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December 2011

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MPRA Paper No. 35391, posted 13 Dec 2011 21:16 UTC

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Three centuries of macro-economic statistics

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Eagle Economic & Statistics Working Paper 2011-02

(This paper is broadly the same as chapters 2, 3 and 4 in F. Bos, 2009, The National Accounts as a Tool for Analysis and Policy; In view of History, Economic Theory and Data Compilation Issues, VDM Publishers, Saarbrücken)

Abstract

This paper describes the history of the national accounts starting from the incidental estimates by Petty, King and Davenant in the seventeenth century. The period 1930-1950 was a revolution in terms of the roles and uses of the national accounts, e.g. the discovery of input-output analysis, purchasing power parities and macro-econometric modelling and the Keynesian revolution in economic thinking. Most of these new uses also reinforced each other. These uses were also closely linked to the economic circumstances: the economic crisis of the thirties, the Second World War and the need for recovery afterwards stimulated an active role of the government. In 1947, for the first time a report on national accounting concepts was published by the UN. Some years later, the first official guidelines were published. Since then, national accounting theory and practice have increasingly been dominated by these guidelines. The period since the Second World War can thus best be labelled as 'the era of the international guidelines'. Many innovations in national accounting have been made since the Second World War. After gaining wider acceptance and maturity, a great deal of them has been included in the guidelines and some others have not. Since the Second World War, the national accounts statistics published by countries all over the world have changed drastically in scope, concepts, frequency and detail. These developments in national accounts practice do not have a straightforward relationship to the international guidelines. Due to the European Unification, the supply of national accounts in Europe has been improved dramatically.

Key words: History of national accounts, History of input-output analysis, Kuznets, Petty, King, Davenant, Vauban, Quesnay, Fleetwood, Boisguillebert, Keynes, Hicks, Frisch, van Cleeff, Clark, Meade, Stone, Tinbergen, Lindahl, Goldsmith, Copeland, History of international guidelines of national accounting

JEL code: B1, B2, B41, C82, E01, E60, O11, O20, O47

1. Introduction

In this paper, the historical backgrounds of the present national accounts are described. Section 2 provides an overview of the developments from the seventeenth century unto the Second World War. Immediately after the Second World War, the first international guidelines on national accounting were issued. This started a new era in national accounting, an era dominated by international guidelines. In section 3 the conceptual developments since the Second World War are described, while section 4 is devoted to the developments of the national accounts as a statistic.

2. NATIONAL ACCOUNTING FROM THE SEVENTEENTH CENTURY UNTO THE SECOND WORLD WAR

National accounting for specific purposes

2.1 Introduction

In the second half of the seventeenth century, the history of national accounting started by some early estimates of national income. This is the period in which mercantilism started to decline, the first germs of liberal economic thought were popping up but where Adam Smith's *Wealth of Nations* is still 100 years to go. The early estimates are discussed in section 2.2¹.

For national accounting, the 1930s and 1940s proved to be revolutionary decades in terms of the role and uses of national accounts, e.g. the discovery of input-output analysis, purchasing power parities, macro-econometric modelling and the Keynesian revolution in economic thinking. These decades were also a revolution in terms of the development of national accounting concepts and methods. This period is the topic of section 2.3. A summary of the developments unto the Second World War is provided by section 2.4.

2.2 The early estimates: from 'Political Arithmetick' to 'Social Accounting'

The origins of the present national accounting systems can be traced back to the first national income estimates by Petty and King in, respectively, 1665 and 1696². At roughly the same time, in France estimates of national income were made by Boisguillebert and Vauban. It is not certain whether these estimates were influenced by the estimates in England. The estimates by Petty and King were unique milestones as they were not equalled in scope and quality in the next two hundred years(!); the only exception were the estimates by their 'intellectual debtor' Davenant in 1698 (see Studenski, 1958, p. 40).

Petty and King

In common with all early estimates of national income, the estimates of Petty and King were practical and directed at concrete policy issues. Petty "wanted [firstly] to prove mathematically that the State could raise a much larger revenue from taxes to finance its peace and wartime needs, and

¹ For a fuller account, we refer to Studenski (1958); about early English estimates, see also Stone (1997). Maddison (2003 and 2005) provides a historical overview mainly restricted to the measurement of economic growth.

² These estimates were published later: Petty's estimates were in 1691 and those of King in part by Davenant in 1698 and in full not until 1802.

that it could do so by more equitable and less burdensome forms of taxation ... Secondly, Petty wanted to disprove once and for all the notion that England had been ruined by the Revolution and foreign wars and was no match, either militarily or commercially, for Holland and France" (Studenski, 1958, p. 27, 28). King also draws clear political conclusions from his estimates:

"the Warr cannot well be sustain'd beyond the year 1698 upon the Foot it now stands, unlesse

1. The Yearly Income of the Nation can be Inceas'd.
2. Or the Yearly Expence Diminish'd.
3. Or a Forreign or Home Credit be Obtain'd or Establish'd.
4. Or the Confederacy be Inlarg'd.
5. Or the State of the Warr Alter'd.
6. Or a General Excise, in effect Introduced." (King, 1936, p. 47).

Nevertheless, Petty as well as King recognised also the more general advantages of estimating national wealth and income. King states that information on a country's wealth and population is a "Piece of Political Knowledge, of all others, and at all times, the most useful, and Necessary" (King, 1936, p. 13). Petty went even further by advocating that in socio-economic discussions "no word might be used but what marks either number, weight, or measure" (Studenski, 1958, p. 27).

The estimates by King can be regarded as improvements on those of Petty. We will shortly discuss the three main features of King's estimates.

Like the estimates of Petty and the earliest estimates in France, King employs a *comprehensive concept of production and income*. This concept is still used in the current international guidelines. According to this concept the production of goods as well as services generates income.

The second important feature of the estimates by King is that they already represented the three ways of estimating domestic product: net production, distribution of income and expenditure. The estimates of Petty and most estimates up till the 1930's only covered one or two ways.

The third important feature of the calculations by King was their remarkable coverage. He presented not only the total annual national income, expenditure, and saving, but also their distribution by social and occupational groups, a breakdown of national income by type of income and an estimate of wealth (gold, silver, jewels, furniture, livestock, etc.). Like Petty, King provided a comparison of the national incomes and wealth of England, Holland and France. International comparison, which is a major objective of the international guidelines, was therefore already present

in Petty's and King's pioneering estimates. King's estimates contained also time series of the period 1688-1695 of national income, expenditure and taxes received.

The fourth important feature of King's work is that he used his time series to forecast income, expenditure and tax revenue for the years 1696, 1697 and 1698. This type of use of national accounting figures dates therefore also back to the earliest estimates of national income.

From a modern perspective, the major limitation of King's work is that all estimates are in current prices. The first price index numbers were invented only some years later by Fleetwood (1707)³. However, the idea of deflating national income is much more recent and originates from Lowe in 1823 (see Studenski, 1958, pp. 107-109).

Lowe used his national income estimates to calculate the tax burden. He related them to the taxable income remaining after deducting the subsistence incomes that could not bear any taxation. He did this for the national incomes of specific years in the preceding three decades, calculated first at current prices and next at prices of 1792. Lowe devoted considerable space to the effects of inflation on fiscal policy. He was particularly concerned over the increase in the burden of public debt on the shrinking money value of national income. He proposed that the government enact a tabular standard that would control the value of money and the payments of interest and wages. This tabular standard was to be based on the "power of purchase" of money in terms of basic commodities and could be applied on a voluntary basis.

For calculating national income, King used net product estimates for agriculture, i.e. he deducted from the revenues of the crop the expenditure on the seeds. However, he did not systematically use value added as a concept. This concept originates from Young (1770; see Stone, 1997, pp. 141-181). For calculating value added in agriculture, Young did not only deduct the costs of seed, but also costs of maintenance and repair, e.g. of buildings, vehicles and horses.

³ The issue addressed by Fleetwood was the interpretation of values in old statutes, entitlements, laws and regulations (see Stone, 1997, 117-140). For example, according to fifteenth century college statutes in Oxford, a fellow should vacate his fellowship if he came in possession of an estate by inheritance or of a perpetual pension worth of 5 pounds per year. According to Fleetwood, corrections should be made for all price changes during the past two centuries. He also mentioned similar problems with the fines for stealing mentioned in old laws and the level of income which entitled to vote in parliamentary elections. To translate such figures into current prices of several centuries later, he provided an overview of price changes for five commodities (wheat, oats, beans, ale and cloth) and recommended to calculate an unweighted index of average price change.

Table 2.2.1 Major events in the early estimates of national accounting

Year	Event
1660-1710	First national income estimates; in England by Petty, King and Davenant; in France by Boisguillebert and Vauban
1707	First index-numbers by Fleetwood
1760	Tableau économique by Quesnay: economic accounts used as a primitive growth and general equilibrium model; precursor of input-output tables
1770	The concept of value added invented by Young
1790-1800	First national income estimates in Russia
1798-1804	First national income estimates in the Netherlands
1805	First national income estimate in Germany
1823	First national income estimates in constant prices by Lowe
1843	First national income estimates in the USA
1886	First official national income estimates by the government (Australia, Coghlan)
1860-1900	First national income estimates in Austria, Australia, India and Greece
1915	W.I. King (USA): one of the last national income estimates with clear policy conclusions
1920	The economic consequences of the peace by Keynes: using national accounts statistics to assess the dramatic economic consequences of a major political agreement
1920-1930	Private institutions publish national income studies, e.g. university institutes in Sweden and Norway, USA: Brookings Institutions, NBER, National Industrial Conference Board; Austria WIFO;
1925-1940	More official national income estimates (e.g. Greece, Canada, Soviet Russia, Germany, Netherlands, New Zealand, USA and Turkey)

Vauban

In France, at the start of the eighteenth century, Vauban proposed a major tax reform (see Studenski, 1958, pp. 55-60). Most of current taxes were to be abolished, as they were inequitable—the small incomes carried nearly all the tax burden—and responsible for poverty. They should be replaced by an income tax, levied at a uniform rate of 5% to 10%, depending on general economic conditions. The income tax should consist of two parts: a levy in kind on agricultural produce and a levy on all money incomes, i.e. on the rent of houses, profits of businesses and grain mills, the operation of public properties, wages, pensions and the fees of government offices. In addition to the income tax, current taxes on salt, postal charges, customs duties and taxes on luxury goods like tea, coffee, chocolate, brandy and gilt coaches should be retained and a tax on wine, cider and beer consumed in public house should be added.

He then estimated the potential revenue of his tax reform. To this end, he made an estimate of the major elements of French national income, but did not present an estimate of total French national income. He was also not aware of the need and fairness for tax purposes of distinguishing between the gross and net value of agricultural production.

Vauban was a military engineer world famous for his fortifications and tactics for attacking and defending them. He was decorated by the French king Louis XIV with every conceivable order

of distinction. He made his proposals for tax reform after his retirement. However, these proposals were not all appreciated by the ruling class. At the court, Vauban fell therefore into disgrace and he died some months later.

Quesnay's zigzag diagram

In 1758, nearly one century after the estimates by King and about half a century after the estimates by Vauban, Quesnay published his zigzag diagram (see Meek, 1963 and Spiegel, 1983, pp. 189-192). Its purpose was “to construct a fundamental Tableau of the economic order for the purpose of displaying expenditure and products in a way which is easy to grasp, and for the purpose of forming a clear opinion about the organization and disorganization which the government can bring about” (Translation by Meek, 1963, p. 108).

The zigzag diagram shows successive rounds of revenue and expenditure by farmers (“the productive class”), landlords (“the mixed class”) and artisans (“the sterile class”)⁴. In the first round, the landlords spend 2 thousand livres: 1 thousand livres on farm products and 1 thousand livres on manufacturing products. The farmers spend 5 hundred livres on own produce (e.g. as seeds and food) and 5 hundred livres on manufacturing products of the artisans (e.g. machinery, pottery, clothing). They are assumed to produce with these inputs 2 thousand livres on farm products. The net revenue over the production costs is thus 1 thousand livres. This surplus accrues to the landlords as rent on land or as interest on advances. The artisans spend 5 hundred livres on farm products (e.g. food) and 5 hundred livres on manufacturing products. The artisans are assumed to be not productive (“the sterile class”), i.e. the value of their output is equal to the value of their inputs and they do not generate a net surplus.

In the second round, the net surplus of 1 thousand livres is spend by the landlords in the same proportion as in the first round. This second round generates a surplus of 5 hundred livres. After approximately twelve rounds, each of the two working classes has reproduced its subsistence income; in addition, the farming class has produced another net revenue of 2 thousand livres for the landlord.

Quesnay's zigzag diagram can be interpreted as an input-output table for a closed economy⁵. This is shown in table 2.1. The farmers produce agricultural products with a value of 5 and the artisans produce products with a total value of 2 (see the first two columns). The farmers' intermediate inputs are agricultural products (1, e.g. seeds) and manufacturing products (1, e.g.

⁴ There are several versions of the zigzag diagram.

⁵ This was first demonstrated by Phillips (1955). He showed that a particular form of the Tableau (the so-called formula form) could be transcribed into a closed Leontief-model. Our presentation is different and inspired by the supply and use tables in the current international guidelines on the national accounts (SNA93 and ESA95).

pottery). The value added is 3: subsistence income is 1 and the net surplus of 2 accrues to the landlords. The artisans' intermediate inputs are only manufacturing products (1). The value added is 1 which consists fully of their subsistence income. All the income (value added = subsistence income and net surplus = 4) is spent on agricultural products. In this way, the use of agricultural products is equal to the supply of agricultural products (= output = 5). The same applies to the supply and use of manufacturing products.

	<i>Inputs of production</i>		<i>Final consumption</i>			<i>Total Use</i>
	Farmers	Artisans	Farmers	Artisans	Landlords	
Use of agricultural products	1	0	1	1	2	5
Use of manufacturing products	1	1	0	0	0	2
Subsistence income	1	1				
Net surplus	2	0				
Output at basic prices	5	2				
P.M. The net surplus of farmers accrues to landlords and						
all income (subsistence income & net surplus) is spent on agricultural products						

In later editions, Quesnay's zigzag diagram becomes more complex: the mixed class contains next to landlords also other social groups like the clergy and soldiers. Their revenue does not only constitute of rent on land or interest on advances but also of taxes. The latter can be used to pay for public services provided by landlords, the clergy and the soldiers.

The ratios and rates of return in the diagram were no random figures, but drawn from detailed calculations made by Quesnay in earlier articles. The artisans were considered to be a sterile class, because the physiocrats observed that manufacturing and commerce only generated a (substantial) net surplus in case of clear monopolies.

Quesnay's *Tableau économique* was used as a primitive growth model that served to promote the idea that agriculture and not merchandising or manufacturing is the engine of economic growth⁶. According to the physiocrats, investments in agriculture should therefore be promoted, taxes and interest rates for agriculture should be reduced and tolls and other restrictions on trade in agricultural products should be abolished. The table also served to argue that the most efficient way of taxing is to directly tax the group that ultimately pays the tax, i.e. the landlords instead of the farmers or the artisans⁷. The table was therefore also a simple general equilibrium model.

⁶ On the interpretation of Quesnay's *Tableau économique* as a growth model, see Eltis (1984), in particular the first two chapters.

⁷ However, the physiocrats were certainly not enemies of the landlords, as they also argued that the net surplus of agriculture should be sufficiently high (e.g. by raising the prices of agricultural products) to pay the taxes and to give them sufficient income.

Quesnay's *Tableau économique* is a clear economic accounting model. As such it can be regarded as the first precursor of both the input-output tables and the sector accounts. The estimates by King and Petty were systematic, but did not stress the circular flow of income and expenditure and the interactions between socio-economic groups.

Smith

Adam Smith had clear reservations about *Political Arithmetick*, in particular because he doubted "the exactness of ... these computations" (Smith, 1776, Book IV, chapter V, part b, paragraph 30). Nevertheless, for some purposes, Smith deemed the calculations sufficiently accurate. For example, he suggested to stimulate the supply of corn for the home market and the domestic production of corn by stimulating the inland corn trade and not by influencing foreign trade, because "the proportion of ... grain imported into Great Britain to that of ... grain consumed, it has been computed ... , ... does not exceed that of one to five hundred and seventy" and "the importance of the inland trade must be to that of the exportation trade as thirty to one" (Book IV, Chapter Vb, paragraph 29).

For three quarters of a century, Smith was very influential in his argument that labourers in agriculture as well as in manufacturing, commerce and the transportation of goods were to be regarded as 'productive'. However, unlike King, he still rated "the whole civil and military personnel of government, the professions, the domestics, and others engaged in the performance of personal services and the services of dwellings" (Studenski, 1958, p. 19) as unproductive labourers. "He considered the national product to be constituted solely of commodities, and the national income ... to be composed of wages, rent and profit (including interest) derived from the production of these articles" (Studenski, 1958, p. 19). Smith's view was supported by among others Ricardo, Malthus, James Mill and John Stuart Mill, but became increasingly subject to criticism by, e.g., Say, McCulloch, Senior, Walras and Marshall.

At the end of the nineteenth century, it appeared that Smith's material concept of production had received the final blow. But more than a half century later, this concept formed the basis of the Material Product System (MPS69), that is the accounting conventions used in the communist countries (see further sections 3.2 and 3.3). Studenski (1958, p. 22) argues that the MPS69 is based on the ideas of Marx, and, more in particular, based on a mistaken interpretation of it. However, it could also be argued that they are based on the ideas of the intellectual father of capitalism, i.e. Adam Smith.

The slow start of political arithmetic in the Netherlands

Political arithmetic had a surprisingly slow start in the Netherlands⁸, by far the richest country in the world⁹ in the seventeenth century. In 1798, on request of the national assembly of the new Batavian republic, Hora Siccama and van Rees made a plan for revising the tax system. Their task was to investigate how taxes could be levied efficiently, in proportion to personal wealth, with as low as possible tax rates and sufficient for financing government expenditure. Estimates of national income, government expenditure and current and potential tax revenue were included in the plan. The plan, including a proposal for introducing personal income and wealth tax, was not executed due to a revolt and a change in government.

In 1804, Metelerkamp published a study of 600 pages on the economic and military power of the Batavian republic over the last fifty years and in comparison with seven other countries (Great Britain, France, Russia, Prussia, Sweden, Denmark and Saxony). The study was published in Dutch and also translated in French. He compared the size of the country, the number of inhabitants, national income, national wealth, imports and exports, income and outlay of the government, government debt and the number of soldiers and warships. However, the comparison of national income was limited to the Netherlands (including Belgium), Great Britain, France and Saxony.

Metelerkamp's study was a reaction to the pessimistic mood in the Netherlands: people thought their country was in decline, full of debt, loosing morale and fighting spirit and with shrinking revenue from international trade and colonies (Metelerkamp, 1804, Introduction, part I). He wanted to investigate whether facts corroborated these feelings and opinions and what policies should be pursued. He concluded that:

- The example of Russia shows that government should interfere at least as possible with domestic trade (hunting, fishing, farming, craftsmanship and commerce); this stimulates employment, income and the supply of products.
- Dutch welfare did not decline during the past fifty years; some sources of income declined indeed, but were compensated by the increase in other sources of income;
- Welfare in other European countries increased. This implied a relative decline of Dutch welfare. However, Dutch welfare still surpasses welfare in other European countries.
- During the last century, government revenue increased in other European countries much more than in the Netherlands. Relatively low taxes may have been the reason for the much more rapid increase

⁸ On the history of the Dutch national accounts, see Bos (2006a).

⁹ In 1700, Dutch GDP per capita was 70% higher than that of England and 130% higher than that of France (see Maddison, 2003, p. 58-59).

in Dutch government debt. However, the tax burden in the Netherlands is now excessive and will in the long run certainly ruin the economy.

The relatively slow development of Dutch ‘political arithmetick’ is surprising considering the dominant role of Dutch republic in trade and science¹⁰ in the seventeenth and eighteenth century. A related surprising fact is the very limited development of economic theory in the Netherlands compared to England and France. How can it be that the scientific revolution in the seventeenth century, in which experimentation and measurement played a major role, flourished in Holland, England and France, stimulated economic thinking and measurement in England and France but did not in Holland? How can it be that the by far richest country in the world did not develop sophisticated economic thinking and measurement?

Van Zanden¹¹ suggests that the richness of Holland and the decentralized state may explain this puzzle. The very favourable position of Holland and its decentralized form of government in the seventeenth century did not stimulate economic thinking and measurement. In contrast, in England and France the relatively backward position was regarded as a problem. Mercantilism with its policies of protection, government intervention and privileges for merchants and traders was first offered as a solution. However, these policies were not effective. Economic thinking and measurement in England and France were then in particular motivated by arguing against mercantilism and in favour of Dutch policy and institutions. According to Petty, Dutch institutions favoured economic growth. Religious tolerance encouraged skilled immigration. Economic enterprise was stimulated by clear property rights, an efficient legal system, sound banking and limited restrictions on international trade. Taxes were high but levied on expenditure rather than income. This encouraged savings, frugality and hard work (see Maddison, 2003, p. 80).

The negative influence of the decentralized government on data need is well explained by Klep and Verheusen (2002, p. 220): “As a consequence of the very loose federal nature of the Republic ... there was almost no ‘national’ organised control of the country that could have created a system of national measured data. There was nothing like the French system of regional statistics that would inform the centre about local conditions around the country in a systematic way. Most Dutch control was exerted in provincial and urban political bodies with high levels of autonomy. At the same time, power was increasingly concentrated in the hands of a closed patriciate. Therefore, ... the Dutch culture of control can be characterised as decentralised, segmented, and informal.

¹⁰ Internationally famous scientists living and working in Holland were e.g. Huygens, Descartes, Swammerdam, van Leeuwenhoek and Linnaeus.

¹¹ He gave this explanation in a email to the author.

Measured data mattered little unless this information pertained to financial problems; moreover, even when such data did exist they were kept secret. During the eighteenth century institutional change and social policy were not a characteristic of this country, and could therefore not inspire government statistics, apart from a handful of fiscal reorganization in certain provinces. ... The Batavian revolution of 1795 ... created a national political and scientific space as well as a great need for national information in which statistics could develop.”

A supplementary explanation for the slow development of Dutch national income estimates is provided by Fritschy¹². A general income tax was not being considered in any of the Dutch provinces. For discussing tax policy, national income estimates were thus irrelevant.

The first Dutch estimates, by Hora Siccama and van Rees in 1798, by Keuchenius in 1803 and by Metelerkamp in 1804, support these explanations. At the end of the eighteenth century, the Netherlands had lost most of its economic power, international trade was ruined by England, government debt had grown rapidly due to the successive wars and the republic became more a centralized state. These changed circumstances raised questions about economic performance, sustainability of government finance and the design of the tax system. This stimulated the development of national income estimates.

Keynes' The economic consequences of the peace

Directly after the First World War, Keynes wrote “The economic consequences of the peace” (Keynes, 1920). This polemic made him instantly world-famous. He was the official British representative at the start of the Paris Peace Conference, but resigned when it became evident that there was no hope for substantial modification of the draft terms of peace. He attacked the peace-treaty and the reparation payments imposed on Germany for not taking into account facts and economic logic.

On the basis of all kinds of statistics on national wealth in e.g. Belgium, France, Great Britain and Serbia, he estimated that the treaty implied that Germany had to pay the various allied powers 2 billion pound for direct war damage¹³ and 5 billion for pensions and allowances. He also calculated that Germany's capacity to pay was not sufficient for this. Transferable wealth (e.g. gold, silver, ships and foreign securities) was only about 0.5 billion pound and the rest had therefore to be

¹² Explanation provided by email to the author. She also pointed out the existence of the estimates by Hora Siccama and van Rees. These estimates were not mentioned in earlier overviews, like Den Bakker (1994).

¹³ Considering that much guesswork was included, he argued that the amount would certainly be between 1.6 billion pound and 3 billion pound.

paid over a number of years out of the net revenue from exports. However, considering the loss of major parts of former Germany (e.g. Alsace-Lorraine) and the loss in capital stock (e.g. ships, livestock, wear and tear due to lack of repair), the transferable part of national income would be less than 0.1 billion pound per year. He proposed to limit Germany's reparation payments well within her capacity to pay, to ensure a fair distribution of coal and iron and to establish a free trade union under the auspices of the League of Nations. Only in such a way, the European economy could be revived, avoid the perils of mass inflation and ensure a proper standard of living for the whole population.

Keynes' polemic could be regarded as a revolt of economics against politics and in this revolt national accounts statistics played a major role. It is still a major example of the use of national accounts statistics for (economic) policy analysis. It marked a radical shift in Keynes thought and its prophetic lessons were learned after the second world war, e.g. the Marshall aid and the European union. All these developments turned out to be very important for national accounting (see chapter 4).

The spread of the idea of estimation national income

In the period from King till the 1930s, the idea of estimating national accounting figures spread over many countries and the number, frequency and timeliness of the estimates increased. In 1900, national income estimates had been constructed for 9 countries (England, France, United States, Russia, Austria, Germany, Australia, Norway and the Netherlands). In 1930, this number had increased to 23 and by 1940 the number had climbed to 33. The compilation of annual estimates by the government was another development. This occurred for the first time in 1886 in Australia and for the second time in 1925 in Canada. In 1933, the number of countries had increased to 6: adding then Soviet Russia, Germany, the Netherlands and New Zealand. At the end of the 1930s official estimates were also available for the United States, Turkey, Yugoslavia and Switzerland (see Studenski, 1958, p. 156).

All early estimates of national income were practical and directed at concrete policy issues; this was a common feature of national income studies upto the 1920's. The study by W.I. King on the size, sources and distribution of income and wealth in the USA (King, 1915) can be regarded as one of the last national income estimates combined with economic and political interpretation¹⁴. The

¹⁴ The study focused on providing facts to answer questions like "If wealth and income are increasing, is not population increasing faster? Is not the increase of wealth recorded in the statistical reports of our government merely an illusion arising from fluctuations in the supply of the medium of exchange? If there has been an increase in the riches of the nation as a whole, has the increase been distributed to all classes of the population, or have the benefits been

policy issues addressed by these early estimates were national economic power and performance, poverty, unfair and inefficient taxation and sustainability of public finance. Often, several of these issues were discussed and the national accounts approach was essential for demonstrating that the various issues were intimately linked.

War, substantial economic decline and wide-spread poverty were circumstances that stimulated the early estimates. Also the availability of census data or income tax data was important; this partly explains the dominant role of the English estimates.

The ruling class was often not very happy with the national income estimates and the accommodating proposals for reform. Early national accountants were sometimes exiled (e.g. Radishchev in Russia) or fell into disgrace (e.g. Vauban in France); others may have feared the consequences of publishing their work and left it therefore unpublished. However, in the twentieth century -probably linked to advancements made in democracy- estimating national income became gradually to be perceived as a task of the government.

In many countries, also private institutions took the responsibility of regularly compiling national accounts statistics and producing national income studies. Examples are university institutes (e.g. in Sweden and Norway), economic research institutes (e.g. NBER, Brookings Institution and National Industrial Conference board in USA, Mitsubishi Economic Research Institute in Japan and WIFO in Austria¹⁵) or private and central Banks (e.g. the Bank of Nova Scotia in Canada). Such institutions reflect the interest of researchers, business, banks, pension funds and trade unions in national income estimates. They need such information for analyzing and monitoring the economy, calculating market shares and deciding on investment, loans, mortgages and wage negotiations.

monopolized by a favored few? Are the landlords, the capitalists, the captains of industry, or the wage earners receiving the principal share of the fruits of progress?" (King, 1915, p. 2). It also gives clear policy advice against unlimited immigration in the USA: "The working man in this country is far more prosperous than in most nations of the globe ... But ... the lot of the unskilled labor ... is a hard one ... the real wage of labor can be kept up only by protecting our workmen directly against foreign importations of labor. Without such safeguards, there seems to be no reason to suppose that we can prevent the wage level in the United States from settling gradually down to that of Europe. This would mean a ruthless cut in wages ... and the forcing down of unskilled labor to a mere subsistence level, turning back a century or more the hands of progress. Against the continuance of such a ruinous policy, it has become the duty of every patriotic American to register an vigorous protest." (King, 1915, pp. 205-207).

¹⁵ The WIFO was founded in 1927 by von Hayek and von Mises.

2.3 Revolutionary decades (1930-1950)

The period 1930-1950 turned out to be revolutionary decades for national accounting. Major features of this transitory period are:

- The start of official and regular national accounts statistics in a limited number of countries. These statistics were not directed at concrete policy issues, but were intended to provide information relevant more in general for policy and analysis.
- Invention of many new applications and uses of the national accounts approach, e.g. the Keynesian revolution in economic theory and policy, input-output analysis and econometric modelling.
- Revolution in national accounting concepts and methods, e.g. the birth of the first modern national accounting systems;
- Political and economic circumstances favouring a national accounts approach in policy and analysis (economic crisis of the thirties, the end of the gold standard, the second world war and the need for recovery afterwards).

Major changes in uses

In the period 1930-1950, national accounting was drastically transformed. It was a revolution in terms of the use of the national accounts (see table 2.3). Most of these new uses also reinforced each other. These uses were also closely linked to the economic circumstances: the economic crisis of the thirties, the second world war and the need for recovery afterwards stimulated an active role of the government. National accounts statistics turned out to be very useful in such circumstances for analyzing, monitoring, forecasting, discussing and planning the national economy.

Table 2.3 New applications and uses of the national accounts during 1930-1950

<i>New application or use</i>	<i>Who?</i>
Purchasing power parity: international comparison of real income	Clark
Systematic analysis of long term growth by using national accounts time series	Kuznets
Input-output analysis	Leontief
Econometric modelling of national economies	Tinbergen and Frisch
Keynesian revolution and the birth of macro-economics	Keynes
Analysing public finance in a macro-economic framework	Meade and Stone
Monetary policy linked to national income instead of gold	
Analysing balance of payments in a macro-economic framework	Meade

Clark and Kuznets

Colin Clark (see e.g. Clark, 1937 and 1940) introduced purchasing power parities and showed how to make international comparisons of real income. He also demonstrated how to make intertemporal comparisons. He even made a comparison between the level of well-being in the ancient world (Egypt, Greece and the Roman Empire at the peak of their powers) and that in the nineteenth century and the first half of the twentieth century! The influence of Clark's estimates was notable in, for example, the constant price calculations for the Netherlands in 1948. In the latter, the choice of the base year was the same as that in Clark (CBS, 1948, p. 50).

Simon Kuznets¹⁶ (see e.g. Kuznets, 1941) reconstructed national income and product accounts for the USA, first back to 1919 and eventually back to 1869. Such impressive measurement exercises were the input for investigating business cycles and long term economic growth. For example, what was the role of the various industries, what was the role of technology and innovations, what is the relationship between economic growth and inequality (the U-shaped Kuznets-curve) or between economic growth and urbanization, traffic congestion and pollution. These examples also illustrate that Kuznets was very well aware of the major differences between economic growth and welfare. According to Kuznets “As a general formula, the desirability of as high and sustained a growth rate as is compatible with the costs that society is willing to bear is valid, but in using it to judge economic problems and policies, distinctions must be kept in mind between quantity and quality of growth, between its costs and return, and between the short and the long run”¹⁷.

¹⁶ About Kuznets and his work, see e.g. Carson (1975) and Lundberg (1984).

¹⁷ Kuznets in the *New Republic* 1962, quoted by McDowall, 2008, p. 173.

Input-output analysis¹⁸ and commodity-flow accounting

Leontief developed input-output analysis, estimated detailed input-output tables for the USA and applied this new tool to all kinds of problems. For example, he estimated the resource costs of conversion to peace time production in 1945. “How will the cessation of war purchases of planes, guns, tanks, and ships ... affect the national level of employment? How many new jobs will be created by the consumers’ demand for an additional one million of passenger cars, how many of these jobs can be expected to be located in the automobile industry itself, and how many in other industries such as Steel and the Chemicals, the Coal and the Petroleum industries? How much additional freight traffic and revenue can the American railroads expect to derive from every billion dollars worth spent on post-war housing construction?” (Leontief, 1941, p.141). By calculating the relative factor intensities of imports and exports he discovered the Leontief paradox: why are American exports labour intensive, while American imports are capital intensive? On behalf of the United Nations, he developed a world input-output model with the environment as an “economic sector”. He used the model to study the environmental impact of expanding production as well as how to get more economic growth with limited additional environmental pollution.

For his seminal work on input-output analysis, Leontief was later awarded the Nobel Prize. Input-output analysis started not fully out of the blue. Precursors can be found amongst other things in Quesnay's zigzag diagram (“Tableau Economique”)¹⁹ and some of the equations relating input and output by Walras (see Stone, 1984). The crucial innovation contained in Leontief's article was that it formulated for the first time a "model connecting inputs and output, which made it possible to calculate indirect as well as direct inputs and thus to carry out the many, now familiar, analyses which depend on being able to do this" (see Stone, 1984). The formulae for calculating the cumulative indirect effects is therefore labelled the Leontief-inverse.

Commodity-flow accounting can be regarded as the statistical counterpart of input-output analysis, as commodity-flow accounts are a type of input-output table. Commodity-flow accounting started in Sweden (Lindahl), Denmark (Kampmann) and the United States (Kuznets). In Sweden,

¹⁸ See also Baumol (2000), Kurz and Salvadori (2000) and Pressman (2006, pp. 217-229).

¹⁹ Quesnay was a source of inspiration for Leontief: “The statistical study presented in the following pages may be best defined as an attempt to construct, on the basis of available statistical materials, a Tableau Economique of the United States for 1919 and 1929. One hundred and fifty years ago, when Quesnay first published his famous scheme, his contemporaries and disciples acclaimed it as the greatest discovery since Newton’s laws. The idea of general interdependence among the various part of the economic system has become by now the very foundation of economic analysis. Yet, when it comes to the practical application of this theoretical tool, modern economists must rely exactly as Quesnay did upon fictitious numerical examples.” (Leontief, 1941, p. 9).

the results of a ten-year project under the direction of Lindahl were published in 1937. In this monumental and well-thought out study, the inputs of industries were calculated by some form of commodity-flow analysis, i.e. as the sum of inputs received by that industry from other industries as computed from the production statistics of the other industries (adjusted for imports and exports). The Swedish study inspired work in Denmark by Kampmann on input-output tables, that included also estimates on national aggregates in constant prices²⁰.

In the forties and fifties, input-output analysis was developed more fully and many of its applications were proved to be successful analytical tools. In the international guidelines of 1968, input-output tables were explicitly linked to national accounting (see sections 3.2 and 3.3).

Econometric modelling

Tinbergen and Frisch pioneered in econometric model building covering the whole national economy. These models need national accounts data as an input and can be used to forecast the national economy or to analyse the economy and the consequences of alternative policy proposals.

In 1936, in advising the Dutch government, Tinbergen constructed the first econometric model of the business cycle covering the whole economy (Tinbergen, 1936). His stylized representation of the Dutch economy was not intended to detect the causes of the economic crisis in the Netherlands. Unlike religious socialists as van Cleeff, the socio-economic order was not a topic of study but taken as a given. The purpose was purely instrumental: to find the conditions which could bring about an improvement of the business cycle. He compared various policy measures, like devaluation, public works and reducing wages. His famous conclusion was that devaluation was the best policy. This was very much against the politics of the time, i.e. not only against the official policy of the government but also against the opinion of the socialist party.

At a meeting of the Dutch economic association also Tinbergen's method was ridiculed and labelled the 'night train'. According to professor Goudriaan, "we have been transported on the night train of his mathematical machinery, but I am convinced that one of the carriages has been uncoupled during the night and has brought us to a station that we would never have reached through realistic economic insights" (Jolink, 2003, p. 136).

Nevertheless, in September 1936, the guilder was devalued without the disastrous consequences that had been predicted by many. This contributed enormously to the reputation of Tinbergen and his new method.

²⁰ More information on these developments in Scandinavia can be found in Aukrust (1994, pp. 26-31).

Tinbergen's revolutionary model of 1936 was not based on a national accounting scheme, e.g. concepts like national income and final consumption by the government were absent. Nevertheless, it gave the development of national accounting in the Netherlands a head start. In order to provide a better empirical grounding to the econometric model, new and longer time series were needed and the quality of existing estimates was to be improved. This was the major reason for compiling new and better figures.

After the Second World War, the Central Planning Bureau (CPB Netherlands Bureau for Economic Policy Analysis)²¹ was founded with Tinbergen as its first director. However, in the early years, there was no role for econometric modelling. The Dutch economy was in ruins and an extensive system of rationing of imports, consumption and investment was put in force to make the most out of what was available. A more or less refined model implicitly assuming free interaction among the major economic variables was then of little use. Instead, a national accounting scheme ('the national budget') served as the overall framework to analyse supply and demand.

Starting from 1946, following UK-practice (see Meade and Stone, 1941) an update of this scheme was also included in the government's annual report on the government budget. In this way, the government budget was presented in a macro-economic framework.

In the CPB's Central Economic Plan of 1946 (CEP1946), first total production was estimated on the basis of the total number of labourers and their labour productivity while taking into account bottlenecks like the lack of capital in one branch or the lack of labourers in another branch. When the total supply of goods and services was known approximately, the demand for these goods and services was investigated for private consumption at subsistence level, other private consumption, restoration and investments and the government.

The methodology of the CEP1947 was quite different from the 1946 plan. It was much more detailed and was built up of separate plans made by governmental agencies for the various branches (e.g. textile, coal and metal). The separate plans were totalised, checked on their consistency and modified in order to bring them in line with the level of the estimated possibilities of consumption, investment, imports and exports. This use of a national accounting scheme for bottom-up planning fitted well with van Cleeff's ideas on planning. However, as recovery proceeded, the extensive rationing system was gradually relaxed. As a consequence, the modelling

²¹ The unique role of the CPB in the Dutch fiscal framework is described in Bos (2007a). Overviews of the successive CPB models are provided by Barten (1991) and Don and Verbruggen (2006). For a general overview of the history of the CPB, see Passenier (1994).

approach and taking account of economic behaviour became much more meaningful. Furthermore, a model could focus on addressing the major policy issues.

The first CPB-model was operational in 1953. It served as a basis for prediction and policy advice by the CPB for most of the 1950s. This was path-breaking, as modelling was elsewhere an academic exercise and considered as not suited for the work of official government institutions.

The 1955 model consists of 27 equations describing the major macro-economic aggregates as defined by the system of national accounts. Compared to the 1936 Tinbergen model, it takes a step forward in its compatibility with the national accounts, its use of cumulated cost shares from the 1938 input-output tables and in the explicit presence of policy variables. However, it scores lower because of the virtual absence of dynamics, the very limited price-quantity interaction and the somewhat weaker empirical basis.

The model was used to draft a table indicating the consequences of particular measures of economic policy ('a railway table'). For example, the effect of an indirect tax or wage increase on employment, investment, consumer prices and the current account of the balance of payments. The table enabled decision-makers to choose their favourite policy menu. The table reflects Tinbergen's new view on planning: policy makers should define the targets of government policy and a model should be used to investigate which instruments are the most effective and efficient in meeting these targets. This approach was extended and formalized in his book "On the theory of economic policy" (Tinbergen, 1952). This book stresses also that politicians should be aware that one policy tool can not serve to achieve two policy targets simultaneously. More in general: the number of policy tools should be at least as large as the number of policy targets.

Tinbergen's purely instrumental approach fitted very well in the Dutch pillarized society, where the four pillars (catholics, protestants, social democrats and liberals/free) all had their own organizations, like political parties, trade unions, employers' organizations, newspapers, sports clubs, schools and universities. After the Second World War, all pillars agreed that a national economic policy was required for economic recovery. This required pillar and class neutral insights. The national accounts framework and Tinbergen's modelling approach provided these.

Tinbergen clearly saw the necessity of a quantitative description of the national economy in terms of large groups of people, goods, etc. (Tinbergen, 1936, p. 67), but he did not present concrete proposals for a social accounting system, i.e. an accounting system in which the role of the various economic and social actors are explicitly shown. In the Netherlands, this role was played by Van Cleeff (1941a, 1941b). In 1941, he presented a simple set of accounts for the Dutch economy of 1938. Four sectors (trade, enterprises, government and consumers) and five accounts (a cash flow account, a financial account for shares, a commodity flow account, an income and outlay account

and profit account) were distinguished in a simple double-entry bookkeeping system. The figures were rather crude and the detail in the transactions very limited. For example, revenue by the government consist only of 'taxes', 'taxes' are only paid by consumers, government expenditure is limited to 'various income components' and no transactions with the rest of the world are shown.

Van Cleeff's purpose was to demonstrate that it is possible to present a concise and systematic overview of the national economy. Provided sufficient statistics are available, this overview could be meaningfully elaborated in many respects. He mentioned further specification of the various purchases and expenditure, adding a breakdown by industry or region and including a national balance at the begin and end of the year.

van Cleeff's system of national accounts was inspired by the analogy with the business accounts and by his ideas on planning and organizing the national economy. He compared the national government with the directors of a big firm, regarded the national accounts as the business accounts of the nation and stated that the government should draw up a business plan for the nation. The national accounts should therefore play a major role in the socio-economic planning advocated by van Cleeff.

Socio-economic planning was presented as an alternative to an unorganised capitalist economy and a communist economy. The economy should be organized as a firm, but -in contrast to communism- individual norms, values and wishes for personal development should be respected.

After the Second World War, van Cleeff joined Tinbergen at the newly founded Central Planning Bureau (CPB). He started as head of department I "Research on Economics of Planning" (Planhuishoudkundig onderzoek). His views on planning were ideologically the basis for the first years of the CPB. However, Tinbergen's new ideas on planning and the role of the CPB gradually started to dominate. Van Cleeff's normative approach of planning lost the battle with the new mathematical and instrumental approach developed by Tinbergen (see Van den Bogaard, 1998, pp. 55-59).

In Norway, Frisch, another pioneer in econometrics, not only stimulated but also pioneered himself in the development of national accounting systems (see Bjerve, 1996 and Aukrust, 1994). From the middle of the 1930s, Frisch emphasised the need for standardising the macroeconomic concepts, inter alia to facilitate comparisons between theories by different authors. Furthermore, precise definitions and definitorial relationships were required in order to develop macroeconomic models for the explanation of business cycles. He saw the national accounts as an instrument for showing the interdependence between the central and local government budgets and the rest of the economy. This could then be used to influence government policy and to restrain the free market system, as the latter worked so disastrously during the Great Depression.

Frisch defined the national accounts as "a survey not only of the national income in a certain year, or the national wealth at a certain point of time, but a fairly complete overview of the entire national economic operations during a year, arranged in such a manner that the relationships between the various data clearly emerge. The set-up must be done in such a way that the relationships in which we are particularly interested, appear with the necessity of bookkeeping. For instance, the change of wealth shall with the necessity of bookkeeping agree with the data on income, consumption, and saving" (Frisch, 1940).

Frisch devised a general accounting system in 1942 (the Ecocirc-system), which was more elaborated by Aukrust in 1949 (see Ohlsson, 1953, pp. 51-61). In Aukrust's system, a clear distinction was already made between current and capital transactions and between product flows and financial flows. Also the idea of quadruple-entry bookkeeping, i.e. double-entry bookkeeping which is also consistent for transactions between two sectors, was made explicit (see Aukrust, 1994, p. 41 and 42).

In 1943, Statistics Norway began calculations of the annual Gross National Product from 1935 on, and of the reduction of national wealth during the war. For the period 1940-1943, estimates were also made of exports and imports, the German use of goods and services and the residual public and private consumption. From 1946, estimates in the form of social accounts were published annually and presented as an integral part of the national budget transmitted to Parliament. In 1946 and 1947, Bjerve used national accounts as a pedagogical device in which he checked the internal consistency of forward-looking data in the national budget and the consistency of some historical data (see Aukrust, 1994).

A specific feature of the work by Lindahl and Frisch is that the development of national accounting concepts is regarded as an important step in improving and clarifying economic theory, e.g. of the Stockholm school. "Like Frisch, Lindahl strived to achieve a system of concepts as general as possible. ... the system had to be applicable both to ex ante and ex post values, and equally suitable for the description of micro-economic and macro-economic phenomena... the description at the micro level should be equally applicable to firms, households, or any subject" (Aukrust, 1994, p. 23).

At present, the link between econometric models and national accounting is still strong: the accounting logic is explicitly used in modelling national economies and national accounting figures are used as data input for estimating coefficients; the latter implies also that the concepts underlying these figures are used (see Klein, 1983).

Keynes published his 'General Theory' in 1936. This launched the Keynesian revolution and gave birth to macroeconomics. This revolution in economic theory had an enormous impact on national accounting. The Keynesian type of analysis established a direct link between economic theory and national accounting as both came to use the same macro-economic identities. A direct effect on national accounting was that another definition of national income and product became most popular. In order to establish a closer linkage between national income and various categories of expenditure, net national income at factor costs was more and more replaced by gross national income at market prices²².

The Keynesian type of analysis also threw a new light on the role of the government: a new responsibility for stabilising the economy was added. Accounting for this role of the government became necessary for economic policy analysis. This induced the introduction of accounting per sector, in particular the introduction of a sector government. As a consequence of the Keynesian revolution, the importance of national accounting figures for economic theory and economic policy increased and was more widely recognised. At present, the link is much clearer. It is therefore not surprising that even introductory textbooks in economics, like that of Samuelson and Nordhaus (1985), include a chapter on national accounts.

Keynes personally also stimulated the development of national accounting systems, in particular in the United Kingdom. He clearly saw the importance of national accounting for planning a national economy in times of war as well of peace. On his instigation, Stone and Meade prepared in 1941 estimates on national income and expenditure (Meade and Stone, 1941). These estimates were used to present government expenditure and revenue as part of a system of balanced tables describing the whole national economy. In this way, they became a tool in planning the British war economy (Stone, 1951, p. 84; Patinkin, 1976, p. 1109). A quote from Stone on his work during the war may illustrate this use:

"The main use of the work on national income and expenditure was to throw light on the magnitude of the problems of war finance, and for this purpose it was used both in discussions before the Budget and in the Chancellor's Financial Statement ... if substantial price increases in the free sector of goods and services and endless queues and confusion in the controlled sector were to be avoided, something had to be done to reduce the pressure of demand either

²² The increased popularity of gross concepts was also due to the specific war circumstances: inasmuch the replacement of capital could be postponed till after the war, it was important to present national income figures gross of the related capital consumption (see Studenski, 1958, p. 153 and Bos, 1992b).

by increasing taxation or by stimulating saving ... fiscal policy came to be directed not merely to the internal problems of financing government expenditure, but to the broader question of maintaining price and income stability throughout the economy" (Stone, 1951, pp. 86, 87).

The abolishment of the gold standard

In the thirties, countries left the gold standard. As a consequence, monetary policy needed a new anchor and was linked to national income. In order to avoid excessive inflation, the supply of money should grow in line with the nominal growth of domestic product corrected for changes in the velocity of circulation. During and directly after the second world war, several countries (e.g. USA, UK, France and the Netherlands) used the national accounts to estimate the inflation gap and investigate the size and effectiveness of various policy measures to be taken to avoid massive inflation, e.g. restrictions on the use of bank deposits or a big incidental capital tax. These studies include also Keynes' famous report *How to pay for the war?* (Keynes, 1940)²³.

The balance of payments and the national accounts

In 1950, Meade wrote his book "The balance of payments" (see Meade, 1951). In the first three chapters, the basic concepts of the balance of payments are clarified and linked to those in the national accounts. The importance of the various types of consistency are stressed. For example the consistency between net exports and a country's indebtedness to foreigners, between the balance of payments of various countries or between the balance of payments and the national accounts, e.g. private and public expenditure and saving, monetary circulation and inflation. In the remainder of the book, he used these accounting identities to analyse the consequences of various types of monetary and fiscal policy on the balance of payments. His exposition of the balance of payments and the national accounts is still the basis of modern text book expositions on international economics (see e.g. Krugman and Obstfeld, 1994, chapter 13).

Innovations in national accounting concepts and compilation methods

These decades were not only a revolution in terms of many new uses of national accounts. They were also a revolution in terms of the development of national accounting concepts and compilation methods. Both revolutions were not independent: they reinforced each other and often also the same persons were involved.

²³ This report also stimulated the work by Meade and Stone (1941), see above.

The works by Clark and Kuznets consisted of profound and detailed estimates that were accompanied by elaborate motivations of the concepts and statistical methods used. In the first chapter of "National Income and Outlay" (Clark, 1937), Clark expounds the purposes of national income measurement and its basic concepts. Examples of the latter are his discussion of the inclusion of the services of owner-occupied dwellings, the exclusion of the services of consumer durables, the exclusion of holding gains and losses and a possible 'deduction for any demonstrable exhaustion of natural resources' (Clark, 1937, p. 9). In "The National Income, 1924-1931" (Clark, 1932), he strongly complains about the condition of the British official statistics. He criticised for example the use of different classifications in various national statistics on employment (Clark, 1932, p. vii).

Much more than Clark, Kuznets was also a pathbreaking theoretician on accounting concepts and statistical techniques. Famous is his discussion in *Economica* with Hicks on subjects like the relation between changes in national income and welfare, the valuation of government output and the concept of intermediate and final product (Hicks, 1940 and 1948, Kuznets, 1948b). There are two other well known discussions in which Kuznets played the central role: the discussion in 1944 on his "National Product, War and Prewar" (Kuznets, 1944; Gilbert, 1944) and the discussion in 1948 on the New Department of Commerce Income Series (Kuznets, 1948a) with Gilbert, Jaszi, Denison and Schwartz (1948). Like Clark, international and inter-temporal comparison were a central focus of his work. As concerns statistical techniques, his contribution to the development of the commodity flow approach is most notifying²⁴ (Kuznets, 1938). Other examples in this respect are his discussion of data-processing techniques like interpolation and extrapolation and of the reliability of estimates (see e.g. Kuznets, 1941)²⁵.

Clark and Kuznets did not play a role in developing national accounting systems, i.e. a system in which sectors as well as accounts are used in presenting data. Kuznets saw it even as a "dubious addition to the theoretical equipment" (Kuznets, 1948a, p. 154)! The development of national accounting systems occurred simultaneously in Britain, the Netherlands and the Scandinavian countries.

A common feature of the pioneering work in Scandinavia (e.g. Frisch and Aukrust), the Netherlands (van Cleeff) and the United Kingdom (Meade and Stone, Hicks) was that they were explicit about the idea to use double-entry bookkeeping for describing the national economy. Fisher

²⁴ However, Lindahl already applied the commodity flow approach some years before Kuznets, see below.

²⁵ For a general overview of the work by Kuznets, we refer to Lundberg (1984). A discussion of his contribution to the development of economic statistics can be found in Studenski (1958) and Carson (1975).

had similar ideas some decades earlier in his 'The Nature of Capital and Income' (1919) (see Kenessey, 1994). In the United States, Fisher's ideas were further expounded by Copeland and Morris in the 1930s. However, the influence of this work on the introduction of double-entry bookkeeping in the international guidelines is at most indirect, i.e. by influencing the ideas of Frisch and Stone. Furthermore, it is a bit awkward to note that even Fisher's influence on official US-estimates seems to have been minor: "in the United States ... the introduction of double-entry national accounting in 1947 has little to do directly with Fisher, Copeland or Martin but a great deal with the UK experience regarding this matter" (Kenessey, 1994, p. 116).

In 1939, the League of Nations had requested for a report with guidelines in order to improve international comparability of national accounting figures, but the war delayed the progress on the report. In September 1944, representatives of the UK, the USA and Canada met in order "to exchange views ... and, if possible, to bring about uniformity in terminology and the treatment of controversial items" (Denison, 1947, p. 3). As a result of this meeting, the national accounts of the United States and Canada were revised, which made them more compatible with the Stone/Meade proposals of 1941 and the British national accounts (see Carson, 1975, p. 177). Immediately after the war, in December 1945, consultations on the United Nations report were resumed. This time also representatives from countries occupied during the war by Germany, like the Netherlands and Norway, could be present. The report was published in 1947 by the UN (UN, 1947) and consisted mainly of an appendix by Stone (1947).

This appendix can be regarded as the first fully worked out and detailed national accounting system (see Aukrust, 1986 and Carson, 1975, p. 178). Furthermore, the report was also path breaking in that it contained for the first time international recommendations on national accounting. However, the report should not be regarded as the first official guidelines of the United Nations: it was not approved by the statistical commission of the United Nations as official guideline, but referred to as a useful technical report; it was also not used as a guideline for submitting data to the United Nations.

2.4 Summary

In the last quarter of the seventeenth century, national accounting had a brilliant start in the work by Petty and King. Nearly one century later, Quesnay's zigzag diagram was the first precursor of modern input-output tables and sector accounts. Progress in national accounting was often slow and small and there were major cases of regress, like the production boundary used. Despite such

unfortunate intellectual detours, at the beginning of the twentieth century, the common stock of knowledge on national accounting had already become considerable. It included for example a comprehensive production boundary treating e.g. agriculture and government services as productive, the notion of three basic ways to estimate domestic product and the concepts of value added and constant prices.

All early estimates of national income were practical and directed at concrete policy issues; this was a common feature of national income studies up to the 1920's. They were therefore not only the start of measuring national economies, but implied also the start of quantitative economic policy analysis. The policy issues addressed were national economic power and performance, poverty, unfair and inefficient taxation and sustainability of public finance. Often, several of these issues were discussed and the national accounts approach was essential for demonstrating that the various issues were intimately linked.

Directly after the First World War, Keynes wrote "The economic consequences of the peace" (Keynes, 1920). This polemic made him instantly world-famous. It is still a major example of the use of national accounts statistics for (economic) policy analysis.

The number of estimates gradually increased all over the world, in particular after the First World War. Substantial progress in national accounting as an applied science was mostly absent until the 1930s and 1940s.

The period 1930-1950 was a revolution in terms of the roles and uses of the national accounts, e.g. the discovery of input-output analysis, purchasing power parities and macro-econometric modelling and the Keynesian revolution in economic thinking. Most of these new uses also reinforced each other. These uses were also closely linked to the economic circumstances: the economic crisis of the thirties, the Second World War and the need for recovery afterwards stimulated an active role of the government. National accounts statistics turned out to be very useful in such circumstances for analyzing, monitoring, forecasting, discussing and planning the national economy. These decades were also a revolution in terms of the development of national accounting concepts and compilation methods. For example, the first fully worked out and detailed national accounting system was published in 1947 (the famous annex of Stone in a UN-report).

3. CONCEPTUAL DEVELOPMENTS SINCE THE SECOND WORLD WAR

Expanding and standardising the conceptual framework

3.1 Introduction

In 1947, for the first time a report on national accounting concepts was published by the UN (the 1947 UN-report). Some years later (in 1951), the first official guidelines were published. Since then, national accounting theory and practice have increasingly been dominated by these guidelines. The period since the Second World War can thus best be labelled as 'the era of the international guidelines'. About fifteen years ago, the third 'generation' of guidelines has been issued (the SNA93 and ESA95). At present, a revised set of guidelines (SNA 2008 and ESA 2010) is being prepared. In section 3.2, the first UN-report and the four generations of official guidelines are introduced briefly. The constancy and change in these guidelines is discussed in section 3.3.

Many innovations in national accounting have been made since the Second World War. After gaining wider acceptance and maturity, a great deal of them have been included in the guidelines and some others have not. These post-war innovations are investigated in section 3.4. They also provide some backgrounds to the concepts in the international guidelines. A summary of the conceptual developments since the Second World War is provided in section 3.5.

In view of the current literature on national accounting, the value added of this chapter is twofold:

- It contains a rather unique comparison between the successive guidelines, including those currently being prepared;
- It provides a concise overview of the major conceptual developments since the Second World War. A somewhat similar, but much more extended, overview can only be found in Vanoli (2005).

3.2 Four generations of international guidelines

The first guidelines

The era of the international guidelines started in 1947 with the publication of the UN-report, which mainly consisted of Stone's appendix. Although it was a report on behalf of the UN, the system recommended was "based essentially on the model of an advanced industrial economy in which transactions in money are dominant" (UN, 1947, p. 24).

On request of the OEEC (the precursor of the OECD), official guidelines were written under the direction of Stone. These were the first official guidelines. The guidelines were to be used in planning the Marshall-aid. In 1951, a "Simplified System of National Accounts" was published (OEEC, 1951). In comparison with the 1947 report, this was truly a simplified system: only a current and capital account were distinguished and the number of sectors was limited to three (government, enterprises and households), without any subsectoring.

Such a 'simplified system' was deemed necessary, as the proposed system in the 1947 report was far too ambitious for most OEEC-countries. In the beginning it was probably even unattainable for the countries most advanced in national accounting. The 1951 foreword contains a clear motivation of its choice of a very simple system: "any system of the kind described here must take account of the kind of information available in different countries. The standard taken is one which in a broad way should be well within the competence of those countries which are advanced in national accounting work but beyond what can be expected in those countries where this work is less advanced" (OEEC, 1951, p. 5).

In 1952, the 'Simplified System of National Accounts' was replaced by the "Standardised System of National Accounts" (OEEC, 1952). This new OEEC-guideline took account of the experience in implementing the simplified system. It contained more accounts, but in comparison to the 1947 report it was still very simplified.

Under the chairmanship of Stone, the UN issued a new guideline in 1953: "A System of National Accounts and Supporting Tables" (UN, 1953); this report is frequently referred to as the first 'SNA' (SNA53). The guideline looked rather similar to the OEEC Standardised System of National Accounts. In contrast to the 1947 report and the OEEC guidelines, the UN report was also intended to be of use for developing countries. This difference in orientation was only reflected in a somewhat extended production boundary, i.e. including also some types of non-market output. In 1956, a slightly revised version of the 1953 report was published.

Table 3.2 The successive guidelines on national accounting

1947	Technical report by the UN containing recommendations; including the famous annex by Stone: the first detailed and fully worked out national accounting system
1951-1953	First generation of international guidelines: OEEC guidelines of 1951 and 1952; UN guideline of 1953 (SNA53); very simple tables and accounts
1968-1970	Second generation of international guidelines: UN guideline of 1968 (SNA68), the European guideline of 1970 (ESA70) and the Material Product System of 1969 (MPS69) for communist countries
1993-1995	Third generation of international guidelines: joint guideline of 1993 by the international organizations (SNA93 by UN, IMF, World Bank, OECD and EC) and the European guideline of 1995 (ESA95)
2008-2010	Fourth generation of international guidelines: updates of the joint and European guidelines (SNA2008 and ESA2010)

The second generation: SNA68 and ESA70

In 1968, the UN published an entirely revised and much more detailed "System of National Accounts" (SNA68; UN, 1968). Aidenoff and Stone served as the main authors. The 1968 report takes a flexible view with respect to the attainability of its system: a very extended system is presented and countries can to a substantial extent determine their own priorities. For developing countries, a separate chapter is included with suggestions for priorities and some classifications especially useful for developing countries, e.g. the distinction between urban and rural areas or between modern and traditional modes of production.

In the late seventies, the UN published a number of supplementary guidelines. They clarified some issues not (well) covered in the SNA68, like balance sheets and reconciliation accounts, income distribution, constant prices and tangible assets.

In 1970, for the first time guidelines on national accounting of the European Communities were published (ESA70; Eurostat, 1970). The concepts in these guidelines were broadly the same as in the SNA68, but focused more on European circumstances, were a bit more precise, included also a concept of employment and may have reflected to some extent French national accounting practice²⁶.

²⁶ This French influence can be discerned e.g. in the preference given to homogeneous branches over industries.

The second generation: MPS69

In 1969, also a fundamentally different guideline on national accounting was published, the Material Product System. This guideline has a rather different background and history than the other guidelines.

After the Russian revolution, official national accounting figures of the Soviet Union came to be based on a 'Marxian' concept of production²⁷ (Studenski, 1958, pp. 350-353; see also section 2.2.). Since the fifties, also several other centrally planned countries adopted this concept for their national accounts. In 1969, the Comecon-countries adopted the "System of Material Product Balances" (generally referred to as 'Material Product System', MPS69) as the basis for compiling their national accounting figures (Standing Statistical Commission, CMEA, 1969; see also UN, 1986). In 1971, the United Nations accepted that the centrally planned countries use the MPS69 for their national accounts. This implied among others that the UN-questionnaires sent to these countries -and thus the figures published by the UN about these countries- employed the concepts and classifications of the MPS69 rather than those of the 1968 SNA.

The third generation: SNA93 and ESA95

A third generation has been issued about 15 years ago: the revised SNA was approved in 1993 (SNA93) and the revised ESA was approved in 1995 (ESA95). The major authors of the SNA93 are André Vanoli (in particular the new accounting framework) and Peter Hill (in particular prices and volumes and the overall drafting). These new guidelines present a very elaborate accounting framework and stress the importance of flexibility to take account of different data needs and different national circumstances.

For various reasons, the SNA93 can be regarded as the first really universal standard on national accounting concepts. Firstly, the SNA93 has been drafted under the joint responsibility of various international organisations, i.e. the UN, the Worldbank, the IMF, the OECD and the EU. They took also the responsibility to better harmonise the concepts in some related guidelines, like the IMF's Balance of Payments Manual, the IMF's Government Finance Statistics Manual and the ESA95 of the EU. However, the SNA53 and SNA68 have been drafted under the auspices of only the United Nations (UN). Secondly, the MPS69 has not been revised as the sudden collapse of

²⁷ However, unofficial estimates based on SNA53-type of concepts were also made by individual researchers. Seton (1954) reconstructs the Soviet accounts for 1934, the last year for which national statistics had been compiled in a systematic form. This type of research is quite difficult, as had been published was very incomplete, often inaccurate and almost all in percentages. Because prices did not necessarily reflect scarcities it was difficult to obtain an overall picture.

communism made it an anachronism of the Cold War. All Eastern-European countries in transition have immediately started to implement the SNA93 and ESA95. Thirdly, compliance of national practice to the international standards is more strictly adhered to (see chapter 4).

A novelty of the ESA95 is that it is part of an official regulation of the EU and thus a legal document. This contrasts with all the other guidelines, like the ESA70 and SNA93: these are 'gentleman's-agreements'; from a legal point of view their application is only binding in some situations.

The explicit legal character of the ESA95 is deemed necessary considering the many and important administrative uses made of national accounts figures in the EU, e.g. as entrance criteria for the European Monetary Union and for determining a major part of the own resources of the EU (see chapter 4). This administrative use necessitates that the ESA95 should be more accurate and precise than the SNA93 and that the Member States should follow it more strictly.

The fourth generation: SNA2008 and ESA2010

At present, the major part of a new update of the SNA has already been finalized²⁸, while work is still to be done on some chapters. The updating process of the European guidelines has just started and the final draft is intended to be completed in 2009; it will take then some years to make a legal act of this final draft.

These updates of the SNA93 and ESA95 do not involve major changes in basic concepts and scope. They are best regarded as further clarifying the framework developed fifteen years ago.

In section 3.3, the scope and basic concepts of the four generations of guidelines will be compared²⁹. However, before starting this comparison, it is necessary to pay some attention to the role that the international guidelines have played in national accounting.

The role of the guidelines

International guidelines have been influential for several reasons. Firstly, the leading international experts of the profession have developed the systems in the international guidelines. They are therefore relatively well thought out and it is costly, time consuming and not easy to invent an alternative system.

²⁸ Anne Harrison is the editor.

²⁹ For a more detailed comparison of the first three generations, see Bos, 1992a and Bos, 1994.

Secondly, by keeping in line with the international guidelines, national figures can be compared with figures from other countries. This is important, as international comparison is a major use of national accounting figures.

Thirdly, in many countries, the national accounts have been set up by or improved with help from the international organisations issuing the guidelines (UN, OECD, EU) or with help from countries advanced in national accounting (Sweden, France). In the latter case, following the international guidelines is usually stimulated to the extent that the helping countries follow them.

As a final reason, we mention that all countries are obliged to compile some figures on the basis of the international concepts, as the contribution to the UN depends on the level of National Income. Besides, the questionnaires of the international organisations employ these concepts. In the EU, due to some important administrative uses, the guidelines are even legally binding; the same applies to the extended statistical programme linked to these guidelines.

The international guidelines are very successful in standardising the concepts and classifications used in compiling national accounts figures. The guidelines achieved that all over the world official figures came to be based on uniform notions of the production boundary, asset boundary, the distinction between intermediate and final consumption, etc. From 1947, countries have adapted their concepts in order to be (more) in line with the international guidelines (see section 4.2).

Next to the official guidelines on the national accounts, over the years many other reports, handbooks and guidelines have been published on specific parts of the national accounts. Recently, more specific guidelines have been issued on e.g. price and volume measurement (Eurostat, 2001), quarterly national accounts (Eurostat, 1999) and input-output tables (Eurostat, 2008). A very welcome novelty is that also the users' perspective (how to use the national accounts for analysis?) starts to be addressed, e.g. by the guidelines on productivity analysis (OECD, 2001), by the EU-KLEMS-project for detailed and internationally comparable productivity data and analysis by industry and by the report on national accounts and policy analysis (UN, 2002).

3.3 Comparison of the successive international guidelines

The successive international guidelines have many differences in purpose, concepts, scope and amount of detail. In this section, they will be compared. The background and concepts of the MPS69 are fundamentally different than those in all the other guidelines. This section starts

therefore with a comparison of all the other guidelines. At the end of this section, they will then be compared with the MPS69.

Purposes

A simple chronological sequence can be found in the successive generations of official guidelines: in time they grow bigger and merely add subjects and detail. This culminates in the SNA2008 and ESA2010, which are the most encompassing and detailed. The 1947 UN-report does not fit in this picture: it is much more ambitious, detailed and complex than the first official guidelines.

In the 1947 UN report, relatively much attention is paid to the purposes and advantages of national accounting. In general it is stated that: "It is necessary to know in quantitative terms how the national income is related to its constituent transactions and to other totals of transactions. Thus modern enquiries which had their origin in an attempt to measure certain broad totals have changed their emphasis and now concentrate more on the structure of the constituent transactions and on the mutual interdependence of these transactions. It has come to be realised that for different purposes certain related but distinct aggregates are useful" (p. 24). Thus, the computation of national aggregates is just one of the main concerns of the 1947 UN report.

In contrast, the compilation of broad totals seems to be the only objective in the SNA53 and OEEC-guidelines. This is evidenced by the sector accounts: these should be recorded in a very specific way in order to obtain national aggregates directly. The SNA68, the ESA70 and the most recent set of guidelines adopt an approach similar to the 1947 UN report. For example, the SNA68 states that "For many purposes of both analysis and policy, however, it is not sufficient to work with aggregates alone; it is also necessary to look at many aspects of the economy in greater detail. As a result, economic models are now built in which the main aggregates are subdivided, or disaggregated" (para 1.10).

In the SNA93 and ESA95 and their newly drafted updates (SNA2008 and ESA2010) also the multi-purpose character of the guidelines is stressed, e.g.: "The System is primarily intended to provide disaggregated data to meet the needs of analysts and policy makers interested in the behaviour of markets and factors responsible for major disequilibria such as inflation and unemployment. The design of the System and its coverage of economic activities has to be a compromise intended to yield the maximum benefits to users of all kinds and may not therefore be ideally suited for any purpose taken in isolation" (SNA93, Chapter I, p. 22).

The limitations of GDP and national income as measures of welfare are discussed only in the SNA93 and ESA95 and their newly drafted updates. For example, "[a]ggregate indicators such as GDP do not reflect any changes in distribution [of wealth and income] that may be taking place

over time, so that such indicators need to be supplemented by micro-data for purposes of analysing changes in welfare (SNA93, Chapter I, p. 21). Similarly, "a natural disaster may well lead to an increase in GDP by creating extra demands, even though the community may be no better off than in the previous period if the loss of welfare caused by the disaster exceeds the increase in welfare from the extra production and consumption" (SNA93, Chapter I, p. 20).

Table 3.3 Major changes in the scope of the successive universal guidelines

SNA53	Simple set of tables and accounts in current prices
SNA68	Extended accounting system, including input-output tables, general principles on prices and volumes and financial accounts
SNA93	Inclusion of balance sheets, employment and purchasing power parities More detailed accounting structure (more accounts, more sub-sectors and detailed supply and use tables) Separate chapters on satellite accounts and flexible adjustments for national circumstances Detailed discussion of general principles on prices and volumes (e.g. chaining and index formulae)
SNA200	8 More detailed discussions of many topics, e.g. government accounts, the informal sector and capital services (important for productivity measurement) But no detailed discussion of price and volumes by industry/product and no separate chapters on quarterly national accounts and regional accounts (unlike ESA95 and its forthcoming update)

Explanation of the concepts

In the 1947 UN report, the SNA93 and SNA2008, concepts are quite extensively discussed. Both guidelines can be regarded as introductions into the logic and basic principles of national accounting.

The ESA95, the ESA2010 and the guidelines of the second and third generation like the SNA53, the SNA68 and ESA70 are better characterised as a systematic enumeration of recommended booking conventions. In these guidelines, the considerations underlying the choice of concepts are in general discussed much more sparingly. However, in the SNA68, some topics are well discussed, i.e. the structure of the accounting system, prices and volumes and the input-output tables (all drafted by Stone). Furthermore, in the ESA95, eight characteristics of the basic concepts and the structure of the accounting system are discussed in the introductory chapter. In the ESA2010, this introductory chapter will be more elaborate.

A major motivation for revising the SNA68 was that "its manner of exposition makes it inaccessible to many users especially those new to the System of National Accounts" (Harrison, 1990, p. 336). So, in the SNA93, "key concepts are defined by rationale and not by enumeration" (Harrison, 1990, p. 336). From this point of view, the ESA95/ESA2010 can be regarded as

supplementing the SNA93/SNA2008, i.e. providing a systematic enumeration of what is included in and excluded from the concepts.

Observation and imputation

The accounting systems recommended in all the guidelines, contain flows for which the values can readily be observed as well as flows for which values have to be imputed. This applies for example to income in kind and the services of owner-occupied dwellings. The fundamental problems with such imputations are already noted in the 1947 UN report:

"The items in the tables may be divided, from one point of view, into cash terms and imputed items, the former being those elements which reflect market transactions, and the latter being those for which a calculation has to be made in the absence of market transactions. In view of the difficulty of finding a commonly accepted basis for the second type of estimate it is desirable that, as far as possible, items of this kind, should be shown separately" (p. 18).

In the SNA93 and ESA95, the distinction between imputed items and other items is explicitly incorporated in its supplementary classifications.

The distinction between what can be observed and measured and what can only be inferred on the basis of some theory or convention, was also the reason for the distinction in the SNA68, SNA93 and ESA95 between, on the one hand, supply and use tables and, on the other hand, symmetric input-output tables. The SNA68 states:

"it is possible to carry the processing (of data) to a point where the results are no longer data. For example, the supply of a commodity may be allocated to users on the assumption that each user draws his supply from domestic production and imports in a common proportion. The result may be something quite different from what is obtained by observing the proportions in which different users actually make use of domestic production, and it may be seriously misleading. While ... assumptions are almost always needed in processing data, it should be recognised that when they come to play a major role the result is no longer an observation but an inference. At the same time the main purpose of making observations is to enable us to make inferences; all that is important is that we should not confuse the two" (SNA68, paragraphs 1.96 and 1.97).

Flexibility

According to the 1947 report, guidelines on national accounting should be a flexible instrument. Flexibility is required because national accounting conventions can not take account of all institutional differences in the world and all specific uses of national accounts figures. For example, it is clearly expressed that "in applying this national accounting system it will frequently be necessary to extend and adapt it to the particular circumstances of different countries" (p. 18, paragraph 11). Furthermore, "experience shows that unavoidable differences of opinion arise in the treatment of certain transactions due in large measure to institutional differences in different countries" (p. 18, paragraph 10). As a final case in point:

"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 ... 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" (p. 24).

In the guidelines of the first and second generation, such remarks on the interaction between national accounting concepts on the one hand, and particular circumstances and uses on the other are absent.

The SNA93/SNA2008 and the ESA95/99 return to the philosophy of the 1947 UN report: "A prominent new feature of the revised SNA is that it emphasised flexibility. The revised SNA includes a description of how the central framework can be applied to policy and analytical requirements, data availability and other specific circumstances of different countries. Also, it describes how satellite accounts with alternative product and income concepts can be elaborated as an extension of the central framework" (Annex on changes, SNA93).

Accounting structure and sector classification

Drastic changes occurred in the accounting structures and sector classifications. The 1947 report shows a detailed and fully worked out accounting system. The first generation of official guidelines, like the SNA53, advocate a much simpler accounting system with only a very limited number of accounts and sectors. The SNA68 and the ESA70 of the third generation employ a number of accounts and sectors rather similar to the 1947 report. In the SNA93/98 and the ESA95/99, the

amount of detail offered is drastically increased. For example, in the SNA68 only one account is used for describing the distribution and use of income, while in the SNA93 six accounts are used.

In the 1947 report and the first official guidelines, the sector classifications are fully functional, e.g. the sector households contains only consumers and does not include households in their function as producers like the activities of self-employed. In the SNA68 and ESA70, the sectors are functional for the production account and the generation of income account but institutional for the other accounts. In the SNA93 and ESA95, the sectors are fully institutional.

A novel feature of the SNA68 was that the national accounting system was explained on the basis of a matrix. This matrix presents an overview of the accounts and their main classifications. It integrates the supply and use tables with the sector accounts. However, it should be noted that the matrix was more complete than the accounting system actually described by the SNA68: in the matrix, balance sheets and a revaluation account are shown, but they are not at all discussed in the remainder of the SNA68. In the SNA93/98 and ESA95/99, the matrix is one of the alternative types of presenting national accounts. The other types are balancing statements (T-accounts), diagrammatic presentation and equations.

Scope

Major changes also occurred in the scope of the guidelines. In the SNA68 and ESA70, for the first time recommendations concerning constant prices and input-output tables are presented. In the ESA70, only a symmetric input-output table product by product (homogeneous branch) is presented. In the SNA68, two types of input-output tables are distinguished: supply and use tables on the one hand and symmetric input-output tables on the other hand. It is shown how supply and use tables can be transformed into symmetric input-output tables, both of the industry by industry type and of the product by product type. In the ESA70, the SNA93 and ESA95 also the concept of employment is included. The SNA93 and the ESA95 introduce for the first time balance sheets, other changes in assets accounts, actual final consumption and actual disposable income, purchasing power parities; the SNA93 includes in addition Social Accounting Matrices and satellite accounts. Both the SNA93/98 and ESA95/99 greatly extend their discussion of the input-output framework.

In the SNA2008, six new chapters have been added for discussing the perspective of various sectors: Measuring corporate activity (perspective of non-financial corporations), General government and public sectors, Non-profit institutions, Households sector, Rest of the world accounts and Links to monetary and financial statistics (= perspective of financial corporations). Furthermore, new chapters have been introduced for capital services and the national accounts

(about measuring the volume of capital services for a better measurement of productivity) and the informal economy.

In ESA2010, also new chapters will be introduced for the perspective of some specific sectors: Insurance and pensions, Rest of the World accounts, Government accounts and Links between business accounts and national accounts (= perspective of non-financial corporations). Furthermore, a new chapter discusses European accounts, i.e. how to add up and consolidate the national accounts of the EU-member states to arrive at true European accounts.

In the SNA93, quarterly accounts and regional accounts are only referred to in the chapter on Special adjustments for national circumstances. In the ESA95, they are given a much more prominent place, as they constitute two of the thirteen chapters. This is more in line with the importance attached by data users to quarterly accounts and regional accounts. However, it should be added that the ESA95 chapter on quarterly accounts is not a serious chapter in terms of size, as it amounts only to two pages. The ESA95 chapter on regional accounts is also brief (ten pages), but captures nevertheless in a serious way some of the essential problems of regional accounting.

In the SNA2008, quarterly accounts and regional accounts are only briefly mentioned as part of the chapter on satellite accounts. This contrasts clearly with the ESA2010: this includes separate and substantially expanded chapters on the quarterly accounts and regional accounts.

In the satellite accounts chapter in the SNA93 and SNA2008, only few specific satellite accounts are discussed. In the SNA93 only environmental accounts are discussed. In the draft SNA 98, also the tourism satellite account, health satellite account and unpaid household account are covered. The (draft) ESA2010 provides a somewhat broader overview of satellite accounts.

The merits of Fisher indices and the chaining of indices are already acknowledged by the SNA68. However, only in the SNA93/98 and ESA95/99, they are actually recommended as the best strategy for deflating. The ESA70 proposes to use Laspeyres indices for volumes and Paasche for prices. The SNA68 recommends a mixture of both Laspeyres and Paasche as this will better fit the existing data. Both the ESA70 and ESA95 recommend to rebase every five years. The SNA93 is not explicit about this.

Changes in basic concepts

A change in concept, in particular important for developing countries, was the inclusion of primary production for own-account. This is included in all official guidelines. Other important changes are:

- Only in the 1947 report, government output is valued at costs including some interest paid on government debt;
- Only in the 1947 report, realised holding gains are included in national income;

- Only in the guidelines of the fifties, gross rent is imputed for buildings owned and occupied by the government;
- Only in the SNA68 and ESA70, Financial Intermediation Services Indirectly Measured (FISIM, i.e. all banking services not explicitly charged to clients) is not allocated to sectors and thus not split in intermediate and final consumption (and exports).
- Only in the 1947 report and the SNA93/08 and ESA95/09, some intangible durables are included in capital formation. In the 1947 report this may also include the cost of a massive advertisement campaign.
- Output is valued at basic prices since SNA68 (i.e. also in ESA70, SNA93/08 and ESA95/09).
- All guidelines recommend a different set of central aggregates of income and product.
- Many new financial instruments, like deep discounted bonds, have been taken account of in the SNA93 and ESA95;
- the SNA93/08 and ESA95/09 have substantially improved the links with other statistics and their guidelines, like the Government Finance Statistics Manual and the Balance of Payments Manual.

It is the irony of history that it now and then repeats itself, i.e. not only progress but also some clear steps backwards. In the preliminary drafts of the SNA93, some of the concepts in the SNA68 were abandoned and replaced by concepts from the earlier reports. Cases in point are the allocation of FISIM and the imputation of rent on government buildings. However, in the final draft, the allocation of FISIM is left open to the compilers and no rent is imputed for government buildings. In the ESA95, one issue was left undecided: whether or not compilers should allocate FISIM (and if so, according to which method); this was later resolved by a separate regulation prescribing how FISIM should be allocated. In SNA2008 and ESA2010, FISIM is to be allocated to the various uses.

Notwithstanding some important changes in concepts, the most characteristic feature of the guidelines is their constancy in basic concepts. This is evidenced by the production boundaries. The production boundaries of all guidelines exclude unpaid household services and do-it-yourself-activities and they all include imputed services of owner-occupied dwellings. Even specific national accounting conventions like the imputed charge for banking services, the valuation of government output at costs and recording government production as final consumption³⁰ are all advocated since 1947. Considering that the guidelines have just been revised, they will most probably constitute an established set of core conventions for more than 75 years.

Changes in concepts in SNA2008 and ESA2010

³⁰ This excludes of course the part of government output explicitly sold or used for own-account capital formation.

The changes in basic concepts in SNA09 and ESA2010 are limited. The three major changes are:

- Expenditure on Research and Development should not be recorded as intermediate consumption but as fixed capital formation and subsequently written-down as consumption of fixed capital;
- Expenditure on military weaponry should not be recorded as intermediate consumption, but as fixed capital formation and subsequently written down as consumption of fixed capital.
- Unlike the output of other financial corporations, the output of the central bank should be treated as non-market and valued at the sum of costs³¹.

In addition, the recording of many specific items/issues has been clarified, e.g. the treatment of employee stock options (= income in kind), non-life insurance in case of catastrophes like 11 September, index linked debt and the concomitant interest payments, public-private partnerships, water as an asset and payments from public corporations to government (and vice versa).

Links with major specific statistics

For decades, the international guidelines on national accounts statistics were partly inconsistent with the international guidelines on three specific types of macro-economic statistics: balance of payments, government finance statistics and statistics on employment and population. However, most of these inconsistencies have now been resolved.

Also the links with international statistics on specific policy areas (e.g. health care, social security, environment) have been improved. International guidelines on these specific statistics explicitly refer to the national accounts concepts and classifications, discuss similarities and differences and propose satellite accounts to bridge the gap between the national accounts and these specific policy areas.

Comparison with the MPS69

The major conceptual difference between the MPS69 and the other guidelines pertains to the production boundary, which is confined to 'material production' in the MPS69. For example, the services of owner-occupied dwellings and collective services like government health care, education and defence are not regarded as production in the MPS69. Nevertheless, some important services were included, e.g. all transport and communications (even if they relate to persons).

³¹ This only applies when market output is not separated from non-market output; otherwise, the market output, e.g. some financial intermediation services, should be recorded and valued separately as market output.

The choice of a different production boundary is reflected in the sector classification of the MPS69. The sectors distinguished are: Branches of the material sphere, Branches of the non-material sphere serving individuals, Branches of the non-material sphere serving society as a whole and Households.

The production boundary of the MPS69 does not compare favourably to the other guidelines. Furthermore, financial and income flows were shown with hardly any detail, which reflected their minor role in central planning in communist and socialist countries. Quantities of products were the focus of the plans and statistics and not prices, profitability, saving and net lending.

However, in some important respects, the MPS69 was well advanced and even anticipated some of the major extensions introduced by the SNA93 and ESA95. For example, the MPS69 already included the concept of actual consumption (labelled 'Total consumption of the population'), balance sheets on national wealth and capital assets, balance sheets on the employment by activity and sectors, and indicators of real income by main socio-economic groups. Detailed discussions of the MPS69 can be found in Ivanov (1987) and Arvay (1994).

3.4 Modern innovations in national accounting

This section will discuss briefly the innovations with respect to the following topics:

- Financial Accounts and Balance sheets;
- Prices and volumes;
- Input-output framework;
- Welfare, alternative indicators and extended accounts;
- Design of the accounting system, SAMs and satellites.

Financial accounts and balance sheets

A full set of financial accounts was introduced for the first time in the guidelines of the third generation, i.e. the SNA68 and ESA70. The description of financial flows was influenced in particular by the work of Copeland (1952) and that at the Norwegian Bureau of Statistics (see e.g. Bjerve and Selsjord, 1959). Reference can also be made to the Reserve Account in the 1947 report (UN, 1947).

Balance sheets have only been introduced in the most recent set of international guidelines, i.e. the SNA93 and the ESA95. However, several of the early estimates of national income were already

accompanied by estimates of national wealth, e.g. those of Petty and King. In the Netherlands, the important estimates of 1938 were also accompanied by a presentation of balance sheets (see Derksen, 1946, p. 15). Of the more recent work, in particular Goldsmith (1951, 1962 and 1985) is outstanding. He also invented the Perpetual Inventory Method in estimating capital stock (see Goldsmith, 1951).

The absence of balance sheets limits the usefulness of the national accounts for various types of applied economic analysis. To name a few: growth accounting and productivity analysis, testing the portfolio theory, estimating vintage models and -more in general- the analysis of intertemporal decisions on investment, saving and consumption (see also Goldsmith, 1985, pp. 65, 66).

The other changes in assets account cover both holding gains and losses due to price changes and changes in the volume of assets which are not related to economic transactions. An example is damage due to earthquakes, flooding or tornado's. This account is very important for completing the whole national accounting system, and for their links to the financial accounts (revaluation) and to balance sheets. Its information can be crucial to economic analysis and policy. For example, final consumption expenditure of households can be drastically influenced by their holding gains on equity and dwellings. The introduction of the other changes in assets account in the SNA93 and ESA95 was therefore a major innovation in the international guidelines.

Prices and volumes

Price and volume-data were discussed for the first time in the SNA68 and ESA70. Stone drafted the chapter in the SNA68. It reflected his report "Quantity and price indexes in the national accounts", which he wrote in 1956 at the request of the OEEC (Stone, 1956). A distinctive feature of this report is that it addresses the problem of deflating in the context of a complete set of accounts. It also discusses the problem of measuring real national income when terms of trade are changing. In most other respects, the chapter in the SNA68 on prices and volumes is best be regarded as a brief overview of the state of the art. It contains thus a synthesis of all the work done by great pioneers in index-theory and price-measurement, like Fisher, Edgeworth and many others.

Purchasing power parities have only been included for the first time in the current recent set of international guidelines (SNA93 and ESA95). There are two reasons for using purchasing power parities in international comparisons: firstly, the relative prices underlying the national accounting figures may be widely different and, secondly, converting national accounting figures into a common currency by using official exchange rates may lead to misleading results.

In Clark (1940), figures of consumption were made more comparable by using one set of relative prices and by employing purchasing power parities in converting national currencies. In the

fifties, under the direction of the OEEC, this work was continued (e.g. Gilbert and Kravis, 1954). In 1968, the UN launched the International Comparison Project (ICP). The purpose of the project was to develop the methods for international comparison of figures of product, income and expenditure and to make such comparisons for a selected group of countries. The ICP has gradually evolved into a joint effort of several international organisations (UN, World Bank, EC, OECD) and many individual countries. The number of countries involved has increased to 139. For a general overview of the ICP, we refer to Kravis (1984).

Also the chapter on prices and volumes in the SNA93 by Peter Hill should be recalled: "In twenty-seven pages, Hill has managed to accurately summarise a vast literature in an elegant and readable fashion... It will be an invaluable reference for not only national accounting specialists but also for students and practitioners of economics in general" (Diewert, 1996, p. 271). Detailed references to the literature summarised by this chapter can be found in Diewert (1996).

Input-output tables

Input-output tables were introduced for the first time in the SNA68 and ESA70. Stone drafted the chapter on input-output in the SNA68. It reflected his report "Input-output and national accounts", which he wrote in 1961 at the request of the OEEC (Stone, 1961). This report showed how input-output tables could be fitted in a complete system of national accounts. For this purpose, he used the matrix, which is the standard way of presenting input-output tables, for presenting the whole accounting system. This matrix is now commonly referred to as Social Accounting Matrix or National Accounting Matrix (see below). In the SNA68, the matrix-presentation was used to present an overview of the whole accounting system.

An important element in linking input-output tables to the national accounts, was Stone's distinction between input-output tables that contain observations (supply and use tables) and input-output tables useful for analysis (symmetric input-output tables). Only the former have a direct link to the rest of the national accounts. He also showed which assumptions are needed to transform the tables that contain observations into one useful for analyses.

Stone's report of 1961 includes also a detailed discussion of valuation problems. It introduces the concepts of basic prices and purchasers' prices to supplement the traditional distinction between market prices and factor costs. These new valuation principles were also adopted by the SNA68 and ESA70.

In the ESA70 no distinction is made between input-output tables for observation and for analysis. Only one type of symmetric input-output table is presented: a product by product table ("homogeneous branch by homogeneous branch") which does not have any straightforward

relationship to the rest of the accounting system. So, the innovation suggested by the SNA68 was not incorporated in the ESA70 but only much later, i.e. in the ESA95.

In both the SNA68 and ESA70, a rather formal and mathematical approach is taken for presenting input-output tables. In the SNA93 and ESA95, the presentation is much more operational and concrete. In this respect, they differ fundamentally from standard textbook discussions on input-output tables (e.g. Miller and Blair, 1985). In the ESA95, it is stressed that not only symmetric input-output tables but also supply and use tables can be used for economic analysis: both tables have different merits for economic analysis (ESA95, 9.13). In the SNA2008 and ESA2010, the supply and use tables are presented as the core of the input-output framework.

Welfare

In the late sixties and the beginning of the seventies, national income was frequently criticised for not being a welfare measure³². However, the authors of the international guidelines did not intend to provide a measure of economic welfare. For example, Jaszi even regards as one of his principal contributions to have resisted successfully to "the will-o'-the-wisp of forging national output into a measure of economic welfare. I was a minority of one in a company that included such mental giants as Simon Kuznets and John Hicks, and at one point I had to defy a forceful Secretary of Commerce who had instructed the BEA [Bureau of Economic Analysis of the USA] to prepare a measure of welfare"³³. According to Okun (1971), "[the] beauty of ... present practice is that no sensible person could seriously mistake the GNP for [a measure of total social welfare] ... Producing a summary measure of social welfare is a job for a philosopher-king". Also Denison (1971) stressed some fundamental problems for a welfare measure: "relations between environmental conditions and welfare are rarely linear, and nonlinear relationships are hard to establish. A little air pollution is harmless, more an annoyance, a great deal is lethal".

In 1972, Nordhaus and Tobin illustrated in an impressive way what accounting aimed at measuring welfare would imply. They calculated a Measure of Economic Welfare (MEW) by modifying traditional national income figures in several respects. For example, they deducted an estimated value of the disamenities of urbanisation and they added tentative estimates for the value of unpaid household services.

³² For example, Mishan (1969). An example of an earlier critique is Margolis (1952). For an overview of major studies stressing the limitations of GDP as a proxy of welfare, see van den Bergh (2008).

³³ Jaszi (1986), p. 411. A similar opinion is expressed by Stone, 1974, and by Stone, 1986, p. 457.

Since then, many measures similar to MEW have been calculated (see Eisner, 1988). Frequently, these measures were presented as part of extended or total accounts. Measuring the contribution of economic activity to welfare is only one of the reasons for drawing up such accounts. Some other motives are to obtain: "more inclusive and relevant measures of capital formation and other factors in economic growth, and better and/or additional data to fit concepts of consumption, investment, and production relevant to economic theory and structural econometric relations" (Eisner, 1988, p. 1612).

The increased use of social indicators like the Human Development Index (UNDP, 1991) is a somewhat related development. In these social indicators, national income (per capita) is only one of the variables, other variables being e.g. infant mortality, life expectancy and adult literacy rates. In contrast to measures like MEW and National Income, social indicators are not measures in money terms; they serve solely as indexes.

Also several partial approaches have been developed. Such partial approaches start from standard national accounting concepts and statistics and introduce then modifications stressing one specific issue or perspective, e.g. unpaid household services and the environment.

In 1978, Adler and Hawrylyshyn, calculated that unpaid household services was equivalent to about 40% of Canada's GNP in 1961 and 1971. They suggested that the relative importance of unpaid household services was not declining and that therefore any retrospective inclusion of such services would not alter past patterns of growth in Canada.

Similar calculations have now been made for many other countries. For example, Bruyn-Hundt (1995) estimated the value of unpaid households services in the Netherlands for 1975, 1980, 1985 and 1990 on the basis of time use surveys. She employed three different valuation principles: minimum wages, wages of home help and average earned wages. The estimates varied from 67% of GNP in 1975 to 108% of GNP. According to all three valuation principles, the value of unpaid household services had declined substantially in 1990: the estimates ranged now from 51% of GNP to 91% of GNP. This decline reflects the increased participation of women in paid work. The estimates for the Netherlands are higher than for other countries, as labour market participation of women in the Netherlands was then still relatively low.

Huetting (1980) stressed the economic importance of pollution and depletion of natural resources. Huetting (1991) developed a concept of Sustainable National Income (SNI): the maximum income that can be sustained without technological development and excluding the use of non-renewable resources. According to Verbruggen et al. (2000), Dutch Sustainable National Income was in 1990 56% below the official Dutch national income. The purpose of the SNI is not to

provide the policy-makers with a goal for national income as such, but to indicate the sustainability gap based on current technology.

Design of the accounting system

In Sweden, in the beginning of the fifties, Ohlsson argued that the design of the ideal accounting system should depend on the specific purpose served (see Ohlsson, 1953 and Aukrust, 1994). For example, for analysing economic behaviour, the production boundary should only include monetary transactions. However, for analysing 'results', non-market production should be included whenever feasible. He concluded that there are three alternatives for presenting official national accounting statistics:

- "1. the construction of a general purpose NA-system from which to extract the special purpose systems
2. the construction of different NA-systems for different purposes
3. the construction of one special purpose NA-system with a list of corrections for the main items for which different treatment for different purposes is required.

... Ohlsson admitted, that a general purpose system (alternative 1) could be constructed ... "for all reasonable purposes". However, this would be "an extremely complex matter". For his empirical work Ohlsson preferred different systems for different purposes (alternative 2)" (Aukrust, 1994, pp. 39 and 40). However, Ohlsson's work in these directions was not followed up internationally and remained for long an episode even in Sweden.

SAM and micro-macro linkage

The Social Accounting Matrix (SAM) concept originates from the sixties and was developed as part of the "Programme for Growth" at the university of Cambridge (UK) (Stone, 1962)³⁴. This work was also supervised by Stone. In SAMs, the national accounting system is presented in a matrix format and the input-output tables are fully integrated in the accounting system. Using a matrix for presenting a national accounting system was a distinctive feature of Stone's work.

³⁴ An interesting off-shoot of the Cambridge Programme for growth was the development of the RAS-method for balancing input-output tables. The name giving of this method reflects the role of Richard Stone. The method consists of multiplying the general matrix A with two other matrices. The latter are called R and S, because these are Stone's initials. However, unknown to Stone and many of his contemporaries, Deming already suggested this algorithm twenty years before (Deming, 1943).

In 1976, Pyatt and Thorbecke, in a project on behalf of the International Labour Office (ILO), used SAMs as an instrument for development planning (see Pyatt and Round, 1977). They gave a fresh and new view on the content and applications of a SAM (see also Pyatt, 1991). In their view, compiling a SAM is the best way to obtain a rather complete and consistent set of data for modelling the national economy. Furthermore, in particular for developing countries, it is necessary to introduce income distribution, poverty and demographic changes in models and accounting systems. In order to explain income distribution, also employment should be included. In all these respects, they judged the scope of the SNA68 as too narrow. Or, to put it in other words, they preferred a system which integrates aspects of the 1968 SNA as well as of Stone's System of Social and Demographic Statistics (SSDS; UN, 1975 and Stone, 1971). A distinctive feature is that achieving internationally comparable figures is of secondary importance: international concepts and classifications should be used only to the extent that they suit the national data needs and possibilities. This reflects the focus on modelling the national economy for policy purposes.

Until recently, SAMs have only been compiled for developing countries that are more or less Anglo-Saxon in orientation, like Pakistan and Indonesia. The SAM has not yet been implemented in the more French oriented developing countries, like those in Africa.

The Social Accounting Matrix-concept was included for the first time in the most recent set of guidelines. In 1994, under the supervision of the author of the SAM-chapter in the SNA93 (Steven Keuning), the SAM was introduced for the first time in the national accounting practice of a developed country, i.e. the Netherlands³⁵. A distinctive feature of this SAM is the absence of a direct link to modelling for policy purposes. A major reason is that Dutch model-builders do not meet the data problems common in developing countries: they can make use of a wide range of readily available national accounts statistics and of various sets of micro-economic data (tax records, survey results). As a consequence, they do not need an intermediate data set and can analyse income distribution much better and in much more detail (e.g. reflecting the specific features of the Dutch tax and social security system). For developed countries, compiling a SAM boils therefore mostly down to compiling labour accounts, i.e. a detailed and systematic breakdown of the values and volumes related to employed and unemployed labour.

Since the seventies, the importance of micro-macro linkages for households and business has been stressed by Richard and Nancy Ruggles (see e.g. Ruggles, 1971, 1990 and 1996; Ruggles and

³⁵ It was not the first time that a SAM was compiled for the Netherlands. Already in 1982, inspired by Pyatt and Thorbecke, an incidental estimate of a SAM for the Netherlands was made by the scientific council for government policy (von Eije, 1982).

Ruggles, 1970, 1986, 1992 and 1999). In their view even the basic concepts in the national accounts should be close to micro-economic concepts for households and business, i.e. closer to market transactions and containing much less imputations and attributions. They propose e.g.:

- to exclude employers' contributions to pension reserves from household income but include the payment of pension benefits.
- to treat interest not as a transfer, but as the purchase of financial service³⁶;
- to regard the purchase of consumer durables as capital formation and to make imputations for these services.

They also stress the importance of a relatively simple set of accounts and criticize the complexity of the new universal accounting framework³⁷:

“These ... accounts are designed to answer “Who does What by means of What for What purpose with Whom in exchange for What with What changes in stocks?” Given this level of complexity, there is a distinct danger that when the revised SNA is actually put in place, it, like the Hubble telescope, may not be successful in bringing into focus a clear view of what it was designed to examine. Only professional national accountants will be able to fathom the national accounts. Furthermore, the establishment of such an elaborate system as the standard to be adopted by national and international statistical offices may result in the SNA becoming a statistical behemoth independent of its creators and with an illogic of its own-not unlike a Frankenstein monster. One of the major virtues of national accounting systems used by many countries is that they do provide a relatively simple macroeconomic overview of the economic system” (Ruggles, 1990, p. 419).

³⁶ The major advocate of this proposal is actually Sunga (1984).

³⁷ Two decades before, a similar criticism about the complexity and cost-inefficiency of the international guidelines was made by Denison: “for every series of any real interest that is developed, at least a dozen series of trivial or no value must be estimated to fill out the “accounts”. Because most of the series called for are of no appreciable interest, existing systems of data collection do not provide the information required by the new SNA (F.B.: SNA68); either collection of trivial data would be required or the number would have to be imaginary. The new SNA has another weakness: it is so complicated that not even serious and expert users of national income and product data (and few producers for that matter) can be expected to understand it or the meaning of the numbers it is to contain. A very simple set of account ..., supplemented by supporting tables to provide analytically interesting detail and alternative breakdowns, is a far better approach, in my opinion” (Denison, 1971, p. 38).

Satellites and modules

In the mid-seventies, the French statistical office developed several satellites supplementing the national accounts. Each of these satellites describes a specific aspect of a national economy, e.g. education, health or transport. These satellites were focused on serving the data needs of specific Ministries (INSEE, 1976, see also Vanoli, 1986).

A decade later, the notion of a building-block system for the national accounts was taken up by the Dutch Central Bureau of Statistics³⁸. They advocated that the structure of the revised SNA should be made more flexible. In their view, the SNA should contain a multi-purpose core supplemented with special modules. This core is a full-fledged, detailed system of National Accounts with a greater institutional content than the 1968 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. Such a system has some clear advantages: there would be room for extended measures, linkages to other accounting systems like the SDSS (UN, 1975) could be explicitly shown, a clear micro-macro link could be established and national data needs and possibilities could be taken into account.

A problem with understanding the Dutch view, e.g. vis-à-vis the old or current international guidelines, is that most of the papers are mainly about general principles and desiderata. The only concrete proposal for a Dutch core can be found in Gorter and van der Laan (1992, pp. 200-209). They propose to omit imputations like the services of owner-occupied dwellings, transfers in kind and the rent imputed to insurance policy holders as property income. The consumption of the services of pension funds and life insurance companies should be registered with the financial institutions themselves. These proposals do indeed reduce the number of imputations. However, it should be realized that many important imputations in the SNA68 and SNA93 are not disputed, e.g. the valuation of government output and the output of financial institutions. Furthermore, various suggestions for a more micro-economic perspective (see above) are not included in this Dutch core.

In the SNA93 and ESA95, the general idea of a building-block system has been incorporated. For example, the SNA93 contains a separate chapter on satellite accounts which is to be supplemented by various handbooks, e.g. on environmental accounting. The proposals for a closer linkage to micro-economic concepts and less imputations in the basic set of accounts have not been honoured. In fact, even some new imputations have been added, e.g. reinvested earnings on direct foreign investment.

³⁸ On the Dutch view on national accounting, see e.g. Van Bochove and Van Tuinen (1986), Gorter (1988), Gorter and van der Laan (1992), Reich (1993), Den Bakker (1994) and Bos (2006).

The SNA2008 and ESA2010, the general idea of a building-block system has been further developed in two ways. Firstly, for some major standard uses (e.g. government finance and balance of payments) separate chapters are now incorporated. Secondly, in ESA2010 now also a chapter on satellite accounts has been introduced. This chapter and the one in SNA2008 are more elaborate and specific than the old chapter on satellite accounts in SNA93.

3.5 Summary

Directly after the Second World War, the major innovations of the 1930s and 1940s were tested and further improved. On request of the OEEC, in 1951 a guideline on national accounting was written which was to be used in planning the Marshall-aid. This guideline and its two immediate successors (1952, OEEC and 1953, UN) can be regarded as the first generation of official international standards. In contrast to the 1947 UN report, rather simple accounting systems were aimed at. In fact, a systems approach was nearly absent as only some aggregates and their composing parts are to be compiled; the financial flows in the national economy are even nearly fully ignored.

A second generation of official guidelines was issued at the end of the sixties and beginning of the seventies. It consisted of two guidelines by the UN: the Material Product System (MPS69) used by communist countries and the System of National Accounts of 1968 (SNA68) used by the rest of the World. For the special purposes of the European Communities, also separate guidelines were issued for EC-countries, i.e. the European System of economic Accounts of 1970 (ESA70). The SNA68 and ESA70 followed mainly the trails set by their predecessors but greatly expanded the accounting system, e.g. by including also input-output tables and constant prices. The MPS69 differed fundamentally from all the other guidelines by its anachronistic concept of production that focuses on measuring only material production. Nevertheless, with respect to the other concepts and the scope covered, the MPS69 was sometimes even more advanced than the SNA68 and ESA70 (e.g. total consumption of the population).

In 1985 Richard Stone was awarded the Nobel price in economics for this contributions to the national accounts, in particular for his leading role in the development of the first and second generation of international guidelines.

About a decade ago, a third generation was issued, the SNA93 and ESA95. The SNA93 and ESA95 have again greatly expanded the scope of the international guidelines by including e.g. balance sheets, purchasing power parities and satellites. A revised version of the MPS69 was not necessary due the collapse of communism in Eastern-Europe. All countries in transition in Eastern

Europe are now implementing the SNA93 and, for those who want to apply for membership of the EU, the ESA95.

At present, the major part of a new update of the SNA (SNA2008) has already been finalized, while work is still to be done on some chapters. The updating process of the European guidelines has just started and the final draft is intended to be completed in 2009 (ESA2010).

By their rapid expansion of scope since the guidelines of the fifties, the most recent set of guidelines have incorporated most of the major innovations in national accounting since the Second World War. If we disregard the MPS69, basic concepts in the guidelines have shown a remarkable consistency, e.g. excluding the services of unpaid household services. Some of the criticism on unchanged basic concepts has been met by introducing satellites, e.g. on the link between environmental indicators and national accounts statistics. Nevertheless, some important changes in concept have also occurred, e.g. the introduction of chain indices or the expansion of the concept of capital formation to include software, mineral exploration and Research and Development.

4. STATISTICAL DEVELOPMENTS SINCE THE SECOND WORLD WAR

Expanding, standardising and institutionalising national accounts statistics

4.1 Introduction

Since the Second World War, the national accounts statistics published by countries all over the world have changed drastically in scope and concepts. These developments in national practice do not have a straightforward relationship to the international guidelines. They are discussed in section 4.2.

Since 1989 national accounting in Europe has been revolutionised as a consequence of the ongoing European unification. These very recent developments are the topic of section 4.3. A summary of the statistical developments since the Second World War is provided in section 4.4.

In view of the current literature on national accounting, the value added of this chapter is in particular the overview provided of the recent developments in Europe. The revolutionary nature of these developments (e.g. the emergence of real jurisprudence and the active monitoring of the reliability of the national accounts statistics) is hardly recognized by national accountants and non-national accountants.

4.2 General trends

Since the Second World War, the number of countries for which estimates of national income are available increased from 42 in 1946, to 92 in 1957 and at present national accounts figures are available for over 150 countries. However, the scope, detail, reliability and frequency of these data differ widely.

Scope

For example, since the fifties countries like Norway, Denmark, the Netherlands and France³⁹ publish annually input-output tables. As indicated in section 3.3, input-output tables were incorporated for the first time in the international guidelines in the SNA68 and ESA70. However, even now, several decades later, only a few more countries publish annually input-output tables, e.g.

³⁹ A very interesting survey of the post-war developments in France can be found in Demotes-Mainard and Bournay (1994). A more extended overview is given by Vanoli (2005).

the UK has recently started (again). For a somewhat larger group incidental but usually rather outdated input-output tables exist. This applies e.g. to the USA.

A similar story can be told for the detailed sector accounts proposed by the SNA68, the ESA70 and the most recent international guidelines. Even now, a great majority of the countries in the world only apply rather simple accounting systems of the SNA53-style. However, the appearance of the most recent set of guidelines seems to be a great stimulus for introducing more detailed sector accounts.

Substantial differences in country practices exist also with respect to specific national accounts statistics, like regional accounts, quarterly accounts, satellites and balance sheets. In some countries, all of them are regularly published (e.g. in the Netherlands, France and Canada). In a somewhat larger group, some of them are regularly published, while in most countries hardly any data are regularly published on any of these topics.

Our remarks with respect to the input-output tables and the sector accounts reveal that most of the international guidelines have been much more ambitious and encompassing than the national accounting practice of their time. This partly reflects their role as a pedagogical device and innovative instrument⁴⁰. The only exceptions are the very simple guidelines of the fifties and the MPS69. In the case of the MPS69, even the reverse situation seemed to hold: the accounting systems of most communist countries had a larger scope than the MPS69 and provided more detail (see Arvay, p. 224).

The guidelines also interact with successful compilation practice. For example, in the Netherlands, the oil crisis of 1973 stimulated the transition towards chain indices for price and volumes in the early eighties (see Al et al., 1985, Boer et al. 1997 and Bos, 1994c). The use chain indices is now recommended by SNA93 and ESA95. Some other examples, e.g. with respect to satellites, can be found in section 3.4.

Harmonisation due to the guidelines

The guidelines have greatly contributed to harmonisation of the concepts used by countries in compiling major aggregates, like National Income.

This is evidenced by some of the earlier country practices. They all differed fundamentally from the basic concepts in the successive guidelines:

- In Sweden in 1937, Lindahl published two alternative estimates of national product, one including the services of unpaid household services and one excluding. However preference was

⁴⁰ It also reflects the totally different amounts of resources in countries available for statistics in general, and for national accounts in particular.

given to the latter. In Norway in 1946, the value of unpaid household services was included in output and national product. However, since 1951 they are excluded (see Aukrust, 1994).

- In some official Scandinavian studies (1937, 1951, 1953), the services of consumer durables like cars were included in output (see Aukrust, 1994).
- In France, until 1975 when the ESA70 was implemented in the French national accounts, the value of the output by banks, insurance companies and general government was not included in output and domestic product (1971 base; see Demotes-Mainard and Bournay, 1994).

Due to the influence of the international guidelines, country practice to include in the national accounts' estimates unpaid household services and the services of consumer durables was gradually extinguished.

However, as the French case shows some drastic differences between country practice and the international guidelines existed unto the seventies. Furthermore, if we look at the changes in the international concepts, some important differences continued to exist for many years. For example, in contrast to the SNA68 and ESA70,

- Many countries continued up to 1995 to apply concepts of the SNA53, i.e. to include an imputation for the services of government buildings and to allocate financial intermediation services indirectly measured (FISIM). In the EU, in order to bring their estimates in line with the ESA70, Greece and Belgium had to abolish this practice. Now a new EU-regulation prescribes that FISIM is to be allocated.
- Before implementing SNA93, the USA did not classify government expenditure on durables as capital formation (and capital consumption) but as intermediate consumption by the government.

The transition to the concepts of the new international guidelines will bring about a greater degree of harmonisation, e.g. the USA will change its treatment of government expenditure on durables and many countries are starting to fully rebuild their accounting systems according to the most recent international standards. Nevertheless, some differences are likely to continue, e.g.:

- Some countries will allocate the services of financial intermediation services indirectly measured and others will not, as the SNA93 does not choose between both alternatives.
- The USA has identified two potential departures, "treating purchases of weapons and weapon delivery systems as capital formation and estimating a general government operating surplus to reflect a net return to the use of government capital" (see Dobbs and Pitzer, 1994, para 82).

For international comparisons, the differences between the concepts in the guidelines and those in country practice imply that modifications to national data are necessary. This can be done by the country itself when reporting its international questionnaires or by the international organisations involved, like the UN, the EU and the OECD.

Reliability

For a proper use of national accounts figures, it is necessary to know their reliability, e.g. in order to assess whether some changes are statistically significant. Therefore, at the end of the forties, in the Netherlands, Sweden and Norway, official estimates were accompanied by indications of reliability⁴¹. In the Netherlands, for "every item of the sector accounts the uncertainty margin was given. This margin ranged from 2-5% (reliable estimate) to >20% (crude estimate)" (Den Bakker, 1994, p. 76). In Sweden and Norway, a scale from 1 to 5 was used. Separate indicators were used for the level and trend of time series (see Aukrust, 1994, p. 45). However, this practice was not continued.

The famous study by Stone and Rowe (1954) on the measurement and behaviour of consumers expenditure in the United Kingdom during the period 1920-1938 also pays attention to assessing reliability. For each item of expenditure, a qualitative assessment was made of the reliability and major potential biases of the estimates. Furthermore, for all items, the reliability of the estimates of the quantity, price and value in 1920 and 1938 is indicated by four error classes: A Firm figure (less than 5% margin of error); B Good estimate (between 5 and 10% margin of error); C Rough estimate (between 10% and 25% margin of error) and D Conjecture (more than 25% margin of error). Finally, also a comparison was made with alternative estimates.

Stone (1981 and 1986b) showed that indicators of reliability can also be used for balancing the accounts. This idea seems to have been applied in Italian compilation practice. In other countries, like France and the Netherlands, the balancing procedure is not based on explicit indicators of reliability. The experience and knowledge of the national account's specialists on the reliability of the various estimates is exploited as an integral part of the balancing process. A major element in this balancing process is the plausibility of the estimated development of the national economy and its major components over time. This crucial element was not addressed by Stone's article.

Unofficial statistics, often inspired by research interests

Though national accounts statistics is dominated by official statistics, also some important non-official statistics have been published. Some of them we already discussed under the label of "innovations". This was mostly work that anticipated concepts in the international guidelines or that

⁴¹ The use of reliability indicators was not an original idea. Josiah Stamp's estimates on national income of 1919 already used them systematically. This has inspired their use in Sweden and Norway.

proposed fundamentally different ones. However, also non-official statistics based on the international concepts play an important role.

They usually intend to fill the *gaps in the officially published national accounts statistics and serve a major role in economic and historical research*. Some major examples can illustrate this.

For decades, historical time series on economic growth all over the world are being compiled, collected and commented by Maddison (see e.g. Maddison, 2003). These time series include official estimates but are drastically extended by Maddison for years and countries for which no official estimates are available. For most researchers on long term economic growth, the data sets of Maddison are now the standard reference. A similar situation exist for the Penn-series on purchasing power parities (Summers and Heston, 1991). All these figures have played an important role in systematically examining the validity of alternative theories of economic growth (e.g. new growth theory). They have also been used for testing via cross-country growth regressions the importance of an sheer endless range of variables that might influence economic growth (e.g. education, health, war, monetary policy, corruption, democracy, geography, ethnicity and inequality).

The classic study *A Monetary History of the United States 1867-1960* by Friedman and Schwartz (1963) is a major example of compiling statistics for research. Based on analysis of these statistics, they argued that money plays an important role in generating cyclical fluctuations and that the severity of the Great Depression was in large part due to the mistakes of the Federal Reserve. The book launched monetarism, had a major impact on monetary policy all over the world and demonstrated that historical study combined with compiling statistics can be an important tool of macro-economic research.

Inspired by the work of Kuznets, a national accounts approach has also been applied to Dutch economic history. The national accounts framework is very suitable to check, combine and complete the limited, patchy and heterogeneous historical information, like tax returns, household budget data, import and export figures, occupational censuses and company archives with price lists, wage-rates and company accounts. In 1990, Dutch economic historians started a major project to reconstruct historical national accounts for the Netherlands. This has resulted in numerous publications and a data base with national accounts figures on the development of the Dutch economy in the period 1500-1913 (see e.g. van Zanden, 1993 and Smits, Horlings and van Zanden, 2000). These Dutch historical accounts include a breakdown of national income by industry (agriculture and various types of manufacturing and services), by type of income (wage income and income from capital) and by type of expenditure (capital formation, government final consumption and private final consumption). In contrast to current official national accounts, national income

includes – partly for practical reasons– all production, income and consumption both inside and outside the market sector, e.g. unpaid household services. This work, and similar work in other European countries, has put an end to the simple idea that there was a one-off break in the economic development which separated the traditional and static economy prior to the industrial revolution from the dynamic and modern economy after it.

Non-official figures based on the international concepts may also *try to improve the official estimates* by using other data sources or other estimation procedures. Examples of this are:

- the standardised productivity estimates compiled by Maddison and van Ark (1994): in order to obtain consistent productivity estimates, they use the same data source for estimating output and employment; this link between output and employment is indeed a frequent weakness of the official figures, see above;
- the estimates of harmonized price indices for ICT capital goods in nine OECD-countries by Collechia and Schreyer (2002). The price indices of ICT capital goods of various countries are only partly or not at all based on hedonic methods. In order to control for such differences in statistical methodology, the price indices were calibrated around the United States ICT prices indices. In this study also estimates are made for missing data, e.g. time series and separate price indices for the business sector.
- official estimates of GNP corrected by adding guesstimates of the black economy assumed to be missing in the estimates (the Economist).

Another group of national accounts statistics are those based on alternative concepts. Major examples are the extended –more welfare oriented accounts- by Eisner (1988) and estimates of economic growth corrected for Douglas North's notion of transactions costs (see Fuess and van den Berg, 1996).

A special category are the KLEMS databases on growth and productivity, which combine official and unofficial statistics. For better measuring, analyzing and monitoring growth and productivity, KLEMS Growth and Productivity Accounts are being developed all over the world. A key-objective is to move beneath the aggregate economy level and examine the productivity performance of individual industries and their contributions to economic growth. In order to reveal the enormous heterogeneity in output and productivity growth across industries, a very substantial amount of different industries (e.g. 72 in EU-KLEMS) are distinguished. The accounts will include quantities and prices of output, capital (K), labour (L), energy (E), material (M) and services (S) inputs at the industry level. Output and productivity measures are provided in terms of growth rates and (relative) levels. Additional measures on knowledge creation (R&D, patents, embodied technological change, other innovation activity and co-operation) will also be developed. These

measures are developed for individual European Union member states, and will also be linked with “sister”-KLEMS databases in the US, Canada, Asia, Africa and Latin-America.

The accounts will consist of two interdependent modules: a statistical module and an analytical module. The analytical module provides a (research) data base at the highest possible quality standards for use in the academic world and by policy makers. It uses “best practice” techniques in growth accounting, focuses on international comparability, and aims at full coverage (in terms of number countries, industries and variables). It will also consider alternative or pioneering assumptions regarding statistical conventions, e.g. with respect to ICT goods, non-market services or the measurement of capital services.

The statistical module of the data base will be developed parallel to the analytical module. It includes data which are as much as possible consistent with those published by national statistical institutes. Its methods will usually correspond to those in the central framework of the national accounts, e.g. supply and use tables are used as the coordinating framework for productivity analysis, chain indices are applied and software is capitalized. However, minor deviations may occur, e.g. the output of non-market services may be modified by taking capital services into account (differently). The statistical module may not only include national accounts data, but also various supplementary information, e.g. employment statistics on the quantity (persons and working hours) and quality (distribution of quantities by age, gender and education level) of labour input per industry.

National data needs

The official national accounts statistics of various countries differ substantially in terms of scope, detail, frequency and reliability. These differences reflect substantial differences in the roles played in national policy. Relatively encompassing, detailed, frequent and reliable national accounts statistics generally reflect that they play a relatively important role in national policy. This applies e.g. to France and the Netherlands. Relatively simple national accounts statistics reflect a minor role.

Nevertheless, rather similar sets of official national accounts statistics may still correspond to rather different roles in national policy. Compare for example the role of national accounts statistics in Netherlands and France. The role of the national accounts in France is much more important as it has permeated the whole French government administration and even the French business accounts. In the Netherlands, the central government administration employs national accounting concepts since the fifties. However, national accounting concepts are considered irrelevant for the administration of the local government and the business accounts.

4.3 The European revolution

The ongoing process of European unification has created a large and increasing demand for economic and social statistics on Member States. This pertains to national accounts statistics as well as to many specific economic and social statistics. A European Statistical Office (Eurostat) was established in 1958 (on the European Community and its statistical system, see DeMichelis, 1993). The first European guidelines on national accounting were issued in 1970; a second edition appeared in 1979. Now regularly a limited set of national accounts statistics on the Member States are published.

Since 1989, five major developments have revolutionised European national accounting:

1. The GNP Committee;
2. New European requirements on major inputs for the national accounts, e.g. new regulations on business registers and various statistical surveys;
3. The new European guidelines on national accounting (ESA95);
4. The European statistical programme for national accounts statistics.
5. The European Monetary Union.

The GNP Committee

In 1989, the Member States' GNP figures became the basis for a new, fourth, own resource of the Commission. This fourth resource will gradually become the Commission's largest financial (budgetary) resource. A committee consisting of representatives from all Member States was created to validate and help improving the quality and comparability of the Member States' GNP estimates.

This GNP Committee has initiated a lot of pioneering work:

- Discussions and jurisprudence on the proper interpretation of ESA concepts. For example, Commission Decisions on the interpretation of the ESA79 were issued with respect to taxes on products and services of owner-occupied dwellings;
- Documentation of the Member States' data sources and methods for compiling GNP. Such quite accurate, complete and up-to-date descriptions did not exist in most Member States and hardly exist anywhere in the world.
- Auditing missions to validate the quality of the Member States GNP figures and the compliance with the ESA79;

- Discussions of the Commission's auditing reports in the GNP Committee;
- Discussions on the merits and limitations of various types of data sources and estimation methods for compiling GNP figures;
- Discussions and concrete proposals on how to estimate some well-known problem areas in the national accounts, e.g. the underground economy, services of owner-occupied dwellings, income in kind and inconsistencies between the Foreign Trade Statistics of EU-member states; a Commission Decision even prescribed how to estimate the services of owner-occupied dwellings;
- Validation of employment underlying the Member States' GNP estimates on the basis of alternative estimates of employment.
- Conceptual modifications in order to comply with the ESA79 instead of the SNA53 (i.e. the guidelines of 1953 were still applied by some Member States!).
- Drastic revisions of the national accounts in some Member States; they also resulted in sizeable adjustments in the GNP estimates, e.g. 10%.

The success of the GNP Committee has been possible thanks to a combination of various factors:

- The political and financial pressure on making clear progress;
- The existence of a legal framework for the GNP Committee and the possibility to legalise some of its proposals in the form of Commission Regulations;
- Confidentiality of the country-specific discussions, reports and inventories⁴²;
- Money to compensate the Member States for all the extra work imposed by the GNP Committee, e.g. the writing of inventories and reports, responding to detailed questionnaires, validating employment underlying GNP estimates and improving the estimation methods. For some Member States, also a substantial amount of technical assistance was arranged.

Table 4.3 Use of national accounts statistics for European policy

Policy area	Which national accounts statistic?
Monetary policy and public finance	Government deficit and debt as a percentage of GDP Financial accounts showing e.g. the size of new mortgages and loans by corporations
Productivity and growth policy	Economic growth, expenditure on Research and Development

⁴² However, several inventories of Member States have been made public by the Member States themselves, e.g. by the Netherlands (Bos and Gorter, 1993).

(Lisbon agenda)	as a percentage of GDP, EU-KLEMS
Social policy	Social protection statistics closely linked to national accounts concepts
Regional policy	Regional product per capita is yardstick for granting regional funds
Agricultural policy	Agricultural accounts showing also the development of farmer income
Development aid	Low domestic product per capita is a yardstick for granting aid
Defense policy	Expenditure on defense as a percentage of GDP
Maximum total expenditure by EC Member states contribution	Percentage of GNI (about 1%) Percentage of GNI (but some other EC-own resources exist, e.g. import duties)

New requirements on inputs for the national accounts

A major change also took place in the inputs for the national accounts. For good-quality GNP estimates, an up-to-date and complete business register and statistics covering major parts of output, expenditure or income are indispensable. The work of the GNP Committee revealed that in many Member States business registers needed improvement and that the coverage of their basic statistics showed some major lacunae, in particular with respect to the services industries. Recently, regulations were issued by the Commission covering also these weak and for the national accounts very important areas. So, in some years time, it will be much easier for EU-national accountants to make good GNP estimates.

The degree of involvement of Eurostat with the Member States' statistics range widely. Traditionally the role was limited to disseminating the Member States data, to issue guidelines on concepts and classifications and to initiating regulations on the scope of the data to be submitted. The fourth own resource has started the active monitoring and auditing of the concepts, data sources and statistical methods used by the Member States in compiling GNP figures. The European experience also reveals an even more active role by Eurostat in achieving comparable statistics: *the processing of the Member States' data by Eurostat*. The latter occurs now for the harmonised Labour Force Survey, the purchasing power parities and the estimates for the EU as a whole, e.g. quarterly accounts.

Deregulation is also part of the process of European unification. In particular the removal of the customs formalities at the intra-EU borders is having significant consequences for compiling the national accounts (see Bos, 1992c and 1996b). The European experience can teach about the consequences of customs-unions and free trade zones for the national accounts.

In order to establish a single European market, on 31 December 1992 customs formalities at the intra-EU borders were been abolished. At the same time, a new system to register imports and exports of goods between Member States has come into force: the Intrastat-system. Under the Intrastat system, enterprises are obliged to send a monthly statistical declaration on intra-community

trade in merchandise to the relevant administration in each Member State. The replacement of customs data on intra-EU trade by Intrastat-information has had direct effects on the Foreign Trade Statistics: they became in most Member States less detailed, less accurate and less timely.

The Foreign Trade Statistics are a major data source for the national accounts statistics. They are not only used for estimating imports and exports, but -as they are very detailed and available monthly and with limited delay- they also play a major role in balancing the accounts and in compiling figures on other variables via commodity-flow estimates (e.g. production and value added). This applies both to short term figures, to the annual accounts and to the detailed input-output tables. Furthermore, imports and exports figures play an important role in the expenditure estimates of GDP.

The quality of the Foreign Trade Statistics changed due to the abolition of the intra-EU customs borders (see Bos, 1996). However, assessing the net effect of the introduction of the Intrastat-system is not straight-forward, for various reasons:

- some of the problems are temporary;
- some Member States do not seem to have serious problems;
- the Intrastat-system offers opportunities that are perhaps not fully exploited by the national accountants (e.g. for linking imports and exports figures with other data at the enterprise level);
- the Intrastat-system is now being reconsidered;
- and inconsistencies between the imports and exports figures of trading partners already existed before the Intrastat-system.

The Intrastat-system may therefore also be a stimulus to reconsider present national accounts compilation strategies and be more critical about the former Foreign Trade Statistics: their detail and timeliness suggested an illusory degree of accuracy and completeness (see also van Bergeijk, 1995).

ESA95

The third major development in European national accounting was the ESA95. Immediately after the completion of the SNA93, the drafting of the new European guidelines on national accounting (ESA95) started. The final draft was officially approved by the Member States's statisticians in 1995; it will be published in 1996. The ESA95 is fully consistent with the SNA93 but has some clear value added for EU Member States, and also for national accounting in general.

A novelty of the ESA95 is that it is part of an official regulation of the EU and thus a *legal document*. This contrasts with the SNA93 and ESA79: these are 'gentlemen's-agreements' (although their application is binding in some situations). The explicit legal character of the ESA95 is

necessary considering the many and important administrative uses made of the national accounts figures.

This pertains not only to the fourth own resource and the entrance criteria for the European Union. Examples of other administrative uses by the European Union are:

- The ceiling for the total own resources of the European Commission is determined as a percentage of the Member States' GNP figures;
- At present, the major own resource of the Commission is the VAT-own resource. The contributions by the Member States for this resource are largely affected by the national accounts figures (in order to calculate the average VAT-rate);
- The sizeable expenditure for the Structural Funds of the European Union (granted to 'poor' and backward regions) are based on regional national accounts figures (regional domestic product per capita);
- Several other types of expenditure by the Commission are indexed or linked to national accounts figures, e.g. those on Research and Development.
- The contributions by the national central banks for financing the European Monetary Institute ('the European central bank') are based on GDP figures (and on population figures).

In several respects, the ESA95 is *more accurate and precise* than the SNA93 (for a comparison of the ESA95 and the SNA93, see also ESA95, paragraph 1.24). This reflects not only the different styles of presentation. It reflects also the focus of the ESA95 on economies in Europe instead of on the whole world and the fact that ESA95 was written some years later (accurate phrases in SNA93 were often copied and several inaccurate ones and minor errors were modified for the ESA95; lessons were also learned from the conceptual and practical problems raised in the GNP Committee). It also reflects *the European need to have stricter rules and a greater degree of conceptual harmonisation than exist at the world level*.

The major example of the latter pertains to the distinction between market and other non-market. This distinction is important for both the sector classification (e.g. the sector government) and the measurement of output, value added, GDP and GNP. In drafting the SNA93 no agreement could be reached on a clear-cut definition and a rather general and vague phrasing was introduced. For European purposes, such a definition was not acceptable considering the uses made of the national accounts figures, e.g. for the GNP own resource and the European Monetary Union. The ESA95 contains therefore a much clearer and stricter distinction between market and other non-market (though there are still some problems of interpretation and application). Another example pertains to the consumption of the Financial Services Indirectly Measured: the SNA93 leaves a choice, while the ESA95 chooses one method of allocating these services.

New European statistical programme for the national accounts

The fourth major European development pertains to the European statistical programme for national accounts statistics. The ESA95 was accompanied by a statistical programme for the national accounts statistics. This programme obliges Member States to compile an extensive set of national accounts statistics, e.g. quarterly accounts, supply and use tables, a whole range of sector accounts and regional accounts. For most Member States, meeting the demands of this statistical programme will imply a massive effort, as it amounts to a drastic extension and speeding up of the national accounts statistics presently compiled. As a consequence of this ambitious statistical programme, a much more balanced set of national accounts statistics is available for the EU-Member States.

European Monetary Union

The fifth major development in Europe was the use of national accounts figures as criteria for the European Monetary Union. Government deficit (i.e. net lending by the sector general government) should not exceed 3% of GDP and government debt should not exceed 60% of GDP or show a downward movement towards this percentage. This has stimulated the work of the GNP committee⁴³ and other Eurostat forums, induced discussions on the proper interpretation of the national accounts concepts involved (e.g. how to account for privatisation? and what is the sector General government?) and has accelerated in most Member States the compilation of financial accounts and balance sheets, in particular for the sectors General government. Moreover, several auditing missions have been held.

A stable rate of inflation is another entrance criterion for the European Monetary Union. This has led to the development of an European, harmonised, consumer price index. Such harmonisation was urgently needed, because the concepts and product ranges used by the Member States for their national consumer price indices differed substantially. This work may also induce improvements in the quality and comparability of other price statistics used for compiling the national accounts.

In 1997, the EU-Member States decided to use also figures on the volume growth of GDP for managing and monitoring the European Monetary Union. As a consequence, work has been launched on harmonising and improving the Member States figures on GDP volume growth. The first priority is achieving in a relatively short term (some years) international comparability of these figures. The second more long term priority is to improve the reliability of the figures and the quality of the concepts used to measure volume growth. In 2001, a Handbook was published

⁴³ Conceptually and in estimation practice GNP and GDP are very close: GNP is just one extra step, i.e. GNP is GDP plus net primary income flows with the Rest of the World.

providing much more operational guidelines for measuring price- and volume changes (Eurostat, 2001). A basic distinction is made between three categories:

- A. Recommended estimation methods ('best practice');
- B. Estimation methods which can be used in case an A-method can not be applied;
- C. Estimation methods which should be avoided.

The handbook is a major contribution to the literature on measuring price- and volume measures in a national accounts context: it gives detailed guidelines by product and transaction-category, incorporates best practice from within the EU and from other experienced countries and provides references to the major articles on the various topics (e.g. about index formulae, the level of aggregation, quality changes and the measurement of the prices of computers and medical services).

In 2000, the EU-Member States decided to develop quarterly accounts for revenue and expenditure of the sector general government. This led also to European definitions of government revenue and expenditure in terms of national accounting concepts. Such definitions are absent in the SNA93, ESA95 and in all earlier national accounts' guidelines.

The European Monetary Union is now the major political project of the EU. The entrance criteria in terms of national accounts figures created a large political interest in these national accounts figures, in particular at the Central Banks and the Ministries of Finance. As a consequence, the national accountant's work on the sector government is now much more actively monitored. In discussing and deciding on the national budget, national accounts statistics on the government deficit have become the central figures in all EU-countries. They have often taken over this role from specifically nationally defined concepts.

4.4 Summary

Under the influence of the international guidelines and the international organisations, national accounts statistics are now available for all countries. For most countries, they have also gradually extended in scope and detail. Nevertheless, still enormous differences in scope, detail, quality and frequency exist between the national accounts statistics published by countries. This applies even to a rather a homogeneous block of countries, like the EU.

The introduction of the new guidelines seems to be a great stimulus for many countries to transform their rather simple, SNA53-style, national accounting system into more extended and detailed accounting systems, approaching more the scope and detail of the SNA68 and ESA70. In the next decades only some countries will come near to the scope and detail offered by the most recent

guidelines. These guidelines can best be regarded as a menu with some common dishes but where every country can select supplementary dishes according to their own needs and resources.

The guidelines have greatly contributed to the harmonisation of the basic concepts and classifications used by countries. Nevertheless, some differences have continued to exist. Only in the EU, strict compliance to the basic concepts in the international standards is now being enforced.

The ongoing European unification is revolutionising European national accounting. National accounts figures, like GNP, government deficit and GDP volume growth have been selected to play a special role in monitoring and managing the European unification. This role in European policy has also drastically increased the importance of national accounts statistics in national policy. In discussing and deciding on the national budget, national accounts statistics on the government deficit have become the central figures in all EU-countries. They have often taken over this role from specifically nationally defined concepts.

The Member States and the European Commission have been aware that the national accounts statistics did not suffice for such usage. They have therefore launched an ambitious programme for improving the quality and comparability of present national accounts figures and for drastically extending the set of national accounts statistics that are available for all EU-Member States.

From a universal perspective, these European developments are in two respects revolutionary. Firstly, the development of jurisprudence on the interpretation and application of the international guidelines is a totally new development for the national accounts. Secondly, the European experience gives a concrete example of how the quality and comparability of national accounts statistics can be improved.

In order to serve research interests, also unofficial national accounts statistics are being compiled. They usually intend to fill the gaps in the officially published national accounts statistics. Major examples are the historical times series on cross-country economic growth by Maddison (e.g. 2003), the Penn-series on purchasing power-parities (Summers and Heston, 1991) and the classic study by Friedman and Schwartz on the monetary history of the United States. Another group of national accounts statistics are those based on alternative concepts. Major examples are the extended –more welfare oriented accounts- by Eisner (1988) and estimates of economic growth corrected for Douglas North's notion of transactions costs (see Fuess and van den Berg, 1996). A special category are the KLEMs databases on productivity, which combine official and unofficial statistics.

REFERENCES

- Adler, H. and O. Hawrylyshyn, 1978, Estimates of the Value of Household Work, Canada, 1961 and 1971, *Review of Income and Wealth*, pp. 121-132.
- Al, P.G., B.M. Balk, S. de Boer and G.P. den Bakker, 1985, The Use of Chain Indices for Deflating the National Accounts, *National Accounts Occasional Papers*, nr. 5 (Statistics Netherlands, Voorburg).
- Arvay, J., 1994, The Material Product System (MPS); a Retrospective. Paper in Kenessey (1994), pp. 218-236.
- Aukrust, O., 1986, On the Occasion of a Nobel prize. *Review of Income and Wealth*, nr. 1, pp. 109-112.
- Aukrust, O., 1994, The Scandinavian Contribution to National accounting. In Kenessey (1994), pp. 16-65.
- Bakker, G.P. den, 1991, The Choice of Index Number Formulae and Weights in the National Accounts. A Sensitivity Analysis Based on Macro-Economic Data for the Interwar Period, *National Accounts Occasional Papers* nr. 44 (Statistics Netherlands, Voorburg).
- Bakker, G.P. den, 1994, Origin and Development of Dutch National Accounts. Paper in Kenessey (1994), pp. 66-92.
- Bakker, G.P. den, T.A. Huitker and C.A. van Bochove, 1990, The Dutch Economy 1921-39; Revised Macroeconomic Data for the Interwar Period. *Review of Income and Wealth*, Series 36, No. 2, pp. 187-206.
- Baumol, W.J., 2000, Leontief's Great Leap Forward: Beyond Quesnay, Marx and von Bortkiewicz. *Economic Systems Research*, Volume 12, Number 2, pp. 141-152.

- Begg, I, J. Bournay, M. Weale and S. Wright, 1996, Financial Intermediation Services Indirectly Measured: Estimates for France and the UK Based on the Approach Adopted in the 1993 SNA. *Review of Income and Wealth*, Series 42, Number 4, pp. 453-473.
- Bodkin, R.G., L.R. Klein and K. Marwah, 1991, *A History of Macroeconometric Model-Building* (Edward Elgar, Aldershot).
- Bjerve, P.J. and M. Selsjord, 1959, *Financial Accounting within a System of National Accounting. Income and Wealth Series VIII* (International Association for Research in Income and Wealth, Bowes & Bowes Publishers Ltd, London), pp. 60-79.
- Bjerkholt, O., 1998, Interaction between Model Builders and Policy Makers in the Norwegian Tradition. *Economic Modelling* 15, pp. 317-339.
- Bochove, C.A. van and H.K. van Tuinen, 1986, Flexibility in the Next SNA: the Case for an Institutional Core. *Review of Income and Wealth*, pp. 127-154.
- Boer, S. de, J. van Dalen and P. Verbiest, 1997, Chain Indices in the National Accounts; the Dutch Experience, *National Accounts Occasional Papers nr 87* (Statistics Netherlands, Voorburg).
- Boogaard, A. van den, 1998, *Configuring the Economy; The Emergence of a Modelling Practice in the Netherlands, 1920-1955* (Thela Thesis).
- Bos, F., 1992a, The History of National Accounting. *National Accounts Occasional Paper nr. 48* (Statistics Netherlands, Voorburg).
- Bos, F., 1992b, Reasons for preferring net to gross figures of product (and vice versa), *Review of Income and Wealth*, Series 38, Nr. 3, pp.267-280.
- Bos, F., 1993, Standard National Accounting Concepts, *Economic Theory and Data Compilation Issues; On Constancy and Change in the United Nations-Manuals on National Accounting (1947, 1953, 1968, 1993)*. *National Accounts Occasional Paper, nr. 61* (Statistics Netherlands, Voorburg).

- Bos, F., 1994a, Constancy and Change in the United Nations Manuals on National Accounting (1947, 1953, 1968, 1993). In Kenessey (1994), pp. 198-217.
- Bos, F., 1994b, Implementing the Revised SNA in the Dutch National Accounts. Netherlands Official Statistics, vol. 9, Spring, pp. 12-25.
- Bos, F., 2006, The development of the Dutch national accounts as a tool for analysis and policy, *Statistica Neerlandica*, vol. 60, nr. 2 (special 60th anniversary issue), 225-258.
- Bos, F., 2008, Uses of national accounts; history, international standardization and applications in the Netherlands, paper presented at the 2008 World Conference on national accounting and performance measures across nations.
- Bruyn-Hundt, M. (1996), *The Economics of unpaid work* (Thela-publishers, Amsterdam).
- Carson, C.S., 1975, The History of the United States National Income and Product Accounts: the Development of an Analytical Tool. *Review of Income and Wealth*, pp. 153-181.
- Carson, C.S., 1999, 50-Year Retrospective of the IARIW: The Early Years. *Review of Income and Wealth*, Series 45, Number 3, pp. 379-396.
- CBS (Statistics Netherlands), 1939, Enkele berekeningen over het Nationale Inkomen van Nederland. *Speciale Onderzoekingen van de Nederlandsche Conjunctuur*, no. 2. (Statistics Netherlands, Den Haag).
- CBS, 1948, Het Nationale Inkomen van Nederland 1921-1939. No. 7 der *Monografieën van de Nederlandsche conjunctuur* (Uitgeversmaatschappij W. de Haan n.v., Utrecht).
- CBS, 1950, De Nationale Jaarrekeningen: Doeleinden, Problemen, Resultaten. No. 8 der *Monografieën van de Nederlandsche Conjunctuur* (Uitgeversmaatschappij W. de Haan n.v., Utrecht).
- Clark, C., 1932, *The National Income, 1924-1931* (MacMillan and Co., Ltd, London).

Clark, C., 1937, *National Income and Outlay* (MacMillan and Co., Ltd, London).

Clark, C., 1940, *Conditions of Economic Progress* (MacMillan and Co., Ltd, London).

Cleeff, E. van, 1941a, *Nationale Boekhouding: Proeve van een Jaaroverzicht Nederland 1938*. *De Economist*, pp. 415-424.

Cleeff, E. van, 1941b, *Betekenis en Inrichting eener Nationale Boekhouding*. *De Economist*, pp. 608-623.

Copeland, M.A., 1952, *A Study of Moneyflows in the United States*. (National Bureau of Economic Research, New York).

DeMichelis, A., 1993, *The European Community and its Statistical System*. *Journal of Official Statistics*, Statistics Sweden, pp. 137-167.

Deming, W.E., 1943, *Statistical Adjustment of Data*. (Wiley, New York).

Demotes-Mainard, M. and J. Bournay, 1994, *Revisions of the French National Accounts; Past Experience as Lessons for the Future*. Paper presented at the 23th IARIW Conference.

Denison, E.F., 1947, *Report on Tripartite Discussions of National Income Measurement*. *Studies in Income and Wealth*, vol. X, pp. 3-22. (National Bureau of Economic Research, New York).

Denison, E.F., 1971, *U.S. National Income and Product Estimates: Evaluation and Some Specific Suggestions for Improvement*, *Survey of Current Business*, 50th Anniversary Issue, 36-44.

Denison, E.F., 1991, *U.S. National Income and Product Estimates: Evaluation and Some Specific Suggestions for Improvement*. *Survey of Current Business*, 50th Anniversary Issue, pp. 36-44.

Derksen, J.B.D., 1944, *Nationale Boekhouding, Doeleinden, Problemen en Resultaten* ["National Bookkeeping, Purposes, Problems and Results"]. In: CBS, 1978, *Denken en Meten; Statistische Opstellen* (Staatsuitgeverij, Den Haag), pp. XIX-XXVII.

- Derksen, J.B.D., 1946, *A System of National Book-keeping; Illustrated by the Experience of the Netherlands Economy*. National Institute of Economic and Social Research Occasional Paper X (Cambridge University Press, London).
- Desrosières, A., 1998, *The Politics of Large Numbers; A History of Statistical Reasoning* (Harvard University Press, Cambridge Massachusetts).
- Don, H. and J. Verbruggen, 2006, *Models and methods for economic policy; 60 years of evolution at CPB*, Statistica Neerlandica.
- Eckstein, O., 1971, *A Model-Builder's View of the National Income Accounts*. Survey of Current Business, 50th Anniversary Issue, pp. 65-66.
- Economic Classification Policy Committee, 1993/1994, *Issues Papers 1-8* (US Department of Commerce, Washington).
- Eije, J.H. von, 1982, *Geldstromen en Inkomensverdeling in de Verzorgingsstaat*, WRR, V32, Den Haag.
- Eijk, C.J., 1993, *National Accounts and the Macroeconomic Revolutions of the Interwar Period*. In: Vries et al. (1993), pp. 133-150.
- Eisner, R., 1988, *Extended Accounts for National Income and Product*. Journal of Economic Literature. Vol. XXVI, pp. 1611-1684.
- Eisner, R., 1989, *Divergences of Measurement and Theory and Some Implications for Economic Policy*. American Economic Review, pp. 1-13.
- Eltis, W., 1984, *The Classical Theory of Economic Growth* (MacMillan).
- Eurostat, 1970, *European System of Integrated Economic Accounts (ESA)* (Office for Official Publications of the European Communities, Luxembourg).

- Eurostat, 1976, European System of Social Protection Statistics (ESSPROS) (Office for Official Publications of the European Communities, Luxembourg)
- Eurostat, 1995, European System of Accounts (ESA95) (Office for Official Publications of the European Communities, Luxembourg).
- Eurostat, 2001, Handbook on Price and Volume Measures in National Accounts (Office for Official Publications of the European Communities, Luxembourg).
- Franz, A., 1996, A Class Society of National Accounts Compilers? Considerations on Certain Requirements and Some Consequences of the Transition to the New Systems. Paper Presented at the Joint UN-ECE/Eurostat/OECD Meeting on National Accounts, Geneva, 30 April-3 May 1996.
- Friedman, M. and A. Schwartz, 1963, A Monetary History of the United States, 1867-1960 (Princeton, Princeton University Press).
- Frisch, R., 1955, From National Accounts to Macro-Economic Decision Models, IARIW Papers on Income and Wealth Series IV (Bowes&Bowes, London).
- Fuess, S.M. and H. van den Berg, 1996, Does GNP Exaggerate Growth in “Actual” Output? The Case of the United States. Review of Income and Wealth, Series 42, Number 1, pp. 35-48.
- Geelhoed, L.A. and J. van Sinderen, 1993, National Accounts, Economic-Policy Standards and Economic Policy: some Observations. In: Vries et al (1993), pp. 167-192.
- Gilbert, M., 1944, National Product, War and Prewar: Some Comments on Professor Kuznets' Study and a Reply by Professor Kuznets. The Review of Economic Statistics, Volume XXVI, Number 3, pp. 109-135.
- Gilbert, M, G. Jaszi, E.F. Denison and C.F. Schwartz, 1948, Objectives of National Income Measurement: A Reply to professor Kuznets. Review of Economics and Statistics, pp. 179-195.

- Gilbert, M. and I.B. Kravis, 1954, *An International Comparison of National products and the Purchasing Power of Currencies; A study of the United States, the United Kingdom, France, Germany and Italy.* (OEEC, Paris).
- Goldschmidt-Clermont, L. and E. Pagnossin-Aligisakis, 1999, *Household's Non-SNA Production: Labour Time, Value of Labour and of Product, and Contribution to Extended Private Consumption.* *Review of Income and Wealth*, Series 45, Number 4, pp. 519-530.
- Goldsmith, R.W., 1951, *A Perpetual Inventory of National Wealth.* *Studies in Income and Wealth* (NBER, New York), Vol. 14, pp. 5-74.
- Goldsmith, R.W., 1962, *The National Wealth of the United States in the Postwar Period.* (Princeton University Press, Princeton).
- Goldsmith, R.W., 1985, *Comparative National Balance Sheets; A Study of Twenty Countries, 1688-1978.* (University of Chicago Press, Chicago).
- Gorter, C.N., 1988, *Imputations and Re-routeings in the National Accounts.* *National Accounts Occasional Paper nr. 26* (Statistics Netherlands, Voorburg).
- Gorter, C.N. and P. van der Laan, 1992, *An Economic Core System and the Socio-Economic Accounts Module for the Netherlands.* *Review of Income and Wealth*, series 38, nr. 2, June 1992.
- Harrison, A., 1990, *Major Changes Proposed for the Next SNA: an Overview.* *Review of Income and Wealth*, Series 36, No. 4, pp. 335-352.
- Harrison, A., 1994, *The SNA: 1968-1993 and Beyond.* In Kenessey (1994), pp. 169-197.
- Herrick, B. and C.P. Kindleberger, 1983, *Economic Development* (McGraw Hill Book Co, Singapore).
- Hicks, J.R., 1939, *Value and Capital* (University Press, Oxford).

Hicks, J.R., 1940, The Valuation of Social Income. *Economica*, pp. 105- 124.

Hicks, J.R., 1948, The Valuation of Social Income- A Comment on Professor Kuznets' Reflections. *Economica*, pp. 163-172.

Hueting, R., 1991, Correcting national income for environmental losses: Toward a practical solution for a theoretical dilemma, in: R. Constanza (ed), *Ecological Economics, the Science and Management of Sustainability*, New York, Columbia University Press.

Hueting, R., 1980, *New scarcity and economic growth; More welfare through less production?*, North-Holland, Amsterdam.

IMF, 1977, *Balance of Payments Manual*. (IMF, Washington).

INSEE, 1976, *Système Elargi de Comptabilité Nationale*. Les Collections de l'INSEE, n. 198-199, Series C, no. 44-45 (INSEE, Paris).

Inter-Secretariat Working Group on National Accounts (ISWGNA), 1992, *National Accounts and Balances : System of National Accounts (SNA)*. Report on decisions by the ISGNA on specific issues concerning the revised SNA at its 14-16 December 1992 meeting held at OECD, Paris.

Ivanov, Y., 1987, Possibilities and Problems of Reconciliation of the SNA and the MPS. *Review of Income and Wealth*, pp. 1-18.

Jaszi, G., 1971, An Economic Accountant's Ledger. *Survey of Current Business*, 50th Anniversary Issue, pp. 183-227.

Jaszi, G., 1986, An Economic Accountant's Audit. *American Economic Association Papers and Proceedings*, pp. 411-417.

Jolink, A., 2003, *Jan Tinbergen; The statistical turn in economics: 1903-1955*, Chimes, Rotterdam.

- Kazemier, B., S. Keuning and P. van de Ven, 1999, *Measuring Well-being with an Integrated System of Economic and Social Accounts : an Application of the SESAME Approach to the Netherlands*, National Accounts Occasional Papers nr. 90 (Statistics Netherlands, Voorburg).
- Kazemier, B. and J. Exel, 1992, *The Allocation of Time in the Netherlands in the Context of the SNA; a Module*. National Accounts Occasional Paper nr. 52 (Statistics Netherlands, Voorburg).
- Keuchenius, W. M., 1803, *De inkomsten en uitgaven der Bataafsche Republiek, voorgesteld in eene nationale balans om onze maatschappelijke belangen, landbouw, koophandel, fabrieken en visscherijen, tegen elkander te berekenen, en de belastingen, naar proefondervindelijk-staatkundige en financieele gronden, te overwegen* (W. Holtrop, Amsterdam).
- Keynes, J.M., 1920, *The economic consequences of the peace* (MacMillan and Co., Ltd London).
- Keynes, J.M., 1936, *The general theory of employment, interest and money*, MacMillan and Cambridge University Press, London.
- Keynes, J.M., 1940, *How to pay for the war*, Harcourt Brace & co, New York.
- King, G., 1936, *Two Tracts*. (The Johns Hopkins Press, Baltimore).
- Kendrick, J.W., 1972, *Economic Accounts and Their Uses* (Mc GrawHill, 1972).
- Kendrick, J.W. (ed.), 1996, *The New System of National Accounts* (Kluwer, Boston).
- Kenessey, Z (ed.), 1994, *The Accounts of Nations* (IOS Press, Amsterdam).
- Keuning, S., 1997, *SESAME: an Integrated Economic and Social Accounting System*. *International Statistical Review*, Volume 65 (1).
- Keuning, S., 1998, *Interaction between National Accounts and Socio-Economic Policy*. *Review of Income and Wealth*, Series 44, Number 3, pp. 345-360.

Klein, L.R., 1983, *Lectures in Econometrics* (North-Holland, Amsterdam).

Klep, P.M.M. and A. Verheusen (2002), *The Batavian Statistical revolution in the Netherlands 1798-1802; Frequency, formats, administrative success and political background*. In P.M.M. Klep and I.H. Stamhuis (eds.), 2002, *The Statistical Mind in a pre-statistical era: The Netherlands 1750-1850*, Aksant, Amsterdam.

Kravis, I.B., 1984, *Comparative Studies of National Incomes and Prices*. *Journal of Economic Literature*, vol. XXII, pp. 1-39.

Kurz, H.D. and N. Salvadori, 2000, 'Classical' Roots of Input-Output Analysis: A Short Account of its Long Prehistory. *Economic Systems Research*, Volume 12, Number 2, pp. 153-180.

Kuznets, S., 1938, *Commodity Flow and Capital Formation*. (National Bureau of Economic Research, New York).

Kuznets, S., 1941, *National Income and Its Composition, 1919-1938*. (National Bureau of Economic Research, New York).

Kuznets, S., 1944, *National Product, War and Prewar: Some Comments on Professor Kuznets' Study and a Reply by Professor Kuznets*. *The Review of Economic Statistics*, pp. 126-135.

Kuznets, S., 1946, *National Income: a Summary of Findings*. (National Bureau of Economic Research, New York).

Kuznets, S., 1948a, *Discussion of the new Department of Commerce Income Series; National Income: a New Version*. *The Review of Economics and Statistics*, Vol. XXX, Number 3, pp. 151-179.

Kuznets, S., 1948b, *On the Valuation of Social Income- Reflection on professor Hicks' article*. *Economica*, pp. 1-16 (part I), pp. 116-131 (part II).

- Landefeld, J.S. and S.H. McCulla, 2000, Accounting for Nonmarket Household Production Within a National Accounts Framework. *Review of Income and Wealth*, Series 46, Number 3, pp. 289-308.
- Leontief, W.W., 1936, Quantitative Input and Output Relations in the Economic System of the United States. *Review of Economic Statistics*, vol. XVIII, No. 3, pp. 105-125.
- Leontief, W.W., 1941, *The Structure of American Economy, 1919-1939* (Oxford University Press, New York).
- Lundberg, E., 1984, Lundberg on Kuznets. In: H.W. Spiegel and W.J. Samuels, *Contemporary economists in perspective, Part II* (JAI Press Inc., London), pp. 523-542.
- Maddison, A., 1982, *Phases of Capitalist Development* (Oxford University Press).
- Maddison, A., 1987, Growth and Slowdown in Advanced Capitalist Countries; Techniques of Quantitative Assessment. *Journal of Economic Literature*, vol. XXV, pp. 649-698.
- Maddison, A., 2003, *The World Economy: Historical statistics*, OECD Development Centre Studies (OECD, Paris).
- Maddison, A., 2005, Measuring and interpreting world economic performance 1500-2001, *Review of Income and Wealth*, 1-36.
- Maddison, A. and B. van Ark, 1994, *The International Comparison of Real Product and Productivity*. Paper presented at the 23th IARIW Conference, St. Andrews, New Brunswick, Canada.
- Margolis, J., 1952, National Economic Accounting: Reorientation Needed. *The Review of Economics and Statistics*, vol. XXXIV, number 4, pp. 291-304.
- Maurice, R. (ed.), 1968, *National Accounts Statistics; Sources and Methods* (Central Statistical Office, London)

- Meade, J.A. and R. Stone, 1941, The Construction of Tables of National Income, Expenditure, Savings and Investment. *Economic Journal*, pp. 216-231.
- Meade, J.A., 1951, *The balance of payments* (Oxford University Press, London).
- Meek, R.L., 1962, *The Economics of Physiocracy: Essays and Translations* (Cambridge Mass: Harvard University Press).
- Metelerkamp, R., 1804, *De toestand van Nederland in vergelijking gebragt met die van enige andere landen van Europa* (Cornel en van Baalen, Rotterdam).
- Mishan, E.J., 1969, *The Costs of Economic Growth*. (Penguin Books Ltd, New York).
- Morgan, M., 1990, *The History of Econometric Ideas*. (Cambridge University Press, Cambridge).
- Neuburger, H., 1996, *How Far Should Economic Theory and Economic Policy Affect the Design of National Accounts*. Paper Presented at the 24th IARIW Conference, Lillehammer, Norway.
- Nooteboom, L., 1978, *Veertig Jaren Nationale Rekeningen* ["Fourty Years National Accounts"]. In: *Statistics Netherlands, Denken en Meten; Statistische Opstellen* (Staatsuitgeverij, Den Haag), pp. 1-17.
- Nordhaus, W. and J. Tobin, 1972, *Is Growth Obsolete?* in: *National Bureau of Economic Research, Economic Growth*. (Columbia University Press, New York).
- North, D., 1990, *Institutions, Institutional Change and Economic Performance* (Cambridge University Press, New York).
- Novak, G.J., 1975, *Reliability Criteria for National Accounts*. *Review of Income and Wealth*, Series 21, Vol. 3, pp. 323-344.
- OECD, 1981, *The Measurement of Scientific and Technical Activities; "Frascati Manual"* (OECD, Paris).

OECD, 2000, A System of Health Accounts (OECD, Paris).

OECD (/Schreijer. P.), 2001, OECD Manual Measuring productivity; measurement of aggregate and industry-level growth (OECD, Paris).

OEEC, 1951, A Simplified System of National Accounts. (OEEC, Paris).

OEEC, 1952, A Standardised System of National Accounts. (OEEC, Paris).

Ohlsson, I, 1953, On National Accounting. (Konjunkturinstitutet Stockholm).

Okun, A.M, 1971, Social Welfare has no Price Tag. Survey of Current Business, 50th Anniversary Issue, pp. 129-133.

Passenier, J. ,1994, Van planning naar scanning; een halve eeuw Planbureau in Nederland (Wolters-Noordhof, Groningen).

Patinkin, D., 1976, Keynes and Econometrics: on the Interaction Between the Macroeconomic Revolutions of the Interwar Period. *Econometrica*, Vol. 44, Number 6, pp. 1091-1123.

Pen, J., 1971, *Income Distribution* (Penguin Book Ltd., Harmondsworth, Middlesex, England).

Phillips, A., 1955, The Tableau Economique as a Simple Leontief Model. *Quarterly Journal of Economics*, 69, pp. 137-144.

Postner, H., 1994, A Historical Note on Quadruple-Entry Bookkeeping. In: Kenessey (1994), pp. 237-245.

Postner, H., 1995, The 1993 Revised System of National Accounts: Where Do We Go From Here? *Review of Income and Wealth*, Series 41, Number 4, pp. 459-470.

Pyatt, G., 1991, SAMs, the SNA and National Accounting Capabilities. *Review of Income and Wealth*, Series 37, No. 2, pp. 177-198.

- Pyatt, G., 1994, Intellectual Foundations for the 1968 SNA. In: Kenessey (1994), pp. 246-250.
- Pyatt, G., 1999, Some Relationships between T-Accounts, Input-Output Tables and Social Accounting Matrices. *Economic Systems Research*, Volume 11, Number 4, pp. 365-389.
- Pyatt, G. and J.I. Round, 1977, Social Accounting Matrices for Development Planning. *Review of Income and Wealth* 23(4), pp. 339-364.
- Pyatt, G. and E. Thorbecke, 1976, *Planning Techniques For a Better Future*. (ILO, Geneva).
- Pressman, S., 2006, *Fifty Major Economists* (Routledge, London).
- Reich, U.P., 1993, The Dutch School of Thought in National Accounts. In: Vries et al. (1993), pp. 257-270.
- Richter, J., 1994, Use and Misuse Of National Accounts from a Modelling Perspective. *Review of Income and Wealth*, Series 40, pp. 99-110.
- Ruggles, R., 1990, A Note on the Revision of the United Nations System of National Accounts. *Review of Income and Wealth*, Series 36, Number 4, pp. 413-420.
- Ruggles, R., 1996, The United Nations System of National Accounts and the Integration of Micro and Macro Data. In: Kendrick (1996), pp. 387-416.
- Ruggles, R., 1999, The Middle Years of the International Association for Research in Income and Wealth, 1962-87. *Review of Income and Wealth*, Series 45, Number 3, pp. 397-408.
- Ruggles, N.D. and R. Ruggles, 1970, *The Design of Economic Accounts* (National Bureau of Economic Research, New York).
- Ruggles, R. and N.D. Ruggles, 1971, The Evolution of National Accounts and the National Data Base. *Survey of Current Business*, 50th Anniversary Issue, pp. 152-161.

- Ruggles, R. and N.D. Ruggles, 1986, The Integration of Macro and Micro Data for the Household Sector. *Review of Income and Wealth, Series 21, No. 2.*
- Ruggles, N.D. and R. Ruggles, 1992, Household and Enterprise Saving and Capital Formation In the United States: A Market Transactions View. *Review of Income and Wealth, Series 38 (2), pp. 119-164.*
- Ruggles, N.D. and R. Ruggles, 1999, *Macro- and Microdata Analyses and Their Integration* (Edward Elgar, Cheltenham UK).
- Ruggles, R., 1991, Statistical Measurements for Economic Systems in Transition: Strategy for Implementing the UN System of National Accounts (SNA). Paper Presented at International Forum Economies in Transition: Statistical Measures Now and In the Future, 15-17 October 1990, Sochi, USSR.
- Schumpeter, J.A., 1945, *History of Economic Analysis* (Allen & Unwin, London).
- Seton, F., 1954, The Social Accounts of the Soviet Union in 1934. *Review of Economics and Statistics, 36, pp. 290-308.*
- Smith, A., 1776, *The Wealth of Nations* (Penguin Classics, 1979, Harmondsworth, England).
- Smits, J.P., E. Horlings and J.L. van Zanden, 2000, *Dutch GNP and its components, 1800-1913* (Groningen, Growth and Development Centre).
- Spengler, J.J., 1961, Quantification in Economics: its History. In: D. Lerner (ed.), *Quantity and Quality*, New York, The Free Press, pp. 129-211.
- Spiegel, H.W., 1983, *The Growth of Economic Thought* (Duke University Press, Durham, North Carolina).
- Standing Statistical Commission, CMEA, 1969, *Basic Methodological Rules for the Compilation of the Statistical Balance of the National Economy. [= Material Product System69]* (Moscow).

- Stone, R., 1947, Definition and Measurement of the National Income and Related Totals. Appendix in UN (1947).
- Stone, R., 1951a, The Use and Development of National Income and Expenditure Estimates. In: Lessons of the British war economy, D.N. Chester (ed.) (Cambridge University Press), pp. 83-101.
- Stone, R., 1954, The Measurement of Consumers' Expenditure and Behaviour in the United Kingdom, 1920-1938, vol. I (Cambridge University Press).
- Stone, R. et al., 1962, A Social Accounting Matrix for 1960. Volume 2 of 'A Programme of Growth' (Chapman and Hall, Cambridge).
- Stone, R., 1971, An Integrated System of Demographic, Manpower and Social statistics and its Links with the System of National Economic Accounts. Sankhya: The Indian Journal of Statistics, Series B 33, pp. 1-184.
- Stone, R., 1974, System of National Accounts (SNA); Supplementing the National Accounts for Purposes of Welfare measurement. Paper presented at the eighteenth session of the Statistical Commission of the United Nations Economic and Social Council.
- Stone, R., 1981, Balancing the National Accounts: the Adjustment of Initial Estimates – a Neglected Stage in Measurement. In A. Ingham and A.M. Ulph (eds.), Demand, Equilibrium and Trade (MacMillan, London).
- Stone, R., 1984, Where Are We Now? A Short Account of the Development of Input-output Studies and their Present Trends. Proceedings of the Seventh International Conference on Input-output Techniques (UN, New York).
- Stone, R., 1985, Richard Stone. In: Les Prix Nobel 1984 (Almqvist and Wicksell International, Stockholm), pp. 256-287.
- Stone, R., 1986a, Social Accounting: The State of Play. Scandinavian Journal of Economics, Vol 88, number 3, pp. 453-472.

- Stone, R., 1986b, Progress in Balancing the National Accounts. In D. Ironmonger et al. (eds.), National Income and Economic Progress (MacMillan, London).
- Stone, R., 1997, Some British Empiricists in the Social Sciences 1650-1900 (Cambridge University Press, Cambridge)
- Studenski, P., 1958, The Income of Nations. (New York University Press, New York).
- Summers, R. and A. Heston, 1991, The Penn World Table (mark 5). Quarterly Journal of Economics, 106 (2), pp. 327-68.
- Sunga, P.S., 1984, An Alternative to the Current Treatment of Interest as Transfer in the United Nations and Canadian Systems of National Accounts. Review of Income and Wealth.
- Sunga, P.S. and J.L. Swinamer, 1986, Health Care Accounts – A Conceptual Framework and an Illustrative Example. Review of Income and Wealth.
- Tinbergen, J., 1936, Prae-advies over de vragen: Kan hier te lande, al dan niet na overheidsingrijpen, een verbetering van de binnenlandsche conjunctuur intreden, ook zonder verbetering van onze exportpositie? Welke leering kan ten aanzien van dit vraagstuk worden getrokken uit de ervaringen van andere landen? Vereniging voor de Staathuishoudkunde en de statistiek, Praeadviezen (Martinus Nijhoff, 's Gravenhage), pp. 62-108.
- Tuinen, H.K. van, 1993, Issues in Dutch National Accounting 1970-1985. In De Vries et al. (1993), pp. 19-32.
- UN, 1947, Measurement of National Income and the Construction of Social Accounts. Studies and Reports on Statistical Methods no. 7 (UN, Geneva).
- UN, 1953, A System of National Accounts and Supporting Tables. Studies in Methods, Series F No. 2, Rev. 1 (UN, New York).

- UN, 1968, A System of National Accounts. Studies in Methods, Series F No. 2, Rev. 3 (UN, New York).
- UN, 1975, Towards a System of Social and Demographic Statistics. Studies in Methods, Series F, No. 18 (UN, New York).
- UN, 1977, Provisional International Guidelines on the National and Sectoral Balance-sheet and Reconciliation Accounts of the Systems of National Accounts. Statistical Papers, Series M, No. 60 (UN, New York).
- UN, 1986, System of Statistical Balances of the National Economy of CMEA Member Countries. Studies in Method, Series F, No. 17, rev. 1, vol. I (UN, New York).
- UNDP (United Nations Development Programme), 1991, Human Development Report 1991. (Oxford University Press, New York).
- UN, 2000, Links Between Business Accounting and National Accounting, Studies in Methods, Series F, No. 76 (UN, New York).
- UN, 2002, Use of Macro Accounts in Policy Analysis, Studies in Methods, Series F, No. 81 (UN, New York).
- UN, 2003a, Handbook on Nonprofit Institutions in the SNA (UN, New York).
- UN, 2003b, Integrated Environmental and Economic Accounting 2003 (SEEA) (UN, New York).
- Vanoli, A., 1986, Sur la Structure Générale du SCN à Partir de l'Expérience du Système Elargi de Comptabilité Nationale Français. Review of Income and Wealth, pp. 155-199.
- Vanoli, A., 2005, A History of National Accounting (IOS Press, Amsterdam).
- Verbruggen, J.P. and G. Zalm, 1993, National Accounts and Modelling at the Central Planning Bureau. In De Vries et al. (1993), pp. 151-166.

Verbruggen, H., R. Dellink, R. Gerlagh and M. Hofkes, 2002, Calculations of a sustainable national income: four variants. In H. Verbruggen (ed), Final report on calculations of a sustainable national income according to Hueting's methodology (Free University, Amsterdam).

Vries, W.M.F. De et al. (eds.), 1993, The Value Added of National Accounting (Statistics Netherlands, Voorburg).

Zanden, J.L. van, 1993, Historical National Accounts. In: Vries et al (1993), pp. 229-242.