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Guidance Note
AI.1 Valuation principles and methodologies[1]

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Guidance Note AI.1 Valuation principles and methodologies

Cover note on the way forward:

- The joint AEG/BOPCOM meeting scheduled for 27-29 March 2023 has a very full agenda focusing on the finalization of the research for the update of the 2008 SNA and BPM6. Therefore, it is proposed to restrict the discussion of the Guidance Note on valuation principles and methodologies at the joint AEG/BOPCOM meeting to those parts which are considered relevant for the update of the 2008 SNA and BPM6. This will thus exclude the section on ecosystem services and assets.
- If agreed by the AEG and BOPCOM, only the part relevant for the update of the 2008 SNA and BPM6 will be subject to a global consultation, following the above meeting. In addition to the comments and suggestions proposed by the AEG and BOPCOM, this would also require a slight modification of the Guidance Note, by excluding the part on ecosystem services and assets.
- Following the global consultation another meeting of the group on valuation will be organized, probably sometime in May – June. This meeting would then discuss the valuation methods for ecosystem services and assets in more detail, with the advantage of having a position on the valuation principles and methodologies in the SNA and BPM.
- It is then expected to submit a revised Guidance Note to the AEG meeting, scheduled for July 2023, to discuss the methodologies for valuing ecosystem services and assets. Depending on the outcome of the discussion at the AEG, the findings on these methods could then be put forward for global consultation.

1. Introduction

1 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. The debate circled around the introduction of some new techniques for valuing ecosystem services and assets (see Section 6 of this Guidance Note), and whether or not these techniques were consistent with the valuation principles applied 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.

2 As the case while drafting guidance for SEEA Ecosystem Accounting, one can notice that producers and users have differences in opinion when it comes to the interpretation of the guidance on valuation principles and methodologies, as provided in the 2008 SNA. One could also argue that the current guidance is relatively pragmatic in nature, without giving due consideration to a set of criteria for evaluating the appropriateness of valuation methodologies. Links to business and public sector accounting standards, often the primary source for compiling national accounts statistics, are also missing.

3 The main objective of this Guidance Note is to provide a more holistic view on the valuation of transactions and positions, including the main conceptual 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.

4 In respect of the above, it is important to state upfront that the objective of this Guidance Note is neither to overturn the conceptual starting points of the current guidance nor to introduce revolutionary new methodologies for valuing transactions and positions. The objective is first and foremost to bring all pieces together in an overall view, and using a predefined set of criteria, to arrive at a hierarchy of valuation methodologies from a conceptual and feasibility perspective.

5 In doing so, not only the current guidance in the 2008 SNA will be taken into account, but also relevant guidance in the Sixth Edition of the Balance of Payments Manual (BPM6), the Government Finance Statistics Manual and Compilation Guide (GFSMCG) 2014 and the Monetary and Financial Statistics Manual (MFSM) 2016 will be included in the analysis, certainly in cases where they provide additional clarifications. Moreover, recommendations on valuing transactions and positions, as included in Guidance Notes which have been endorsed by the Advisory Expert Group (AEG) on National Accounts and the IMF Balance of Payments Committee (BOPCOM), will be taken on board[2]. Finally, as crucial pieces of information are often derived from available data on corporations and government institutions, International Financial Reporting Standards (IFRS) and International Public Sector

[2] A multitude of Guidance Notes can be considered relevant, directly and indirectly, in the context of valuation: CM.4 on Gross and net measures; D.2 on Valuation of unlisted equity in direct investment; D.16 on Treatment of retained earnings; DZ.6 on Recording of data in the national accounts; F.8 on Valuation of debt securities at both market and nominal value; F.9 on Valuation of loans (fair value); F.13 Measurement of margins on buying and selling of financial instruments; F.15 on Debt concessionality, including the related issues note; G.2 on Treatment of MNE and intra-MNE flows; Guidance Note G.5 on Economic ownership of intellectual property products: recording of intra-MNE transactions 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.

Accounting Standards (IPSAS) also feed into this process of analysis, including the latest considerations around valuation within the IPSAS community.

6 The ordering of the discussion in this Guidance Note is as follows. Section 2 dwells upon the main principles for valuing transactions and positions, thereby not only looking at the conceptual starting points, but also making reference to the guidance provided by business and public sector accounting standards. The development of a set of criteria to evaluate the alignment of valuation methodologies to these principles is the topic of Section 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 in the current guidance of the 2008 SNA, including newly agreed recommendations, 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.

2. The general principles for valuing transactions and positions

The general principles for valuing transactions

7 When it comes to recording transactions, the following principles can be derived from paragraphs 3.118 and 3.119 of the 2008 SNA:

- First of all, *"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*".
- Secondly, transactions should be valued consistent with "*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*".
- Finally, the prices paid or the exchange values *"… 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".*

BPM6 uses (almost) similar wording to define the principles for recording transactions in the international accounts; see paragraph 3.68.

8 The 2008 SNA is slightly ambiguous when it comes to the main principles for valuing transactions. On the one hand, it refers, in paragraph 3.118, to exchange values, i.e., *"the value at which goods, services and assets are in fact exchanged or else could be exchanged for cash*". On the other hand, the 2008 SNA states that market prices, defined as the prices paid between two independent parties, i.e., a valuation of transactions at arm's length, can be considered as the best representation of the above principles. In this respect, paragraph 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*". Paragraph 3.67 of the BPM6 is fully consistent with this guidance. However, in defining the principles for valuing transactions, it nicely connects the notion of market prices with the notion of exchange values, as follows: "*Market prices refer to current exchange value, that is, the values at which goods and other assets, services, and labors are exchanged or else could be exchanged for cash. Market prices are the basis for valuation in the international accounts*".

9 When looking at these definitions for the valuation principles, one should realize that one may be confronted with some implicit circularity in describing the methods for valuing transactions, in the sense that, for example, (observed) exchange values or market(-equivalent) prices include more than an implicit reference to the valuation principles. Such circularity could be avoided by using observed exchange values or observed market prices in the cases that reference is made to valuation methods, instead of principles.

10 A final consideration concerns the issue that market prices may be interpreted slightly restrictive, in the sense of only referring to market transactions. An advantage of using exchange values, as defined in paragraph 3.118 of the 2008 SNA as well as paragraph 3.67 of BPM6, is that it refers to a broader set of transactions, by also adding "*or else could be exchanged for cash"*. All in all, it is recommended to use the definition from paragraph 3.67 of BPM6, when it comes to defining the valuation principles in international standards for macro-economic statistics. However, one may prefer to refer to this principle as "exchange values", in line wit the broader definition, and not to be considered as being equivalent to observed exchange values.

11 The concept of market prices, or exchange values, also provides a direct link to economic theory. 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. Annex 1 of this Guidance Note contains an excerpt from this annex. Perhaps the single most important take from this excerpt is that the SNA and BPM do not attempt to determine the utility of the flows (and positions). Instead, the international standards for macro-economic statistics first and foremost look at the exchange values, thus not including consumer surplus.

12 Importantly, 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) market prices and exchange values

13 In practice, observed exchange values, i.e., a valuation of exchanges in goods, services or assets according the market prices actually paid, are generally used to arrive at an appropriate valuation of transactions in line with the general principles. However, there may be certain exceptions. The 2008 SNA specifies two specific cases for which observed exchange values, or observed market prices, cannot be considered as appropriate reflections of the general valuation principles.

14 The first exception to the use of observed exchange values concerns distorted transfer pricing (see paragraph 3.131 – 3.133 of the 2008 SNA and paragraphs 3.76 – 3.77 of BPM6). 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, distorted transfer prices relate to prices which are not set in line with the arm's length principle (ALP) applied in business and public sector 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 (see Guidance Note G.2 on Treatment of MNE and intra-MNE flows; and Guidance Note G.5 on Economic ownership of intellectual property products: recording of intra-MNE transactions), it has been

concluded, at least implicitly, 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. As a consequence, macro-economic statisticians typically have to rely on an adequate pricing in business and public sector records. Further discussions with corporate accountants on their principles of valuation might prove to be very useful to better understand the data that statisticians are actually receiving from businesses and public sector entities.

15 Having said that, both the 2008 SNA and BPM6 contain guidance for adjusting transfer prices to prices reflecting market conditions, in cases that the amounts are substantial and relevant source data available, although it is also stated that this may an exercise calling for cautious and informed judgment. What further complicates such an exercise is the necessary concomitant adjustments to income and/or financial transactions (see, for example, paragraph 11.101 of BPM6), and perhaps even more critical, the need to arrive at an internationally consistent recording. All in all, it is recommended to add guidance in the updated versions of the 2008 SNA and BPM that from a conceptual point of view, adjustments should be made for cases of transfer prices, but that in practice it is almost impossible to include such adjustments, also in view of an internationally consistent way of recording.

16 The second exception to the use of observed exchange values mentioned in the 2008 SNA and BPM6 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 paragraph 3.134 of the 2008 SNA and paragraph 3.79 of BPM6). Examples may concern a variety of loans by governments, loans by employers to employees, loans between related households and loans between affiliated enterprises. The treatment of these loans, and the related interest flows, has been discussed in Guidance F.15 on Debt concessionality, and a subsequent issues note. At the Joint meeting of the 21st Meeting of the AEG on National Accounts and the 39th meeting of the BOPCOM, held on 19 – 20 October 2022 in Washington DC, it was concluded "… to never record a transfer element for concessional lending in the "central framework" of national accounts and external sector statistics, except for concessional loans provided by employers to employees. As a consequence, it was also agreed to remove the exception made for loans/deposits by central banks, as currently included in the 2008 SNA and GFSM[CG] 2014. The majority of members supported classifying the transfer element in the case of concessional loans provided by employers to employees as a sequence of current transfers in the "central framework." Furthermore, in line with the recommendations of the issues note, it was agreed that "supplementary items for the transfer element included in concessional lending are compiled for concessional loans provided in a non-market context, i.e., those provided by governments, central banks and international organizations". As noted in the conclusions of the meeting, for these supplementary items, the transfer element would be recorded "… as capital transfers at inception", which is preferred "… because the concessional element relates to an explicit policy decision to provide a lower interest rate at the start of the loan, or to change the conditions of relevant loans. Moreover, it is in line with the recommendations of the International Public Sector Accounting Standards (IPSAS)"

17 A case not explicitly addressed in the 2008 SNA concerns cross-subsidising, in which case higher prices are charged for certain products/consumers with the goal of subsidizing lower prices for other products/consumers. 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 paragraph 17.39, the example of an

insurance corporation 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.

Short summary on the valuation principles for transactions

18 Basically, there is a common understanding and general agreement on the main principles for valuing transactions, although one can observe some differences of opinion on how exactly to frame these principles. Whatever the case, the transactions should not represent utility, and thus not include consumer surplus. The transactions should represent prices established between willing buyers and sellers, at arm's length. Furthermore, the market structure under which the prices are established is considered irrelevant.[3] These principles are best represented by the notion of market prices, or exchange values. As quantities and prices are typically not collected separately, in practice transaction values are used to approximate the valuation principles. From a conceptual point of view, these observed exchange values are considered as an appropriate way of valuing transactions, with the exception of circumstances of transfer pricing and concessional pricing. However, as also (implicitly) pointed out in relevant Guidance Notes, it is considered almost impossible to make adequate adjustments to arrive at a better approximation of the relevant market prices or exchange values, although for some cases of concessional lending it is proposed to monitor the impact of such lending by way of supplementary items.

19 In the case of transactions for which observable exchange values are not available, market-equivalent prices should be used as a first preference. However, for quite a number of transactions, markets may not be well established, or markets simply don't exist. In the absence of market-equivalent prices, valuation methods need to applied which best approximate the above valuation principles. As stated in paragraph 2.59 of the 2008 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)". In Section 4, methods to approximate the valuation principles are discussed in more detail.

The general principles for valuing positions

20 The general rule or principle for valuing positions is provided in paragraph 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*". Paragraph 3.84 of BPM6 provides similar guidance for the valuation of positions of financial assets and liabilities. It is also by and large consistent with the valuation at "fair

[3] Please note that market structures should not be put on a par with market conditions. Market conditions may relate, for example, to the maturity of the markets or the number of transactions taking place. In the case of less mature markets or very thin markets, the resulting prices are to be used for valuing transactions, but these prices may not be considered as being representative, and thus less suitable for valuing transactions and positions on the basis of market-equivalent prices; see the subsection on the general principles for valuing positions.

value" in business accounting standards[4], which is defined in IFRS 13 on Fair value measurement as "… *the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date*".

21 It is important to make a distinction between the initial recognition of assets, and the subsequent valuation of assets. Regarding the initial recognition, i.e., the time at which the asset (or liability) enters the balance sheet, the valuation principles for valuing transactions are relevant, albeit that in the case of valuation for balance sheet purposes the treatment of costs related to the transfer of ownership may need further clarification.[5] As this is not the main topic of this Guidance Note, this topic is not addressed here in detail. Only to say that, in line with the current guidance, generally transfer of ownership costs are included in the initial value of non-financial assets, while in the case of financial assets such costs are generally excluded; see, for example, paragraphs 3.122, 10.48, 13.34, and 13.42 of the 2008 SNA.

22 However, when it comes to the subsequent valuation, it can become much more complicated. It is clear that, for a variety of reasons, quite a number of exceptions are made to the above principle, the most obvious being that there are no active markets in which the relevant assets are traded. This is not only true for most non-financial assets, certainly when taking into account the second-hand nature of the latter assets, but also for various financial instruments. As a consequence of the unavailability of market or near-market prices, alternative valuation methods need to be applied to arrive at an appropriate valuation.

23 In respect of the latter, 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 may need further elaboration. 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, including consumption of fixed capital, 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.

24 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 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

[4] This is not to say that it is recommended here to also use the term "fair value" as a short-hand for the principle to value positions in the international standards for macro-economic statistics.

[5] Regarding the treatment of costs related to the transfer of ownership, a distinction is made between first and foremost fixed assets versus financial assets (and valuables). In the former case, the transfer costs paid by the entity acquiring the asset are recorded as gross fixed capital formation, as a consequence of which they are included in the balance sheet value of the relevant asset. In the case of financial assets, the transfer costs are recorded as intermediate consumption, and do not affect the balance sheet value.

representing the value of the asset in an enterprise as a going concern. Others would argue that the second-hand assets in these types of markets are not the same as the assets that are being valued, thus not being a good representation of the assets being valued.

25 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. The 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 may clearly generate a future stream of resource rents, going well beyond the payments of rent to the legal owner, for the exploiter owning these rights, basically reflecting the future capital services.

26 Another principle for valuing positions, which is specific to the system of national accounts, and consequently also for external sector statistics, is the need for consistency in the valuation of debtor and creditor positions for financial instruments. This is one of the reasons to apply nominal values for financial instruments which are not (actively) traded on the market; for more details, see Section 5. Some would argue that such a valuation is somewhat inconsistent with a valuation at fair value of the relevant asset positions, while others would argue that nominal values can be considered as a good approximation of the fair value, all things considered. As such, there may be a thin line between having different valuation principles for various types of assets versus the use of various methods to approximate the fair value of, in this case, financial assets. Here, it is proposed to apply the latter line of reasoning, in line with the current guidance.

Short summary on the valuation principles for positions

27 All in all, it is recommended to further elaborate the principles of valuing positions in the 2025 SNA, along the lines laid out in the above paragraphs 20 – 26. Basically, this comes down to not introducing a change to the valuation principles of the 2008 SNA and BPM6, i.e., "*every item in the balance sheet should be valued as if it were being acquired on the date to which the balance sheet relates"*, with one important exception. This concerns the valuation of non-financial assets used in the production of goods and services.

28 In the case of non-financial assets used in production, the value of the asset in providing future capital services to the economic agents using them in production is considered the dominant principle. As with financial instruments which are not (actively) traded on the market, one could argue that the latter is only one of many methods to arrive at a valuation of non-financial assets in line with the general principle. However, as this valuation is considered quite different, it is recommended not to follow this line of reasoning.

Relationship between standards for macro-economic statics and business and public sector accounting standards

29 As noted before, when comparing the above principles for valuing transactions and positions with business and public sector accounting standards, the SNA and BPM valuation principles for positions are very similar to the concept of "fair value" applied in business and public sector accounting standards. Concerns around the valuation of non-financial assets, similar to the ones explained in the context of the SNA, also exist in business and public sector accounting standards. Actually, the latest IPSAS Exposure Draft 77 on Measurement, which is still under discussion, introduces the concept of "current operational value", which is defined as "*… the value of an asset used to achieve the entity's service delivery objectives at the measurement date*". It is different from the fair value, in that *"(a) is explicitly an entry value and includes all the costs that would*

necessarily be incurred when obtaining the asset; (b) reflects the value of an asset in its current use, rather than the asset's highest and best use (for example, a building used as a hospital is measured as a hospital); and (c) is entity-specific and therefore reflects the economic position of the entity, rather than the position prevailing in a hypothetical market (for example, the current operational value of a vehicle is less for an entity that usually acquires a large number of vehicles in a single transaction and is regularly able to negotiate discounts than for an entity that purchases vehicles individually)". A valuation of non-financial assets using the Perpetual Inventory Method would fit this valuation almost perfectly.

30 More generally, to arrive at a proper valuation of both non-financial assets and financial assets (and liabilities), business and public sector accounting standards distinguish three levels of information, as follows, in order of preference:

- 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 can be used in the international standards for macro-economic statistics.

31 A general warning may be needed here. Although the principles for valuation in business and public sector accounting standards are more or less the same as the ones applied in the standards for macro-economic statistics, differences in the practical application of these principles can have quite significant impacts, as a consequence of which relevant source data cannot simply be used one-to-one. For example, for reasons of prudency, business and public sector accounting standards have an accounting policy choice to use historical costs for non-financial assets used in production, while national accounts require the application of current replacement costs. Another example concerns the recognition of non-financial assets, especially the production of intellectual property products produced on own account. As noted in paragraph 3.140 of the 2008 SNA, awareness of such differences is warranted.

3. Criteria for evaluating the appropriateness of valuation methodologies

32 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 valuation 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.

33 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 macro-economic statistics.[6]

- *Replicability of the methodology.* The method should be replicable, in the sense that its application in slightly different circumstances, or its application by different (groups of) statisticians, leads to similar results, or, as a minimum, not widely diverging results.
- *Accuracy of the resulting estimates.* The methods should lead to results which are sufficiently accurate for their purpose.
- *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 from 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.

34 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, or exchange value. 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.

35 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.

[6] 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.

36 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 hand, differences across countries in the legal standards for business and public sector accounting may also affect the international comparability of the results.

37 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. It should be noted upfront that in the next sections all these criteria will not be used consistently for the assessment of each and every method. The analysis will thus be limited to the most relevant considerations, and the main pros and cons of each valuation method.

4. Valuation methodologies for transactions

38 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 principles for valuing transactions in the SNA and BPM, as explained in Section 2. The methods are discussed in order of preference, although not all methods are applicable for each and every type of transaction.

39 The starting point for this overview is the guidance on valuation methodologies currently provided in the 2008 SNA and BPM6, while the evaluation is based on the criteria laid out in Section 3. If relevant, recently agreed recommendations for the update of the 2008 SNA and BPM6, as included in the various Guidance Notes, are included as well. Here, the recommendations on the valuation of unpaid household services, included in Guidance Note WS.3 on Unpaid household service work, are considered of specific relevance. Guidance provided in the SEEA Central Framework is implicitly reflected upon as well, although these standards do 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.

Observed exchange values (or observed market prices)

40 Values based on the prices actually observed in the exchange of goods, services and assets, are generally considered as the most appropriate measure in line with the valuation principles for macro-economic statistics. Exceptions are made from a conceptual point of view, for example relating to distorted transfer prices between affiliated enterprises and concessional pricing (see Section 2), although in practice it is generally recommended not to make adjustments, mainly for reasons of feasibility and (international) consistency, and to rely on the source data provided. When it comes to transfer pricing, close contacts with the business and public sector accounting practice, including those involved in the setup of guidance under the OECD Base Erosion and Profit Shifting (BEPS), is highly recommended.

41 As noted above, when applicable, observed 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 distorted transfer prices 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.

42 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*" (paragraph 2.63 of the 2008 SNA).

43 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.

44 Whatever the case, the current valuation layers for supply and use of goods and services require a decomposition of the relevant observed 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 departures from the exchange values, which should be used as the starting point for this decomposition.

45 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[7]; etc.). In other cases, the output of services is approximated by partitioning of transactions (e.g., FISIM and insurance), whereby in the case of insurance the service element may need to be approximated by indirect valuation methods; for the latter, see paragraphs 6.175 – 6.206.[8] 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 transaction values for purchases and sales. In the case of insurance, FISIM, etc., the starting point for partitioning transactions is also based on observed transaction 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 observed 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

46 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, services and assets. This valuation method is particularly relevant in the following areas:

[7] See also Guidance Note F.13 on Measurement of margins on buying and selling of financial instruments.

[8] Please note that a separate issues note on the measurement of output and investment income attributed to insurance policy holders/investment income payable on pension entitlements is in the process of being prepared.

- 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, for which a full range of the assets are regularly traded on the market (e.g., dwellings).

47 An important prerequisite for applying this valuation method is the homogeneity, or comparability, of the relevant goods, services and assets. 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, services and assets which are used to arrive at a market-equivalent price should be traded under the same market conditions as the goods, services and assets 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, services and assets 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. It is recommended that the updated standards on macro-economic statistics put much more emphasis on these market conditions, when using market-equivalent prices.

48 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.

Indirect valuation

49 Leaving apart the compilation of insurance output, there are a few cases, in which the transactions have to be based on what is here referred to as an “indirect valuation” method. The most obvious example, as explained in paragraph 3.74 of BPM6, and also paragraph 7.139 of the 2008 SNA, concerns the imputation of reinvested earnings. In this case, the valuation is based on the net saving of direct investment enterprises before “distribution” of the reinvested earnings. As such, one could also argue that the reinvested earnings are derived, although indirectly, from observed exchange values. Having said that, it goes beyond the scope of this Guidance Note to provide details, including related problems, for the compilation of estimates for this transaction. Reference is made to paragraphs 8.15 – 8.16 and 11.33 – 11.47 of BPM6, and also to Guidance Note D.16 on Treatment of retained earnings in particular.

Sum-of costs

50 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, or exchange values, 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 significantly – 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.

51 However, a number of questions can be, and are, raised in relation to the application of the latter 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 invested capital; and
- the current exclusion of return on invested capital in the case of non-market services.

52 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 paragraph 6.126 of the 2008 SNA, "*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*". This recommendation raises questions, as 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 types of work. Such an estimation method would also better align to the recommendations made for the valuation of communal construction projects, as described in paragraph 6.127 of the 2008 SNA.

53 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 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, it should be noted that recommendations put forward in Guidance Note AI.2 on Treatment of rent for the recording of data, marketing assets and biological resources, which is currently being prepared and reviewed, could not yet be reflected in this Guidance Note.

54 Concerning the third point, the return to capital, paragraph 6.245 of the 2008 SNA 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".[9] 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. Recommendations on the use of the discount rate are also included in GN WS.10 on Valuation of mineral and energy resources.

55 The final issue, either or not including a return to invested 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 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 invested 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 be included, 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 has been agreed, at the 21st meeting of the AEG on National Accounts, held on 17 – 21 October in Washington DC, to re-open the discussion on including a return to invested capital in the valuation of non-market services, including the extent of capital items to be included. A separate issues note will reflect on the pros and cons of aligning the application of the sum-of-costs approach.

56 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 (and BPM). First of all, the method resembles the pricing strategy of producing a good or service for the market, where the producer would want to recoup, as a minimum, the costs made. 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*".

57 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

[9] 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 typically used.

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.

58 Looking at guidance that is being developed in the context of the update of the 2008 SNA and BPM6, 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 valuing these household services, see Guidance Note WS.3 on Unpaid household service work, for which Annex 2 of this Guidance Note contains a concise recap of the guidance provided.

59 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.[10]

60 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.

61 As for some of these unpaid household services one may have to rely on rather broad categories of labour input with a relatively broad range of labour costs attached to them, the accuracy and the (international) comparability of the estimates may be negatively affected. Furthermore, 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.

Short summary of methods for valuing transactions

62 Leaving apart the relatively exceptional case of indirect valuation, the preferred methods for valuing transactions can be summarised as follows:

- In the case of goods, services and assets,
    - which are transacted on the market via monetary settlement, the values actually exchanged are the basis for valuation.
    - which are transacted via barter type, and also the consumption of goods produced for own final use, usually prices can be derived from market transactions of similar goods, services and assets.

[10] 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.

- In the case of unpaid household services produced for own final use, a distinction should be made between housing services from owner-occupied dwellings, which are included in the production boundary of the SNA versus other services which are not yet included in the production boundary:
    - For the former services, the preferred method is to use market-equivalent prices which can be derived from market transactions of similar services. However, as this often concerns relatively heterogeneous products and assets, adequate adjustments need to be made to account for this heterogeneity.
    - For the other unpaid household services, market-equivalent prices may also be used. However, as it may be hard to find relevant data on the quantities of services provided, the default option is to use the sum-of-costs method.
- In the case of own-account capital formation of assets, the default option is the application of the sum-of-costs method.[11] However, when the assets are relatively homogeneous and regularly traded on the market (e.g., dwellings), preference is given to market-equivalent prices, adequately adjusted for heterogeneity.
- Finally, in the case of non-market output of government and NPISHs, output and final consumption should be valued by using the sum-of-costs method. Whether or not an imputed return to invested capital should be included in the application of this method is still subject to discussion.

5. Valuation methodologies for positions

63 As in the case of valuing transactions in the previous section, this section starts with 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. Importantly, although it may be of quite some relevance for the subsequent valuation of positions at a certain point in time, the discussion on valuation of assets in this section does not concern the initial recognition, i.e., when the assets enter the balance sheets. The valuation of these flows has been addressed in the previous section.

64 Similar to Section 4, the starting point for the overview is the guidance currently provided in the 2008 SNA and, for financial instruments, BPM6, while the evaluation of the various valuation methods is based on the criteria laid out in Section 3. If relevant, recently agreed recommendations for the update of the 2008 SNA and BPM6, as included in the various Guidance Notes, are included as well. This includes, amongst others, 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. Whenever relevant, more specific recommendation on the treatment of financial instruments, in addition to unlisted equity, will be referred to. Finally, guidance provided in the SEEA Central Framework, mainly relating to mineral and energy resources, is reflected upon as well. Alternative methodologies for valuing ecosystem assets put forward in the context of SEEA Ecosystem Accounting, which are predominantly based on the Net Present Value (NPV) of the (capital) services derived from these assets, are addressed in Section 6.

[11] Please note, as mentioned before, the sum-of-costs method is still subject to discussion on whether or not rent should be included.

65 In discussing each of the valuation methodologies, a distinction is made between various types of assets, as the relevance of the various methodologies can differ quite significantly for different types of assets. More explicit recommendations about the hierarchy of preferred valuation methods is included in the summary at the end of this section. A final introductory remark concerns the valuation of financial instruments, for which it should be stated upfront that the consistency in valuing assets and liabilities is an important prerequisite in the system of national accounts. With the exception of monetary gold for which a counterpart liability does not exist, total financial assets should equal liabilities.[12]

Observed market prices

66 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.

67 Unfortunately, this valuation method 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*" (paragraph 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, which reflects the actual payments of principal to be made in the future, including interest accrued to date.[13]

68 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 (IFRS 13) 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.

[12] Crypto assets without a counterpart liability may become another exception. However, this depends on the outcomes of the discussion on Guidance Note F.18 on Treatment of crypto assets in macroeconomic statistics, regarding which a global consultation of users has been set up.

[13] Guidance Note F.8 on Valuation of debt securities at both market and nominal value addresses this concern, and recommends reporting debt securities at nominal value, as a supplementary item.

Market-equivalent prices

69 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.

70 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 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.

71 It is also possible that accurate and current market prices for tradable debt securities and equities may not be available, for example in the case that they are infrequently traded. In these cases, their market-equivalent prices may be estimated using using the market price of a similar but frequently traded financial instrument. For example, the price of an infrequently traded bond with five-year remaining maturity might be given by the market price of a publicly traded five-year bond having a comparable risk. In other cases, it may be appropriate to use the market price of a similar financial instrument, but with some adjustment in the value to account for differences in liquidity and/or risk level between traded and non-traded instruments.

72 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.

73 As noted in Section 2 on the valuation principles, the valuation method using market-equivalent prices may become less appropriate in the case of fixed assets used in production. Apart from problems related to relevant data on market prices being available, the rather specific modalities of the assets, etc., the system of national accounts primary focuses on the capital services that can be derived from these assets. As such, valuation according to the written-down replacement costs is then considered more appropriate. For a few types of non-financial assets, which are regularly traded, and for which – if needed – adequate adjustments can be made to account for heterogeneity, information on market prices could add to the quality of the estimates derived from the Perpetual Inventory Method (see also below).

74 Disregarding the above discussion on fixed assets, the approximation of the values of positions with market-equivalent prices is conceptually sound, provided that the conditions mentioned in the above paragraph, mainly concerning the adjustment for heterogeneity, 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., in the case of adjusting 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

75 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, adjusted for price changes. 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). Furthermore, while the historical acquisition price only takes into account the price prices at acquisition, the written-down replacement cost method also takes into account the decrease in value of the asset due to normal levels of physical depreciation, obsolescence, and accidental damage; see paragraph 6.240 of the 2008 SNA.

76 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 produced non-financial assets, through the application of the Perpetual Inventory Method (PIM). 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. It goes without saying that, in the context of macro-economic statistics, values adjusted for price changes are to be considered superior to historical 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.

77 As noted before, the written-down replacement cost method can be considered superior to market(-equivalent) prices, certainly if the market prices for second-hand assets cannot be considered as being representative for the future capital services that 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. 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.

78 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 value of the assets in question is capped by the level of past expenditures (adjusted by price changes).[14]

79 The valuation of assets based on past expenses is generally conceptually sound when adequate adjustments can be made for price changes. However, 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, disregarding the adjustments for price changes, 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

[14] To improve (the availability) of estimates on consumption of fixed capital, Guidance Note CM.4 on Gross and net measures recommends to establish an international “capital measurement internet-based information hub”. Obviously, such an international cooperation would also result in improved estimates of the value of fixed assets using the Perpetual Inventory Method.

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

80 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"* (paragraph 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 but slightly more elaborate (see paragraph 3.88). In this respect, Guidance Note F.8 on Valuation of debt securities at both market and nominal value recommends to extend and further align the definition of nominal value in the 2008 SNA, in line with paragraph 3.88 (b) of BPM6, by adding the explanation that nominal value "*reflects the sum of funds originally advanced, plus any subsequent advances, plus any interest that has accrued, less any repayments".*[15]

81 In relation to zero-coupon and other deep-discounted bonds, as well as for certain financial instruments that do not accrue interest over a longer period of time, it is recommended to follow the guidance provided in GFSMCG 2014, according to which the nominal value of these securities is equal to the Net Present Value of future payments, using the market interest rate as the discount rate; see e.g., paragraph 7.30 and also the numerical example for zero-coupon bonds in Box 2.4 of the Public Sector Debt Guide (PSDG). It should be noted, however, that such an adjustment is not recommended for concessional loans, for which the nominal value in line with the agreed outstanding principal, including accrued interest, is considered appropriate. More generally, given its omnipresence in macro-economic statistics, it is recommended to further extend the guidance on nominal value in the SNA as well as BPM, by adding some of the details provided in GFSMCG 2014.

82 The 2008 SNA does not provide any (substantial) justification for the use of nominal value. However, BPM6 provides the following clarifications, in paragraph 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….*". Guidance Note F.9 on Valuation of loans (fair value) discusses issues related to nominal value versus fair value. In the end, it

[15] A minor issue in relation to nominal value concerns the possible misinterpretation of paragraph A2.68 of BPM6, and the need for a possible rephrasing. In discussing the possible recording of concessional loans, this paragraph recommends to re-calculate the value of the loan, by discounting the future payments with a market interest rate. The paragraph 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 may suggest that the new, re-calculated, value of the loan is in line with the nominal value.

is recommended to retain the nominal valuation, but also to extend the possibility for re-assessing the value of loans, by allowing for a value reset beyond cases of bankruptcy and liquidation, when there is public evidence of loan deterioration.

83 Although not recommended in the end, Guidance Note F.9 also presents the option of a valuation at full fair value, thus not only adjusting for expected loan losses, but also taking into account the changes in value resulting from differences between the actual interest rates on loans and the market interest rates. In the past, during the update of the 1993 SNA, quite some discussion has taken place on the valuation of loans in line with this "market value". 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 often lead to additional costs equal to the interest differential. For tradable financial instruments, the debtor is not necessarily locked in. For these conceptual reasons, but also – as mentioned in Guidance Note F.9 – for reasons of feasibility, valuation at nominal value is still preferred for non-tradable financial instruments.

84 Looking at business and public sector accounting standards, a valuation at "amortized cost" is recommended for financial debt instruments not (actively) traded on a market, and similar instruments held to maturity. Nominal value is a concept which comes relatively close to this valuation concept, although in principle the latter also includes adjustments for loss allowances.[16] In this respect, recommendations to improve the accounting for provisions, among which impairments on loans, in supplementary tables, as included in Guidance Note WS.8 on Recording of provisions, could also assist in establishing the link between macro-economic statistics and the numbers included in corporate accounting.

85 As noted in Section 2, from a purely conceptual perspective, nominal value is different from a market value, and in practice the difference between the two of them may be quite significant. Notwithstanding this point, 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, when looking at the valuation of the relevant financial assets in isolation, there is much to say in favour of a valuation according to creditor's point of view. From the 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

86 In relation to unlisted equity, the 2008 SNA and BPM6 also contain 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 for an indirect valuation are suggested in paragraph

[16] Paragraph 26 Guidance Note F.9 on Valuation of loans (fair value) suggests that a full fair value is consistent with business and public sector accounting standards. However, a valuation at full fair value is not recommended in business and public sector accounting standards for debt instruments which are not (actively) traded on a market.

13.71 of the 2008 SNA and, in some cases using a slightly different terminology, paragraph 7.16 of BPM6:

- *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.

87 In addition, three other methods are suggested for valuing unlisted equity: (i) *recent transaction price*, which could be looked upon as a method based on observed market(-equivalent) prices; (ii) *present value/price to earnings ratio*, according to which the value of equity is basically approximated by discounting forecasted future profits, and thus could be listed as net present value of future returns (see below); and (iii) *apportioning global value*, which could be used to value unlisted equity of foreign direct investment enterprises.

88 Importantly, 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, including equity in quasi-corporations: (i) own funds at book value; (ii) recent transaction prices (in the above listed under observed market(-equivalent) prices); and market capitalization (in paragraph 86 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.

89 From a conceptual perspective, the above indirect valuation methods are considered sound, as all of them try to approximate, directly or indirectly, the market prices of the relevant equity. 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 may 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, is considered as a very useful tool to 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

90 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 (see the previous subsection); and
- natural resources.

It may also be relevant for a limited number of fixed assets, where expenses on past capital formation are not available, or not considered to provide an adequate reflection of the value of the relevant assets. Here, one could think of some intellectual products, such artistic originals. Applying the method of net present value of future returns may also provide an alternative for valuing some other financial assets in the case that the valuation methods listed above are considered to generate less appropriate results.

91 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 – in line with the recommendations of Guidance Note D.2 on Valuation of unlisted equity – various other methods are considered more appropriate in providing estimates for this type of equity.

92 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. In addition, the application of this method 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. If, for example, reliable estimates can be derived from transactions in a competitive market, valuation should preferably be based on these data. However, unfortunately, this is not often the case. See also below, where more detailed guidance from SEEA Central Framework is discussed.

93 This leads to another issue, already alluded to in Section 2 on valuation principles, which 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, for one reason or another, the government often does 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 is zero. On the other hand, however, one can observe that the private corporation

owning the exclusive rights to extract derives value from these rights, in the form of part of the resource rents being appropriated.[17]

94 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 also Annex 2 of this Guidance Note. These recommendations mainly concern ways to estimate the various elements feeding into the actual measurement of mineral and energy resources. The recommendations and clarifications have been endorsed, and will be included in the 2025 SNA.

95 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.[18] 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.

96 Also the valuation of human capital has been addressed, as part of Guidance Note WS.4 on Labour, human capital and education. 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 related to 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.

[17] An up to now unresolved issue concerns the recording of the "split-asset" recording, on how to record the part of the resource rents appropriated by the exploiter of the resources, as represented by the difference between the total value of the resource rents and the actual royalties paid. The resolution of this research question is part of the testing programme for the update of the 2008 SNA.

[18] 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 AI.2 on Treatment of rent for the recording of data, marketing assets and biological resources, which is still in the process of being finalized.

97 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 (consumption of fixed capital and return to invested capital); (ii) the "appropriation method", in which the resource 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.

98 In evaluating these three methods, SEEA Central Framework notes that the collection of resource rents 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 rents, 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 using 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 rents, 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, it is recommended to compile estimates of resource rents based on the residual value method and, where possible, reconcile the results with estimates obtained using the other methods.

99 It should also be added here that the SEEA Central Framework contains much more detailed guidance on the application 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.

100 Conditional upon the direct link between the (residual) resource rents 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 made in the past. However, in the case of many natural resources, this choice is often not available, and one has to depend on the net present value method, using the residual value method for estimating the resource rent.

101 From an (international) comparability point of view, the additional guidance provided in 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

102 This subsection contains a summary of the valuation of positions. As it may have become clear from the discussion in the above, the application of the various valuation methods is highly dependent on the type of assets considered, as a consequence of which it is difficult to arrive at a generic order of preference of the various valuation methods. Instead, a distinction is made between the following types of assets: financial instruments; fixed assets; valuables; and non-produced non-financial assets. For each category, a hierarchy of preferred valuation methods is recommended.

103 Another type of assets, inventories, has not been explicitly addressed here. The valuation methods are well explained in the current guidance of the 2008 SNA. In the case of inventories of materials and supplies, finished products, military inventories, and goods for resale, relevant observed market prices can be used for the valuation, while in the case of work-in-progress, excluding the part related to the production of fixed assets for own final use, the valuation is based on (expected) market prices or the contractual agreed prices, of which the portion of the finalized part enters into the balance sheet.

104 In the case of financial instruments, a distinction should be made between instruments which are (actively) traded on the market, versus those instruments that are typically not traded on a market. For the first category, which mainly consists of monetary gold, currency, securities and financial derivatives, a valuation using observed market(-equivalent) prices is considered to be the preferable option for valuation. In some cases, however, market(-equivalent) prices may not be available, for example in the case of some types of derivatives. One would then need to revert to pricing models. For debt securities, it is recommended to also compile, as supplementary items, data at nominal value, especially for the liability positions.

105 For the second category, a further distinction can be made between (i) deposits, loans and other accounts receivable or payable; (ii) unlisted equity; and (iii) insurance technical reserves and pension entitlements (including standardized guarantees). For the first subgroup, a valuation at nominal value is recommended. In this respect, it should be added that Guidance Note F.9 on Valuation of loans (fair value) recommends retaining the valuation at nominal value for loans, but also extending the possibility for re-assessing the value of loans, by allowing for a value reset beyond cases of bankruptcy and liquidation, when there is public evidence of loan deterioration. Furthermore, Guidance Note WS.9 on Recording of provisions, recommends to improve the accounting for provisions, among which impairments on loans, in supplementary tables.

106 A special case is unlisted equity, for which various methodologies can be considered; see paragraph 13.71 of the 2008 SNA and its further precisions in 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).

107 Another special case concerns the estimation of insurance technical reserves and pension entitlements. When the claims constitute a future stream of benefits, for example in the case of annuities and defined benefit pension entitlements, the valuation can only be based on actuarial type of calculations using the net present value of future benefits. In other cases, such as claims arising from defined contribution schemes, the valuation is equal to the value of the accumulated assets, appropriately valued according to the methods for the various assets. For other types of insurance, reference is made to the relevant business and public sector accounting practices.

108 When it comes to the first category of non-financial assets, (produced) fixed assets, an estimate based on past expenses, in this case the written-down replacement costs, using the Perpetual

Inventory Method, is the preferred method for valuation. In cases of well-established markets for second-hand assets, the relevant market prices could be used to verify the resulting estimates. This may hold for dwellings, for which prices including land are available, and for some types of transport equipment. For some assets, such as artistic originals, one may not be able to collect adequate data on past investment expenses. As a possible option, one could revert to estimates using the net present value of (expected) future benefits. Written-down historical costs, and/or valuations using service lives allowed/recommended by, for example, tax authorities, as often applied in business and public sector accounting, are considered inferior.

109 It is far from easy to collect adequate data on valuables. Country experiences are also fairly limited. Having said that, a valuation based on observed market(-equivalent) prices is not recommended because of the heterogeneity of valuables. An exception may be gold bullion, in the case of which heterogeneity is not an issue, while market prices from active markets are available. However, usually, one can only rely on historic acquisition costs, possibly adjusted for changes in recent market transactions of similar valuables, for example the price development of, for example, works of arts of particular artists. If relevant data are available for statistical purposes, the recommended valuation method is to use the assessments by insurance corporations of collections of valuables, or the valuations by experts.

110 Finally, for non-produced non-financial assets, first and foremost natural resources, actual transaction prices would be the preferable method. However, as the relevant prices are usually not set in competitive markets, and also in order to arrive at an appropriate accounting for the future capital services of these assets, a valuation based on the net present value of future resource rents is to be considered as the method to be applied in practice.

6. Appropriateness of alternative valuation methodologies for valuing ecosystems

111 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 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.

112 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 Section 9.3 of SEEA Ecosystem Accounting and the paper on Monetary valuation of ecosystem services and assets for ecosystem accounting, hereafter referred to as "ecosystem valuation paper". Actually, a considerable part of the text in this section is copied one-to-one from the paper. Below each group of methods will first be shortly introduced, followed by a concise discussion which mainly focuses on the consistency with the valuation principles of the SNA. It should be noted, however, that in line with what has been stated regarding the status of the chapters on valuation in SEEA Ecosystem Accounting, the methods have not yet been endorsed. In this respect, the assessment, by the AEG on National Accounts, on whether or not these methods are considered as being in line with the valuation principles and methods of the SNA is considered as a step towards possible endorsement.

113 Furthermore, before introducing these methods, it is useful to add a couple of more general comments. Firstly, as noted in Section 2, the SNA, and also BPM, does not explicate a certain market structure in the case of market transactions. Market structures, be it competitive, monopolistic, monopsonistic, or any other market structure are considered irrelevant for the use of exchange values, the most important criterion being whether or not the transactions have taken place at arm's length).[19] Having said that, the assumptions regarding market structures may be extremely important when it comes to a valuation of transactions and positions in a non-market context. It most certainly is a crucial element in some of the valuation methodologies for ecosystem services and assets. The question is whether one should always assume perfect/competitive market structures, or that it is also considered viable to apply alternative market structures. The latter can become quite problematic, as in the case of, for example, monopolistic behaviour, this could potentially lead to rather extreme and unrestricted valuations.

114 There is general agreement that one should not prescribe certain market structures, other than the arm's length principle. Instead, it is considered preferable to make a distinction between whether or not information on similar markets is available. If such information is available, this could also be used in the non-market context. On the other hand, if such information is not available, competitive market conditions would be the logical fall-back solution. In this respect, it was also suggested to further elaborate on the market structure and the maturity of relevant markets. This is not further elaborated in this Guidance Note.

115 The second general comment concerns the rather special case of ecosystem services and ecosystem assets. Ecosystem services concern capital services that can be derived from ecosystem assets. A considerable part of these services involves an extension of the current SNA production boundary, similar to e.g., unpaid household services.[20] An important and logical consequence of this extended production boundary is that it will also lead to an extension of the asset boundary, by including non-SNA benefits into the valuation of ecosystem assets. Therefore, provided that appropriate valuation methodologies, consistent with the valuation principles of the SNA, are applied, such an extension per se is considered appropriate to arrive at a fuller accounting for natural capital.

116 Thirdly, SEEA Ecosystem Accounting groups the various valuation methods in a preference order of five categories, based on their alignment with the target concept of market prices, 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.

[19] It should be noted here, as also explained in Section 4 and 5, that market conditions may be highly relevant when it comes to use of observed market(-equivalent) prices for valuing transactions and positions. If markets are not well established, or highly regulated by, for example, government, the relevant observations cannot be used one-to-one to approximate the prices for similar goods, services and assets.

[20] It should be noted that ecosystem services may be different from unpaid household services, in the sense that the former cannot always be separated easily, and that they may lack exclusivity in their use.

SEEA Ecosystem Accounting subsequently discusses examples of each of these methods in section 9.3 and states, in paragraph 9.21 that these methods "*support the derivation of prices for ecosystem services that are consistent with exchange values and hence can be used to provide estimates for entry into the accounts"*.

117 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 applied in the compilation of national accounts are reviewed and evaluated here.

118 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 ecosystem valuation paper, although they are not recommended, as compared to the above valuation methods. As noted in paragraph 9.56 of SEEA Ecosystem Accounts, *"… 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*". As noted before, the assessment whether or not the valuation methods, and in particular the ones presented below, are actually considered to be in line with the valuation principles and methodologies of the SNA, is part of the objectives of this Guidance Note.

119 Finally, 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 Annex 1 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, under conditions of constraints to income, 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 ecosystem valuation paper.

Prices embodied in market transactions

Productivity change method

120 The productivity change method is sometimes described as production function method. As noted in paragraph 9.38 of SEEA Ecosystem Accounting: *"In this method, the ecosystem service is considered an input in the production function of a marketed good. Thus, changes in the service will lead to changes in the output of the marketed good, holding other things equal*". The method requires information about the various inputs and outputs of production processes, thus allowing to econometrically estimate the marginal productivity of inputs.

Hedonic pricing method

121 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

122 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

123 As explained on page 29 of the ecosystem valuation paper, *"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 paragraph 9.45 of SEEA Ecosystem Accounting)."*

Travel expenditures

124 In relation to the travel expenditures method page 30 of the ecosystem valuation paper notes the following: *"The travel expenditures to reach a site can be used as a basis for calculating a market price for the service provided at the destination. In using data on travel expenditures, it is necessary to make a distinction between two different methods that will be discussed in this section:*

- *The traditional travel cost method is commonly applied in welfare valuation contexts and hence the results cannot be directly applied for accounting purposes. However, when a demand curve is estimated, this curve can be used to model an exchange value by choosing a suitable point on the curve for example by intersecting it with an estimated supply curve – this is called the simulated exchange value (SEV) method.*
- *The consumer expenditures method uses estimated costs directly as a proxy for the value of the service. Travel expenditures (sometimes referred to as "outlays") that are collected as an input to the traditional travel cost method can be used in this method but alternative sources for expenditure data can also be used."*

125 The ecosystem valuation paper discusses various types of travel cost approaches, including zonal methods, and the random-utility model which is a discrete choice modelling technique which is particularly suitable in case of substitute recreational sites. The report also provides specific guidance on the scope of expenditures to include as well as valuation of time spent travelling to the site.

Short evaluation

126 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 expenditures approach, the valuation method typically provides estimates of the total value including consumer surplus, unless one applies the "consumer expenditure approach"[21]; 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 2. On the other hand, however, applying a rule of thumb [22], as suggested in the ecosystem valuation paper, may circumvent these conceptual problems; as a minimum, the relevant costs would not differ that much from replacement costs, as preferred in the case of unpaid household services.

127 As noted in Section 3.2.4.1 of the ecosystem valuation paper, 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*".

[21] 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.

[22] The ecosystem valuation paper (page 37) states that empirical work has revealed "that time spent travelling is valued at somewhere between a third and a half of the wage rate (OECD, 2018). It is common practice in transport research to value leisure time at 1/3 of the wage rate (Cesario, 2006)."

128 Finally, the application of the travel expenditures 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

129 As noted in paragraph 9.30 of SEEA Ecosystem Accounting, "*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*". It should be distinguished from the restoration cost approach, which measures how much it would cost to restore the ecosystem to a previous state. The latter does not provide a valuation of an individual ecosystem service, but rather a measure of the loss of a bundle of services.

130 Page 38 of the ecosystem valuation paper then goes on with stating the following: "*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 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

131 As explained in the ecosystem valuation paper, "*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*".

132 Furthermore, "*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 paragraph 9.52 of SEEA Ecosystem Accounting)*".

Simulated exchange value

133 "*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

134 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.[23]

135 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.

136 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 exchanged for cash (e.g., between the visitors and the ecosystem trustee); for more details, reference is made to page 40 of the ecosystem valuation paper. It goes without saying that the estimation of an accurate demand function may be quite challenging.

137 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

138 From the discussions in this Guidance Note, it can be derived that the guidance of the 2008 SNA and BPM6 is still considered generally fit for purpose. However, there are a number of issues where it is recommended to update, or as a minimum to clarify the current guidance. These recommendations are listed below, for consideration by the Advisory Expert Group (AEG) on National Accounts and the IMF Balance of Payments Committee (BOPCOM). In doing so, the recommendations on valuing transactions and positions, as put forward in a number of other Guidance Notes, are not included again, although in some cases it is considered useful to make reference to them, for reasons of clarity. In addition, the AEG is requested to reflect upon the appropriateness of the methods for valuing ecosystem services and ecosystem assets.

139 **Recommendation 1**: First of all, it is considered of the utmost importance to provide **further clarification on the valuation principles of the SNA (and the BPM)**. It is first of all recommended to clarify the **overarching principles for valuing transactions**, for which it is recommended to **use either (i) the term "market prices", defined as the prices paid between two independent parties, i.e., a valuation of transactions at arm's length, or (ii) the term "exchange values", defined as the values at which goods, services, labour or assets are in fact exchanged (between two independent parties)**

[23] 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."

or else could be exchanged for cash, realizing that in the end both represent the same notion. In this respect, it is also considered important to distinguish these principles from observed market prices or observed exchange values, which are the preferred methods for valuing transactions (and positions). Secondly, it is recommended to further clarify the **principles for valuing positions**, in particular non-financial assets, where the **notion of capital services**, or – as framed in the International Public Sector Accounting Standards (IPSAS) – current operational value, needs to be introduced and elaborated.

140 **Recommendation 2**: It is also recommended to add more **clarifications on the appropriateness of market conditions, when using observed market prices to arrive at market-equivalent prices**. This first and foremost concerns issues related to the maturity of the markets and/or the markets not being distorted by, for example, government interventions. It does not relate to market structures (competitive, monopolistic, oligopolistic, monopsonistic or other types of markets), regarding which the macro-economic statistics are basically indifferent.

141 **Recommendation 3**: When it comes to the valuation methods, it is recommended to add more **clarifications with regard to the application of the sum-of-costs method**. This concerns the estimation of labour input provided by owners and family members of unincorporated enterprises; the extent of capital services to be included; and the rate to be used in estimating the return on invested capital. **The proposed extension of capital services, by also including other non-financial assets used in production, beyond fixed assets, would require a change to the 2008 SNA.** Please note that this recommendation does not concern the consistency of the sum-of-costs method for market and non-market producers, which is subject of a separate issues note.

142 **Recommendation 4**: It is also recommended to add **clarifications on the application of the net present value of resource rents for natural resources**, in which the resource rent is estimated by using the residual value method. In this respect, it is also recommended to 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.

143 **Recommendation 5**: It is also recommended to add **clarifications on the concept of nominal value, in line with the guidance currently included in GFSMCG 2014 and PSDG, thereby also including clarifications on the measurement of nominal values for zero-coupon/deep-discount securities and other debt instruments that do not accrue interest**.

144 **Recommendation 6**: It is also recommended to include recommendations on **alternative valuation methodologies on transactions and positions beyond the central framework of national accounts** (unpaid household services, human capital, ecosystem accounting). This could be done concisely in the general text on valuation principles and methodologies (see below), and somewhat more extensively in the new chapters on well-being and sustainability.

145 **Recommendation 7**: When it comes to valuation of transactions and positions in the SNA and BPM, it is also recommended to provide more details on the **relationship between the SNA and BPM on the one hand, and business and public sector accounting standards on the other hand**. Apart from some very concise references in the introductory chapters of the SNA and BPM, the chapters on non-financial corporations and the one on government would probably provide the best fit for a somewhat more extensive text.

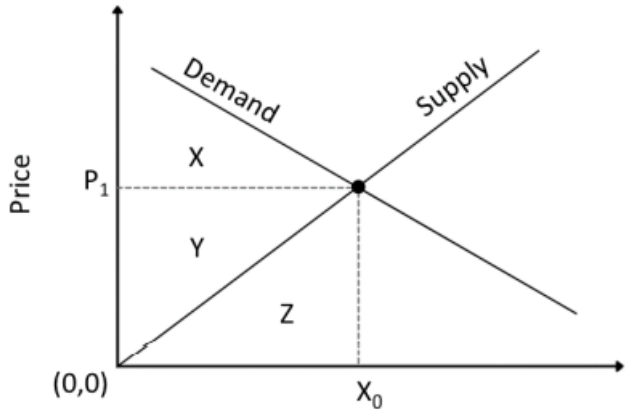
146 **Recommendation 8**: Finally, looking at the 2008 SNA, the more general guidance on valuation principles and methods is somewhat dispersed. Chapter 3 of the 2008 SNA contains some general guidance, mainly on valuing transactions, but various other details are included in the relevant chapters on the sequence of economic accounts, including the chapter on supply and use tables, and the one on capital services. This order may need to be reconsidered. Here, as a minimum, it is recommended to **introduce a more in-depth discussion of valuation principles and methods in the 2025 SNA Chapter 4/BPM7 Chapter 3 on Flows, stocks and accounting rules**, along the lines of what has been presented in this Guidance Note. As the relevant text may become too lengthy, it may be considered useful to add an annex with more details on, for example, the various methods for valuing transactions and positions. Specific guidance on valuing particular transactions and assets could be included in the most relevant chapters, in line with what is done in the 2008 SNA and BPM6.

147 The above recommendations all concern the sequence of economic accounts of the SNA and BPM, as well as some extended accounts and supplementary tables, as discussed in Sections 2 to 5. Section 6 has put forward a number of additional **valuation techniques to account for ecosystem services and ecosystem assets**. The AEG is also requested to give its opinion on the appropriateness of these valuation methods, in the sense of these methods being in line with the general principles for valuing transactions and positions in the SNA. In this respect, the most relevant criterion relates to the conceptual soundness of the valuation methods, i.e., whether or not the methods (implicitly) include consumer surplus. In addition, there may be concerns about accuracy and replicability, although one may expect that these issues will be resolved in the future, by gaining more practical experience.

Annex 1. Excerpt on the concept of market prices from Annex 12.1 of SEEA Ecosystem Accounting

When it comes to a more exact interpretation of the concept of market prices, economic theory can prove to be helpful. Figure 1 below presents 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



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.[24]

[24] 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.

Annex 2. 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[25], 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.[26]

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 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

[25] 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.

[26] 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".

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 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[27]. 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

[27] 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.

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.

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)[28]: "*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*

[28] 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.

method applies." In this respect, Abraham and Mackie (2005)[29] 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.

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.45

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

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.