Guidance Note AI.1 on Valuation principles and methodologies

1. Introduction

In discussions around the endorsement of international standards for ecosystem accounting, the System of Environmental-Economic Accounting (SEEA) Ecosystem Accounting, the principles and methodologies for valuing ecosystem services and ecosystem assets raised quite strong controversies regarding the interpretation of valuation principles and the appropriateness of certain valuation methodologies in the System of National Accounts (SNA). In the end, it was decided to include the guidance in SEEA Ecosystem Accounting, albeit without giving this guidance the status of international standards.

One could indeed argue that the current guidance on valuation principles and methodologies in the 2008 SNA is not always very precise, and lacks certain theoretical foundations. Instead, the guidance is rather pragmatic in nature, without giving due consideration to a set of criteria for evaluating the appropriateness of valuation methodologies. Links to business accounting standards, often the primary source for compiling national accounts statistics, are also missing.

The main objective of this Guidance Note is to provide a more holistic view on the valuation of transactions and positions, including the main theoretical foundations, in order to arrive at more precise guidance in the 2025 SNA. However, it should be noted upfront that at some stage pragmatic considerations around the feasibility of collecting relevant data will feed into the evaluation process as well.

Section 2 of this guidance dwells upon the main principles for valuing transactions and positions, thereby not only looking at the theoretical foundations, but also making reference to the guidance provided by business accounting standards. The development of a set of criteria to evaluate the alignment of valuation methodologies to these principles is the topic of Sections 3. This is followed, in Section 4, by a discussion of methods for valuing transactions, while Section 5 provides more details on methods for valuing positions. In both cases, the various methodologies included in the current guidance of the 2008 SNA are used as the starting point for the discussion, the evaluation of which is based on the previously defined set of criteria. Section 6 then considers the appropriateness of alternative valuation methodologies which have been proposed in the context of valuing ecosystem services and ecosystem assets. Section 7 concludes with the main recommendations.

Annex 1 provides an (almost) exhaustive inventory of the valuation guidance in the various editions of the SNA, while relevant extracts from SEEA Central Framework and SEEA Ecosystem Accounting are listed in Annex 2. To alleviate the digesting of these rather lengthy annexes, the most relevant phrases have been highlighted in bold. Furthermore, it should also be noted that this Guidance Note has benefited from previous work done on valuation issues, as included in, amongst others, the following Guidance Notes: D.2 on “Valuation of unlisted equity in direct investment”; DZ.6 on “Recording of data in the national accounts”; WS.3 on “Unpaid household service work”; WS.4 on “Labour, human capital and education”; and WS.10 on “Valuation of mineral and energy resources”. Concise summaries of the recommendations included in these Guidance Notes are provided in Annex 3.

2. The general principles for valuing transactions and positions

The general principles for valuing transactions

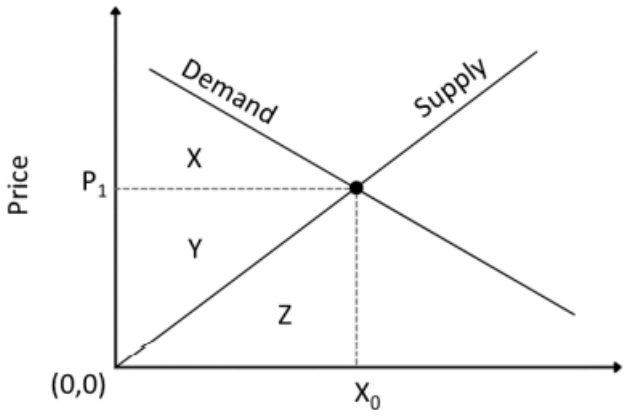
When it comes to recording transactions, the principal aim of the SNA is to arrive at *market prices*, i.e. the prices paid between two independent parties, or a valuation of transactions at arm's length. Para. 2.59 of the 2008 SNA explicitly states the following: "*Transactions are valued at the actual price agreed upon by the transactors. Market prices are thus the basic reference for valuation in the SNA*".[1] This paragraph then goes on, by stating that *"… In the absence of market transactions, valuation is made according to costs incurred (for example, non-market services produced by government) or by reference to market prices for analogous goods or services (for example, services of owner-occupied dwellings)*".

Importantly, valuation of transactions is not conditional upon whether or not markets are competitive. Prices paid in monopolistic or oligopolistic markets are equally valid. As para. 3.119 of the 2008 SNA puts it: *"… a market price should not necessarily be construed as equivalent to a free market price; that is, a market transaction should not be interpreted as occurring exclusively in a purely competitive market situation. In fact, a market transaction could take place in a monopolistic, monopsonistic, or any other market structure*".

When it comes to a more exact interpretation of the concept of market prices, economic theory can prove to be helpful. An excellent overview of the link between market prices in an accounting context and welfare values in economic theory is provided in Annex 12.1 of SEEA Ecosystem Accounting. The following is an excerpt from this annex.

In Figure 1 below present the supply and demand for a particular product. At the X-axis, quantities are shown, while the Y-axis shows the prices. For most goods, an individual's willingness to pay (WTP) decreases with each additional unit that they obtain. Or conversely, the quantity they demand decreases as the price increases. On the other hand, the willingness to accept (WTA) a payment for giving up a product increases as the price increases, as represented in the upward sloping supply curve.

Figure 1. Supply and demand in a static one-product market



[1] SEEA Central Framework also refers to "market prices" as the main principle for valuation; see Annex 2 of this paper. On the other hand, SEEA Ecosystem Accounting mainly refers to "exchange values", although one may assume that basically the same valuation principle is being applied.

The total WTP for quantity X0 is the area under the demand curve, represented by the sum of the areas X, Y and Z. If the product were sold in a market at a price P1, the individual would purchase quantity X0 as they are willing to pay more than P1 for all the units before X0, but their WTP for an additional unit (X0+1) is less than P1, so they will not purchase another unit at that price. In this case, the sum of money exchanged is equal to X0 * P1, or the sum of the areas Y and Z. This latter value reflects the value that is recorded in the accounts, the *exchange value*. Area X is the benefit that individuals who obtain the good or service enjoy over and above what is paid and is commonly referred to as the *consumer surplus*. Area Z reflects the costs of supply. Area Y, representing the *producer surplus*, is the additional benefit that a producer receives from selling quantity X0 at price P1 given costs of Z.

As noted in Annex 12.1 of SEEA Ecosystem Accounting, two key implications can be derived from the graphic presentation in Figure 1. The first concerns the link between the price and the exchange value in accounting. In short, the price of a good is what is paid for it which needs to be multiplied by the quantity to establish the exchange value. People will continue buying goods until their WTP equals the price at which the goods are offered. The price can therefore also be referred to as the *marginal value* of the good. A similar logic can be applied from the perspective of the producer of the good, i.e., the price will reflect the marginal cost of the good to them.

Secondly, the welfare derived from a product is equal to the total WTP for it, which includes the payment made and the consumer surplus. National accounts do not include the consumer surplus and instead record accounting values. A link with welfare can nonetheless be posited because the price is also the marginal value of a unit, which is the welfare that unit provides. Thus, a small increase in the availability of a product will generate a change in welfare approximately equal to the change in the accounting value. This insight is the basis of a formal proof in the literature that variations in material well-being are reasonably well represented by changes in Net Domestic Product (NDP). It should be noted, however, that this result assumes the absence of externalities and that all goods and services are provided through competitive markets.[2]

The above is also consistent with the arm's length principle (ALP) applied in business accounting. This principle indicates a transaction between two independent parties in which both parties are acting in their own self-interest. Both buyer and seller are independent, possess equal bargaining power, are not under pressure or duress from the opposing party, and are acting in their own self-interest to attain the most beneficial deal.

Exceptions to the use of (observed) prices and exchange values

Generally, the exchange value, i.e., the prices paid in the exchange for goods, services or assets, is considered the most appropriate method for arriving at market prices. However, there may be certain exceptions. The 2008 SNA specifies five cases for which exchange values cannot be considered as appropriate reflections of market prices.

The first case concerns barter transactions (see para. 3.125 – 3.128 of the 2008 SNA). One could argue that this is not a true conceptual exception for the use of exchange values as the best representation of market prices. Instead of having a direct valuation in monetary units, one "only" needs to arrive at an approximation of the monetary value, by using the prices of similar goods transacted on the market (i.e., market-equivalent prices; see section 4).

The second case refers to the exchange of goods in the case of quotation prices (see para. 3.129 of the 2008 SNA). Quotation prices refer to transactions "*in which the contracts establish a quotation period*

[2] There are also connections to wealth distribution and relative poverty which will be important in determining individual well-being that are not captured in aggregate measures.

often months after the goods have changed hands". As a consequence, the market price at the time of change of ownership should be estimated. Later on, this estimate should be revised with the actual market, when known. Again, one could argue that quotation prices are not an exception to the application of exchange values, at least from a conceptual point of view. From a practical perspective, however, it can pose problems in arriving at the appropriate exchange value.

The third case concerns transfers in kind (see para. 3.130 of the 2008SNA. In the case of such transfers, the relevant products "*should be valued at the market prices that should have been received if the resources had been sold in the market".* As a rule of thumb, the donor's view, which may be quite different from the recipient's perception, is to be applied. For goods and services which are regularly traded on the market, valuation may not be that problematic. However, the practice of transfers in kind often relates to transfers of non-market services provided by government, for which equivalent market prices are not available, as a consequence of which other valuation methods, such as the sum-of-costs approach, need to be applied (see section 4).

A real exception to the use of market prices, or exchange values, concerns transfer pricing (see para. 3.131 – 3.133 of the 2008 SNA. Transfer pricing refers to the pricing mechanism for "*transactions between affiliated enterprises, manipulative agreements with third parties, and certain non-commercial transaction, including concessional interest"* (for a discussion on the latter, see below). "*Prices may be under- or over-invoiced, in which case an assessment of a market-equivalent price needs to be made*". Basically, transfer pricing concerns prices which are not set in line with the arm's length principle (ALP) applied in business accounting. Substantial international guidance has been developed and released by the OECD, which is used by all accounting firms to avoid transfer prices, although there is still quite some evidence of profit shifting across countries, thus implicitly showing the use of prices not reflecting market circumstances. In the guidance provided by the ISWGNA Task Team on Globalisation, it has been concluded that it is almost impossible for statisticians to make the necessary adjustments, unless one applies relatively simple methods, such as a proportional allocation of profits, or allocating all profits to the country in which the headquarter of the multinational enterprise is residing. Therefore, national accountants typically have to rely on an adequate pricing in business records. Having said that, discussion with corporate accountants on their principles of valuation might proof to be very useful to understand better the data that statisticians are actually receiving from businesses.

The final exception mentioned in the 2008 SNA relates to concessional pricing, i.e., "*non-commercial transaction … at implied prices that include some element of grant or concession so that those prices … are not market prices*" (see para. 3.134 of the 2008 SNA). Examples mainly concern transactions by government, although there may also be cases of, for example, concessional interest on loans by employers to employees, loans between related households and loans between affiliated enterprises. Whatever the case, the extent of concessional pricing, for which adjustments would need to be made, is not further specified in the SNA. A couple of cases are mentioned explicitly: concessional lending by employers to employees (see para. 7.54) and concessional lending by central banks (see para. 7.124 – 7.126). On the other hand, somewhat awkwardly, the 2008 SNA is undecisive when it comes to concessional lending by government and international organisations (see para. 22.123 – 22.124 and para. A4.44). Guidance Note F.15 on "Debt concessionality" did contain proposals for extending concessional lending to the latter. However, it was not possible to arrive at an agreed position. As part of the resolution mechanism between the SNA community and the Balance of Payments Manual (BPM) community, an issues paper will be drafted, providing a more holistic view on concessional lending. However, it may prove to be quite problematic to arrive at such a more holistic view on all concessional pricing mechanisms, mainly because of a certain reluctance among compilers of national accounts statistics to introduce a significant amount of imputations, and a certain preference to keep the estimation procedures relatively simple by using the observable transactions.

A case not explicitly addressed in the 2008 SNA concerns cross-subsidising. As noted in Guidance Note DZ.8 on "The treatment of free digital products in the core national accounts", "*subsidising certain prices, often down to zero, is a common technique for increasing sales of complementary items at marked-up prices. For example, a telecom carrier may offer subsidised smartphones, or a manufacturer of ink cartridges and printers may subsidise the printers. Other examples are free online games that encourage in-game purchases and free software that encourages users to purchase support services and related software products. Reducing transactions costs can also be a motive for providing "free" products as part of a bundle of items that are usually consumed together*". The 2008 SNA only mentions, in para. 17.39, the example of an insurance corporations setting premiums for one line of business very low to cross-subsidise another line of business, however without providing any guidance on how to deal with this situation. Generally, one may assume that no imputations should be recorded, as the subsidised product and the product with the marked-up price can be considered as a bundle of products.

The general principles for valuing positions

The general rule or principle for valuing positions is provided in para. 13.16 of the 2008 SNA: *"For the balance sheets to be consistent with the accumulation accounts of the SNA, every item in the balance sheet should be valued as if it were being acquired on the date to which the balance sheet relates. This implies that when they are exchanged on a market, assets and liabilities are to be valued using a set of prices that are current on the date to which the balance sheet relates and that refer to specific assets*". This is by and large consistent with the valuation at *fair value* in business accounting standards; see below.

However, it should be stated upfront that, for various reasons, quite a number of exceptions are made to this principle, the most obvious being that there are no active markets in which the relevant assets are traded. This is not only true for various financial instruments, but also for many non-financial assets, certainly when taking into account the second-hand nature of the latter assets. As a consequence, market or near-market prices are not available, and alternative valuation methods need to be applied to arrive at an appropriate valuation. This Is further discussed in Section 5.[3]

Moreover, when it comes to the valuation of non-financial assets, which are used in the production of goods and services over a considerable period of time, the guidance in the SNA looks slightly ambiguous. For these assets, two basic approaches can be distinguished, the first one based on the market prices for similar (second-hand) assets, and the second one based on the contribution of capital services to the production process in the remaining service life of the asset. The latter approach is usually approximated by estimating the written-down replacement cost, adequately adjusted for changes in prices. To compile these estimates, the Perpetual Inventory Method is applied, which – if applied properly – should replicate the net present value of future capital services derived from the asset in question.

In the case of non-financial assets for which active second-hand markets exist, such as the ones for generic transport equipment and dwellings, it can be assumed that the value derived from the capital services approach will closely follow the market prices of the relevant second-hand assets, as the relevant economic agents can make an explicit choice between investing in new assets, or purchasing second-hand assets. However, most non-financial assets used in production are not generic, but specifically designed and constructed for a certain production activity. Moreover, the markets for

[3] The general principles for valuing positions in the SEEA Central Framework and the SEEA Ecosystem Accounting are basically consistent with the SNA, although these standards mainly address a quite specific subset of assets, i.e., natural resources and ecosystem assets. For these assets, market prices or market-equivalent prices are usually not available, and current prices need to be estimated by using the Net Present Value of future resource rents and the like. Reference is again made to Section 5 (and Section 6) for more details.

these second-hand assets may be extremely thin. As a consequence, the market prices for these second-hand assets may be close to their scrap value, thus not providing a good representation of the capital services that can be derived from them in the remainder of the service life, the latter representing the value of the asset in an enterprise as a going concern.

Similar valuation issues may exist in the case of, for example, natural resources, which are not traded in the market, but for which exploitation rights are provided by government for a series of rent payments. These actual rent payments may not account for the full resource rent that can be derived from these assets. If the rights are not transferable, one could argue that the market price of the rights is zero, although the asset in question generates a future stream of resource rent for the exploiter owning these rights, basically reflecting the future capital services.

All in all, it is recommended to further elaborate the principles of valuing positions in the 2025 SNA, along the above lines.

As noted before, when comparing the above principles for valuing transactions and positions with business accounting practices, the SNA valuation principles for positions are very similar to the concept of *fair value* applied in business accounting. This latter value is defined as "*the estimated price at which an asset can be sold or a liability settled in an orderly transaction to a third party under current market conditions*". Concerns around the valuation of non-financial assets, similar to the ones explained in the context of the SNA, also exist in business accounting, although they may have been framed differently.

To arrive at a proper estimate of the fair value, business accounting standards distinguish three levels of information:

- Level 1: Quoted prices in active markets for identical assets or liabilities. Such a quoted market price in an active market provides the most reliable evidence of fair value.
- Level 2: Observable information on (i) quoted prices for similar assets or liabilities in active markets; (ii) quoted prices for identical or similar assets or liabilities in markets that are not active; (iii) information other than quoted prices that are observable for the asset or liability, for example interest rates and yield curves, implied volatilities and credit spreads; and (iv) information that can be derived principally from or corroborated by observable market data by correlation or other means.
- Level 3: In the case no observable information is available, because of little, if any, market activity, other information usually based in an entity's own data, taking into account all information about market participant assumptions that is reasonably available. Examples include (i) constant pre-payment rate; (ii) forecast of cash flows for a cash-generating asset; and (iii) forecast of profit or loss for a cash-generating asset.

As discussed in the following sections, similar criteria for evaluating valuation methodologies are used in the international standards for national accounts.

3. Criteria for evaluating the appropriateness of valuation methodologies

Section 2 presented the main valuation principles. The various methodologies for valuing transactions and positions are discussed in Sections 4 and 5, while Section 6 provides an evaluation of alternative methodologies that are proposed in the context of valuing ecosystem services and ecosystem assets. Before entering into these discussions, this section puts forward a set of criteria for assessing the appropriateness of the various methodologies. The starting point for the criteria listed below is the list developed in Guidance Note D.2 on "Valuation of unlisted equity in direct investment". It should be noted, however, that, as compared to the Guidance Note, some modifications have been introduced,

mainly because of the much broader application of these criteria, going well beyond the valuation of unlisted equity.

The following criteria for assessing valuation methodologies are put forward:

- *Methodological soundness of the valuation methodology.* The method should produce reliable market(-equivalent) prices, which also relates to the accuracy of the results of the applied method. In some cases, the absence of a benchmark with which to compare and validate the estimated values, could be a drawback for the choice of some methods. Methodological soundness also relates to the requirement of limiting horizontal and vertical discrepancies in macroeconomic statistics.[4]
- *Comparability of the resulting estimates.* The methods used should in principle lead to comparable results, across institutional sectors as well as across countries. Consistency of the estimates obtained by different economies is essential in an environment of increased globalisation and growth in the activities of multinational enterprises.
- *Availability of relevant source data.* The information needed should be available, in the sense that they can be easily provided by relevant economic actors in a timely and consistent manner. In this respect, it would be desirable that the methods be based on available information about an economic actor, rather than be based on subjective assumptions.
- *Simplicity of the valuation methods.* Given the challenges with data availability and taking into account countries' varied level of statistical developments, methods that incorporate modelling and estimation techniques could present problems of applicability.

It is clear that the above criteria may prove to be conflicting with each other. For example, certain modelling and estimation techniques may better approximate the market price. However, using such techniques in the case of, for example, valuing unlisted equity, based on the behaviour of listed shares and requiring detailed information by sector/industry and/or by other characteristics, may provide problems in countries/sectors with few or no listed companies. It may also be problematic for countries with less statistical expertise and/or lacking the relevant source data. In both cases, (international) comparability may be seriously hampered.

Similarly, looking at data availability, using more subjective assumptions consistently, in addition to the more objective information collected, could lead to a more appropriate valuation in line with the targeted market price. However, it could hamper international comparability, as the consistent application of such assumptions is unlikely to hold across countries.

Moreover, in some cases, certain relatively simple methodologies based on available source data may provide an excellent indicator for the market price. However, if the method is only applicable to a more limited subset of the economic actors under consideration, one may end up with statistics which are not comparable across institutional sectors and/or industries. On the other and, differences across countries in the legal standards for business accounting may also affect the international comparability of the results.

[4] Horizontal discrepancies arise when the data on assets and liabilities are not consistent for a given instrument (i.e., sum of transactions/positions of a financial asset over all resident sectors and the rest of the world are not equal to sum of transactions/positions of an equivalent liability). This may be the case when the sources or valuation methods differ between or within sectors of the economy. Vertical discrepancies arise when, for a given sector, data on financial and non-financial transactions and (the changes in) the relevant positions are not consistent. See Chapter 7 of the manual *Financial Production, Flows and Stocks in the System of National Accounts* for further guidance on horizontal and vertical balancing.

Notwithstanding this issue of potentially conflicting criteria, the application of these criteria can serve as a useful tool for guiding the discussions on, and assessing the pros and cons of, the various valuation methodologies in the next sections.

4. Valuation methodologies for transactions

This section includes an overview of the various valuation methodologies for transactions, including an evaluation of the appropriateness of the methodologies in approximating the general principle of market prices. The starting point for this overview is the guidance currently provided in the 2008 SNA, while the evaluation is based on the criteria laid out in Section 3. Subsequently, recent guidance on valuation in the context of the SNA Research Agenda is discussed as well. The latter mainly concerns the valuation of unpaid household services for which recommendations are included in relation to the definition of a broader framework of accounts for capturing well-being and sustainability.

The SEEA Central Framework does not contain that much (additional) guidance, which is considered relevant for the valuation of transactions. Alternative valuation methodologies for valuing ecosystem services, put forward in the context of SEEA Ecosystem Accounting, are addressed in Section 6.

Exchange values

Values based on the prices actually observed in the exchange of goods, services and assets, are generally considered as the most appropriate measure for observing market prices. Exceptions are made for concessional pricing (see Section 2), although in practice not that many exceptions are actually applied. For example, possible transfer prices are generally not adjusted, mainly for reasons of feasibility.

It goes without saying that, when applicable, exchange values are the most preferable method for valuing transactions, both from a conceptual perspective and from a perspective of source data availability. It also does not raise concerns regarding the international comparability of the estimates, although, first and foremost in the case of smaller economies, the measurement of main aggregates may be seriously affected by transfer pricing within multinational enterprises. On the other hand, the method is relatively straightforward to apply, not making it necessary to impute, often rather simple and/or subjective, approximations of market prices.

Here, it should be noted as well that the SNA contains various layers of valuation for the supply and use of goods and services. The uses of goods and services are typically valued at purchasers' prices, which equals the amount of money actually exchanged for the purchase of a product. On the other hand, "*the preferred method of valuation of output* (and value added) *is at basic prices, although producers' prices may be used when valuation at basic prices is not feasible. Basic prices are prices before taxes on products are added and subsidies on products are subtracted. Producers' prices include, in addition to basic prices, taxes less subsidies on products other than value added type taxes*" (para. 2.63 of the 2008 SNA).

Moreover, imports and exports are valued free-on-board, that is at the exporter's customs frontier. However, Guidance Note G.1 on "Valuation of imports and exports" includes the recommendation to introduce, in the 2025 SNA, clear references to invoice values as the new principle for valuing imports and exports in the future. The latter change would bring the valuation of imports and exports much closer to the exchange values agreed between economic agents.

Whatever the case, the current valuation layers for supply and use of goods and services require a decomposition of the relevant exchange values. This may sometimes pose problems, especially in the

case of making the necessary adjustments to arrive at the required valuation of imports and exports. However, this should not result in major departures from the exchange values, which are the starting point for this decomposition.

Similar issues may arise in the case of *margin pricing.* For some services, the valuation of output is based on the differences between purchases and sales of similar products and assets (e.g., wholesale and retail trade; trading in financial assets; etc.). In other cases, the output of services is approximated by partitioning of transactions (e.g. FISIM and insurance). As in the case of valuing supply and use of goods and services, one could look upon these issues as special cases of valuation based on exchange values. For trading type of services, the price is based on observed exchange values for purchases and sales. In the case of insurance, FISIM, etc., the starting point for partitioning transactions is also based on observed exchange values. One additional complication in the case of trading type of services is related to the distinction between recording transactions versus the recording of holding gains and losses. Although exchange values remain the point of departure, holding gains and losses may affect the value of the transactions recorded in the system of national accounts.

Market-equivalent prices

In quite a number of cases, actual exchange values are not available. Market prices could then be approximated by using the prices of similar goods and services. This valuation method is particularly relevant in the following areas:

- barter transactions;
- consumption of goods produced for own final use;
- housing services from owner-occupied dwellings; and
- exceptional cases of own-account capital formation of assets, which are relatively homogeneous and regularly traded on the market (e.g., dwellings).

An important prerequisite for applying this valuation method is the homogeneity of the relevant goods and services. Where homogeneity does not exist, it is also considered acceptable to apply, for example, hedonics to adjust for different characteristics in the goods and services under consideration, although these hedonic valuation methods may be rather complicated, requiring significant amounts of source data. Moreover, the goods and services which are used to arrive at a market-equivalent price should be traded under the same market conditions as the goods and services under consideration. For example, using data on rentals for dwellings, which are subsidised by government, is not considered appropriate for arriving at market-equivalent prices for owner-occupied housing services in a competitive market. Finally, the markets for the goods and services which are used for the comparison should be well-established, and not too thin, which sometimes may be problematic for e.g., certain types of dwellings in the case of estimating owner-occupied housing services

However, provided that the above conditions are met, the conceptual soundness of this valuation method does not raise particular concerns. It would also lead to comparable results. However, the methods needed may lack simplicity, certainly in the case of applying hedonics.

Sum-of costs

A method, which is frequently applied in the system of national accounts, is the sum-of-costs method. According to this method, it is assumed that market prices can be approximated by summing up the costs of (i) intermediate consumption; (ii) compensation of employees; (iii) other taxes less subsidies on production; (iv) consumption of fixed capital, or depreciation; and (v) return on invested capital. This method is applied in various circumstances, in particular in the following cases:

- non-market output of government and NPISHs (currently without return on invested capital); and

- own-account production of fixed assets (and – less significant – other goods produced for own final use), for which it is not feasible to make an estimate on the basis of similar goods traded on the market.

However, a number of questions can be, and are, raised in relation to the application of this method. This concerns first and foremost the following:

- the estimation of compensation of employees for unincorporated enterprises;
- the extent of the capital services to be included (including the payment of rents for non-produced assets);
- the estimation of the return on capital; and
- the current exclusion of return on invested capital in the case of non-market services.

Regarding the first issue, the problem is related to the fact that labour input of the owner of the unincorporated enterprise and his/her family members is often not explicitly paid for in the form of compensation of employees. As noted in para. 6.126 of the 2008 SNA, "*it may not possible to estimate compensation of employees, consumption of fixed capital and a return to capital separately in which case an estimate of mixed income, covering all these items, should be made*". One can wonder about this recommendation, because one wonders about the benchmark that could be used for estimating this combined item, regarding which the 2008 SNA does not provide any guidance at all. Different from the current guidance, it looks more feasible to impute an estimate of labour input (and the other items) separately, based on wage rates paid for similar kinds of work. Such an estimation method would also better align to the recommendations made for the valuation of communal construction projects, as described in para. 6.127 of the 2008 SNA.

Regarding the second point, the extent of capital services to be included, the current guidance in the 2008 SNA recommends to only account for the capital services from fixed assets, thus excluding non-produced assets, among which land, and inventories. Capital services derived from fixed assets may indeed be the most substantial part of capital services, but one wonders about the (implicit) exclusion of the other assets in the own-account production of fixed assets. This issue has recently become much more relevant, for two reasons. In Guidance Note DZ.6 on "Recording of data in the national accounts", it is proposed to record payments for accessing personal data as rent, and to include these rent payments as another element into the sum-of-costs approach for valuing capital formation of data. Secondly, Guidance Notes WS.6 on "Economic ownership and depletion of natural resources" and WS.8 on "Accounting for biological resources" recommend to account for depletion of these resources as a cost of production. Both recommendations suggest the inclusion of the capital services derived from non-produced assets (i.e., depletion and return to non-produced assets) in the estimation of sum-of-costs. If non-produced assets, and also inventories, are actually used in the own-account production of fixed assets, one can hardly see any reason to exclude them from the valuation. In this respect, please note that a separate Guidance Note, UA.2 on "Treatment of rent for the recording of data, marketing assets and biological resources", is currently being prepared and reviewed.

Concerning the third point, the return to capital, para. 6.245 provides some guidance, when comparing consumption of fixed capital with rental of assets under an operational lease, as follows: "*The rental needs to be large enough to cover (i) any direct costs incurred by the owner including the costs of maintaining the asset, (ii) the reduction in the value of the asset over that period (the consumption of fixed capital) and (iii) the interest costs on the value of the asset at the start of the period. The interest costs may consist either of actual interest paid on borrowed funds or the loss of interest incurred as a result of investing own funds in the purchase of the fixed asset instead of a financial asset. Whether owned or rented, the full cost of using the fixed asset in production is measured by the actual or imputed*

rental on the asset and not by consumption of fixed capital alone".[5] The SNA could clearly gain from adding more explicit guidance and clarifications on the estimation of the return to capital, by recommending the use of rate of return to capital from an opportunity costs perspective. Such a rate could be based on the interest rate paid for the borrowing of funds, which could differ across institutional sectors and/or industries, given differences in the perceived risks attached to borrowing funds to the relevant economic agents.

The final issue, either or not including a return to capital in the valuation of non-market services, already led to quite controversial discussions during the update of the 1993 SNA, resulting in the guidance provided in the 2008 SNA. At its third meeting (Bangkok, 18 – 22 July 2005), the Advisory Expert Group (AEG) on National Accounts discussed the issue at quite some length, after a global consultation showing mixed outcomes regarding the recommendation to also include a return to capital on conceptual grounds, including the resulting improvement of consistency in the application of the sum-of-costs approach. There was also quite some debate on which capital items to include, mainly relating to public land and monuments, regarding which a preference was shown for excluding these items, for conceptual reasons as well as for reasons of feasibility, in the absence of estimates for public land and monuments. All of this is also related to definition of government services, and whether or not the relevant assets are being used in the production of these services. In addition, the impact on GDP was mentioned, although this should not feature as an argument per se. All in all, for conceptual reasons, including the consistency of compiling estimates using the sum-of-costs approach, it is recommended to re-open the discussion on including a return to capital in the valuation of non-market services, including the extent of capital items to be included. It is proposed to draft a separate Issues Note on the pros and cons of aligning the application of the sum-of-costs approach.

Looking at the pros and cons of the sum-of-costs approach, one can argue that it is conceptually sound, and consistent with the basic valuation principles of the SNA. First of all, the method resembles the pricing strategy of producing a good or service for the market. In the case of the production of fixed assets for own final use by private producers, one could add that making the actual expenditures, including a compensation for the return on capital used, shows the willingness to pay for producing the relevant fixed assets for own final use. In the case of the production of non-market services by government, as noted in Annex 12.1 of SEEA Ecosystem Accounting, one could argue that the link between the levels of provision of services and the value of expenditures comes about "*through the political process that determines the level of provision. Thus, a given level of spending on health, education, transport etc. reflects societies' collective willingness to pay for these services through taxes and user charges*".

Furthermore, the sum-of-costs method does not raise specific problems concerning the international comparability of the estimates, assuming – in the case of non-market services – the existence of a certain level of consistency across countries in the relationship between public expenditures and the true values of the services produced. The sum-of-costs method is also fairly attractive because of its simplicity, while source data are generally available. However, in respect of the latter, for some fixed assets produced for own final use, one may observe problems in distinguishing the (labour) costs which are relevant for the production of the assets in question.

Looking at guidance that is being developed in the context of the update of the 2008 SNA, the recommendations for valuing the production of unpaid household services for own final use, are especially relevant when it comes to valuation methods for transactions; for more information on

[5] There is a major theoretical discussion on the estimation of capital services. It centres around the question of using an exogenous rate of return, or estimating the return to capital endogenously, by considering all net operating surplus as an implicit return to capital. This issue is considered to go well beyond the discussions in this Guidance Note. In applying the sum-of-costs method, an exogenous rate of return to capital is used.

valuing these household services, see Guidance Note WS.3 on "Unpaid household service work", for which Annex 3 of this Guidance Note contains a concise recap of the guidance provided.

Although in practice not often applied, the conceptually preferable option for valuation of unpaid household services is to look at the market prices of similar goods and services. However, it may not be that easy to find relevant information on the quantities of the services produced, and also to collect data on comparable services produced for the market, adequately adjusted for quality and productivity. Therefore, in practice, the production of services by households for own final use is valued using the sum-of-costs approach. Importantly, in the application of this method, one has to impute a value for the labour input, again adequately adjusted for quality and productivity.[6]

Major point of discussion is whether to estimate the labour input with replacement costs or with opportunity costs. The latter may be relevant in the case a household is unconstrained in its allocation of time between selling its labour services and other usages of time, and/or in the case one wants to arrive at a welfare-measure of consumption. For these reasons, the use of replacement costs is considered the most appropriate way of valuation for arriving at an approximation of the market price, consistent with the national accounts.

As there is no upward bound of actual monetary expenditures to the estimates, the accuracy and the (international) comparability of the estimates may be negatively affected. Finally, as time-use surveys are the most important source of information for estimating the labour inputs, arriving at accurate and time-consistent estimates of unpaid household services may also be hampered by a lack of high quality time-use data, including the required frequency and timeliness, and containing the required breakdowns into various types of labour.

5. Valuation methodologies for positions

This section includes an overview of the various valuation methodologies for positions, including an evaluation of the appropriateness of the methodologies in approximating the general principles elaborated in Section 2. The starting point for this overview is the guidance currently provided in the 2008 SNA, while the evaluation of the various valuation methods is based on the criteria laid out in Section 3. Subsequently, recent guidance on valuation in the context of the SNA Research Agenda is discussed as well. The latter includes topics which affect the central framework of national accounts (data, mineral and energy resources, and unlisted equity) as well as guidance recommended in the context of the definition of a broader framework of accounts for capturing well-being and sustainability (first and foremost relating to human capital). Concise information on this additional guidance is presented in Annex 3 of this Guidance Note.

If considered relevant, attention is also paid to relevant guidance on the valuation of assets, as provided in the SEEA Central Framework. Alternative methodologies for valuing ecosystem assets, put forward in the context of SEEA Ecosystem Accounting, predominantly based on the Net Present Value (NPV) of the (capital) services derived from these assets, are addressed in Section 6.

In discussing each of the valuation methodologies, a distinction is made between non-financial assets and financial assets, as the relevance of the various methodologies can differ quite significantly for these two types of assets. Moreover, when it comes to the valuation of financial instruments, it should

[6] For example, one may assume that the productivity of a cook working at a restaurant for say 50 people is higher than someone making dinner for a small family of say 4 people. The quality may also differ, although this probably would have less impact.

be noted that the consistency in valuing assets and liabilities is an important prerequisite in the system of national accounts.

Market prices

The most obvious way to arrive at current (market) prices for positions recorded on the balance sheet at a certain point in time is the use of prices observed in the market. Preferably, the relevant markets should be trading in considerable volumes, with prices listed at regular intervals. However, if traded from time to time, recent market transactions could also be used as an approximation of the current market price.

Unfortunately, this valuation method, which is preferable from a conceptual point of view, can only be applied in a limited number of cases, mainly relating to financial instruments, first and foremost for securities traded on "*a market, like the stock exchange, in which each asset traded is completely homogeneous, is often traded in considerable volume, and has its market price listed at regular intervals*" (para. 13.20 of the 2008 SNA). Here, it should be noted that for debt securities, users often request supplementary information on the nominal value (see below) of the liabilities, in addition to the valuation at market prices. For example, in the case of government debt, the principal method of valuation is at nominal value, as this reflects the actual down-payments to be made in the future.

As already noted in the above, this valuation method is conceptually sound, provided that the relevant assets are (relatively) homogenous, and regularly traded in active markets with regular price quotations. If the latter conditions are not met, other valuation methods may be more appropriate (see below). The method also doesn't raise concerns regarding (international) comparability, and it is rather straightforward. Regarding the availability of source data, it can be noted that the valuation is very much aligned to the fair value of the relevant assets in business accounting. Also when it comes to valuation of liabilities, business accounting rules define "*the fair value of a liability as the price that would be paid to transfer the liability in an orderly transaction between market participants at the measurement date*". Having said that, data on liabilities, for example in the case of source data for government entities, may often be valued at face value or at nominal value, and adjustments need to be made. On the other hand, more and more granular data on securities have become available in the past decade.

Market-equivalent prices

The alternative for directly observed prices is to approximate current prices by using observable market prices of similar assets. Under this valuation method, one could also include expert estimates, which are typically based on information from the market as well.

Valuing assets at market-equivalent prices can be applied for less homogenous non-financial assets which are regularly traded on the market, such as dwellings and certain types of quite generic (second-hand) transport equipment. Of importance, especially in the case of dwellings, is the need to account for the various characteristics which are relevant for the market price setting. Moreover, it is important to realise that the market prices of dwellings and other real estate are a combination of the structure and the underlying land, which is less suitable from a national accounts perspective, in which these two elements are separated. Notwithstanding this separate recording, market prices could be used as a benchmark for arriving at appropriate estimates for the sum of the two elements. For more details, reference is made to the Eurostat-OECD Compilation Guide on Land Estimations.

Expert estimates made for insurance purposes, for tax purposes, etc. may be the only viable option for valuing valuables, unless the valuable has been acquired relatively recently. In addition, expert estimates could also provide a source of information for valuing real estate.

Moreover, as noted in Section 2 on the valuation principles, this valuation method may become less appropriate in the case of second-hand "special purpose" fixed assets, and/or in the case the markets assets are relatively thin. A combination of these two elements would lead to a market price close to scrap value, not representing the value of such an asset used in an enterprise as a going concern. Valuation according to the written-down replacement costs is then considered more appropriate.

As in the case of market prices, the approximation of the values of positions with market-equivalent prices is conceptually sound, provided that the conditions mentioned in the above are met. The method could raise problems, also around (international) comparability, if more subjective assumptions are being used, instead of estimations based on observable data (e.g., the adjustment for lesser tradability in the case of unlisted shares), and in case observable market prices are not adequately adjusted for differences in characteristics, which on the other hand could add to the complexity of the method. Regarding the availability of source data, it can be noted that the valuation seems to very much in line with, or at least does not deviate from, the principle of fair value used in business accounting.

Valuation based on past expenses

If market(-equivalent) prices are not available, the next best method to arrive at an appropriate value for assets is a valuation based on past expenses. Here, one can distinguish two basic methods, depending on whether or not the assets in question are subject to depreciation: (i) historical acquisition price; and (ii) written-down replacement costs. The costs in the case of the latter method do not only concern direct expenditures on purchases of capital goods, but may also relate to expenditures made for the own-account production of fixed assets, typically valued using the sum-of-costs method (see Section 3).

A valuation of assets based on past expenses can be applied to a considerable number of assets, but in practice it is most often used in the case of non-financial assets. The use of the first method could be used for e.g., the valuation of valuables, but it may also be a valid alternative for some financial instruments. The second method is most commonly used for valuing fixed assets, through the application of the Perpetual Inventory Method (PIM).

It is obvious that values adjusted for price changes are superior to historic acquisition prices, certainly in cases where the acquisition has taken place further in the past, or in cases where significant price changes have been observed in the period since the acquisition.

As noted before, the written-down replacement cost method can be considered superior to market(-equivalent) prices, if the market prices for second-hand assets cannot be considered as representative for the future capital services, which can be derived from the continued use of the asset in production. A problem in the application of this method relates to the information needed for the application of this estimation method. Most importantly, apart from long time series on past expenditures on the purchases, including price developments, of the assets in question, information is needed on the service life; the age-price or the age-efficiency profile; and discard patterns.

It goes beyond the scope of this Guidance Note to explain all the technicalities involved in the application of the Perpetual Inventory Method (PIM). Excellent guidance, including the sensitivity of estimates when using certain assumptions, is provided in the OECD Manual on Measuring Capital (2009, 2nd edition). Here, it is only noted that directly observable information on service lives and other

relevant determinants is often not available, as a consequence of which one has to rely on, sometimes quite rough, assumptions, or guestimates. However, in this respect, it should also be noted that the stock value of the assets in question are capped by the level of past expenditures (adjusted by price changes).

The valuation of assets based on past expenses is generally conceptually sound, certainly when market(-equivalent) prices for second-hand fixed assets do not provide a valid alternative. An important condition for the adequacy of the method is a proper adjustment for price changes. As noted before, the accuracy of the estimates can suffer from a lack of observable information on service lives, age-price profiles and discard functions, as a consequence of which rather rough assumptions have to be made. On the other hand, the estimates are capped by the past expenditures. International comparability may also be hampered by these considerations, although this can be, and is, often countered by agreed international recommendations on the relevant determinants. From a purely technical perspective, the PIM is relatively complex, but available software for applying this method is available. In the case of fixed assets, leaving apart the information on service lives, etc., data on gross fixed capital formation are generally available from the standard estimation procedures for national accounts themselves. A problem may be the required length of consistent time-series, and – certainly in cases of relatively short time series, the estimate of the starting capital stock.

Nominal value

Valuation at nominal values is typically applied to financial instruments which are not traded via markets, such as deposits and loans. It is also relevant for the valuation of currency. Nominal value *"… refers to the amount the debtor owes to the creditor, which comprises the outstanding principal amount including any accrued interest"* (para. 3.157 of the 2008 SNA). The definition of nominal value in the sixth edition of the Balance of Payments Manual (BPM6) is the same (see para. 3.88). However, it should also be noted that para. A2.68 of BPM6 may generate some confusion. In discussing the possible recording of concessional loans, it recommends to re-calculate the value of the loan, by discounting the future payments with a market interest rate. The difference between the resulting value and the original value of the loan is to be treated as a capital transfer. Para. A2.58 then goes on with stating the following: "*This approach has the advantage of considering all the possible sources of transfers in debt concessionality – maturity period, grace period, frequency of payments, interest rate, and other applicable costs – and is consistent with nominal valuation of loans*", which suggests that the new, re-calculated, value of the loan is in line with the nominal value. This is also the interpretation of Guidance Note F.15 on "Debt concessionality", in which the nominal value is interpreted as the Net Present Value of future down-payments, discounted with the market interest rate. Whatever the case, a further clarification may be needed. This will be part of the agreed issues note on the recording of concessional lending.

The 2008 SNA does not provide any (substantial) justification for the use of nominal value. However, BPM6 provides the following clarifications, in para. 3.86: "*The use of nominal values is partly influenced by pragmatic concerns about data availability and the need to maintain symmetry between debtors and creditors. In addition, because loans are not intended for negotiability, without an active market, estimating a market price can be somewhat subjective. Nominal value is also useful because it shows actual legal liability and the starting point of creditor recovery behaviour. In some instances, loans also may be traded, often at discount, or a fair value may exist or would be possible to estimate. It is recognised that nominal value provides an incomplete view of the financial position, particularly when the loans are non-performing. Therefore, information on the nominal value of non-performing loans should be included as a memorandum or supplementary item…. Loans that have become negotiable de facto should be reclassified under debt securities….*".

In the past, during the update of the 1993 SNA, quite some discussion has taken place on the valuation of loans in line with their market value, i.e., adjusted for changes in market interest rates and adjusted for loan losses. It goes without saying that for the creditor, a loan with an interest rate of say 5% is more valuable than a loan with an interest rate of 3%. However, an important consideration regarding the valuation of financial instruments is that the SNA applies, for reasons of consistency, the same valuation for both financial assets and liabilities. Looking at it from the perspective of the debtor, the nominal value is the most relevant one, as he is basically locked in the position, and restructuring the debt into one with a lower interest rate would lead to additional costs equal to the interest differential. For tradable financial instruments, the debtor is not necessarily locked in. All in all, valuation at nominal value is preferred for non-tradable financial instruments.

Looking at business accounting standards, nominal value, interpreted as the Net Present Value of future cash flows discounted with the interest rate charged on the loan, is fully consistent with business accounting practice of using amortized cost for financial debt instruments not (actively) traded on a market, and similar instruments held to maturity. The latter may include adjustments for loss allowances.

From a conceptual point of view, valuation at nominal value for financial instruments which are not (actively) traded on the market seems to be a valid approach, certainly when taking into account the pre-condition of the system of national accounts regarding consistency in the valuation of assets and liabilities. However, looking at the valuation of the relevant financial assets in isolation, there is much to say in favour of a valuation according to the creditor approach. Looking at it from a perspective of (international) comparability, valuation at nominal values does not raise major concerns, although in situations of large divergences in inflation rates across countries, an international comparison, from an economic substance point of view, may be seriously hampered. Data availability is generally good, even more so when compared to other types of valuation.

Indirect valuation

In relation to unlisted equity, the 2008 SNA also contains some possible ways for valuing the relevant assets (and liabilities), which could be referred to as “indirect valuation”. Basically, these methods do not apply a form of direct valuation of unlisted equity; instead the value of a corporation is considered as a valid starting point for the valuation of the equity invested. More specifically, using the assumption that the intrinsic value of a corporation provides an indication of the value of related equity, three alternative options are suggested in paragraph 13.71 of the 2008 SNA:

- *Net asset value*, i.e., appraisals by knowledgeable management or directors of the enterprise, or provided by independent auditors to obtain total assets at current value less total liabilities (excluding equity) at market value.
- *Book values*, i.e., information on “own funds at book value”, adjusted with ratios based on suitable price indicators, such as prices of listed shares to book value in the same economy with similar operations, or alternately, assets that enterprises carry at cost revalued to current period prices using suitable asset price indices.
- *Own funds at book value*, i.e., the value of the enterprise recorded in the books of the direct investment enterprise, as the sum of (i) paid-up capital (excluding any shares on issue that the enterprise holds in itself and including share premium accounts); (ii) all types of reserves identified as equity in the enterprise’s balance sheet; (iii) cumulated reinvested earnings; and (iv) holding gains or losses included in own funds in the accounts, whether as revaluation reserves or profits or losses.

In addition, Guidance Note D.2 on “Valuation of unlisted equity” contains an evaluation of the various methods for valuing unlisted equity, based on a number of criteria. In the end, the following valuation methods are recommended for unlisted equity: own funds at book value; recent transaction prices (in

the above listed under market prices); and market capitalization (in the above referred to as book values). Annex VII of Guidance Note D.2 also contains a very nice decision tree, with a clear prioritisation of the various valuation methods, taking into account available source data. More generally, it is noted that the updated international standards should first explain the concept to be measured – namely, in the absence of market prices, own funds as the difference between assets and liabilities of unlisted corporations measured at market prices – in line with the core principles of macro-economic statistics.

From a conceptual perspective, the above indirect valuation methods are considered sound. For traditional enterprises, one may indeed assume that the intrinsic value of a corporation, as far as possible adjusted for price changes, provides an adequate reflection of the, usually unobservable, market price. However, this is not always be the case. Especially in the case of start-up companies, for which the value of equity is first and foremost driven by expectations about future profits, the sometimes even negative intrinsic value may be far below the value which can occasionally be observed in the case of take-overs. The decision tree, included in Annex VII of Guidance Note D.2 should assist countries in arriving at reasonably comparable results, based on available source data. The application of the method obviously requires sufficiently detailed balance sheet data for the relevant corporations.

Net present value of future returns

In cases that the above valuation methods cannot be applied, the net present value of future returns is considered as a viable alternative. Looking at the current guidance and compilation practices, the method is typically used in the following areas:

- defined benefit pension entitlements;
- unlisted equity in the case other methods are considered less appropriate; and
- natural resources.

The following discussion mainly concerns the valuation of natural resources and other non-financial assets, such as data and human capital. The ins and outs of actuarial methods for estimating pension entitlements are not dwelt upon; instead, reference is made to the extensive guidance developed in the context; see e.g., Technical Compilation Guide for Pension Data in National Accounts. Also estimating the value of unlisted equity through the Net Present Value of (expectations about) future profits is not elaborated, because various other methods are considered to provide more reliable estimates for this type of equity, and also because a further discussion would not provide additional insights in applying the Net Present Value method more generally.

In the case of non-financial assets, this method can only be used, if there is a direct link between the resource rent and the asset in question, in the sense that one can assume that there are no other assets which may have generated the residual income. Furthermore, it requires forecasting a future path of income streams, which may be quite challenging. For this purpose, assumptions need to be made on the asset life; the future path of extractions, and in the case of renewable resources, the regeneration potential of the asset in question; and the expected flows of income associated with the extractions. The question of which discount rate is appropriate in which circumstances is also an important question to answer. Because of these issues, the method is often considered as a last resort option, to be applied only for certain classes of assets, such as natural resources.

Another issue, already alluded to in Section 2 on valuation principles, concerns the way in which one accounts for the ownership of extraction rights. One can often observe that government, usually the legal owner of mineral and energy resources, provides extraction rights to private corporations, for a series of annual payments of royalties, either or not paid in advance for a certain period of time. In doing so, the government may not appropriate the full resource rent that can be derived from the

relevant resource. Moreover, as these rights are often not transferable, so without a price being established in a market, the value of the rights as such are zero. However, the private corporation as a going concern still derives value from these rights, in the form of part of the resource rents being appropriated[7]; see also the discussion of the guidance provided by SEEA Central Framework below.

Looking at the guidance developed in the context of the update of the 2008 SNA, detailed recommendations on the practical application of the Net Present Value method for mineral and energy resources have been proposed in Guidance Note WS.10 on "Valuation of mineral and resources"; see Annex 3. These recommendations mainly concern ways to estimate the various elements feeding into the actual measurement of mineral and energy resources. The Guidance Note is currently out for global consultation. If endorsed, the recommendations and clarifications would need to be included in the 2025 SNA.

In the context of the update of the 2008 SNA, a discussion has also taken place on the recording and valuation of data; see Guidance Note DZ.6 on "Recording of data in the national accounts". In this Guidance Note, data is defined as "*information content that is produced by accessing and observing phenomena; and recording, organizing and storing information elements from these phenomena in a digital format, which provide an economic benefit when used in productive activities*". Although there may be some monetary payments for (access to) observable phenomena or for databases at large, most data is produced in-house, by processing observable phenomena which are collected for free, either or not as a by-product of the primary output. Therefore, two valuation methods could be considered: the written-down replacement costs and the application of the Net Present Value method. In the choice between these two methods, a clear preference is given to the former method, not only for reasons of prudency, but also because the link between the data and the resulting profits is less direct and straightforward.[8] However, it should also be noted that getting the appropriate input data can be quite challenging, in the sense of breaking out the relevant expenditures, including the distinction between current expenditures and expenditures which add to the value of the asset in question.

Also the valuation of human capital has been addressed. Again the choice is between written-down acquisition costs and Net Present Value of future income streams. Both have their advantages and disadvantages. Regarding the former method, the relevant expenditures may be relatively easy to collect. However, service lives and depreciation patterns will have to rely on a set of assumption. Another complication is the measurement of unpaid labour input (e.g., studying at home), which would need to rely on the income foregone. For the application of the Net Present Value method, one needs to agree on which income to use, in addition the more general complexities of forecasting the future incomes, in this case over quite lengthy periods. In the end, the guidance does not make a firm recommendation on the preferred method, only suggesting to get more practical experience by applying both methods, which would also help in comparing and evaluating the methods.

SEEA Central Framework mainly deals with the valuation of natural resources. Three different methods are suggested for the estimation of the value of natural resources: (i) the Net Present Value of future resource rents, for which the resource rent is calculated using the "residual value method", i.e., the rent is estimated as the residual value of operating surplus, after deduction of the capital services (depreciation and return to invested capital); (ii) the "appropriation method", in which the resource

[7] An unresolved issue concerns the recording of the transfer of part of the resource rents by government to the exploiter, represented by the difference between the resource rent and the actual royalties paid. The resolution of this research question is part of the testing programme for the update of the 2008 SNA.

[8] Please note that the Guidance Note also contains proposals to record monetary payments for (access to) observable phenomena as payments of rent. Moreover, it is proposed to add these rent payments as a cost element in the estimation of the resource rent. These issues are further elaborated in Guidance Note UA.2 on "Treatment of rent for the recording of data, marketing assets and biological resources".

rent is estimated using the actual payments made to owners of environmental assets; and (iii) the "access price method" which is based on the fact that access to resources may be controlled through the purchase of licences and quotas, and the market prices of these rights may be a good approximation of the value of the natural resources in question.

In evaluating these three methods, SEEA Central Framework notes that the collection of resource rent is generally undertaken by governments through mechanisms such as fees, taxes and royalties. In practice, the fees, taxes and royalties actually collected tend to understate total resource rent, as the rates may be set with other priorities in mind, for example, encouraging investment and employment in extracting industries. These alternative motivations should be considered before use of the appropriation method. Similar concerns may be expressed in relation to the access price method, unless rights are auctioned in a competitive environment. All in all, the SEEA Central Framework states that while, in theory, all three methods would generate the same estimates of resource rent, it is the case that the application of the appropriation and access price methods are more heavily influenced by institutional arrangements in a country. For these reasons, estimates of resource rent based on the residual value method should be compiled and, where possible, reconciled with estimates obtained using the other methods.

It should also be added here that the SEEA Central Framework contains much more detailed guidance on the applications of the Net Present Value method. The guidance in the SNA could definitely gain from including these more detailed clarifications, if only by referencing to the relevant parts of the SEEA Central Framework.

Conditional upon the direct link between the resource rent and the asset under consideration, the Net Present Value method can be considered as a conceptually sound methodology to arrive at a valid approximation of the future capital services generated by using the asset in production. If rights to exploit natural resources are auctioned in a competitive environment, preference should be given to the price established in the market; however, more often than not, these conditions are not met in practice. When it comes to the choice between written-down replacement costs method and the Net Present Value method, generally a preference is given to the former methodology, for reasons of prudency. The Net Present Value method is not only highly impacted by the uncertainties surrounding the forecasts of future incomes, it also lacks the benchmarking of actual expenditures. However, in the case of many natural resources, this choice is not available, and one has to depend on the Net Present Value method, using the residual value method for estimating the resource rent.

From an (international) comparability point of view, the additional guidance provided in the SEEA Central Framework and also the further clarifications and recommendations provided in Guidance Notes WS.10 on "Valuation of mineral and energy resources" could result in substantial improvements of compiling, up to this time rather scarcely available, estimates with the use of the Net Present Value method. Depending on accuracy requirements, which may involve very granular source data, it should be possible to compile good approximations of the value of natural resources, which are the most relevant type of assets in this context. The method as such does not generate major obstacles from a perspective of technical expertise needed for its application.

Summary of valuation methods for assets and liabilities

In summary, the following can be noted in relation to the valuation of assets and liabilities, thereby distinguishing between financial instruments versus non-financial assets.

In the case of financial instruments, market(-equivalent) prices are the preferable option for valuation. However, its application is relatively limited, as most financial instruments are not traded on active market with regular price quotations, the obvious exception relating to tradable securities. For non-

tradable financial instruments, one could use market prices from recent market transactions. However, as this methodology cannot generally applied, a valuation at nominal values is considered the most viable option.

A special case is unlisted equity, for which various methodologies can be considered; see para. 13.71 of the 2008 SNA and Guidance Note D.2 on "Valuation of unlisted equity". An evaluation of the various valuation methods has led to a hierarchy of methods, nicely represented in a decision tree (see Annex VII of Guidance Note D.2). Another exception concerns the estimation of defined benefit pension entitlements, which are based on actuarial type of calculations using the Net Present Value of future benefits.

For non-financial assets, in the absence of market(-equivalent) prices, two valuation methods are applied most frequently, either the written-down replacement cost method or the Net Present Value of future earnings. The former method is typically applied to fixed assets used in the production of goods and services, while the latter method is often the only alternative for arriving at an approximation of the value of natural resources. In addition, expert estimates may be the only viable option for estimating the value of valuables.

6. Appropriateness of alternative valuation methodologies

In the discussions leading up to the drafting of SEEA Ecosystem Accounting, considerable debate has taken place on the various methodologies for valuing ecosystem services, which are also the primary source for valuing the related ecosystem assets, estimated as the Net Present Value (NPV) of ecosystem services. The debates raised quite some controversy, mainly concerning the appropriateness of the valuation methods, in the sense of being consistent with the valuation principles of the SNA. As a consequence, it was not possible to arrive at agreed conclusions, and the chapters on valuation in SEEA Ecosystem Accounting were not endorsed as part of the international standard per se, although the relevant chapters were considered as useful guidance for commencing the work on accounting for ecosystems. Based on experience gathered from these implementation exercises, further development of guidance may be feasible.

This section includes an overview of the main methods put forward for measuring ecosystem services and ecosystem assets. The main source of information for each method is the paper on "Monetary valuation of ecosystem services and assets for ecosystem accounting" (not yet publicly available). Actually, a considerable part of the text in this section is being copied one-to-one from the paper. Below each group of methods will first be shortly introduced, followed by a short discussion which mainly focuses on the consistency with the valuation principles of the SNA.

Two additional points needs to be made before entering into a discussion of valuation methods for ecosystem services and ecosystem assets. First of all, the paper on "Monetary valuation of ecosystem services and assets for ecosystem accounting" groups the various valuation methods in five categories, as follows:

- prices from directly observable values;
- prices from similar markets;
- prices embodied in market transactions;
- prices based on revealed expenditures (costs) for related goods and services; and
- prices based on expected expenditures or markets.

The valuation methods using market(-equivalent) prices (the first two groups in the above), and also the method of estimating resource rents using the residual value method (part of the third group) are

not included in the discussion below. These methods are commonly applied in the system of national accounts, and should thus not raise any concerns about the consistency with the valuation principles of the SNA, apart from potential issues already mentioned in Sections 4 and 5. So, only the methods which are currently not (usually) applied in the compilation of national accounts are reviewed and evaluated.

Furthermore, there is a range of other valuation methods used in environmental economics and the literature for valuing ecosystem services. These methods are also discussed in the paper on valuing ecosystem services and asset, although they are not recommended, as compared to the above valuation methods. As noted in the paper, *"… if data based on these (alternative) methods are considered for compilation purposes, then they should be checked for consistency with exchange value principles and adjusted as required before use in the accounts*".

Secondly, it is good to recall the main principles of valuing transaction in the system of national accounts. Importantly, the exchange values recorded in national accounts, represented by areas Y and Z in Figure 1 in Section 2 of this Guidance Note, exclude consumer surplus (represented by area X). For any valuation method to comply with the principles applied in the SNA, the result should thus represent the intersection of the marginal willingness to pay and the marginal willingness to accept, or in the latter case the marginal cost of supplying the good or service. In Figure 1, this is represented by price P1, with a quantity of X0 being exchanged. If the methods can approximately reproduce this type of information, one could argue that they are in line with the SNA valuation principles. For an excellent, more thorough, explanation of these theoretical considerations, reference is made to Section 2.4 of the paper on "Monetary valuation of ecosystem services and assets for ecosystem accounting".

Prices embodied in market transactions

Productivity change method

In the productivity change method, sometimes called the production function method, the ecosystem services are considered an input into the production function of a marketed good (see para. 9.38 of the SEEA Ecosystem Accounting). The productivity change method estimates a value by estimating a production function directly, based on micro-level data on physical inputs and outputs at the site (e.g., farm) level, such as concerning land area, water use, labour, machinery, fertiliser, etc. The econometric estimation of the equation provides a direct estimate of the marginal productivity of the input(s). Multiplying the marginal productivity by the price of the output gives the exchange value of the ecosystem service.

This method has been applied, for example, to value the services provided by water and other inputs in agriculture, mostly in locations where detailed data to estimate a production function are available. It has also been used more recently to value the productivity gains that result from keeping urban areas cool through the planting of vegetation.

Hedonic pricing method

The hedonic pricing method estimates the differential premium on property value derived from proximity to some environmental attribute (e.g. a local park). In order to obtain a measure of how the specific environmental attribute affects the value of houses or other properties, all other characteristics of the house (e.g. number of rooms, central heating, garage space, etc.) are distinguished. Moreover, any unit of housing needs to be completely described by geographical, neighbourhood and environmental attributes. Once all characteristics and attributes that influence the

property value are separated, the differential premium can be estimated assuming additive separability of all characteristics with respect to the total property value.

Short evaluation

Both these methods using prices embodied in market transactions provide estimates, which are based on marginal values of the relevant ecosystem services, and can thus be considered as being consistent with the SNA valuation principles. Having said that, the methods may raise some concerns when it comes to the accuracy of the estimates. In the case of the productivity change method, one needs to be able to single out the contribution of the ecosystem services under consideration to the production of goods and services. When it comes to the hedonic pricing method, the limitations are well-known, and various considerations need to be taken into account, as very well described in Section 3.2.3.3 of the paper on valuing ecosystem services and assets:

- *"allowing for geographically fragmented and imperfect real estate markets which make it difficult to transfer models and values to different locations;*
- *spatial multi-collinearity of different variables and omitted spatial variable biases which mean that specification of the hedonic pricing models can be challenging;*
- *non-linear distance decay of implicit prices for ecosystem amenity access which means that using direct distances to ecosystems "as the crow flies" may not be a good indicator of access to an ecosystem from a given dwelling;*
- *spatial variation in ecosystem amenity access must be perceived by residents such that the amenity values are reflected in dwelling values;*
- *ensuring that asset values are appropriately amortized to annual flows and that spatial aggregation across multiple properties is undertaken to generate ecosystem services values linked to specific ecosystem assets".*

On the other hand, however, more and more experience is being built up in developing and analysing big data used for this type of valuation.

Prices based on revealed expenditures (costs) for related goods and services

Averting behaviour method

The averting behaviour method (sometimes also called the defensive expenditure method or averting cost method, is based on the assumption that individuals and communities spend money on mitigating or eliminating damages caused by adverse environmental impacts and the revealed expenditure demonstrates the value placed on associated ecosystem services. This is the case, for example, with extra filtration for purifying polluted water, or air conditioning for avoiding polluted air. The majority of examples where this method is applied concern applications in which the value of reduced mortality and morbidity is estimated, such that the contribution of ecosystems to those outcomes can be identified (see para. 9.45 of SEEA Ecosystem Accounting).

Travel cost method

The travel cost method is based on the expenditures incurred (and the foregone income) by households or individuals to reach a site as a means of measuring the willingness to pay for the recreational activity. The sum of the cost of travelling (including the opportunity cost of time to travel and visit the site) and any entrance fee would then provide a proxy for market price. By observing these costs and the number of trips that take place across a group of visitors, it is possible to derive a demand curve for the particular environmental good or resource. The area under the demand curve measures the willingness to pay of consumers for that environmental good or resource. This method is considered as one of the most effective approaches in valuing recreation services. Most of the early

research using the travel cost approach was motivated by estimating the value of visits to recreational sites. In time, the method has also been adapted to be able to value quality changes. Indeed, the last 50 years have witnessed a considerable evolution of travel cost method techniques, from simple aggregate demand models to very sophisticated analysis of individual level choices.

Short evaluation

Looking at the above valuation methodologies from a conceptual perspective, one can argue that the averting behaviour method is consistent with the valuation principles of the SNA, as the basic information elements used in this method are actual transactions. When it comes to the travel cost approach, the valuation method typically provides estimates of the total value including consumer surplus, unless one applies the "consumer expenditure approach"[9]; for more details about the relevant expenditures, see Section 3.2.4.2.3 of the paper on valuing ecosystem services and assets. A conceptual issue in relation to the application of the latter approach concerns the imputation, or not, of costs for travelling time, similar to what is being done for time spent on producing unpaid household services. In the case of imputing costs related to travelling time, the only viable option in the travel cost method is to use opportunity costs, which may include an element of consumer surplus; see Guidance Note WS.3 on "Unpaid household service work", and the concise summary of this Guidance Note in Annex 3. On the other hand, however, applying a simple average wage rate, as suggested in the paper on valuing ecosystem services and ecosystem assets, may circumvent these conceptual problems; as a minimum, the relevant costs would not be that differ that much from replacement costs, as preferred in the case of unpaid household services.

A problem in applying the averting behaviour method *"… is that the expenditures may not be very sensitive to the differences in environmental quality, so they are not spatially sensitive in the way damage functions could be. Also, care is needed to align the expenditure to specific ecosystem services, since they may reflect securing a bundling of services, so to ensure that the expenditures reflect only the cost of avoiding environmental impacts rather than also reflecting matters of taste and consumption preferences*".

Finally, the application of the travel cost approach may be quite resource demanding, as it requires considerable amounts of data, to be collected through surveys conducted at the relevant recreational site.

Prices based on expected expenditures or market

Replacement cost method

The replacement cost method estimates the cost of replacing the ecosystem service with something that provides the same benefits but for which there are established costs or prices. It is sometimes called the substitute cost method or alternative cost approach and refers to the cost of available substitutes for the particular non-priced service or good. It should be distinguished from the restoration cost of an ecosystem, which seeks to ensure the full bundle of services that were provided prior to the degradation. Such restoration costs would not be considered a measure of the services currently provided by the ecosystem, but rather a measure of the overall value of what was lost.

The validity of the replacement cost method depends upon three main conditions: (i) the substitute can provide exactly the same function of the good or service substituted for; (ii) the substitute is actually the least-cost alternative; and (iii) evidence indicates an actual demand for the substitute. It

[9] Alternatively, one could use the information on the demand curve, as derived from the surveys, to simulate an exchange value; see the simulated exchange value method below.

should be noted that often natural resources and the environment also provide other services in addition to the one that substitutes for the marketed good or service. In this case the substitute cost should be considered as a lower bound of the value of the environmental asset.

Avoided damage costs method

The avoided damage cost method estimates the value of ecosystem services based on the costs of the damages that would occur due to the loss of these services. Similar to the replacement cost method, the focus will generally be on services provided by ecosystem services that are lost if the ecosystem is not present or is in sufficiently poor condition such that the services are not available.

The validity of the avoided damage cost method depends also on conditions as listed for the replacement cost method, although in this case there is no substitute service. Two conditions are relevant: (i) that the damages avoided can be related to a specific service; and (ii) that people would be willing to pay an amount to actually avoid the damage (i.e., if they are willing to accept the damage then this method is inappropriate). The avoided damage cost method is particularly useful for regulating services such as soil erosion control and flood control, air filtration, and global climate regulation services (see para. 9.52 of SEEA Ecosystem Accounting).

Simulated exchange value

The simulated exchange value method estimates the price and the quantity that would prevail if the ecosystem service were to be traded in a hypothetical market. The simulated exchange method is applied by using results from demand functions for the relevant ecosystem service (e.g. estimated using the travel cost method, discussed above, or stated preference methods). These are used to calculate the value of the ecosystem service that would occur if it was actually being marketed. This requires combining the information on the demand function with a supply function and an appropriate market structure (institutional context).

Short evaluation

Estimates using the replacement cost method are considered to be consistent with the valuation principles of the SNA, as a similar principle is used when estimating cost of consumption of fixed capital.[10] However, restoration costs (i.e., the costs required to restore the asset to a previous condition or societally agreed condition) are not considered to be consistent with the SNA, because they measure potential or historical value, not real annual value. Moreover, restoration usually covers multiple services, and hence cannot be used to value individual ecosystem services.

When it comes to the avoided damage costs method, damages should be estimated using prices that are consistent with the valuation principles of the SNA. For example, in the case of avoided health care, preference should be given to avoided health care expenditures, instead of using data on e.g., monetary valuations of gains in life years or values of statistical lives which may contain elements of consumer surplus.

Finally, also the simulated exchange value is considered to be consistent with the SNA valuation principles, specifically the value that would arise in case the ecosystem services in question were to be

[10] Para 1.67 of the 2008 SNA states the following: "Similarly, consumption of fixed capital in the SNA is calculated on the basis of the estimated opportunity costs of using the assets at the time they are used, as distinct from the prices at which the assets were acquired. Even when the fixed assets used up are not actually replaced, the amount of consumption of fixed capital charged as a cost of production should be sufficient to enable the assets to be replaced, if desired."

exchanged for cash (e.g., between the visitors and the ecosystem trustee). It goes without saying that the estimation of an accurate demand function may be quite challenging.

More generally, one could say that the valuation methods using prices based on expected expenditures or market are valid options for valuing ecosystem services and assets, provided that the various conditions mentioned in the above are met. From a feasibility perspective, it is clear that the methods may involve more or less complexities, and can be resource demanding. More practical experience would definitely support a further delineation of methodologies, which are conceptually sound, in terms of being consistent with the SNA valuation principles, and practically feasible.

7. Conclusions and way forward

[This section still needs to be further elaborated. The proposal is to list a number of recommendations to be included in the 2025 SNA, such as:

- Include a more comprehensive section on valuation principles and methodologies in 2025 SNA Chapter 4 on Flows, stocks and accounting rules (2008 SNA Chapter 3), along the lines of what has been presented in this Guidance Note.
- Include much more details on the application of the Net Present Value method, in line with what is already included in SEEA Central Framework, including the more detailed recommendations in Guidance Note WS.10 on "Valuation of mineral and energy resources".
- Include the recommendations provided in Guidance Note on "Valuation of unlisted equity in direct investment"
- Add clarification on the concept of nominal value.
- Include recommendations on alternative valuation methodologies on transactions and positions beyond the central framework of national accounts (unpaid household services, human capital, ecosystem accounting (not sure where to address this: probably more extensively in the new chapters on well-being and sustainability, and more concisely in 2025 SNA Chapter 4).
- Provide more details on the relationship between SNA and business accounting in the relevant chapters/sections.
- Etc.}

Annex 1. Guidance on valuation in the various versions of the SNA

Introduction

This annex provides an overview of the guidance on valuation provided in the various versions of the SNA. It starts with a summary of the valuation guidance in the 1953 and 1968 SNA. The following two sections provide overviews of the relevant paragraphs in the 1993 SNA and in the 2008 SNA, respectively. The bolding of text is added by the author, to highlight the most important principles and methodologies for valuing transactions and positions.

More in general, when comparing the guidance in the subsequent versions of the SNA, one can notice a large degree of consistency in the guidance on valuation. Transactions are to be valued at market prices, or close approximations of these prices, while positions are to be valued at current prices, or more or less closer approximations of these prices, depending on circumstances.

Another conclusion which one can derive from comparing the guidance on valuation is that it becomes more and more extensive and detailed. For a significant part, this is due to the increasing role of balance sheets in the SNA, a feature that was non-existent in the first version of the SNA, the 1953 SNA.

Guidance on valuation in the 1953 SNA and the 1968 SNA

The 1953 SNA and the 1968 SNA do not include that much (explicit) guidance on valuation, partly because balance sheets were absent from the 1953 SNA, or of less significance in the 1968 SNA.

The **1953 SNA** only states, on page 8, the following: "**Production should as far as possible be valued at market prices.** Thus the monetary purchases of households are valued at the prices actually paid an the same is true of purchases by private non-profit institutions, general government, and purchases on capital account. **In the case of non-monetary transactions, that is, barter and production for own final use, the prices applied are those at which the producer sells, or if he does not sell, those at which producers of similar products sell in the same or neighbouring localities**. … **Minor modifications have sometimes to be made to these general rules. For instance, it is convenient to value own-account construction at the cost to the enterprise undertaking it exclusive of the profit margin which might be realised by a contractor producing a similar product.** This profit margin will ultimately be reflected in the profit obtained from the main business of the own-account constructor".

In addition, on page 9, the following is stated on the valuation of consumption of fixed capital: "**Provisions for the consumption of fixed capital are valued at current market prices.** This involved a valuation of the physical components of the provisions for the consumption of fixed capital already described. These are expressed in terms of a proportion of the assets that are being used up in production and should be valued in terms of the current market prices of these assets". Moreover, it is stated, on the same page, that "**gross additions to stocks are valued at purchase price or at cost to the producing enterprise if internal processing of these stocks is involved. Stocks withdrawn and charged to current expense are value at current market prices or at current cost prices in the case of internal processing.** This method of inventory accounting ensures that whenever a stock is either sold or withdrawn and used in production a charge will be made in the production account that is sufficient to provide for its physical replacement at current prices. In this way the provision for replacing stocks is identical in concept to that made for the replacement of fixed assets through the valuation of provisions for consumption of fixed capital at current prices". Some more details are provided on page 30.

Finally, it should be noted that the 1953 SNA does not recognise non-market output by government (and NPISHs). Relevant expenditures are directly allocated to **general government consumption expenditure**, which "… **represents the current expenditure on goods and services undertaken by general government. It comprises compensation of employees, purchases by government from enterprises and from the rest of the world less purchases from government of goods and services, other than surplus stores, by enterprises and households**".

Looking at the 1968 SNA, the guidance on valuation is somewhat more elaborated, but still relatively concise. For the first time, balance sheets are introduced. In this respect, it is stated, in paragraph 1.36, that "reduced to its simplest terms a balance sheet shows for a sector or a set of sectors such as a national economy: (i) **the written-down value of tangible assets** held plus the excess of financial claims held as assets over financial claims issued as liabilities". **In relation to financial claims, paragraph 1.64 notes that the common basis for valuation of financial claims is current values, or, as stated in paragraph 2.87, current market prices.** This paragraph also notes that "**certain claims, such as currency and deposits, do not posses a market value, different from their nominal value; and in other cases nominal values may have to be used in practice**".

Chapter VI of the 1968 SNA provides more details on the valuation of transactions. At the start, in paragraphs 6.16 and 6.17 provide the general principles, as follows: "Producers' values, or basic values, should, as far as practicable, be assigned to commodities in terms of **market prices** at the producing unit of identical items at the moment the commodities are produced. **In general, the appropriate price is the price at which the commodities are sold against immediate cash payment. … It may not infrequently be impracticable to principles of valuation completely**".

Paragraph 6.21 then goes on with the following: "**Gross output for own consumption should be valued at producers´ prices on the market. Where the producer does not sell any of his output, the relevant prices are those at which producers in the same or neighbouring localities sell the same or similar commodities. Valuing this output at producers´ prices furnishes a measure of the income foregone, or the costs incurred, in consuming the commodities** …".

Paragraph 6.24 describes the valuation of own-account fixed capital formation, as follows: "**Fixed assets produced on own account should, in principle, be valued at the producers' values of the same commodities when sold in the market.** However, not infrequently, it will be impracticable to value these fixed assets at producers' values. Serious difficulties are likely to be encountered in comparing these items with goods which are supplied on the market, particularly in the case of structures, other construction work, or heavy machinery. Further, **a suitable market for purposes of determining prices may not be available. In these circumstances it will be necessary to resort to valuing fixed assets produced on own account at the explicit costs incurred**".

More details on the valuation of changes in stocks are provided in paragraphs 6.109 – 6.113, while paragraphs 6.119 – 6.120 provide some more information on the valuation of gross fixed capital formation. However, all in all, basically consistent with the guidance provided in more recent versions of the SNA.

In relation to the measurement of **services produced by government and NPISHs**, paragraph 6.41 says the following: "The value of the **gross output** of the producers of other goods and services – the producers of government services and of private non-profit services to households and the domestic services rendered by households – it **is taken to be equivalent to the costs of producing these services**. The costs in the case of the first two classes of producers consists of outlays on the **intermediate consumption** of commodities and of other goods and services and of the value added in production. The value added consists of their **compensation of employees, consumption of fixed assets, and direct payments of indirect taxes. Consumption of fixed assets is charged in respect of all these assets**

except roads, bridges and similar facilities. The value added is not to include an element of operating surplus …".

Finally, in chapter VII, some additional guidance is provided on the valuation of (purchases of) assets. For example, paragraph 7.21 states the following on **consumption of fixed capital**: "In a stationary economy, in which the quantity of fixed assets in use remains the same and does not change in quality, consumption of fixed capital can readily be defined so that in each year it is equal to the replacement needed. The problem of definition is however more complicated in an economy characterized by changes in demand or technical changes leading to obsolescence; and **no general rule can be formulated for such situations. It seems reasonable, however, to value consumption of fixed capital on a straight-line basis with reference to the expected lifetime of the individual assets**.

Finally, paragraphs 7.106 – 7.109 provide some further guidance on the valuation of transaction in financial assets. Basically, it comes down to the following: "Purchases or sales of financial assets should in general be valued at the price at which the assets are acquired, or disposed of, respectively".

Guidance on valuation in the 1993 SNA

2.67 Again, following the quadruple entry principle, a transaction must be recorded at the same value through all the accounts of both sectors involved. The same principle applies to assets and liabilities. It means that a financial asset and its liability counterpart have to be recorded for the same amount in the creditor and the debtor accounts.

2.68 **Transactions are valued at the actual price agreed upon by the transactors. Market prices are thus the basic reference for valuation in the System. In the absence of market transactions, valuation is made according to costs incurred (non-market services produced by government) or by reference to market prices for analogous goods or services (services of owner-occupied dwellings).**

2.69 **Assets and liabilities are valued at current prices at the time to which the balance sheet relates, not at their original prices.** Theoretically, national accounts are based on the assumption that assets and liabilities are continuously revalued at current prices, even if estimates are in fact made only periodically. **The appropriate valuation basis for assets and liabilities is the price at which they might be bought in markets at the time the valuation is required. Prices observed in markets or estimated from observed market prices should preferably be used. Current prices may be approximated for balance sheet valuation in two other ways: by accumulating and revaluing transactions over time or by estimating the discounted present value of future returns expected from a given asset** (see also chapter XIII).

2.70 Internal transactions are valued at current prices at the time these transactions occur, not at original prices. These internal transactions include entries in inventories, withdrawals from inventories, intermediate consumption and consumption of fixed capital.

…

3.70 The power of the SNA as an analytical tool stems largely from its ability to link numerous, very varied economic phenomena by expressing them in a single accounting unit. **The System does not attempt to determine the utility of the flows and stocks which come within its scope. Rather, it measures the current exchange value of the entries in the accounts in money terms, i.e., the values at which goods and other assets, services, labour or the provision of capital are in fact exchanged or else could be exchanged for cash (currency or transferable deposits)**.

3.71 **When institutional units exchange these items with other institutional units for cash, the values required by the System are directly available.** These transactions are recorded at the actual exchange value agreed upon by the two parties. Furthermore, of course, the values for all flows and stocks that concern cash holdings and liabilities are directly known.

3.72 **In respect of all remaining flows and stocks, no actual exchange values are at hand, so their values must be assessed indirectly. These values should be taken from markets in which the same or similar items are traded currently in sufficient numbers and in similar circumstances against cash.** The selection of the appropriate reference markets requires that attention be paid to differences between wholesale and retail markets, regional divergences, etc. **Non-monetary transactions in existing goods often can be valued at the market price for similar new goods, if properly adjusted for consumption of fixed capital and other elements, such as unanticipated damage, which may have accrued to the asset since the time it was produced.**

3.73 **If there is no appropriate market from which the value of a particular non-monetary flow or stock item can be taken by analogy, as a second best, its valuation could be derived from prices that are established in less closely related markets. Ultimately, some goods and services can only be valued by the amount that it would cost to produce them currently. Market and own-account goods and services valued in this way should include a mark-up that reflects the net operating surplus or mixed income attributable to the producer. For non-market goods and services produced by government units or NPISHs, however, no allowance should be made for any net operating surplus.**

3.74 **Sometimes it is necessary to value stocks at their estimated written down current acquisition values or production costs.** The write-down should then include all changes which have occurred to the item since it was purchased or produced (such as consumption of fixed capital, partial depletion, exhaustion, degradation, unforeseen obsolescence, exceptional losses and other unanticipated events). The same method could be applied to non-monetary flows of existing assets.

3.75 **If none of the methods mentioned above can be applied, flows and stocks are to be recorded at the discounted present value of expected future returns. Although this method is theoretically entirely justified, it is not generally recommended since it involves many assumptions and as a consequence the outcomes are highly speculative.**

…

3.77 Business accounts, tax returns and other administrative records are main sources of data for drawing up the national accounts. One should be aware, however, that none of these necessarily satisfies the valuation requirements of the System and that accordingly adjustments may have to be made. In particular, in the interest of prudence, business accounting often adopts valuations that are not appropriate for the national accounts. Similarly, valuations for tax purposes often serve objectives that differ from those of macroeconomic analysis. For example, the depreciation methods favoured in business accounting and those prescribed by tax authorities almost invariably deviate from the concept of consumption of fixed capital employed in the System.

3.78. Extending the general rule in paragraph 3.71 above, where a single payment refers to more than one transaction category (such as they are defined in the System), the individual flows need to be recorded separately. For example, the System recommends dividing interest transactions with financial enterprises between two transaction categories whenever possible: one standing for pure interest and the other representing the implicit payment for financial intermediation services. Earlier in this chapter, the partitioning of financial leasing and transactions of wholesalers and retailers were discussed. Partitioning is not limited to transactions; an example is real holding gains, which are

separated for analytical reasons from neutral holding gains that are simply proportionate to changes in the general price level.

3.79 In some cases partitioning is connected with deceptive behaviour. Values put on an invoice may deviate systematically or to such a large extent from the prices paid in the market for similar items that it must be presumed that the sums paid cover more than the specified transactions. **An example is so-called transfer pricing: affiliated enterprises may set the prices of the transactions among themselves artificially high or low in order to effect an unspecified income payment or capital transfer. Such transactions should be made explicit if their value is considerable and would hinder a proper interpretation of the accounts.**

…

6.85 **The goods and services (for own final use) should be valued at the basic prices at which they could be sold if offered for sale on the market.** In order to value them in this way, goods or services of the same kind must actually be bought and sold in sufficient quantities on the market to enable reliable market prices to be calculated which can be used for valuation purposes. **When reliable market prices cannot be obtained, a second best procedure must be used in which the value of the output of the goods or services produced for own use is deemed to be equal to the sum of their costs of production**: that is, as the sum of: intermediate consumption; compensation of employees; consumption of fixed capital; and other taxes (less subsidies) on production.

6.86 It will usually be necessary to value the output of own-account construction on the basis of costs as it is likely to be difficult to make a direct valuation of an individual and specific construction project that is not offered for sale. When the construction is undertaken for itself by a business enterprise, the requisite information on costs may be easily ascertained, but not in the case of the construction of dwellings by households or communal construction for the benefit of the community undertaken by informal associations or groups of households. Most of the inputs into communal construction projects, including labour inputs, are likely to be provided free so that even the valuation of the inputs may pose problems. As unpaid labour may account for a large part of the inputs it is important to make some estimate of its value using wage rates paid for similar kinds of work on local labour markets. While it may be difficult to find an appropriate rate, it is likely to be less difficult than trying to make a direct valuation of a specific construction project itself.

…

6.89 Heads of household who own the dwellings which the households occupy are formally treated as owners of unincorporated enterprises that produce housing services consumed by those same households. **As well-organized markets for rented housing exist in most countries, the output of own-account housing services can be valued using the prices of the same kinds of services sold on the market in line with the general valuation rules adopted for goods or services produced on own account.** In other words, the output of the housing services produced by owner-occupiers is valued at the estimated rental that a tenant would pay for the same accommodation, taking into account factors such as location, neighbourhood amenities, etc. as well as the size and quality of the dwelling itself. The same figure is recorded under household final consumption expenditures.

6.90 … **government units or NPISHs may engage in non-market production because of market failure or as a matter of deliberate economic or social policy.** Such output is recorded at the time it is produced, which is also the time of delivery in the case of non-market services. **In general, however, it cannot be valued in the same way as goods or services produced for own final consumption or own capital formation that are also produced in large quantities for sale on the market.** There are no markets for collective services such as public administration and defence, but even in the case of

non-market education, health or other services provided to individual households, suitable prices may not be available. It is not uncommon for similar kinds of services to be produced on a market basis and sold alongside the non-market services but there are usually important differences between the types and quality of services provided. In most cases it is not possible to find enough market services that are sufficiently similar to the corresponding non-market services to enable their prices to be used to value the latter, especially when the non-market services are produced in very large quantities.

6.91 For these reasons, and also to ensure that the various non-market services produced by government units and NPISHs are valued consistently with each other, they are all valued in the System by the sum of the costs incurred in their production: that is, as the sum of: intermediate consumption; compensation of employees; consumption of fixed capital; and other taxes, less subsidies, on production. The net operating surplus on the production of non-market goods or services produced by government units and NPISHs is assumed always to be zero.

6.92 Government units and NPISHs may be engaged in both market and non-market production. Whenever possible, separate establishments should be distinguished for these two types of activities, but this may not always be feasible. Thus, a non-market establishment may have some receipts from sales of market output produced by a secondary activity: for example, sales of reproductions by a non-market museum. However, even though a non-market establishment may have sales receipts, its total output covering both its market and its non-market output, is still valued by the production costs. The value of its market output is given by its receipts from sales of market products, the value of its non-market output being obtained residually as the difference between the values of its total output and its market output. The value of its receipts from the sale of non-market goods or services at prices that are not economically significant remain as part of the value of its non-market output.

…

10.13 To ensure consistency between the accumulation accounts and the balance sheets, **assets recorded in balance sheets should be valued as if they were being acquired on the date to which the balance sheet relates.** For example, if fixed assets were to be acquired on the balance sheet date they would be recorded at their current purchasers' prices, including any costs of ownership transfer, or at their current basic prices if produced on own account. **The valuation of fixed assets that were acquired some time before the balance sheet date is more problematic. In general, they are valued by writingdown the current purchasers' or basic prices of new assets by the accumulated consumption of fixed capital on the assets. With good information and efficient markets, the written-down values of the assets should equal, or at least approximate, both the present, or discounted, values of the remaining future benefits to be derived from them and their market values when active second hand markets exist.** In practice, these values may differ from each other because of lack of information or other imperfections. **As already stated, the written-down value of the asset is generally the most practical and also the preferred method of valuing an existing fixed asset, bearing in mind that the calculation of consumption of fixed capital should take into account the observed values of second hand assets when they are actively traded.**

10.14 **Most financial assets consist of financial claims. A financial claim is usually valued by the amount of the principal outstanding: i.e., by the amount that a debtor must pay to the creditor to extinguish the claim. When financial assets are traded on markets, this value is equal to the market price of the security in question as the debtor, or issuer of the security, can extinguish the claim by buying back the security at the current market price.**

…

13.25 For the balance sheets to be consistent with the accumulation accounts of the System, **a particular item in the balance sheet should be valued as if it were being acquired on the date to which the balance sheet relates, including any associated costs of ownership transfer in the case of non-financial assets. This implies that assets and liabilities (and thus net worth) are to be valued using a set of prices that are current on the date to which the balance sheet relates and that refer to specific assets.**

13.26 **Ideally, these prices should be observable prices on markets** whenever such prices are available for the assets and liabilities in question. Prices at which assets may be bought or sold on markets are the basis of decisions by investors, producers, consumers and other economic agents. For example, investors in financial assets (such as securities) and tangible assets (such as land) make decisions in respect of acquisitions and disposals of these assets in the light of their values in the market. Producers make decisions about how much of a particular commodity to produce and about where to sell their output by reference to prices on markets. **For a given asset, the price is the same for purchaser and seller, and, in the case of financial assets, for creditor and debtor.**

13.27 **When there are no observable prices because the items in question have not been purchased/sold on the market in the recent past, an attempt has to be made to estimate what the prices would be were the assets to be acquired on the market on the date to which the balance sheet relates.** In estimating the current market price for balance sheet valuation, a price averaged over all transactions in a market can be used if the market is one on which the items in question are regularly, actively and freely traded.

13.28 **In addition to prices observed in markets or estimated from observed prices, current prices may be approximated for balance sheet valuation in two other ways.** In some cases, **prices may be approximated by accumulating and revaluing acquisitions less disposals of the asset in question over its lifetime; this generally is the most practical and also the preferred method for fixed assets**, but it can be applied to other assets as well. In other cases, **market prices may be approximated by the present, or discounted, value of future economic benefits expected from a given asset; this is the case for a number of financial assets, natural assets and intangible assets. With good information and efficient markets, the values of the assets obtained by accumulating and revaluing transactions should equal, or at least approximate, both the present, or discounted, values of the remaining future benefits to be derived from them and their market values when active second-hand markets exist. These three price bases are discussed below in general terms.**

13.29 **The ideal source of price observations for valuing balance sheet items is a market**, like the stock exchange, in which each asset traded is completely homogeneous, is often traded in considerable volume and has its market price listed at regular intervals. Such markets yield data on prices that can be multiplied by indicators of quantity in order to compute the total market value of different classes of assets held by sectors and of different classes of their liabilities. **These prices are available for nearly all financial claims, existing real estate (i.e., existing buildings and other structures plus the underlying land), existing transportation equipment, crops, and livestock as well as for newly produced fixed assets and inventories.**

13.30 For securities quoted on a stock exchange, for example, it is feasible to gather the prices of individual assets and of broad classes of assets and, in addition, to determine the global valuation of all the existing securities of a given type. In some countries, another example of a market in which assets may be traded in sufficient numbers to provide useful price information is the market for existing dwellings.

13.31 **In addition to providing direct observations on the prices of assets actually traded there, information from such markets may also be used to price similar assets that are not traded. For**

example, information from the stock exchange also may be used to price unquoted securities by analogy with similar, quoted securities, making some allowance for the inferior marketability of the unquoted securities. Similarly, appraisals of tangible assets for insurance or other purposes generally are based on observed prices for items that are close substitutes, although not identical, and this approach can be used for balance sheet valuation. For a discussion of the special valuation problems associated with direct investment enterprises, see chapter XIV, paragraphs 14.49 and 14.159.

13.32 **For some assets, initial acquisition costs (appropriately revalued) are written off - amortized - over the asset's expected life. For this method, a pattern of decline must be chosen, and reference may be made to tax laws, accounting conventions, etc. The value of such an asset at a given point in its life is given by its current acquisition price less the accumulated value of these write-offs. This valuation is typically used for non-produced intangible assets, such as purchased goodwill and patented entities.**

13.33 In addition, **most fixed assets are recorded in the balance sheets at current written-down value - i.e., at current purchasers' or basic prices written-down for the accumulated consumption of fixed capital, a valuation frequently referred to as "written-down replacement cost".** When fixed assets are valued in this way, the balance sheet values are consistent with the measures of consumption of fixed capital elsewhere in the System.

13.34 **In the case of assets for which the returns either are delayed (as with timber) or are spread over a lengthy period (as with subsoil assets), although normal prices are used to value the ultimate output, a rate of discount must, in addition, be used to compute the present value of the expected future returns.** It is thus necessary to derive a capitalization factor - a factor that works back from the present value of the expected future return to the value of the asset - from information about the market. **The rate of discount and the capitalization factors should be derived from information based on transactions in the particular type of assets under consideration - forest lands, mines and quarries - rather than using a general rate of interest, such as one derived from the yield on government bonds.**

…

13.59 Subsoil assets are proven reserves of mineral deposits located on or below the earth's surface that are economically exploitable given current technology and relative prices. Mine shafts, wells and other extraction sites are included with structures rather than with the subsoil asset.

13.60 **The value of the reserves is usually determined by the present value of the expected net returns resulting from the commercial exploitation of those assets, although such valuations are subject to uncertainty and revision.** As the ownership of subsoil assets does not change frequently on markets, it may be difficult to obtain appropriate prices which can be used for valuation purposes. In practice, it may be necessary to use the valuations which the owners of the assets place on them in their own accounts.

13.61 **Non-cultivated biological resources and water resources** are included in the balance sheet to the extent that they have been recognized as having economic value that is not included in the value of the associated land. **As observed prices are not likely to be available, they are usually valued by the present value of the future returns expected from them.**

…

13.64 **In line with the general valuation principles described above, financial assets and liabilities should be valued at current prices whenever they are regularly traded on organized financial**

markets, and they should also be assigned the same value in the balance sheets whether they appear as assets or liabilities. The prices should exclude service charges, fees, commissions and similar payments for services provided in carrying out the transactions. **Financial claims that are not traded on organized financial markets should be valued by the amount that a debtor must pay to the creditor to extinguish the claim.**

…

13.73 **Shares and other equities should be valued in the balance sheets at their current prices when they are regularly traded on stock exchanges or other organized financial markets. The value of shares in corporations that are not quoted on stock exchanges or otherwise traded regularly should be estimated using the prices of quoted shares that are comparable in earnings and dividend history and prospects, adjusting downward, if necessary, to allow for the inferior marketability or liquidity of unquoted shares. Equity in quasi-corporations should be valued as equal to the value of the quasi-corporations' assets less the value of their liabilities.**

Guidance on valuation in the 2008 SNA

2.59 **Transactions are valued at the actual price agreed upon by the transactors. Market prices are thus the basic reference for valuation in the SNA. In the absence of market transactions, valuation is made according to costs incurred (for example, non-market services produced by government) or by reference to market prices for analogous goods or services (for example, services of owner-occupied dwellings).**

2.60 **Assets and liabilities are recorded at current values at the time to which the balance sheet relates, not at their original valuation.** Theoretically, national accounts are based on the assumption that the values of assets and liabilities are continuously up-rated to current values, even if in fact up-rating occurs only periodically. The appropriate valuation basis for assets and liabilities is the value at which they might be bought in markets at the time the valuation is required. **Ideally, values observed in markets or estimated from observed market values should be used. When this is not possible, current values may be approximated for balance sheet valuation in two other ways, by accumulating and revaluing transactions over time or by estimating the discounted present value of future returns expected from a given asset** (see also chapter 13).

2.61 Internal transactions are valued at current values at the time these transactions occur, not at the original valuation. These internal transactions include entries into inventories, withdrawals from inventories, intermediate consumption and consumption of fixed capital.

…

3.118 The power of the SNA as an analytical tool stems largely from its ability to link numerous, very varied economic phenomena by expressing them in a single accounting unit. **The SNA does not attempt to determine the utility of the flows and stocks that come within its scope. Rather, it measures the current exchange value of the entries in the accounts in money terms, that is, the values at which goods, services, labour or assets are in fact exchanged or else could be exchanged for cash (currency or transferable deposits).**

3.119 **Market prices for transactions are defined as amounts of money that willing buyers pay to acquire something from willing sellers; the exchanges are made between independent parties and on the basis of commercial considerations only, sometimes called "at arm's length".** Thus, according to this strict definition, a market price refers only to the price for one specific exchange under the stated conditions. A second exchange of an identical unit, even under circumstances that are almost

exactly the same, could result in a different market price. **A market price defined in this way is to be clearly distinguished from a price quoted in the market, a world market price, a going price, a fair market price, or any price that is intended to express the generality of prices for a class of supposedly identical exchanges rather than a price actually applying to a specific exchange. Furthermore, a market price should not necessarily be construed as equivalent to a free market price; that is, a market transaction should not be interpreted as occurring exclusively in a purely competitive market situation. In fact, a market transaction could take place in a monopolistic, monopsonistic, or any other market structure. Indeed, the market may be so narrow that it consists of the sole transaction of its kind between independent parties.**

3.120 **When a price is agreed by both parties in advance of a transaction taking place, this agreed, or contractual, price is the market price for that transaction regardless of the prices that prevail when the transaction takes place.**

3.121 **Actual exchange values in most cases will represent market prices as described in the preceding paragraph. Paragraphs 3.131 to 3.134 describe cases where actual exchange values do not represent market prices.** Transactions that involve dumping and discounting represent market prices. Transaction prices for goods and services are inclusive of appropriate taxes and subsidies. A market price is the price payable by the buyer after taking into account any rebates, refunds, adjustments, etc. from the seller.

3.122 **Transactions in financial assets and liabilities are recorded at the prices at which they are acquired or disposed of. Transactions in financial assets and liabilities should be recorded exclusive of any commissions, fees, and taxes whether charged explicitly, included in the purchaser's price, or deducted from the seller's proceeds. This is because both debtors and creditors should record the same amount for the same financial instrument. The commissions, fees, and taxes should be recorded separately from the transaction in the financial asset and liability, under appropriate categories. The valuation of financial instruments, which excludes commission charges, differs from the valuation of non-financial assets, which includes any costs of ownership transfer.**

3.123 **When market prices for transactions are not observable, valuation according to market-price-equivalents provides an approximation to market prices.** In such cases, market prices of the same or similar items when such prices exist will provide a good basis for applying the principle of market prices. Generally, market prices should be taken from the markets where the same or similar items are traded currently in sufficient numbers and in similar circumstances. If there is no appropriate market in which a particular good or service is currently traded, the valuation of a transaction involving that good or service may be derived from the market prices of similar goods and services by making adjustments for quality and other differences.

…

Transfer prices

3.131 **In some cases actual exchange values may not represent market prices. Examples are transactions involving transfer prices between affiliated enterprises, manipulative agreements with third parties, and certain non-commercial transactions, including concessional interest (that is, interest payable at a reduced rate as a matter of policy).** Prices may be under- or over-invoiced, in which case an assessment of a market-equivalent price needs to be made. **Although adjustment should be made when actual exchange values do not represent market prices, this may not be practical in many cases.** Adjusting the actual exchange values to reflect market prices will have consequences in other accounts. Therefore, when such adjustments are made, corresponding

adjustments in other accounts should also be made, for example, if prices of goods are adjusted, associated income account or financial account transactions or both should also be adjusted.

3.132 Values put on an invoice may deviate systematically or to such a large extent from the prices paid in the market for similar items that it must be presumed that the sums paid cover more than the specified transactions. An example is so-called transfer pricing: affiliated enterprises may set the prices of the transactions among themselves artificially high or low in order to effect an unspecified income payment or capital transfer. Such transactions should be made explicit if their value is considerable and would hinder a proper interpretation of the accounts. In some cases, transfer pricing may be motivated by income distribution or equity build-ups or withdrawals. **Replacing book values (transfer prices) with market-value equivalents is desirable in principle, when the distortions are large and when availability of data (such as adjustments by customs or tax officials or from partner economies) makes it feasible to do so. Selection of the best market-value equivalents to replace book values is an exercise calling for cautious and informed judgment.**

3.133 The exchange of goods between affiliated enterprises may often be one that does not occur between independent parties (for example, specialized components that are usable only when incorporated in a finished product). Similarly, the exchange of services, such as management services and technical know-how, may have no near equivalents in the types of transactions in services that usually take place between independent parties. **Thus, for transactions between affiliated parties, the determination of values comparable to market values may be difficult, and compilers may have no choice other than to accept valuations based on explicit costs incurred in production or any other values assigned by the enterprise.**

Concessional pricing

3.134 **While some non-commercial transactions, such as a grant in kind, have no market price, other non-commercial transactions may take place at implied prices that include some element of grant or concession so that those prices also are not market prices.** Examples of such transactions could include negotiated exchanges of goods between governments and government loans bearing lower interest rates than those with similar grace and repayment periods or other terms for purely commercial loans. Concessional lending is described in chapter 24. Transactions by general government bodies and private non-profit entities not engaged in purely commercial undertakings are often subject to non-commercial considerations. However transfers involving provision of goods and services may also be provided or received by other sectors of the economy.

Valuation at cost

3.135 If there is no appropriate market from which the value of a particular non-monetary flow or stock item can be taken by analogy, its valuation may be derived from prices that are established in less closely related markets. **Ultimately, some goods and services can only be valued by the amount that it would cost to produce them currently. Market and own-account goods and services valued in this way should include a mark-up that reflects the net operating surplus or mixed income attributable to the producer. For non-market goods and services produced by government units or NPISHs, however, no allowance should be made for any net operating surplus.**

Valuation of assets

3.136 **Sometimes it is necessary to value stocks at their estimated written down current acquisition values or production costs.** The write-down should then include all changes that have occurred to the item since it was purchased or produced (such as consumption of fixed capital, partial depletion,

exhaustion, degradation, unforeseen obsolescence, exceptional losses and other unanticipated events). The same method could be applied to non-monetary flows of existing assets.

3.137 **If none of the methods mentioned above can be applied, stocks, or flows arising from the use of assets, may be recorded at the discounted present value of expected future returns.** For some financial assets, particularly those with a face value applicable at some point in the future, the present market value is established as the face value discounted to the present by the market interest rate. In principle, therefore, if a reasonably robust estimate of the stream of future earnings to come from an asset can be made, along with a suitable discount rate, this allows an estimate of the present value to be established. **However, because it may be difficult to determine the future earnings with the appropriate degree of certainty, and given that assumptions are also needed about the asset's life length and the discount factor to be applied, the other possible sources of valuation described in the preceding paragraphs should be exhausted before resorting to this method.** Further, if this method is used, some sensitivity testing of the assumptions made may be appropriate. In fact, the method most commonly used to derive estimates of consumption of fixed capital and the capital stock of fixed assets associates a stream of future earnings with the decline in value of a fixed asset in use in production. (This method, the perpetual inventory method, is described further in chapters 13 and 20.)

3.138 **Although the net present value method depends on making projections of future earnings and discount rates, it is theoretically sound as can often be verified for a number of financial assets. If it is used for non-financial assets, some sensitivity testing of the assumptions made may be appropriate.**

3.139 In conformity with the general rule, provision of assets, services, labour or capital in exchange for foreign cash is recorded at the actual exchange value agreed upon by the two parties to the transaction. Flows and stocks concerning foreign currency are converted to their value in national currency at the rate prevailing at the moment they are entered in the accounts, that is, the moment the transaction or other flow takes place or the moment to which the balance sheet applies. The midpoint between the buying and selling rate should be used so that any service charge is excluded.

Business accounting valuation

3.140 Business accounts, tax returns and other administrative records are main sources of data for drawing up the national accounts. One should be aware, however, that none of these necessarily satisfies the valuation requirements of the SNA and that accordingly adjustments may have to be made. In particular, in the interest of prudence, business accounting often adopts valuations that are not appropriate for the national accounts. Similarly, valuations for tax purposes often serve objectives that differ from those of macroeconomic analysis. For example, the depreciation methods favoured in business accounting and those prescribed by tax authorities almost invariably deviate from the concept of consumption of fixed capital employed in the SNA.

…

3.155 **Stocks of financial assets and liabilities should be valued as if they were acquired in market transactions on the balance sheet reporting date. Many financial assets are traded in markets on a regular basis and therefore can be valued by directly using the price quotations from these markets.** If the financial markets are closed on the balance sheet date, the market prices that should be used in the valuation are those that prevailed on the closest preceding date when the markets were open. Debt securities have a current market value as well as a nominal value, and for some purposes supplementary data on the nominal values of positions of debt securities may be useful.

3.156 **Valuation according to market-value equivalent is needed for valuing financial assets and liabilities that are not traded in financial markets or are traded only infrequently. For these assets and liabilities, it will be necessary to estimate fair values that, in effect, approximate market prices. The present value of future cash flows can also be used as an approximation to market prices, provided an appropriate discount rate can be used.**

3.157 **Market values, fair values, and nominal values should be distinguished from such notions as amortized values, face values, book values, and historic cost.**
a. **Fair value is a market-equivalent value.** It is defined as the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arm's length transaction. It thus represents an estimate of what could be obtained if the creditor had sold the financial claim.
b. **Nominal value refers to the amount the debtor owes to the creditor, which comprises the outstanding principal amount including any accrued interest.**
c. **Amortized value** reflects the amount at which the financial asset or liability was measured at initial recognition minus the principal repayments. Excess payments over the scheduled principal repayments reduce the amortized value whereas payments that are less than the scheduled principal repayments or scheduled interest increase the amortized value. On each scheduled date, amortized value is the same as nominal value, but it may differ from the nominal value on other dates due to the accrued interest being included in the nominal value.
d. **Face value is the undiscounted amount of principal to be repaid.**
e. **Book value in business accounts generally refers to the value recorded in the enterprise's records. Book values may have different meanings because their values are influenced by timing of acquisition, company takeovers, frequency of revaluations, and tax and other regulations.**
f. **Historic cost, in its strict sense, reflects the cost at the time of acquisition**, but sometimes it may also reflect occasional revaluations.

3.158 **The valuation of financial assets and liabilities in data reported by enterprises or other respondents may be based on commercial, supervisory, tax, or other accounting standards that do not fully reflect the market prices of the assets and liabilities. In such cases, the data should be adjusted to reflect, as closely as possible, the market value of the financial assets and liabilities.** (More information on valuation rules can be found in External Debt Statistics: Guide for Compilers and Users (Bank for International Settlements, the Commonwealth Secretariat, Eurostat, International Monetary Fund, Organisation for Economic Co-operation and Development, the Paris Club Secretariat, the United Nations Conference on Trade and Development and World Bank (2003)), known as the External Debt Guide.)

…

Services of owner-occupied dwellings

6.117 Households that own the dwellings they occupy are formally treated as owners of unincorporated enterprises that produce housing services consumed by those same households. **When well-organized markets for rented housing exist, the output of own-account housing services can be valued using the prices of the same kinds of services sold on the market in line with the general valuation rules adopted for goods or services produced on own account.** In other words, the output of the housing services produced by owner occupiers is valued at the estimated rental that a tenant would pay for the same accommodation, taking into account factors such as location, neighbourhood amenities, etc. as well as the size and quality of the dwelling itself. The same figure is recorded under household final consumption expenditures. In many instances, no well-organized markets exist and other means of estimating the value of housing services must be developed.

…

Valuation of output for own final use

6.124 **Output for own final use should be valued at the basic prices at which the goods and services could be sold if offered for sale on the market.** In order to value them in this way, goods or services of the same kind must actually be bought and sold in sufficient quantities on the market to enable reliable market prices to be calculated for use for valuation purposes. The expression "on the market" means the price that would prevail between a willing buyer and willing seller at the time and place that the goods and services are produced. In the case of agricultural produce, for example, this does not necessarily equate to the prices in the local market where transportation costs and possibly wholesale margins may be included. The nearest equivalent price is likely to be the so-called "farm-gate" price; that is, the price that the grower could receive by selling the produce to a purchaser who comes to the farm to collect the produce.

6.125 **When reliable market prices cannot be obtained, a second best procedure must be used in which the value of the output of the goods or services produced for own final use is deemed to be equal to the sum of their costs of production**: that is, as the sum of:
a. Intermediate consumption;
b. Compensation of employees;
c. Consumption of fixed capital;
d. A net return to fixed capital;
e. Other taxes (less subsidies) on production.
By convention, no net return to capital is included when own-account production is undertaken by non-market producers.

6.126 For unincorporated enterprises, it may not be possible to estimate compensation of employees, consumption of fixed capital and a return to capital separately in which case an estimate of mixed income, covering all these items, should be made.

6.127 It will usually be necessary to value the output of own-account construction on the basis of costs as it is likely to be difficult to make a direct valuation of an individual and specific construction project that is not offered for sale. When the construction is undertaken for itself by an enterprise, the requisite information on costs may be easily ascertained, but not in the case of the construction of dwellings by households or communal construction for the benefit of the community undertaken by informal associations or groups of households. Most of the inputs into communal construction projects, including labour inputs, are likely to be provided free so that even the valuation of the inputs may pose problems. As unpaid labour may account for a large part of the inputs, it is important to make some estimate of its value using wage rates paid for similar kinds of work on local labour markets. While it may be difficult to find an appropriate rate, it is likely to be less difficult than trying to make a direct valuation of a specific construction project itself. The fact that an imputation is made for the value of labour input is a means to approximate the market price for the construction. It does not imply that these labour costs should also be treated as compensation of employees. As explained in chapter 7, when labour is provided on a voluntary basis to a producer unit other than the labourer's own household, no imputation for compensation of employees is made. If labour is provided for a nominal payment, only the nominal payment is recorded as compensation of employees. The other labour costs are treated as mixed income.

Non-market output

6.128 Non-market output consists of goods and individual or collective services produced by non-profit institutions serving households (NPISHs) or government that are supplied free, or at prices that are not economically significant, to other institutional units or the community as a whole. Although this output

is shown as being acquired by government and NPISHs in the use of income account, it should not be confused with production for own use. The expenditure is made by government and by NPISHs but the use of individual goods and services is by households, and the use of collective services by households or other resident institutional units. Thus non-market output should never be confused with output for own use where the producer unit not only has imputed expenditure on the output but also actually uses the output. Chapter 9 discusses the difference between expenditure and use in more detail.

6.129 As explained above, government units or NPISHs may engage in non-market production because of market failure or as a matter of deliberate economic or social policy. Such output is recorded at the time it is produced, which is also the time of delivery in the case of non-market services. **In general, however, it cannot be valued in the same way as goods or services produced for own final consumption or own capital formation that are also produced in large quantities for sale on the market. There are no markets for collective services such as public administration and defence, but even in the case of non-market education, health or other services provided to individual households, suitable prices may not be available.** It is not uncommon for similar kinds of services to be produced on a market basis and sold alongside the non-market services but there are usually important differences between the types and quality of services provided. In most cases it is not possible to find enough market services that are sufficiently similar to the corresponding non-market services to enable their prices to be used to value the latter, especially when the non-market services are produced in very large quantities.

6.130 **The value of the non-market output provided without charge to households is estimated as the sum of costs of production**, as follows:
a. Intermediate consumption;
b. Compensation of employees;
c. Consumption of fixed capital;
d. Other taxes (less subsidies) on production.

6.131 **If the output is made available at nominal cost, the prices are not economically significant prices and may reflect neither relative production costs nor relative consumer preferences. They therefore do not provide a suitable basis for valuing the outputs of the goods or services concerned.** The non-market output of goods or services sold at these prices is valued in the same way as goods or services provided free, that is, by their costs of production. Part of this output is purchased by households, the remainder constituting final consumption expenditures by government units or NPISHs.

6.132 Government units and NPISHs may be engaged in both market and non-market production. Whenever possible, separate establishments should be distinguished for these two types of activities, but this may not always be feasible. Thus, a non-market establishment may have some receipts from sales of market output produced by a secondary activity: for example, sales of reproductions by a non-market museum. However, even though a non-market establishment may have sales receipts, its total output covering both its market and its non-market output is still valued by the production costs. The value of its market output is given by its receipts from sales of market products, the value of its non-market output being obtained residually as the difference between the values of its total output and its market output. The value of receipts from the sale of non-market goods or services at prices that are not economically significant remains as part of the value of its non-market output.

…

10.197 **Goodwill cannot be separately identified and sold to another party. The value has to be derived by deducting from the sale value of the corporation the value of assets and liabilities classified elsewhere within the asset boundary of the SNA.** (In practice, since it is estimated as a

residual, an estimate of goodwill will also reflect errors and omissions in the valuation of other assets and liabilities.)

…

10.199 The value of goodwill and marketing assets is defined as the difference between the value paid for an enterprise as a going concern and the sum of its assets less the sum of its liabilities, each item of which has been separately identified and valued. Although goodwill is likely to be present in most corporations, for reasons of reliability of measurement it is only recorded in the SNA when its value is evidenced by a market transaction, usually the sale of the whole corporation. Exceptionally, identified marketing assets may be sold individually and separately from the whole corporation in which case their sale should also be recorded under this item.

…

13.16 **For the balance sheets to be consistent with the accumulation accounts of the SNA, every item in the balance sheet should be valued as if it were being acquired on the date to which the balance sheet relates. This implies that when they are exchanged on a market, assets and liabilities are to be valued using a set of prices that are current on the date to which the balance sheet relates and that refer to specific assets. In the case of non-financial assets, other than land, the value includes any associated costs of ownership transfer. Financial claims that are not traded on organized financial markets are valued at the amount the debtor must pay to the creditor to extinguish the claim.**

13.17 **The prices at which assets may be bought or sold on markets are the basis of decisions by investors, producers, consumers and other economic agents.** For example, investors in financial assets (such as securities) and natural resources (such as land) make decisions in respect of acquisitions and disposals of these assets in the light of their values in the market. Producers make decisions about how much of a particular commodity to produce and about where to sell their output by reference to prices on markets. For a given asset, there is a clear relationship between the price paid by the purchaser and the price received by the seller. For non-financial assets other than land, the price paid by the purchaser exceeds that received by the seller by the costs of ownership transfer. In the case of financial assets, the value is the same for creditor and debtor because the costs of transferring financial assets and liabilities are treated as consumption rather than accumulation.

13.18 **Ideally, observable market prices should be used to value all assets and liabilities in a balance sheet. However, in estimating the current market price for balance sheet valuation, a price averaged over all transactions in a market can be used if the market is one on which the items in question are regularly, actively and freely traded. When there are no observable prices because the items in question have not been purchased or sold on the market in the recent past, an attempt has to be made to estimate what the prices would be were the assets to be acquired on the market on the date to which the balance sheet relates.**

13.19 **In addition to values observed in markets or estimated from observed prices, values may be approximated for balance sheet valuation in two other ways.** In some cases, values may be approximated by **accumulating and revaluing acquisitions less disposals of the type of asset in question over its lifetime and adjusted for changes such as consumption of fixed capital**; this generally is the most practical and also the preferred method for fixed assets, but it can be applied to other assets as well. In other cases, values may be approximated by the **present, or discounted, value of future economic benefits expected from a given asset**; this is the case for a number of financial assets, natural resources and even for fixed assets. With good information and efficient markets, the values of the assets obtained by accumulating and revaluing transactions should equal, or at least approximate, both the present, or discounted, value of the remaining future benefits to be derived

from them and their market values when active second-hand markets exist. These three price bases are discussed below in general terms.

13.20 **The ideal source of price observations for valuing balance sheet items is a market, like the stock exchange, in which each asset traded is completely homogeneous, is often traded in considerable volume and has its market price listed at regular intervals.** Such markets yield data on prices that can be multiplied by indicators of quantity in order to compute the total market value of different classes of assets held by sectors and of different classes of their liabilities. **These prices are available for nearly all financial claims, existing transportation equipment, crops, and livestock as well as for newly produced fixed assets and inventories.**

13.21 For securities quoted on a stock exchange, for example, it is feasible to gather the prices of individual assets and of broad classes of assets and, in addition, to determine the global valuation of all the existing securities of a given type. In some countries, **another example of a market in which assets may be traded in sufficient numbers to provide useful price information is the market for existing dwellings.**

13.22 **In addition to providing direct observations on the prices of assets actually traded there, information from such markets may also be used to price similar assets that are not traded. For example, information from the stock exchange also may be used to price unlisted shares by analogy with similar, listed shares, making some allowance for the inferior marketability of the unlisted shares. Similarly, appraisals of assets for insurance or other purposes generally are based on observed prices for items that are close substitutes, although not identical, and this approach can be used for balance sheet valuation.** For a discussion of the special valuation problems associated with direct investment enterprises, see chapters 21 and 26.

13.23 **Most non-financial assets change in value year by year reflecting changes in market prices. At the same time, initial acquisition costs are reduced by consumption of fixed capital (in the case of fixed assets) or other forms of depreciation over the asset's expected life. The value of such an asset at a given point in its life is given by the current acquisition price of an equivalent new asset less the accumulated depreciation. This valuation is sometimes referred to as the "written-down replacement cost". When reliable, directly observed prices for used assets are not available, this procedure gives a reasonable approximation of what the market price would be were the asset to be offered for sale.**

13.24 **In the case of assets for which the returns either are delayed (as with forests) or are spread over a lengthy period (as with subsoil assets), although market prices are used to value the ultimate output, a rate of discount must, in addition, be used to compute the present value of the expected future returns.**

…

13.27 **In principle, fixed assets should be valued at the prices prevailing in the market for assets in the same condition as regards technical specifications and age. In practice, this sort of information is not available in the detail required and recourse must be had to valuation by another method, most commonly the value derived by adding the revaluation element that applied to the asset during the period covered by the balance sheet to the opening balance sheet value (or the time since acquisition for newly acquired assets) and deducting the consumption of fixed capital estimated for the period as well as any other volume changes and the value of disposals**. In calculating the value of consumption of fixed capital, assumptions have to be made about the decline in price of the asset and even where full market information is not available, partial information should be used to check that the assumptions made are consistent with this.

13.28 Estimates of consumption of fixed capital must include the decline in value of the purchasers' costs of ownership transfer on acquisition and disposal associated with these assets. These are to be written off over the period the purchaser expects to own the asset. In many cases, this period may coincide with the expected life length of the asset but for some types of asset, particularly vehicles, the purchaser may intend to sell them after a certain period, for example, in order to acquire a newer model with a higher level of specification and lower maintenance costs. Installation costs should be treated in a similar manner. Where possible, the estimates of consumption of fixed capital should also allow for anticipated terminal costs such as decommissioning or rehabilitation. Further explanation of these adjustments can be found in chapters 10 and 19. More detail on the application of a perpetual inventory method (PIM) of estimating the value of capital stock of fixed assets can be found in Measuring Capital.

…

13.31 **Markets for existing automobiles, aircraft, and other transportation equipment may be sufficiently representative to yield useful price observations for valuation of these stocks or at least to use in conjunction with a set of PIM assumptions. In the case of existing industrial plant and equipment, however, observed prices on markets may not be suitable for determining values for use in the balance sheets**, either because many of the transactions involve assets that for some reason are not typical, or because they embody specialized characteristics, or because they are obsolete or because they are being disposed of under financial duress.

13.32 For balance sheet purposes, **livestock that continue to be used in production year after year should be valued on the basis of the current purchasers' prices for animals of the same age. Such information is less likely to be available for trees** (including shrubs) cultivated for products they yield year after year; in this case they should then be recorded at the current written-down value of the cumulated capital formation.

13.33 **Research and development expenditure carried out on contract is valued at the contract price. If carried out on own account, it is valued as cumulated costs. If it is carried out by a market producer, the costs include a return to capital.** Both valuations need to be increased for changes in prices and reduced because of consumption of fixed capital over the life of the asset.

13.34 Even though costs of ownership transfer on non-produced assets (other than land) are shown separately in the capital account, and treated as gross fixed capital formation, in the balance sheets these costs are incorporated in the value of the asset to which they relate even though the asset is non-produced. Thus there are no costs of ownership transfer shown separately in the balance sheets. The costs of ownership transfer on financial assets are treated as intermediate consumption when the assets are acquired by corporations or government, final consumption when the assets are acquired by households and exports of services when the assets are acquired by non-residents.

13.35 **Mineral exploration and evaluation should be valued either on the basis of the amounts paid under contracts awarded to other institutional units for the purpose or on the basis of the costs incurred for exploration undertaken on own account. These costs should include a return to the fixed capital used in the exploration activity.** That part of exploration undertaken in the past that has not yet been fully written off should be revalued at the prices and costs of the current period.

13.36 **Originals of intellectual property products, such as computer software and entertainment, literary or artistic originals should be entered at the written down value of their initial cost, revalued to the prices of the current period. Since these products will have often been produced on own account, the initial cost may be estimated by the sum of costs incurred including a return to capital**

on the fixed assets used in production. If value cannot be established in this way, it may be appropriate to estimate the present value of future returns arising from the use of the original in production.

13.37 Subsequent copies may appear as assets (i) if the original owner has subcontracted the duties of reproducing and providing support to users of the copies, or (ii) if a copy is being used under a contract that is effectively a financial lease. In these cases, market prices should be available to use for valuation.

13.38 **Inventories should be valued at the prices prevailing on the date to which the balance sheet relates, and not at the prices at which the products were valued when they entered inventory.** In the balance sheets, figures for inventories frequently have to be estimated by adjusting figures of book values of inventories in business accounts, as described in chapter 6.

13.39 As is the case elsewhere in the SNA, inventories of materials and supplies are valued at purchasers' prices, and inventories of finished goods and work-in-progress are valued at basic prices. Inventories of goods intended for resale without further processing by wholesalers and retailers are valued at prices paid for them, excluding any transportation costs that have been separately invoiced to the wholesalers or retailers and included in their intermediate consumption.

13.40 **For inventories of work-in-progress, the value for the closing balance sheet should be consistent with the value of the opening balance sheet, plus any work put in place during the current period, less any work completed and reclassified as finished goods. In addition, an allowance for any necessary revaluation for changes in prices in the period must be included.** As explained in chapter 6 and chapter 19, the time series of the value of work in progress put in place over a period of time should reflect the increase in value of work put in place earlier as the delivery date approaches.

13.41 **Standing single-use crops (including timber) cultivated by human activity and livestock being raised for slaughter are also counted as inventories in work-in-progress. The conventional way of valuing standing timber is to discount the future proceeds of selling the timber at current prices after deducting the expenses of bringing the timber to maturity, felling, etc.** For the most part, other crops and livestock can be valued by reference to the prices of such products on markets.[11]

13.42 **Given their primary role as stores of value, it is especially important to value works of art, antiques, jewellery, precious stones and metals at current prices. To the extent that well-organized markets exist for these items, they should be valued at the actual or estimated prices that would be paid for them to the owner were they sold on the market**, excluding any agents' fees or commissions payable by the seller, on the date to which the balance sheet relates. On acquisition they are valued at the price paid by the purchaser including any agents' fees or commissions.

13.43 **An approach in the absence of organized markets is to value these items using data on the values at which they are insured against fire, theft, etc., to the extent information is available.**

13.44 In principle, the **value of land** to be shown under natural resources in the balance sheet **is the value of land excluding the value of improvements, which is shown separately under fixed assets, and excluding the value of buildings on the land which is also to be shown separately under fixed assets. Land is valued at its current price paid by a new owner, excluding the costs of ownership transfer** which are treated, by convention, as gross fixed capital formation and part of land improvements and are subject to consumption of fixed capital.

[11] The phrasing of this paragraph has led to considerable confusion and ambiguity; see the Guidance Note WS.8 on" Accounting for biological resources".

13.45 Because the current market value of land can vary considerably according to its location and the uses for which it is suitable or sanctioned, it is essential to identify the location and use of a specific piece or tract of land and to price it accordingly.

13.46 **For land underlying buildings, the market will, in some instances, furnish data directly on the value of the land. More typically, however, such data are not available and a more usual method is to calculate ratios of the value of the site to the value of the structure from valuation appraisals and to deduce the value of land from the replacement cost of the buildings or from the value on the market of the combined land and buildings.** When the value of land cannot be separated from the building, structure, or plantation, vineyard, etc. above it, the composite asset should be classified in the category representing the greater part of its value. Similarly, if the value of the land improvements (which include site clearance, preparation for the erection of buildings or planting of crops and costs of ownership transfer) cannot be separated from the value of land in its natural state, the value of the land may be allocated to one category or the other depending on which is assumed to represent the greater part of the value.

…

13.49 **The value of subsoil mineral and energy resources is usually determined by the present value of the expected net returns resulting from the commercial exploitation of those resources, although such valuations are subject to uncertainty and revision. As the ownership of mineral and energy resources does not change frequently on markets, it may be difficult to obtain appropriate prices that can be used for valuation purposes. In practice, it may be necessary to use the valuations that the owners of the assets place on them in their own accounts.**

13.50 It is frequently the case that the enterprise extracting a resource is different from the owner of the resource. In many countries, for example, oil resources are the property of the state. However, it is the extractor who determines how fast the resource will be depleted and since the resource is not renewable on a human time-scale, it appears as if there has been a change of economic ownership to the extractor even if this is not the legal position. Nor is it necessarily the case that the extractor will have the right to extract until the resource is exhausted. **Because there is no wholly satisfactory way in which to show the value of the asset split between the legal owner and the extractor, the whole of the resource is shown on the balance sheet of the legal owner and the payments by the extractor to the owner shown as rent.** (This is therefore an extension of the concept of a resource rent applied in this case to a depletable asset.)

13.51 **Non-cultivated biological resources, water and other natural resources are included in the balance sheet to the extent that they have been recognized as having economic value that is not included in the value of the associated land. As observed prices are not likely to be available, they are usually valued by the present value of the future returns expected from them.**

13.52 **Contracts, leases and licences may be marketable operating leases, licences to use natural resources, permits to undertake specific activities and entitlement to future goods and services on an exclusive basis.** As explained in part 5 of chapter 17, **these sorts of contracts are regarded as assets only if the existence of the legal agreement confers benefits on the holder in excess of the price paid to the lessor, owner of the natural resource or permit issuer and the holder can realize these benefits legally and practically.** It is recommended that such assets be recorded only when the value of the asset is significant and is realized, in which case a suitable market price necessarily exists. The asset does not exist beyond the length of the contract agreement and its value must be reduced accordingly as the remaining contract period shortens.

13.53 **The balance sheet entry for goodwill and marketing assets is the written-down value of the entry that appears in the financial account when an enterprise is taken over or when a marketing asset is sold. These entries are not revalued.**

13.54 In line with the general valuation principles described above, **whenever financial assets and liabilities are regularly traded on organized financial markets, they should be valued at current prices. Financial claims that are not traded on organized financial markets should be valued by the amount that a debtor must pay to the creditor to extinguish the claim. Financial claims should be assigned the same value in the balance sheets whether they appear as assets or liabilities.** The prices should exclude service charges, fees, commissions and similar payments **for** services provided in carrying out the transactions. There is more detailed discussion on the definition of financial assets and their recording in chapter 11 and part 4 of chapter 17.

13.55 **Monetary gold is to be valued at the price established in organized markets or in bilateral arrangements between central banks.**

13.56 **The value of the SDR is determined daily by the IMF on the basis of a basket of currencies.** Rates against domestic currencies are obtainable from the prices in foreign exchange markets; both the basket and the weights are revised from time to time.

13.57 **For currency, the valuation is the nominal or face value of the currency. For deposits, the values to be recorded in the balance sheets of both creditors and debtors are the amounts of principal that the debtors are contractually obliged to repay the creditors under the terms of the deposits when the deposits are liquidated. The amount of principal outstanding includes any interest and service charge due but not paid.** Currency and deposits in foreign currency are converted to domestic currency at the mid-point of the bid and offer spot exchange rates prevailing on the date of the balance sheet. Repayable margin payments in cash related to financial derivatives contracts are included in other deposits.

13.58 **Short-term securities, and the corresponding liabilities, are to be valued at their current market values.** Such a valuation is particularly important under conditions of high inflation or high nominal interest rates.

13.59 **Long-term securities should always be valued at their current prices on markets, whether they are bonds on which regular payments of interest are paid or deep-discounted or zero-coupon bonds on which little or no interest is paid.** The price should always be that including accrued interest (the so-called "dirty" price). Although the nominal liability of the issuer of a long-term security may be fixed in money terms, the market prices at which fixed interest securities are traded may vary considerably in response to variations in general market rates of interest. **As the issuer of a long-term security usually has the opportunity to refinance the debt by repurchasing the security on the market, valuation at market prices is generally appropriate for both issuers and holders of long-term securities, especially financial transactors who actively manage their assets or liabilities.**

13.60 An index-linked debt security is also valued at its market price in the balance sheet whatever the nature of the index to which the security is linked.

13.61 If both the principal and coupons of a debt instrument are indexed to a foreign currency, the security should be treated as if it is denominated in that foreign currency with conversion to domestic currency at the mid-point of the rates prevailing on the date of the balance sheet.

13.62 **The values of loans to be recorded in the balance sheets of both creditors and debtors are the amounts of principal outstanding. This amount should include any interest that has been earned but**

not been paid. It should also include any amount of indirectly measured service charge (the difference between bank interest and SNA interest) due on the loan that has accrued and not been paid. In some instances, accrued interest may be shown under accounts receivable or payable but inclusion in loans is to be preferred if possible.

13.63 The value of a loan does not reflect the consequences of any interest payments due after the date of the balance sheet, even if these were specified in the original loan agreement.

13.64 **If there is evidence of a secondary market for a loan, and frequent market quotations are available, the loan is reclassified as a security.** A loan that is traded once only and for which there is no evidence of a continuing market is not reclassified but continues to be treated as a loan. The valuation rules for debt securities and loans then apply.

13.65 Loans where the principal is index-linked, or both principal and interest are indexed to a foreign currency, should be treated in the manner described above for debt securities with these characteristics.

13.66 **Despite the fact that loans are to be recorded in the balance sheets at nominal values, certain loans that have not been serviced for some time should be identified and memorandum items concerning them should be included in the balance sheet of the creditor. These loans are termed non-performing loans.** A common definition of such a loan is as follows. A loan is non-performing when payments of interest or principal are past due by 90 days or more, or interest payments equal to 90 days or more have been capitalized, refinanced, or delayed by agreement, or payments are less than 90 days overdue, but there are other good reasons (such as a debtor filing for bankruptcy) to doubt that payments will be made in full. This definition of a non-performing loan is to be interpreted flexibly, taking into account national conventions on when a loan is deemed to be non-performing. Once a loan is classified as non-performing, it (or any replacement loans) should remain classified as such until payments are received or the principal is written off on this or subsequent loans that replace the original.

13.67 **Two memorandum items are recommended relating to non-performing loans. The first is the nominal value of the loans so designated, including any accrued interest and service charge. The second is the market equivalent value of these loans. The closest approximation to market equivalent value is fair value, which is "the value that approximates the value that would arise from a market transaction between two parties".** Fair value can be established using transactions in comparable instruments, or using the discounted present value of cash flows, or may sometimes be available from the balance sheets of the creditor. In the absence of fair value data, the memorandum item will have to use a second best approach and show nominal value less expected loan losses.

…

13.69 **Listed shares are regularly traded on stock exchanges or other organized financial markets. They should be valued in the balance sheets at their current prices.**

13.70 For unlisted shares, there may be no observable market prices for positions in equity not listed on a stock exchange. This situation often arises for direct investment enterprises, private equity, equity in unlisted and delisted companies, listed but illiquid companies, joint ventures, and unincorporated enterprises.

13.71 **When actual market values are not available, an estimate is required. Alternative methods of approximating market value of shareholders' equity in a direct investment enterprise follow. These**

are not ranked according to preference, and each would need to be assessed according to the circumstances and the plausibility of results.

a. **Recent transaction price.** Unlisted instruments may trade from time to time, and recent prices, within the past year, at which they were traded may be used. Recent prices are a good indicator of current market values to the extent that conditions are unchanged. This method can be used as long as there has been no material change in the corporation's position since the transaction date. Recent transaction prices become increasingly misleading as time passes and conditions change.

b. **Net asset value.** Appraisals of untraded equity may be conducted by knowledgeable management or directors of the enterprise, or provided by independent auditors to obtain total assets at current value less total liabilities (excluding equity) at market value. Valuations should be recent (within the past year).

c. **Present value/price to earnings ratios.** The present value of unlisted equity can be estimated by discounting the forecast future profits. At its simplest, this method can be approximated by applying a market or industry price-to-earnings ratio to the (smoothed) recent past earnings of the unlisted enterprise to calculate a price. This method is most appropriate where there is a paucity of balance sheet information but earnings data are more readily available.

d. **Book values reported by enterprises with macro-level adjustments by the statistical compiler.** For untraded equity, information on "own funds at book value" can be collected from enterprises, then adjusted with ratios based on suitable price indicators, such as prices of listed shares to book value in the same economy with similar operations. Alternately, assets that enterprises carry at cost (such as land, plant, equipment, and inventories) can be revalued to current period prices using suitable asset price indices.

e. **Own funds at book value.** This method for valuing equity uses the value of the enterprise recorded in the books of the direct investment enterprise, as the sum of (i) paid-up capital (excluding any shares on issue that the enterprise holds in itself and including share premium accounts); (ii) all types of reserves identified as equity in the enterprise's balance sheet (including investment grants when accounting guidelines consider them company reserves); (iii) cumulated reinvested earnings; and (iv) holding gains or losses included in own funds in the accounts, whether as revaluation reserves or profits or losses. The more frequent the revaluation of assets and liabilities, the closer the approximation to market values. Data that are not revalued for several years may be a poor reflection of market values.

f. **Apportioning global value.** The current market value of a global enterprise group can be based on the market price of its shares on the exchange on which its equity is traded, if it is a listed company. Where an appropriate indicator may be identified (for example, sales, net income, assets, or employment), the global value may be apportioned to each economy in which it has direct investment enterprises, on the basis of that indicator, by making the assumption that the ratio of net market value to sales, net income, assets, or employment is a constant throughout the transnational enterprise group. (Each indicator could yield significantly different results from the others.)[12]

13.72 **In cases where none of the above methods is feasible, less suitable data may need to be used. For example, cumulated flows or a previous balance sheet adjusted by subsequent flows may be the only sources available. Since these sources use the prices of previous periods, they should be adjusted for subsequent price developments, for example by using aggregate share price or asset price indices, and taking into account exchange rate movements, where relevant.** The use of unadjusted summing of past transactions is not a recommended practice. Equity represents owners' funds. The means through which equity can be generated may take various forms, such as share issues, equity injections without any commensurate issue of shares (sometimes called "contributed surplus" or "capital contributions"), share premiums, accumulated reinvested earnings, or revaluation. While these should be taken into account when cumulated flows need to be used as a starting point to

[12] Please note that Guidance Note D.2 on "Valuation of unlisted equity in direct investment" contains further guidance on the ordering and appropriateness of the valuation methods included in this paragraph.

measure the value of equity, the different categories are all components of equity and need not be identified separately in other cases.

13.73 **If the current market price is not directly observable, the decision about the method to adopt should take into account the availability of information as well as judgments as to which available method best approximates market values. Different methods may be suitable for different circumstances and a standard ranking of the alternative methods is not proposed for valuing instruments when current market prices are not directly observable.** Compilers should be transparent and should state clearly the method(s) used. Methods for valuation of direct investment equity positions are discussed in more detail in the OECD Benchmark Definition of Foreign Direct Investment, fourth edition (Organisation for Economic Cooperation and Development, 2008) referred to as the BD.

13.74 Other equity covers equity in any corporation or quasi-corporation that does not issue shares or units. Such corporations include public enterprises, the central bank, some special government units, partnerships, unlimited liability companies and quasi-corporations whenever they are institutional units without shares. **Other equity should be valued as equal to the value of the unit's assets less the value of its liabilities.**

13.75 **Shares (or units) in money market funds or in other investment funds should be valued in a manner similar to the proposals under equity. Listed shares should be valued using the market price of the share. Unlisted shares should be valued according to one of the methods described above for unlisted equity.**

13.76 The amount of the reserves for non-life insurance to be recorded in the balance sheet covers premiums paid but not earned at the date for which the balance sheet is drawn up plus the amount set aside to meet outstanding claims. This latter amount represents the present value of the amounts expected to be paid out in settlement of claims, including disputed claims, as well as allowances for claims for incidents which have taken place but have not yet been reported.

13.77 **The amount to be recorded under the stock values for life insurance and annuities entitlement is similar to that for non-life insurance technical reserves in that it represents reserves sufficient to meet all future claims. However, in the case of life insurance, the level of the reserves is considerable and represents the present value of all expected future claims.** In the commercial accounts of insurance corporations, some of these will be described as provisions for bonuses and rebates. These are the result of the insurance industry's practice of smoothing benefits over time and possibly retaining some benefits until the policy matures.

13.78 **The entitlements due under pension schemes comprise two elements; one when the formula determining the amount of the pension is agreed in advance (as under a defined benefit scheme) and one where the amount of the pension depends on the performance of financial assets acquired with the future pensioner's contributions (a defined contribution scheme). For the former, an actuarial estimation of the liabilities of the pension provider is used; for the latter the value is the market value of the financial assets held by the pension fund on behalf of the future beneficiaries.** The basis on which pension entitlement is calculated and the alternative means of representing these in the accounts of the SNA are described in detail in chapter 17.

13.79 **The value to be entered in the balance sheet for provisions for calls under standardized guarantees is the expected level of claims under current guarantees less any expected recoveries.** Strictly speaking, these amounts will represent a degree of double counting in the assets of the units benefiting from the guarantees. For example, if financial institutions make 1 000 loans of 20 each that are covered by guarantees and 10 are expected to default, the value of the loans made is still shown

as 20 000 and in addition the lenders have an asset of 200 in respect of the expected calls under the guarantee. However, the unit offering the guarantee has a liability of 200 with no matching asset so the net worth for the whole economy is not overstated.

13.80 The treatment of derivatives is discussed in chapter 11. **Financial derivatives should be included in the balance sheets at market value. If market value data are unavailable, other fair value methods to value derivatives, such as options models or present values, may be used.**

13.81 **Options should be valued in the balance sheets as either the current value of the option, if this is available, or the amount of the premium payable.** A liability should be entered in the sector of the writer of the option to represent either the current cost of buying out the rights of the option holder or the accrual of a holding gain. Depending on how margin systems operate, it may be appropriate to enter zero for the value of an option, as any profits (losses) will have been received (paid) daily by the holder. The counterpart of these asset entries should be entered as liabilities.

13.82 **A forward is recorded at market value.** When payments are effected, the value of the asset and associated liability is amortized and subsequently reflected in the balance sheet value on the appropriate accounting date. The market value of a forward contract can switch between an asset position and a liability position between accounting dates depending on price movements in the underlying item(s). All price changes, including those that result in such switches, are treated as revaluations.

13.83 **Employee stock options (ESOs) should be valued by reference to the fair value of the equity instruments granted.** The fair value of equity instruments should be measured at grant date using a market value of equivalent traded options (if available) or using an option pricing model (binomial or Black-Scholes) with suitable allowance for particular features of the options. The IASB gives detailed recommendations on how ESOs may be valued and their recommendations are likely to be followed by corporations using ESOs as a form of compensation for their employees. The value of the ESO alters between grant date and vesting date and then between the vesting date and exercise date as the value of the shares covered changes. Part 6 of chapter 17 covers ESOs in more detail.

13.84 **Trade credit and advances and other items due to be received or paid (such as taxes, dividends, rent, wages and salaries, and social contributions) should be valued for both creditors and debtors at the amount of principal the debtors are contractually obliged to pay the creditors when the obligation is extinguished.** Interest due on other accounts receivable or payable may be included here but, in general, interest due on debt securities is recorded as increasing the value of the asset concerned. Interest accruing on deposits and loans may have to follow national practices and be classified here if it is not incorporated into the principal of the relevant loan or deposit.

Annex 2. Guidance on valuation in SEEA Central Framework and SEEA Ecosystem Accounting

Introduction

This annex contains a concise overview of the most relevant paragraphs from the SEEA Central Framework and the SEEA Ecosystem Accounting, pertaining to valuation concepts, principles, and approaches. The paragraph numbers are indicated, with bolding provided by the authors.

In respect of SEEA Ecosystem Accounting, it should be noted that the guidance on valuation has not yet been endorsed as part of the relevant international standard. The main issues relate to the question whether or not the proposed valuation methodologies are consistent with the valuation principles of the SNA. In Section 5 of this paper, the various methodologies are, amongst others, evaluated on their conceptual soundness, in particular their consistency with the valuation principles of the SNA.

SEEA Central Framework

Asset boundary

1.47. **In monetary terms, the asset boundaries of the SEEA Central Framework and the SNA are the same.** Thus, only those assets—including natural resources and land—that have an economic value following the valuation principles of the SNA are included in the SEEA Central Framework.

1.48 **In physical terms, the asset boundary of the SEEA Central Framework is broader and includes all natural resources and areas of land of an economic territory that may provide resources and space for use in economic activity.** Thus, the scope in physical terms is not limited to those assets with economic value. It is recommended that those environmental assets that have no economic value be clearly distinguished.

2.105. In the Central Framework, **a monetary value is not placed on all of the benefits that may accrue** to current and future generations so as to provide what might be regarded as social valuations of environmental assets. The consideration of the value in monetary terms of a broader range of benefits from the environment is discussed in SEEA Experimental Ecosystem Accounts.

2.106. Since in physical terms, the **conceptual scope for each individual component is broad and is extended to include all of the resources that may provide benefits to humanity**, there may be some stocks recorded in physical terms that have a zero economic value. For example, all land within a country is within scope to allow for a full analysis of changes in land use and land cover, but in monetary terms some land may be considered to have zero value.

Valuation principles

1.51. The SEEA Central Framework **adopts the same market price valuation principles as the SNA**. However, since observable market prices are usually not available for environmental assets, the SEEA Central Framework provides an extensive discussion of the techniques that may be applied in the valuation of these assets. This is particularly relevant with respect to the description of the net present value approach to valuation and in the discussion of discount rates.

2.143. For accounts in monetary terms, the question of valuation is central. In the SEEA, as in the SNA, the **values reflected in the accounts are, in principle, the current transaction values or market prices** for the associated goods, services, labour or assets that are exchanged.

2.146. **When market prices are not observable, valuation according to market price equivalents** should be used to provide **an approximation to market prices**.

2.147. In the SEEA, **these valuation principles are applied slightly more broadly than in the SNA as the SEEA includes a wider range of intra-enterprise flows**, in particular own-account production used for intermediate consumption by market producers ... Since intra-enterprise flows are not sold on the market, no net return to fixed assets used in production is included in the derivation of the value of this output.

Depletion/degradation

1.53. In the SEEA Central Framework, **the value of depletion is considered to be a cost against income;** hence, in the sequence of economic accounts, the definition of depletion adjusted balancing items and aggregates entail deducting depletion from the measures of value added, income and saving.

5.69. **Depletion relates to the physical using up of natural resources through extraction.** In monetary terms, it represents the decline in future income that can be earned from a resource due to extraction.

5.76. **Depletion, in physical terms, is the decrease in the quantity of the stock of a natural resource over an accounting period that is due to the extraction of the natural resource by economic units occurring at a level greater than that of regeneration.**

5.80. Depletion can also be measured in monetary terms by **valuing the physical flows of depletion using the price of the natural resource in situ**. This step is explained in detail in annex A5.1. It is noted that the monetary value of depletion is equal to the change in the value of the natural resource that is due to physical depletion.

5.85. In principle, **depletion is recorded wherever the amount of extraction is greater than the sustainable yield** corresponding to the population size and structure.

5.90. **Degradation considers changes in the capacity of environmental assets to deliver a broad range of contributions known as ecosystem services (e.g., air filtration services from forests) and the extent to which this capacity may be reduced through the action of economic units, including households.** In this sense, since depletion relates to one type of ecosystem service, it can be considered **a specific form of degradation.**

Valuation methods

5.121. In practice, there are three main approaches to estimating resource rent: the residual value method, the appropriation method and the access price method.

5.122. The most commonly applied method is the *residual value method*.

5.126. The *appropriation method* estimates the resource rent using the actual payments made to owners of environmental assets. In many countries, governments are the legal owners of environmental assets on behalf of the country. As legal owners, governments could in theory collect the entire resource rent derived from extraction of the resources that they own. This amount would, in principle be equal to GOS less user costs of produced assets of the extractor, as defined.

5.127. The collection of resource rent is generally undertaken by governments through mechanisms such as fees, taxes and royalties. **In practice, the fees, taxes and royalties actually collected tend to understate total resource rent**, as the rates may be set with other priorities in mind, for example, encouraging investment and employment in extracting industries. These alternative motivations should be considered before use of the appropriation method.

5.128. The *access price method* is based on the fact that access to resources may be controlled through the purchase of licences and quotas, as is commonly observed in the forestry and fishing industries. When these resource access rights are freely traded, it is possible to estimate the value of the relevant environmental asset from the market prices of the rights ….

5.131. While, **in theory, all of these methods will generate the same estimates of resource rent**, it is the case that the **application of the appropriation and access price methods are more heavily influenced by institutional arrangements** in a country. **For these reasons, estimates of resource rent based on the residual value method should be compiled** and, where possible, reconciled with estimates obtained using the other methods. Indeed, there may be particular analytical interest in comparing the estimates of resource rent based on the different methods.

Discounting

5.147. To ensure a valuation that is aligned to the general concept of market prices, **it is recommended that a market-based discount rate should be used equal to the assumed rate of return on produced assets.**

SEEA Ecosystem Accounting

Value framing / scope

2.60. The **monetary values in ecosystem accounting are limited in scope to the range of ecosystem services that are included in a given ecosystem account** and the use of exchange values **does not provide a broader monetary value that incorporates the direct and indirect benefits received from ecosystems including their non-use values.** In this respect, monetary data from the ecosystem accounts, in line with the valuation basis used in the SNA, **do not provide a comprehensive monetary value of well-being associated with ecosystems.**

2.64. Overall, while **there is a primary focus on anthropocentric, instrumental values,** the data from a set of ecosystem accounts will also be relevant in supporting assessments based on other value perspectives.

SEEA EA Valuation principles

8.8. In ecosystem accounting, the **valuation concept that is applied is exchange values**. This is the same valuation concept applied in the SNA and hence is a concept that supports comparison and integration with national accounts estimates and a range of analytical and indicator applications as described above.

8.22. Chapter 2 described the general ecosystem accounting framing in which ecosystem services are supplied by ecosystem assets and where ecosystem assets are established as additional units in a wider accounting system, distinct from the standard economic units such as households and businesses. From a national accounting perspective, **flows of ecosystem services from ecosystem assets can be conceptualised in two ways**. First, **ecosystem assets** may be considered as complex, and interacting,

producing units that supply outputs of ecosystem services to various users – this reflects the societal benefit perspective described in Chapter 2. Alternatively, flows of ecosystem services may be considered **analogous to flows of capital services** supplied by produced and non-produced assets as described in 2008 SNA, Chapter 20 – this reflects the asset value perspective from Chapter 2. **These two perspectives are reconciled** for the purposes of monetary valuation **by treating the output of ecosystem assets as producing units as consisting solely of capital services**.

8.24. Analogously, in ecosystem accounting, **ecosystem services are distinguished from the benefits to which they contribute, and hence the focus of valuation is on the contribution of the ecosystem asset** (i.e., the input of ecosystem services) and not on the valuation of the benefits.

8.25. For each final ecosystem service, a single capital service flow can be envisaged between an ecosystem asset and an economic unit.

8.26. More significantly, it will be usual for a single ecosystem asset to supply a bundle of ecosystem services. [different from capital services in SNA]

8.27. It must be recognised that **ecosystem services lie outside the production boundary that defines the scope of measured GDP**.

8.28. **Two valuation contexts can be distinguished**. **First,** in some cases, **flows of ecosystem services are inputs to the production of goods and services within the production boundary of the SNA, i.e**., **SNA benefits**. In these cases, the values of ecosystem services are implicitly embodied within values of goods and services recorded in the national accounts. Examples include ecosystem services that contribute to agricultural output, such as biomass provisioning services and pollination by wild bees. Monetary valuation therefore involves partitioning the values of the goods and services recorded in the national accounts to reveal the ecosystem contribution.

8.29. **Second, in other cases, ecosystem services contribute to benefits received by economic units including households and governments that are not within the production boundary of the SNA, i.e., non-SNA benefits.** For example, air filtration services of forests contribute to cleaner air whose value is not included in national accounts measures of output. In this case, estimating the accounting entries based on exchange values requires (i) determining the prices that would be charged on behalf of the ecosystem asset for the ecosystem services if a market existed; (ii) estimating the costs to obtain an ecosystem service that would need to be incurred by an economic unit to secure the benefits; or (iii) assessing the loss of benefits to an economic unit that would be incurred if ecosystem services were to be lost.

Valuation methods (ecosystem services)

9.23. The general advice of the SNA (chapter 3) is that where directly observed market prices are not available, they may be estimated by prices from similar markets; from related markets or using costs of production. **Following a similar framing, it is recommended that valuation methods are applied in the following order**.

i. Methods where the price for the ecosystem service is directly observable;
ii. Methods where the price for the ecosystem service is obtained from markets for similar goods and services;
iii. Methods where the price for the ecosystem service is embodied in a market transaction;
iv. Methods where the price for the ecosystem services is based on revealed expenditures (costs) for related goods and services;
v. **Methods where the price for the ecosystem service is based on expected expenditures or markets.**

Valuation methods (ecosystem assets)

8.33. Ecosystem accounting also incorporates recording entries for ecosystem assets based on their exchange values, together with associated changes in the value of ecosystem assets over an accounting period. These changes include ecosystem enhancement, ecosystem degradation, ecosystem conversions and revaluations.

8.35. The approach adopted for ecosystem accounting is to value ecosystem assets using **a net present value approach**.

9.12. Generally, entries recorded in the monetary ecosystem services flow account should correspond directly to those recorded in the physical ecosystem services flow account.

Discounting

10.77. In this context, the following conceptual framing should be applied in selecting a discount rate:

- Individual, **market-based discount rates** should be applied in the valuation of ecosystem services whose users are **private economic units**;
- **Social discount rates should be applied in the valuation of ecosystem services that contribute to collective benefits**, i.e., received by groups of people or society generally.

10.78. The selection of a social discount rate for SEEA EA purposes should be **based on rates as specified in relevant government guidelines** and further, the rates should be in active use in government decision making. These rates are likely to embody some assumptions on preferences of individuals and societies. Where such rates are not available, compilers may consider using long-term government bond rates. It is not expected that all countries will use the same discount rate given variations in economic context and institutional arrangements. The consistent application of the conceptual framing outlined above will however support comparability across countries.

Considerations in assigning economic ownership

11.48. The **compilation of the ecosystem accounts in physical and monetary terms does not necessarily require a statement or assumption concerning the ownership of ecosystem assets**. This is important since it highlights that accounting for ecosystem assets, their services and their links to the economy can be undertaken from the perspective of ecosystems being distinct ecological entities. This neutrality with respect to ownership enables the set of ecosystem accounts to support a wide range of decision-making contexts.

11.61. When integrating ecosystem accounts with economic accounts, the allocation of ecosystem degradation and enhancement to economic units is required. For both degradation and enhancement, this allocation is directly related to the approach applied to assigning ownership as explained above. Thus, **ecosystem degradation and enhancement of an ecosystem asset is partitioned and recorded in the accounts of either the economic unit that receives the SNA benefits or the new ecosystem trustee in relation to contributions to non-SNA benefits.**

11.62. For integrated economic accounting in the SEEA, **a costs borne approach for recording ecosystem degradation is followed meaning that the cost of capital is attributed to the economic unit who is assigned ownership of the asset**. This is consistent with general accounting practice. An alternative is to allocate degradation on the basis of costs caused (polluter pays) by determining the appropriate “source”, i.e., the economic unit that has caused the degradation.

12.2. The alignment with SNA principles in the SEEA EA also implies that the **monetary values recorded in the ecosystem accounts reflect the current use of ecosystems**. Thus, they are **based the existing management regimes and institutional arrangements**, regardless of whether the associated patterns of use may be considered (un)sustainable or (in)efficient. However, in many contexts it is important to assess scenarios reflecting alternative management regimes or institutional arrangements for ecosystems. For example, it may be relevant to analyse how certain negative externalities (e.g., pollution) might best be internalized in the decisions of economic units. The monetary values of the ecosystem accounts supports, but does not incorporate, such alternative valuations.

Complementary tables

12.3. In this context, this chapter considers how the monetary ecosystem accounts presented in chapters 8 – 11 can be related to, and support, other approaches and applications in monetary terms. Section 12.2 describes a set of **complementary tables that can be obtained when taking a welfare-based approach to valuation**, and explains the links between these approaches and the ecosystem accounts. Section 12.3 describes **alternative measures of income, wealth and degradation that can be derived when making different assumptions regarding the attribution of costs or the institutional arrangements underlying valuation**. Section 12.4 describes linkages with corporate assessments of natural capital. Finally, annex 12.1 describes the conceptual connection between exchange and welfare values.

Annex 3. Guidance on valuation: special topics

Introduction

This annex provides an overview of the guidance on the valuation of certain transactions and assets, as included in a number of Guidance Notes which have been drafted in relation to the update of the 2008 SNA. Three topics concern valuation issues which are relevant for the "central framework" of national accounts. The other topics are part of the extended accounts, to improve the accounting for well-being and sustainability. Subsequently, the following topics are addressed, starting with the ones affecting the central framework:

- data;
- unlisted equity;
- mineral and energy resources;
- human capital; and
- unpaid household services.

Valuation of data

The topic of accounting for data, and its contribution to economic growth, has gained quite some importance in this age of digitalisation. As part of the research agenda for issues related to digitalisation, Guidance Note DZ.6 on the "Recording of data in the national accounts" has been drafted. The following shortly describes the valuation issues addressed in this Guidance Note.

Like most other assets in the SNA, the most obvious valuation method for measuring the value of data would be to collect prices from market transactions. However, it is well established that the majority of data used in production is constructed on an own account basis and is not actively traded on the market. Additionally, even if there was a functioning market for data from which values could be taken, the extraordinarily heterogeneous nature of data (even more so than other products in the economy) would mean it is extremely difficult to obtain prices that could appropriately be assigned to other data products.

Therefore, alternative valuation methods had to be considered. The SNA includes two options that may be of relevance in this respect, i.e., (i) applying the perpetual inventory method (PIM) on the basis of estimates of gross fixed capital formation, which are based on a sum-of-costs approach, or (ii) deriving the value on the basis of the net present value of future earnings that can be attributed to this new type of asset.

The first option is considered easier for statistical offices due to the similarity between the proposed measurement of data and other own account intellectual property products. However, two significant concerns arise with this approach. The first, which is generic to all assets measured this way, is the inability to measure any potential productivity improvement. In addition to being considered a significant driver of improved productivity for the production of other products over the past decade, the production of data itself has also become much more efficient over time. However, it will be hard to identify any productivity improvement for data when applying a sum-of-costs approach. The second concern, which is specific to the production of data, involves delineating exactly which costs to include in the sum-of-costs. The ability to produce valuable data is not solely due to the ability of a firm to "prepare" the data in an appropriate format but is also dependent on the ability of producers to access useful "observable phenomena" (OPs), preferably in an exclusive manner. To do this, producers must come up with creative and efficient ways to gain access to useful and timely OPs, which takes resources (i.e., costs) to plan and undertake. Arguably, all these costs, if contributing to the final data product, could be included in a sum-of-cost valuation. However, many of them are often undertaken for other

reasons, with the OPs being collected as a by-product. This raises the question which (parts of the) costs should be taken into account in measuring the value of the data asset.

The second option is based on potential future revenues that may be derived from the asset, which is used in some areas of the national accounts, for example when valuing natural resources. The NPV method would theoretically provide a more accurate measure of the value of data assets, as it would take into consideration their profitability, including the information embedded in the data (which may significantly differ across data sets). However, since data can have so many context-dependent uses (which may not all be known at the time of creation), including the possibility of the same data being used multiple times[13], it will be extremely challenging to obtain good quality data. Additionally, when applied for valuing natural resources, the stock of the resource, its use, the pattern of use, the price and the amount of time until the known stock may be depleted are broadly understood. In the case of data, with the industry still in its infancy, a lot of this information is unknown. Statistical offices are likely to encounter significant difficulties sourcing the required information from businesses and firms that produce these data products.[14]

For these reasons, the Digitalisation Task Team is considering the first option as the most viable one.

Valuation of unlisted equity

Paragraph 13.71 of the 2008 SNA provides six alternatives for valuing unlisted equity. As such a broad range of alternative options may lead to a lack of international comparability of the resulting estimates, and also to increasing risks of bilateral asymmetries in the recording of e.g. foreign direct investment, further guidance was requested for ranking and possibly restricting the number of options in the 2025 SNA. The results of this research has been included in Guidance Note D.2 on "Valuation of unlisted equity".

In the Guidance Note, the various methods for valuing unlisted equity are grouped together into the following three types: (i) valuation based on recent transactions; (ii) valuation based on accounting data of the corporation (e.g., net asset value, present value/price to earnings ratios, and own funds at book value (OFBV); and (iii) valuation based on the value of a comparable corporation or of a group of comparable corporations (e.g., market capitalization method). An overview with a short description of of the valuation methods is presented in Annex III of the Guidance Note.

Furthermore, the following criteria are considered important in the choice of the valuation model:

- Availability: The information needed from companies should be equally available to all macroeconomic compilers and can be easily provided by enterprises in a timely and consistent manner. It would be desirable that the methods be based on available information about a company rather than subjective assumptions. Even if the individual statistical agency could make such assumptions consistently, this is unlikely to hold across countries, which would hamper the comparability of such statistics internationally. On the other hand, such adjustments may provide better indicators of market value consistent with the valuation of assets and liabilities. Methods based on ratios need estimates and assumptions that play a fundamental role in the results obtained. Net asset value would require first-hand information about the companies. Recent transaction prices are not widely available, and, for apportioning global value, there is the

[13] For example, even time sensitive data which has moved past it relevancy might be reused as input to machine learning algorithm of some other need which simply requires data irrespective of the information embedded.

[14] Furthermore, if data asset values and the gross fixed capital formation undertaken to produce them were measured based on future earnings, the valuation could bring in additional unrelated external non-produced effects such as potential monopolistic network effects, rent seeking due to market power and contributions from other unknown capital. Alternatively, such a methodology would likely involve assumptions that, as pointed out by Reinsdorf and Ribarsky (2019), would be "unacceptable for national accounts purposes".

limitation that the information does not exist for most unlisted companies. Last, for private companies which are not listed, OFBV may not be readily available. Apart from limited over the counter (OTC) data, compilers will need to rely on surveys and administrative data to compile OFBV.

- Simplicity: Given the challenges with data availability for unlisted equity and taking into account countries' varied level of statistical developments, methods that incorporate modelling and estimation techniques could present problems of applicability and comparability at the international level. There seems to be a consensus that these methods better approximate the market value by being based on the behaviour of listed shares. In this sense, the ratios to be applied in the valuations must be calculated for companies with similar characteristics to those to be applied, and, so, breakdowns are made by sector or industry. Nevertheless, problems usually arise in applying these models in countries/sectors with few or no listed companies. This could also be tackled by a centralized estimation at the international level. In this sense, as the collection of data and the estimation of valuation models could be a very time-consuming process, it would be recommended that the work should be conducted by one specific international organization.
- Comparability: The methods used should in principle support analyses. In this sense, the consistency of the figures obtained by different economies is essential in an environment of increased globalization and growth in the activity of MNEs. Comparability was the argument used to make OFBV the recommended method in some cases. Nevertheless, as noted earlier, OFBV may limit bilateral asymmetries but is not sufficient for cross-country comparability, given the cross-country differences in accounting standards (IFRS vs GAAP vs nGAAP) and legal forms.
- Methodological soundness: The methods should produce reliable market value equivalents. In some cases, the absence of a benchmark with which to compare and validate the estimated values, could be a drawback for the choice of some methods. Methodological soundness of market value estimates is particularly relevant due to the links between External Sector Statistics and National Accounts via its rest-of-the-world account, and the requirement to limit horizontal and vertical discrepancies in the latter statistics.

A more detailed assessment of the various methods is provided in Annex IV and Annex VI of the Guidance Note. Annex IV includes a table with an overview of the advantages and disadvantages of the different valuation methods, while Annex VI contains a table with an assessment of the six methods according to selected criteria.

In the end, it was decided to put forward the following preferred valuation methods for unlisted equity: Own Funds at Book Value, transaction prices, and market capitalization. More generally, it is noted that the updated international standards should first explain the concept to be measured – namely, in the absence of market prices, own funds as the difference between assets and liabilities of unlisted corporations are measured at market prices – in line with the core principles of macro-economic statistics. It was also agreed that compilers make use of a decision tree to implement one of the three preferred methods (see Annex VII of the Guidance Note), and in the event that some countries may still not be able to do so, the decision tree would serve as a guiding principle to decide on another method as a fallback solution.

Valuation of mineral and energy resources

The main objective of Guidance Note WS.10 on "Valuation of mineral and energy resources is to provide more detailed guidance on the application of Net Present Value (NPV) of future resource rents for mineral and energy resources. The valuation method as such is not questioned. The following recommendations for additional guidance in the updated SNA are provided:

- To include further clarifications on the delineation of mineral and energy resources, by relying on the same three resource classes as in SEEA 2012 (i.e., "commercially recoverable resources",

"potentially commercially recoverable resources" and "non-commercial and other known deposits"). In the case that reliable information on their value exists, these three classes should be included in the national accounts, provided that separate estimates can be compiled for the different classes.

- To underline that the aim of the SNA (and the SEEA) is to compile market(-equivalent) values, not social values (e.g., consumer surplus/welfare based measures).
- To add clarifications on the calculation of net present values (NPVs) for (specific types of) mineral and energy resources, by explicitly referring to Chapter 5 in the SEEA-CF. This includes, amongst others, the recommendation (i) to use a constant rate of extraction or the most recent quantity of extraction as forecasts of future production; and (ii) to assume that the output price of the extracted resource follows a long-run historical trend.
- To explain that different types of mineral and energy resources may require slightly different NPV treatments, underlining the relevance of properly distinguishing different types, e.g., renewable from non-renewable resources.
- To explain that compilers should try to compile the value of mineral and energy deposits at a disaggregated level, ideally at the deposit level, and then sum the obtained values up to the national level.
- To emphasise specific compilation issues, i.e. (i) the sensitivity of results to the choice of the discount rate; (ii) heterogeneity of extraction costs across space; (iii) constraints imposed on mineral production at the micro level by initial investments in physical capital; and (iv) volatility in the value of mineral assets introduced by short-run price fluctuations of commodity prices.

Valuation of unpaid household services

In the context of better monitoring well-being and sustainability, as part of a broader framework of national accounts, guidance has been developed for the measurement of the production of household services for own final use, in Guidance Note WS.3 on "Unpaid household service work". Basically, two possible methods are distinguished: (i) the "input method", where the valuation is based on the inputs needed to produce the services, i.e. unpaid labour input, intermediate goods and services, and consumption of fixed capital; and (ii) the "output method", where the units of service produced and consumed are used as a starting point for the valuation[15]. In this respect, it is noted that both methods should ideally result in a valuation of output and value added for the unpaid household services which is equal. In practice however, valuations using the two methods will usually differ due to the strengths and weaknesses of the data sources for the two approaches.

In discussing the advantages and disadvantages of the two methods, one of the advantages of the second method is the comparability to the prices of equivalent market services. On the other hand, however, the output approach does not allow much insight into the distribution of unpaid household service work production among sub-populations. The sum-of-costs approach, by using results from time-use surveys to measure the labour input into the production of unpaid household services, makes further disaggregation much easier, not only into sub-populations of households, but also when it comes to the distribution of work within households and breakdowns into various types of unpaid household activities. Conversely though, it may be more expensive to acquire the data via a time use survey, and a time use survey may lack coverage of some kinds of passive or "on-call" type activity, where respondents do not record their activity but are still acting in a particular capacity (e.g., providing babysitting services, but only writing down the activities one is doing while babysitting). Non-response may also be a concern in truly capturing the total scale of unpaid household work in any given year, if those who are very busy do not respond to the survey.

[15] Using the terminology applied in this note on valuation, the first methodology is referred to as the sum-of-costs approach, while the second methodology is termed market-equivalent prices.

Overall, it may be considered that the input approach to valuation (using a time use survey) better enables understanding the household experience, and hence facilitates a well-being orientated analysis to be conducted following valuation. Alternatively, an output approach may provide estimates which are more consistent with the valuations of economic activity within the "core" SNA production boundary, and is therefore preferable (a) to measure transitions of activity across the production boundary (where market services take on what was previously produced by households and vice versa); and (b) where estimates of GDP are to be extended to create a time series of GDP estimates including unpaid household service work. Whatever the advantages and disadvantages of the various methodologies, use of both methods offers great potential for cross-checking and balancing of results.

The Guidance Note provides quite some detail on the application of the two methods. In the context of this note, one important consideration is quite important, i.e., which wage rates to use when measuring the labour input component in the sum-of costs method. Two basic methods are distinguished, leading to substantially different results:

- The replacement cost approach, where an average post-tax, hourly wage, representative of the relevant activities covered in the production of unpaid household services, is constructed.
- The opportunity costs approach, which takes the average hourly wage across the whole economy, thus trying to estimate the market income foregone as a result of spending time on unpaid household activities.

In evaluating both methods, it is noted that the opportunity cost approach is most relevant to individual's own consideration of how they should spend their time, because it informs decisions regarding utility maximization. As noted by Schreyer and Diewert (2014)[16]: "*We conclude that two elements condition the choice between an opportunity cost and a replacement-cost approach: In the general case of an unconstrained household, a first element enters the considerations: Is the purpose of valuing time spent on household production to capture full consumption (a welfare-related concept) or is the purpose more narrowly defined at capturing only the value of own account household production (not necessarily a welfare-related concept)? In the second case, the replacement cost method applies.*" In this respect, Abraham and Mackie (2005)[17] also emphasizes that opportunity costs implicitly incorporate consumer surplus, or willingness to pay, making them inconsistent with market prices. It is therefore concluded that, while opportunity cost measures are certainly useful for individual calculations (such as "Should I perform this work or hire someone else to do it for me?"), they are less relevant to national accounts.

Valuation of human capital

As in the case of unpaid household service work, guidance has also been developed on the measurement of human capital, in the context of a broader framework of accounts to monitor well-being and sustainability. The relevant guidance can be found in Guidance Note WS.4 on "Labour, human capital and education".

As often, two alternative methods for valuing human capital are being considered, either the "cost-based approach" or the "lifetime income approach". The cost-based approach uses the costs of generating human capital (e.g., expenditures on education) as a starting point, while the lifetime income approach tries to estimate the value of human capital by calculating the net present value of future earnings. For further details, reference is made to the UNECE Guide on Measuring Human Capital.

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[16] Schreyer, P. and Diewert, E. (2014). "Household production, leisure, and living standards", in Measuring Economic Sustainability and Progress, University of Chicago Press, pp. 89-114, www.nber.org/chapters/c12826.pdf.

[17] Abraham, K. and Mackie, C. (2005). Beyond the Market: Designing Nonmarket Accounts for the United States. Washington, D.C.: The National Academies Press.

The UNECE Guide states that, from a more theoretical point of view, the net present value estimate seems to be the most viable one, as it adds all future benefits that can be allocated to the relevant asset, thus replicating a market-equivalent valuation. Its measurement, however, requires quite a number of assumptions on the future development of the (active) population and the development in the level of economic benefits. It is also significantly affected by the discount rate that is applied. For that reason, a cost-based estimation is typically provided as an alternative method. According to this method, the investment costs for creating human capital are summed to obtain an estimate. These costs do not only relate to formal education, but also training and courses provided by the employer; time spent on learning and studying at home; and other expenditures on, for example, school books and other training material. However, one should be aware of the fact that this method also requires several assumptions, for example on the distinction between expenditures with a more current nature and expenditures which add to the capital stock of human capital. Also various assumptions are needed to measure and to value the unpaid activities. Furthermore, to arrive at a capital stock estimate, one needs to make additional assumptions on the service lives and depreciation patterns of the relevant assets.

Usually, the estimates from the lifetime income approach are (substantially) higher than the ones using the cost-based approach. Various reasons can cause this difference, obviously one of them being that not all future labour income can actually be attributed to human capital. Another reason may be that part of human capital is actually not produced, but for example genetically inherited. However, as the Guide goes on stating, from a purely conceptual point of view, one could argue that in a setting of perfect competition, the cost-based approach ought to end up with an estimate which is equal to a valuation estimated using the lifetime income approach. In the “production process” of human capital, the difference between the costs/inputs and the benefits/outputs could be attributed to an operating surplus/mixed income resulting from investing in education, be it formal or informal. However, this issue is not further elaborated.62

Further details on the methodologies, their challenges, and the practical problems encountered in applying these methods to actually estimate stocks of human capital can be found in Chapter 3 of the UNECE Guide.