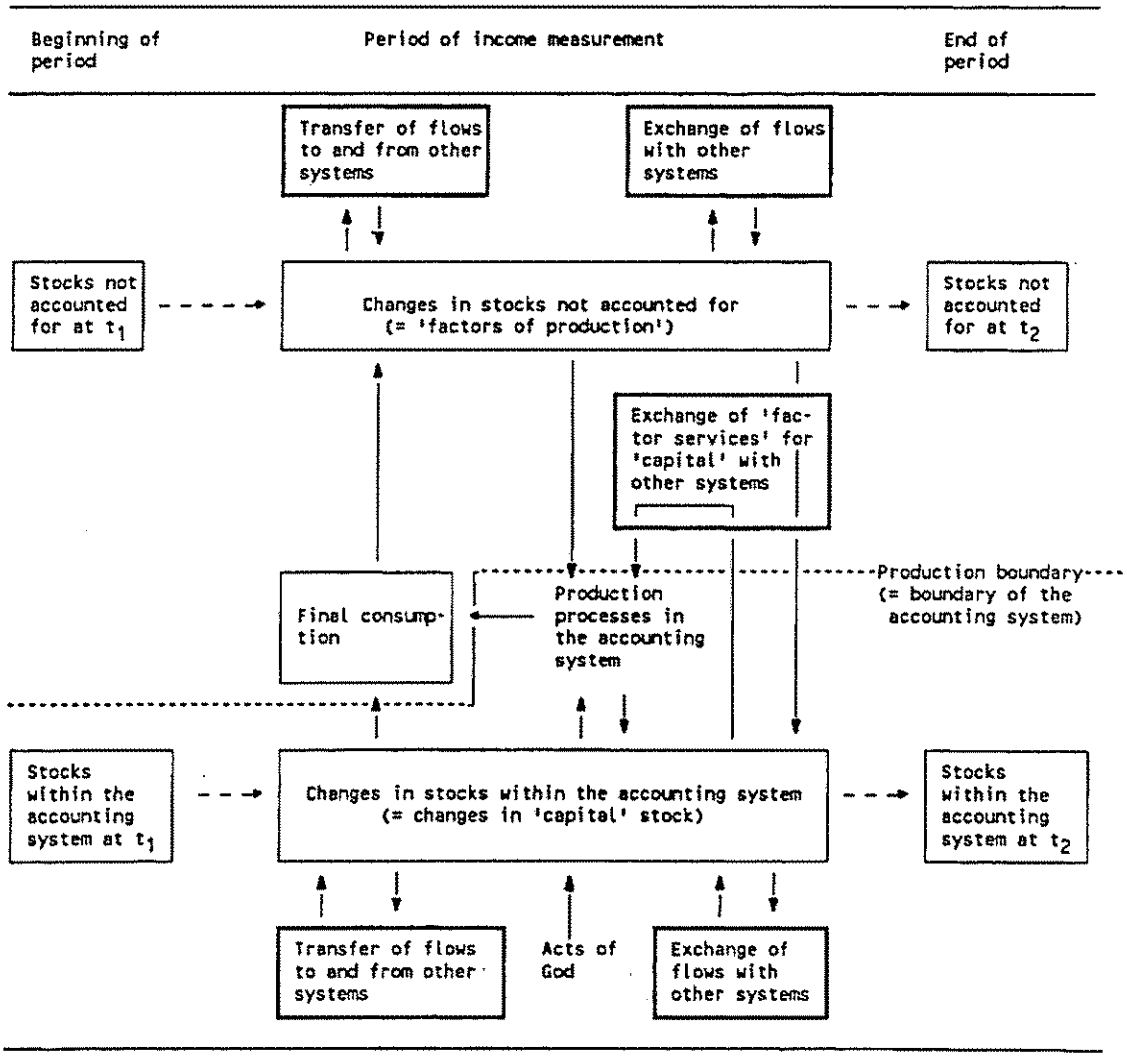
More in general, it can be stated that concepts of income (like GDP and GNI) depend on three demarcations:
a) between transfers and exchanges
b) between stocks inside and outside the production boundary
c) between system's and other systems' stocks.
Although these distinctions are crucial to concepts of income, it is difficult to define them unambiguously. When recording flows within a multinational enterprise all these problems of definition become apparent. For example, a flow of 'profits' from a foreign subsidiary towards the 'parent'-country, can be recorded as a transfer, as a return on investment (= payment for factor services) or as a payment for the use of intangible assets like technological and managerial knowledge (= payments for goods and services).

In figure 3, the stocks and flows in figure 2 have been extended by incorporating also the above discussed transactions with other systems. Some changes in a system's stocks are preferably not conceived of as being brought about by decisions of the system's unit or other system's units. These could be called "Acts of God". Examples of Acts of God are changes due to earth quakes and extremely bad weather. In figure 3 also the occurrance of "Acts of God" is acknowledged. Consequently, given a production boundary, concepts of income can differ in three respects:
- the inclusion or exclusion of (some) transfers of flows to or from other systems. This relates e.g. to the distinction between National income and National Disposable income differing with respect to unrequited current transfers received from the rest of the world.
- the inclusion or exclusion of (some) exchange of 'factor services' between systems. This relates e.g. to the difference between GDP and National income. Exchange of 'factor services' can be subdivided into

exchange of factor services for 'capital' (e.g. labour for money) and exchange of factor services for other factor services. The latter type of exchange is ignored in concepts of income, because it takes place completely outside the production boundary.

- the inclusion or exclusion of (some) Acts of God. This relates e.g. to concepts of National income including or excluding damage due to earthquakes and war (see e.g. Van Bochove and Van Sorge, 1989).

Figure 3. The interaction with other systems and Acts of God during a given period of time



Whether transfers and Acts of God must be included or excluded from a concept of income depends on the concept's purposes. In judging performance transfers and acts of God must be excluded. To this end, Acts of God can be redefined as: all changes in the system's stocks outside the control of the unit and not being part of the 'normal' risk of the system. The vague notion of 'normal' risk will be discussed in section 4, which deals with expectations and income.

For income serving as a measure of financial strength, transfers and Acts of God may be included in income. For example, particular losses due to a flood may lead to a reduction in taxable profit and dividend payments. Similarly, subsidies received increase the financial strength.

For an integrated description, concepts of income including and excluding transfers and Acts of God can be used side by side. For a partial description, the most suitable concept may depend on the actual behaviour of economic subjects. For example, when the purpose of a concept of income is solely to explain consumer behaviour, income may be defined depending on the consumer's notion of income. The latter can be identified by means of interviews or by choosing the best-explaining concept. Such an empirical rule will decide especially on including or excluding (some) transfers and Acts of God.[5)]

When the occurrance of Acts of God is unpredictable, it evidently does not make much sense to try to forecast an income figure based upon a concept including Acts of God. Under the same unpredictability-assumption, the argument applies as well to transfers.

4. The role of expectations and risk

Hicks (1946) distinguishes between income concepts ex ante and ex post. Income ex ante can be defined as the net increase in capital plus final consumption expected at the beginning of the period and its ex post equivalent as the actual increase in capital plus final consumption.[6] In ex ante as well as ex post concepts, maintaining capital intact can be interpreted in several ways, for example as maintaining intact its money value (market value) or as maintenance of capital in a purely physical sense. (see e.g. Denison, 1957, Lemke, 1982, Scott, 1984 and Usher, 1980a).

Hicks defines a man's income as "the maximum value which he can consume during a week, and still expect to be as well off at the end of the week as he was at the beginning." (Hicks, 1946, p. 75, in Parker and Harcourt). Hicks mentions three interpretations of an individual "being as well off": firstly, as maintaining intact the capital value of prospective receipts in money terms, secondly, as maintaining intact the possibility to spend the same amount in money terms in each ensuing period (e.g. of importance when interest rates change) and, thirdly, like the second interpretation but in real terms instead of in money terms (of importance when also prices change). These three interpretations are concepts of income based upon a notion of "the maximum level of permanently maintainable consumption". As a consequence, every increase in capital is regarded as an increase in income in all subsequent periods, not as an increase -by the full amount- of present income.

According to Hicks (1946, p. 81 in Parker and Harcourt) extensive use of the concept of money income ex post in economic theory is not justified, because "Ex post calculations of capital accumulation have their place in economic and statistical history; they are a useful measuring-rod for economic progress; but they are of no use to theoretical economists, who are trying to find out how the economic system works, because they have no significance for conduct. The income ex post of any particular week cannot be calculated until the end of the

week, and then it involves a comparison between present values and values which belong wholly to the past. On the general principle of 'bygones are bygones', it can have no relevance to present decisions. The income which is relevant to conduct must always exclude windfall gains; if they occur, they have to be thought of as raising income for future weeks (by the interest on them) rather than as entering into any effective sort of income for the current week. Theoretical confusion between income ex post and ex ante corresponds to practical confusion between income and capital." However, Hicks seems to prescribe how economic subjects should behave, not how their actual behaviour can be studied by economic theorists.[7)]

Hicks states that economic subjects should regard all windfall gains as capital and not as income, but this is an unrealistic requirement. Firstly, because the concept of windfall gains is as vague as the concept of expectations and, secondly, because even measurement by experienced and well-trained accountants seems to be hardly possible. It is therefore not at all surprising when -due to lack of information on windfall gains- economic subjects behave "as if" some windfall gains are part of their income and not of capital. This is of clear importance to theoretical economists and practical economists alike (e.g. in making forecasts or in discussing the consequences of taxing some specific windfall gains).

Registration of ex post income as well as its related ex ante income indicates the extent to which plans and expectations are not realized. This information can be used, firstly, as a guide to corrective action, secondly, in adjusting expectations and, thirdly, in better estimating the risks and uncertainties of economic activities. Ex ante and ex post income may be used simultaneously in describing, forecasting and judging performance. In determining the financial strength ex post concepts are to be preferred.

Especially in judging performance, it should be remarked that ex ante income is vulnerable to the quality of expectations and when management's performance is evaluated, one should also consider the

quality of the management's expectations. Part of the manager's task consists of dealing with risk and uncertainty, which means e.g. that when past decisions turn out to be wrong, they should be changed quickly. Survival of the system in a world full of risk, uncertainty and imperfect information is an essential part of a manager's job. Differences between ex ante and ex post income can be reduced by indexation of contracts, hedging, taking preventive measures and insurance.

In comparing the performances of two companies of which only one pays insurance premiums, e.g. for the risk of bad debts, income figures ex post (and ex ante) can be constructed in three ways. Firstly, by regarding (imputed) insurance premiums as current cost of both companies, secondly by not regarding insurance premiums as current cost of either company, and thirdly by regarding only the insurance premiums actually paid as current cost. In the third option, strong fluctuations in the uninsured company's ex post income due to bad debts are taken for granted. Performances can only be evaluated correctly by comparing series of ex post income figures of both companies. Unfortunately, in practice comparison of nearly all income figures involves a mixture of the three options, because it is difficult to assess which costs should have been prevented and which costs are actually preventive.

When dealing with risk, a notion like "normal" business risk is used to distinguish between "normal" and "abnormal" costs and revenues. However, such distinctions do not solve the problem, because the notion of "normal" is -of course- subjective. A national accounting example can further illustrate this issue. Kuznets (1945, p. 8,9) argues that military expenditure should be spread over years as an insurance premium for peace; these are expenditure to cover a nation's "normal" risk of war. So, in comparing the national incomes of an "insured" and an "uninsured" country in times of peace and war all three options are in principle open. As a corollary, it can be remarked that even concepts of income which serve to judge performance (ex ante as well as ex post) may include the consequences of "Acts of God" like a flood or a war. In this respect, "Acts of God" may be interpreted very broadly as all external

influences which reasonably could not have been foreseen. For a business enterpise this may or may not include changes in consumer preferences, government regulations etc. It is clear that this balance tips differently for a small firm than for a big corporation with its own marketing and economic research divisions. Analogously, governments of non-OPEC countries could be blamed for the decreases in their national incomes caused by the oil crises in the seventies only to the extent that these decreases could have been avoided by timely 'normal' preventive measures.

In a flexible accounting system, expenditure on insurances and preventive measures should be recorded separately in order to improve the comparability of income figures. Imputed expenditure for "uninsured" enterprises or countries are even more difficult to estimate. Nevertheless, inclusion of this information in an accounting system would increase the comparability of income figures. For short term comparisons, like comparison of annual income figures, this information is even essential for making inferences.

When income figures are used for forecasting, even more variables should be considered. Changes in interest rates may lead to unexpected changes in ex post income. This in turn may change expectations and is therefore of importance for predicting future ex ante and ex post income. For prediction purposes, all changes in indicators and economic stocks expected in the next period must be taken into account, while all changes in the current period which are supposed to be transitory must be removed.

In present national accounting systems, such as the SNA, only ex post concepts of income are recorded. However, in order to serve the purposes of describing, judging performance and forecasting also ex ante concepts are of importance. (see e.g. Ohlsson, 1953, on the Swedish national budget). Such an extension of the traditional accounting framework is in line with new developments in business accounting. Recently, accounting has been more and more related to information theory and information economics. From this point of view, an accounting system is

regarded as an organized group of information sets (see Bell, 1987). Concepts of income ex ante clearly provide information and must therefore be included in national accounting systems.

5. Implications of the need for measurability and comparability

The importance of the requirements comparability and measurability for a concept of income depends on its purposes. All economic actions are time and space bound. Therefore, it does not make sense to require full comparability in time and space. For some purposes only comparability in some period of time is of importance. For example, in stating that income is larger than in previous years, only comparability with respect to these years is needed. For other purposes, specific comparability in space is essential. For example, in comparing national income between industrialized countries or in comparing income between enterprises within the same branch. One can also imagine non-comparative uses of national income. For example, Hicks states that in contrast to the welfare measure "The important uses of the productivity measure ... are non-comparative. Accounts of the National Income and Expenditure (for whatever purpose they are set out) belong on the productivity side, but they are not comparative in character. Their main object is to give one a basis for estimating (however crudely) what the *existing* productive capacities would reach to, if they were used in a different way from the way they are being used. The purpose of comparing productivity at different dates is, at the best, only secondary." (Hicks, 1948, p. 166). Comparability is usually also not of importance for partial description and forecasting.

'Measurability' is a matter of degree, because always some -even totally fictitious- amounts or values can be imputed. Different purposes require different degrees of measurability. For example, in stating that national income has increased with 3% (= 'most probably between 2 and 4%') last year, national income must have been measured very accurately; otherwise, the statement is not statistically significant. For statements on an increase in national income of 30% (= 'most probably between 25 and 35%') during the last decade, less reliable measurement of national income suffices.

Measurability in money terms depends to a large extent on the existence of markets. However, the existence of markets differs in time

and space, so the objective of comparability in time and space often conflicts with the requirement of measurability. As a consequence, in devising concepts of income that are both measurable and comparable some inevitable trade-off between the two requirements must be taken for granted.

Hicks (1946) stresses that only money income ex post, i.e. income ex post based upon maintaining capital in money terms intact, is open to objective measurement. In this respect, money income ex post is most useful for accounting purposes. Hicks suggests that approximations of incomes ex ante or other incomes ex post can be made by adjusting - inevitably in a very rough and imperfect way- money income ex post. However, even measurement of money income ex post may be problematic, especially when the production boundary encloses more than only goods and services in perfect markets. For example, the value of intangible assets is usually difficult to assess because they are marketed infrequently. Similarly, the minor role played by net concepts of income is fully due to the absence of sufficiently broad second-hand markets for many capital assets. This lack of marketability of second-hand capital assets makes reliable calculation of depreciation problematic and therefore hampers reliable measurement of (net) income. With perfectly working markets the distinction in business accounting between realized and unrealized income (or gains) also looses its importance. Consequently, reliable measurement of money income ex post and all other concepts of income largely depend on the choice of the production boundary and the existence of (perfect) markets.

A concept of income in current prices can contain all kinds of imputations; a concept of income without imputations can be called an actual concept of income. An actual concept of income in current prices is constructed fully out of the actual sales and purchase values of the system in the same period. For example, the actual income from trade equals the difference between the actual sales and purchase values of the traded goods and services. The concept of actual income in current prices meets the requirement of objective and reliable measurability fully. However, for most purposes actual concepts of income do not

suffice and some imputations are inevitable. At least three types of imputations can be distinguished:

- actual purchase and sales values in other periods are used; for example, the use of historical purchase values.
- actual sales and purchase values are transformed into other, non-actual, values; for example, transfer prices are transformed into market prices.
- a value is attributed to goods and services, not marketed with monetary settlement:
  * a value is attributed to barter trade
  * a value is attributed to transfers of goods and services
  * a value is attributed to goods and services which do not change hands (e.g. some intangible assets and services of owner-occupied dwellings)

  Unpaid household services can be regarded as barter trade (e.g. in exchange for food and housing), as a transfer or as a service which does not change hands (it is produced and consumed by the same person/household).

Extension of an actual concept of income in current prices by way of some imputations can increase its comparability.

Concepts of income which meet the requirement of comparability in time and space, can be called "real" concepts of income. Unfortunately, real concepts of income are mostly theoretical constructs without counterparts in real life: "income comparison is only possible in the space of present and future consumption" (Samuelson, 1961, p.50), for example because of life-cycle considerations. Comparability of income figures amounts to assuming, i.a.:

- identical interest rates
- identical price ratios (relative prices)
- identical wants (including comparable income distributions and populations)
- perfect information and foresight
- competitive markets
- availability of the same goods and services (e.g. technological progress may introduce new products and therefore hamper comparability

in time)
(see, e.g., Kuznets, 1948 and Sen, 1979).
Some arbitrary ad hoc calculations can be made in order to increase the realism of these assumptions. For example, to calculate a mark-up over market prices for rationed goods and to value non-available goods at prices reducing demand to nil (Hicks, 1940, p. 114). However, unlike in economic models, in practice full comparability of income figures can not be attained.

In dynamic economics[8)] internal and external indicators, like prices, interest rates, wants and expectations change. As a consequence, past decisions have different effects than expected and some of them may well be regretted: new decisions are made and old ones are revised on the basis of changed internal and external indicators. In defining income in terms of the system's stocks and flows during some given period of time, the common assumption that these indicators have not changed, cannot be maintained in real life. Therefore, even achieving full comparability of income figures in two subsequent periods is problematic. One of the most prominent income theoreticians even remarks that "we shall be well advised to eschew income and saving in economic dynamics. They are bad tools which break in our hands." (Hicks, 1946, p.79 in Parker and Harcourt). Nevertheless, despite the problematic nature of concepts of income, for practical purposes (business accounting, taxation) and economic analysis one could not do without. Therefore, one should try to devise concepts of income as good as possible and be aware of the unavoidable limitations of these concepts.

The notion of an "optimal" concept of income depends on its use, the requirements imposed and on the actual (or supposed) circumstances. The purpose of measurement is of importance, because it does not make sense to recommend uniform treatment of Acts of God, changes in prices, changes in expectations and changes in wants in describing, judging and forecasting economic flows (see subsections 3.3 and 4.3). Next to bringing concepts of income and general dynamic circumstances in line, also the actual circumstances are of importance, because these make some assumptions (approximations of "ideal" concepts) more valid than others.

For example, assuming no relative price changes is probably not valid for a period covering the first oil crisis.

The actual circumstances are also of importance in the trade-off between the requirements of measurability and comparability. For example, small differences between the amounts of unpaid household services between social classes or between countries may justify the choice of a production boundary excluding unpaid household services; this will not destroy the comparability of income figures between these social classes or countries.

The concepts of income in current and in constant prices represent a different choice between both requirements. Income in constant prices (or: "real" income) is in general more comparable but less measurable than income in current prices. A trade-off also exists between gross and net concepts of income: although net income is the most "real" income, gross income is in general preferred because of its easier measurement.[8)] In most National Accounting systems the problem has been solved by recording both gross and net income, and income in current as well as in constant prices. On the other hand, usually only one production boundary is chosen. For example, the SNA recommends a production boundary excluding unpaid household services while recording expenditure on consumer durables as final consumption. This choice was most probably motivated by general measurement considerations. In a flexible National Accounting system concepts of income including and excluding unpaid household services can be registered within one accounting system (see, e.g., van Bochove and Bloem, 1986, and Gorter and van der Laan, 1989, in particular their table 6).

6. A systems view of income applied to micro-macro linkages in the National Accounts

6.1 Linkages between concepts of income in the SNA

In the present SNA concepts of income are part of an accounting system aiming at an integrated and consistent description of a country's economic processes. The SNA intends to be an accounting system suitable throughout time and space (e.g. for different countries), i.e. it is meant to be independent of actual circumstances. The emphasis lies on comparability between national accounting figures like national income. So, worldwide use of the uniform accounting concepts articulated in the SNA is recommended. In section 5 it has been concluded that an 'optimal' concept of income depends on its purpose, the trade-off between both requirements and the actual circumstances. This implies that concepts of income in the SNA are in general not 'optimal'. Further, the SNA's meso and macro concepts of income are to a large extent just aggregates of its micro and meso concepts of income. Consequently, concepts of income in the SNA depend only to a minor extent on the level of description. Next, some relations between concepts of income in the SNA are discussed. In subsection 6.2, micro-meso-macro-linkages between concepts of income are investigated.

In the SNA, the concepts of value added, primary income (or: 'factor income') and disposable income within the period of registration are closely linked. Firstly, (gross) value added and income accruing to the production factors within the period of registration are equal by definition. If total value added of an enterprise differs from the observed primary income flows, like wages, interest and distributed dividends, this difference is registered as operating surplus, e.g. as retained profits. This equality within the period of registration between value added and primary income is a bookkeeping device[10], without any direct analytical implications. E.g., it is wrong to assess that all primary income paid out equals the distribution of the value added presently generated, because it can also refer to previously generated value added or factor services to be rendered in the future.

This definitional equality holds for individual enterprises and for groups of enterprises, for example sectors. At a more aggregate level, Gross Domestic Product (GDP) and Gross National Income (GNI) are linked, because GNI equals GDP plus the balance of primary income received from non-residents. Consequently, changes in GDP-calculations will be reflected in GNI-calculations.

Next to primary incomes, other kinds of income exist, namely unrequited current transfers. Examples are pensions, unemployment benefits and gifts. These income flows can be characterized as redistributions of income, but generally speaking this does not refer to primary incomes generated during the period under consideration. For example, pensions financed by premium payments in previous years, are redistributions of incomes generated in previous years. The net result of all income flows to a group of transactors (e.g. a sector) is their disposable income, which consists of primary income plus unrequited current transfers received. Consequently, any increase in primary income received increases disposable income by the same amount. At a more aggregate level, Gross National Disposable Income equals Gross National Income plus the balance of unrequited current transfers received from non-residents. In this way changes in GNI are linked to the Gross National Disposable Income.

As a result of these bookkeeping links, the delineation of one concept of income bears direct consequences for other concepts. This can be illustrated by the case of imputed services of owner-occupied dwellings. If services of owner-occupied dwellings are registered as production of the owners, the value added of these services is factor income and disposable income of the owners, the imputed value of these services is also final consumption and all expenditure on the maintenance of dwellings is intermediate consumption or investment. If it is decided that services of owner-occupied dwellings fall outside the production boundary in the National Accounts, no related value added, primary income, disposable income and intermediate consumption are registered; in this case, only the expenditure on the purchase and maintenance of such dwellings is registered in the National Accounts (as

final consumption, not as intermediate consumption). In a system like the SNA, the decision to include an imputation for services of owner-occupied dwellings changes concepts of income at all levels, e.g. income of groups of households, income of all households and national income.

6.2 'The whole should be unequal to the sum of its parts' in the National Accounts

In this section some factors disturbing micro-macro linkages of income in the National accounts are discussed. More in particular, this concerns the validity of the statement that the whole does not equal the sum of its parts. [11)]

In the SNA, concepts of income are part of an accounting system aiming at an integrated description of a country's economic processes. Consequently, its concepts of income are not especially devised for our other purposes: judging performance, partial description, determining the financial strength and forecasting. This results in two clear limitations of SNA-concepts of income:

- using SNA-concepts of income for other purposes is in general not optimal, because different purposes may lead to different ideal concepts of income;
- in compiling income according to the SNA-concepts often figures have to be used which are based upon concepts devised for other purposes, e.g. business profit figures constructed for taxation purposes. As a consequence, the objective of an integrated description is difficult to attain.

In general, it can be stated that micro-macro linkage may be lost when macro and micro purposes differ. For example, national income may be defined in order to describe the interactions between national income and national consumption, but business income may be defined in order to judge the managers' performance or to determine taxable profit. In this respect, the main differences will relate to the inclusion or not of (some) transfers, acts of God and windfall gains and losses. Similarly, business units are usually defined as legal units and the national

economy as an economic entity, and this may lead to problems (e.g. splitting up multinationals in resident and non-resident units).

In section 3.2, Acts of God have been defined as all changes in stocks and flows outside the control of the unit and not being part of its "normal" risk. Consequently, Acts of God on a micro level and on a macro level are to some extent defined differently. For example, an enterprise may regard increases in taxes and changes in regulations as Acts of God, but on the level of a national economy these are entirely within control of the system's unit and therefore not Acts of God. Similarly, transfers may be defined different at micro and macro-level. For example, an enterprise or individual typically does not regard taxes as a quid pro quo, i.e. it is considered as a transfer. However, at the level of the national economy, taxes are probably better regarded as an exchange (e.g. as the purchase of public goods). This implies that incomes at a micro-level do not necessarily add up to the macro-level. In a similar way, partial description at a micro-level may not add up to a good partial description at a macro-level. So, even when micro and macro purposes coincide, full micro-macro linkage may not be considered desirable.

Another problem is that production boundaries at the micro-level and the macro-level may be different so that the micro-macro linkage is lost. Production boundaries need not be the same for each group of transactors employed in the National Accounts, such as persons, households, establishments and enterprises. For example, in a micro analysis of an enterprise's stocks and flows it may be suitable to define exhaustion of natural resources and pollution as being outside the production boundary, while from a macro point of view these stocks and flows may be deemed crucial for analysis and forecasting. Similarly, all kinds of social overhead like national defense, general education and health care can be regarded as production and final (or intermediate) consumption by the national economy. However, disaggregating such final consumption and including it in individual final consumption and income is very arbitrary. Only very strong comparability requirements could justify such arbitrary imputations.

More in general, macro-income can be regarded as a summation of micro-incomes plus specific macro-income and minus specific micro-income. In this sense the whole is unequal to the sum of its parts.

The distinction between macro-income and the summation of micro-incomes can also be clarified by regarding final consumption as the ends of a system. The ends of a macro system encompasses not only the ends of its subsystems, but also the safety and survival of the system as a whole. Formulating the ends of a system entirely in terms of subsystems is therefore not possible.[12] Similar reasoning could be applied to the intermediate consumption of the system and its subsystems. As a consequence, a systems concept like national income should not be interpreted as an increase in (potentially) all individual incomes. Such an interpretation is not correct, if only because the population has not been constant. Comparing national income figures per capita still amounts to a comparison between systems incomes and not to a comparison between (potential) individual incomes.

Interpretation of national income figures in terms of individual incomes is also difficult because of the implicit use of different units in aggregation and interpretation. Gross national income equals the sum of gross value added of resident establishment-type units (gross domestic product) plus the balance of primary income flows with the rest of the world. Interpretation of this aggregate in terms of individuals (or households) is problematic, e.g. because retained profits of resident establishments belong to resident and non-resident (present and future) shareholders.

The choice of production boundaries which differ by level of aggregation and by type of transactor is caused by imperfections in the market mechanism. In principle, all micro problems can be fully translated by the market into macro problems and vice versa. For example, external effects can be internalised by the existence of a market. However, imperfect markets do exist. Assuming both full information and perfect foresight and the omnipresence of competitive markets is clearly not realistic. It is only for this reason that a

macro problem like exhaustion of natural resources is not treated as a "cost" by an individual enterprise.

The choice of different production boundaries at different levels may also be reinforced by different measurement and comparability requirements or possibilities. For example, at the micro-level comparability between enterprises is of importance in judging performance, while at the macro-level comparability between groups of resident and non-resident enterprises and comparability in time of a (homogeneous) group of enterprises is at stake. The costs of measurement vary widely at different levels. For example, measurement of the amount of pollution or of the value of housing services of owner-occupied dwellings might be feasible at the macro-level, but not at the micro-level.

The lack of a complete micro-macro link is not a weakness in the present SNA. It can be regarded as an implicit acknowledgement of the arbitrary character of the imputations and re-routeings needed to establish a complete linkage. Trying to achieve a complete linkage is a waste of effort. Superimposing a micro-macro linkage leads to rather irrelevant concepts of micro income, because they are not part of perceptions at that level. Only when comparability between (totally) different systems is regarded as very important, disregarding perceptions makes sense; however, they remain artificial constructs, leading to a more or less arbitrary comparison. Similarly, enterprises which try to make arbitrary cost allocations by fully disaggregating their social overhead will not increase efficiency, because these calculations do not help in judging and guiding the performance of the enterprise departments (subsystems).

So, production boundaries should differ between different entities and at different levels. Differences in business accounting amount to the use of different production boundaries at the level of the enterprise. The production boundary implicitly used in business accounting may be most useful in analyzing and predicting individual business behaviour, but in order to analyze and predict the performance of a group of enterprises, consistency in accounting procedures can be of

more importance than maintaining individual accounting practices. In this respect, Kuznets distinguishes "real" and "apparent" income (Kuznets, 1937, p. 154-156). In the national accounts the "real" (or: 'objective') income of an enterprise is registered in contrast to the "apparent" (or: more subjective) income resulting from the accounting methods used by enterprises. Micro-macro linkage is broken in the sense that "real" national income is not a summation of "apparent" individual incomes. In my opinion, both "real" aggregates and "apparent" aggregates make sense for analysis and forecasting. For example, the fact that people and enterprises overstate their "real" income in some specific year, might be very useful in explaining business cycles.

7. Conclusions

In this paper, a systems approach has been used to reveal the basic choices underlying (nearly) all concepts of income. Concepts of income can be devised for different purposes: integrated description, partial description, judging performance, determining the financial strength and forecasting. Different purposes justify differences in concepts of income, for example a different treatment of transfers. Purposes may differ according to the level of description. A case in point is the aim of integrated description in the SNA, which usually conflicts with the purpose of taxation underlying the measurement of business profits. Even when micro and macro purposes coincide, full micro-macro linkage may not be considered desirable. For example, an enterprise does not regard taxes as a quid pro quo, i.e. it is considered as a transfer. At the level of the national economy taxes are probably better regarded as exchange (e.g. as the purchase of public goods). This implies that these incomes at the micro-level do not add up to the macro-level.

All concepts of income are conditional upon the choice of the production boundary. Two important requirements can be imposed on concepts of income and their production boundaries: comparability in time and space and measurability. In most cases, a strong trade-off between both requirements exists. A difference in preference for these requirements also justifies some differences between concepts of income. For example, stressing measurability in money terms can lead to the choice of a production boundary and a related concept of income excluding unpaid household services and pollution. The weight which is attached to each requirement may differ according to the level of analysis. For example, at micro-level comparability between enterprises is of importance in judging performance, while at macro-level comparability between groups of resident and non-resident enterprises and comparability in time of a (homogeneous) group of enterprises is at stake. The possibilities (or costs) of measurement may also differ greatly at different levels. For example, measurement of the amount of pollution could be feasible at the macro-level, but not at the micro-level.

The present SNA does not contain many concepts of income which are relevant for economic analysis. In the SNA concepts of income are part of an accounting system which aims at an integrated and consistent description of a country's economic processes. The SNA intends to be an accounting system in which differences in structure between countries do not matter. Comparability between national accounting figures like national income is regarded very important. In a flexible national accounting system set up as an organized group of information sets, the registration of concepts of income is rather different. It should take into account the different purposes, requirements and actual circumstances at different levels and for different entities. This means that the one-side and convulsive emphasis on comparability between countries is abandoned. We should endeavour the construction of such a flexible system. This system would remain intelligable and systematically organized if it were built using a systems view on National Accounting.

Notes

1) The production frontier can be defined including existing institutional restrictions.
2) Thus in figure 2 a distinction is made between on the one hand flows changing stocks within the accounting system (additions to 'capital') and on the other hand flows changing stocks outside the accounting system (final consumption). Analogously, to some extent, Hill distinguishes two kinds of services: services affecting goods and services affecting persons (Hill, 1977). If goods indicate capital and persons indicate stocks outside the accounting system, both distinctions coincide. However, our distinction is more general and stresses that the distinction is dependent on the choice of the production boundary. As a corollary, services can be regarded simply as flows and goods as stocks.
3) The economy in figure 2 is closed because no interactions with other economies have been taken into account. Notice however that the accounting system constitutes only part of the economy. Moreover, the accounting system is an "open" subsystem of the economy. 'Factor services' are the inflows and final consumption the outflows of the accounting system.
4) Drawing a parallel to thermodynamics, the inflow-outflow identity can be interpreted as the first law ('conservation of energy') about the system's production processes. The second law of thermodynamics yields the notion of a world in which 'engines' convert energy only at the price of some irreversible waste and useless dissipation (transformation losses). So, some of the system's energy cannot be reversed anymore, i.e. is not usable for transformation anymore. This implies that without any external inflow of energy, in the end the systems production processes will have to stop, due to lack of usable energy. As a consequence, 'income' will also become nil. This seems to be the view enhanced by some ecologists, who consider the world as a closed system without external inflows (therefore neglecting e.g. use of other planets' raw materials and solar energy).
5) Stone (1947, p. 24) remarks: "The same is true where income and expenditure components are used to work out behaviouristic or

institutional coefficients such as the propensity to consume, the relation of imports to national income, etc. It may be argued that, in this kind of work, those definitions should be chosen which give rise to the simplest enduring regularities. Thus, such questions as whether corporate taxes should or should not be included in national income may, if they cannot be settled on theoretical grounds, be decided by econometric analysis".

6) Kaldor (1955, p. 168 in Parker and Harcourt) uses a different -more Swedish- definition of ex post income. His ex post increase in capital equals the difference between the actual value of assets at the end of the period and "the revised value of the assets relating to the beginning of the period, as estimated at the end of the period (i.e., the value the assets would have possessed if the structure of the expectations at the end of the period had been the same as at the beginning; and if the events occurring during the period had been correctly foreseen at the beginning)".

7) See e.g. Faulhaber and Baumol (1988), who regard several economic concepts as 'inventions' but not as actual descriptions; they give many revealing examples of differences between economist's inventions and their actual use -implicitly or explicitly- by economic subjects.

8) The term 'dynamic economics' refers to the point of view adopted by i.a. Frisch and Samuelson. "They distinguish between statics and dynamics not in terms of the stationariness or nonstationariness of the economy studied, but upon the degree of emphasis of the analysis upon the *process* of change. A dynamic analysis is one that focuses upon some aspect of the process of change: its mechanism, its equilibrium, or its optimality, or whatever standard one chooses to apply. Statics is a method of analysis that deals with a world in which change occurs but the analysis concerns itself with *other* characteristics of the system" (Baumol, 1972, p.51 in Spiegel and Samuels).

9) Gross value added of enterprises can be calculated without using arbitrary depreciation schemes, but gross value added of the government can only be calculated by using such schemes (assuming that government's gross value added is calculated by adding up costs like wages and depreciation while gross value added of enterprises is

computed by substracting their intermediate consumption from their sales values). So, for enterprises gross value added figures are in general more reliable and for the government net value added figures. Typically, gross domestic product figures will usually be more reliable than net domestic product figures.

10) That this equality is just a bookkeeping device implies also that primary income and value added can not be estimated separately. So, in fact there is only one way to measure national income and GDP. The other two methods (see section 3) result only in the 'right' figure by using the bookkeeping equalities.

11) For a general discussion of linearity and aggregation in economics, see e.g. Lancaster (1966). For a general methodological discussion of wholes and sums, see e.g. Nagel (1961), pp. 23-25, 380-397, 535-546, 568-575.

12) Hicks (1948, p. 169) states: "But surely there is another classification which is intensely relevant- that into expenditure which confers a direct benefit upon particular individuals, and expenditure which confers an "indivisible" or "unallocable" benefit upon the community in general".

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NA/01 Flexibility in the system of National Accounts, Van Eck, R., C.N. Gorter and H.K. van Tuinen (1983).
This paper sets out some of the main ideas of what gradually developed into the Dutch view on the fourth revision of the SNA. In particular it focuses on the validity and even desirability of the inclusion of a number of carefully chosen alternative definitions in the "Blue Book", and the organization of a flexible system starting from a core that is easier to understand than the 1968 SNA.

NA/02 The unobserved economy and the National Accounts in the Netherlands, a sensitivity analysis, Broesterhuizen, G.A.A.M. (1983).
This paper studies the influence of fraud on macro-economic statistics, especially GDP. The term "fraud" is used as meaning unreporting or underreporting income (e.g. to the tax authorities). The conclusion of the analysis of growth figures is that a bias in the growth of GDP of more than 0.5% is very unlikely.

NA/03 Secondary activities and the National Accounts: Aspects of the Dutch measurement practice and its effects on the unofficial economy, Van Eck, R. (1985).
In the process of estimating national product and other variables in the National Accounts a number of methods is used to obtain initial estimates for each economic activity. These methods are described and for each method various possibilities for distortion are considered.

NA/04 Comparability of input-output tables in time, Al, P.G. and G.A.A.M. Broesterhuizen (1985).
It is argued that the comparability in time of statistics, and input-output tables in particular, can be filled in in various ways. The way in which it is filled depends on the structure and object of the statistics concerned. In this respect it is important to differentiate between coordinated input-output tables, in which groups of units (industries) are divided into rows and columns, and analytical input-output tables, in which the rows and columns refer to homogeneous activities.

NA/05 The use of chain indices for deflating the National Accounts, Al, P.G., B.M. Balk, S. de Boer and G.P. den Bakker (1985).
This paper is devoted to the problem of deflating National Accounts and input-output tables. This problem is approached from the theoretical as well as from the practical side. Although the theoretical argument favors the use of chained Vartia-I indices, the current practice of compilating National Accounts restricts to using chained Paasche and Laspeyres indices. Various possible objections to the use of chained indices are discussed and rejected.

NA/06 Revision of the system of National Accounts: the case for flexibility, Van Bochove, C.A. and H.K. van Tuinen (1985).
It is argued that the structure of the SNA should be made more flexible. This can be achieved by means of a system of a general purpose core supplemented with special modules. This core is a fully fledged, detailed system of National Accounts with a greater institutional content than the present SNA and a more elaborate description of the economy at the meso-level. The modules are more analytic and reflect special purposes and specific theoretical views. It is argued that future revisions will concentrate on the modules and that the core is more durable than systems like present SNA.

NA/07 Integration of input-output tables and sector accounts; a possible solution, Van den Bos, C. (1985).
The establishment-enterprise problem is tackled by taking the institutional sectors to which the establishments belong into account during the construction of input-output tables. The extra burden on the construction of input-output tables resulting from this approach is examined for the Dutch situation. An adapted sectoring of institutional units is proposed for the construction of input-output tables.