8th Meeting of the Advisory Expert Group on National Accounts,
29-31 May 2013, Luxembourg

Agenda item: 7
Topic: Land and other non-financial assets

Introduction

The issue of measurement of land and dwellings was given increased prominence as part of the G20 Data Gaps initiative (Financial Stability Board, 2011). In response to this, the OECD launched a questionnaire on land towards the end of 2011. Countries supported the idea of a dedicated Task Force to tackle issues related to land and also dwellings. A joint Eurostat/OECD Task Force, including participation from the European Central bank (ECB), on Land and Non-financial assets has now met twice. The initial focus of the Task Force will be on issues relating to land. The goal is to have a first draft of a compilation guidance handbook available by July 2013. The compilation guide on the measurement of land will include descriptions of sources and methods, practical guidance and numerical country examples. A final version of the compilation guide is expected at the end of 2014. At that point, further work may involve research into other non-financial assets. At this stage, questions have arisen on the valuation of government owned land.

Guidance on documentation provided

The attached report is an intermediate report of the work and the discussion in the Task Force on Land and non-financial assets.

Main issues to be discussed

The AEG is expected to provide guidance on the valuation of land owned by government. A brief discussion on whether government-owned land should be valued is in section 3.1 of this report. The views of the AEG are also welcomed on the other topics addressed in the attached report, e.g. the contents of the foreseen compilation guide, the classification of land, different methods to value/separate land, etc.

TASK FORCE ON LAND AND OTHER NON-FINANCIAL ASSETS

PROGRESS REPORT

Summary:

This note describes the state of play regarding the work of the Task Force (TF) on Land and other non-financial assets. The note presents the proposed content and drafting responsibilities of what will be the main TF's output: the compilation guide on land. The outcomes of the TF's first discussions on four topics – classification of land, housing bubbles, questionnaire on service lives, separation of land and structures – have been summarised as well. A provisional time schedule for the work to be done by the TF in the coming two years has been presented. The annexes to this note will go more into the substance of the issues that have been discussed by the Task Force. They are mainly the result of discussions in the TF and have a very provisional status.

1. Background

In the April 2012 meeting of the EU National Accounts Working Group (NAWG) it was decided to establish a Task Force (TF) on Land and other non-financial assets. In this meeting the NAWG supported the general content of the draft mandate of the TF. The mandate of the TF is attached as Annex 1.

Both Eurostat and the OECD consider the production of estimations for non-financial assets (and in particular land) as a high priority and therefore it was also decided to bundle the resources and to create a joint Eurostat-OECD TF. Apart from the Eurostat and OECD representatives, the TF counts 20 members: 11 EU Member States, 8 (other) OECD countries and the European Central Bank. The TF is chaired by Eurostat and OECD. The TF meets twice a year. In addition there are electronic and email discussions.

In this document the current state of play of the TF work as well as the future plans will be discussed. To be more precise: in section 2 the rough content of the 'compilation guide on land', which will be the main output of the TF, will be presented. Section 3 will summarise the conclusions concerning some topics that were already discussed ‘in the first round’. Finally, in section 4 the time schedule for the TF’s work in the coming 1½ years will be presented. The annexes 2, 3 and 4 provide some more background information on the topics discussed in paragraph 3.

2. Compilation guide on Land

In the second TF meeting on 10 and 11 December 2012 the TF discussed the topics that should be addressed in the compilation guide on land. Not only the topics as such have been defined, it was also agreed who would be responsible for drafting the chapters:

CH1 Why do we need this manual? – OECD
CH2 Concepts and definitions – ESTAT
CH3 Classification of land – DE, AT, MX, NL, ES
CH4 Data sources – OECD
CH5.1+5.2 Direct estimates of land – DE, KR, FI
CH5.3 Indirect estimates of land – DK, IT, SI, CA
CH5.4 Depreciation aspects – US, KR, NL, CZ
CH6.1 Separation land and structures – DK, IT, SI, CA
CH6.2 Estimating land improvements – ESTAT
CH6.3 Treatment of government owned land – NL
CH6.4 Value, price and volume changes – OECD
CH6.5 Sectorisation and cross classification – CA, UK
CH7.1 Housing bubbles – ECB
CH7.2 Valuation historical monuments – CZ
(CH7.3 Imputed rent – to be deleted)
CH7.4 Dwellings as storage of wealth – MX
CH 8 Country studies – KR

As can be concluded from the overview above, some topics/chapters will be studied and drafted by a group of TF members (‘working groups’); in these cases a ‘coordinating country’ has been appointed.

3. First discussion on selected topics

In the TF meeting of 10-11 December 2012 four working groups already informed the TF about the results of their study on some of the topics that will form part of the compilation guide: 1) classification of land (CH 3), 2) capturing housing bubbles (CH 7.1), 3) questionnaire on service lives (CH 5.4) and 4) separation of land and structures (CH 6.1). Below a summary of the discussions and conclusions of the TF will be presented. In the annexes to this note the content of some of these topics will be discussed in some more detail.

3.1 Classification of land

Because there is no commonly used approach to sub-classify land, the working group on 'classification of land' presented an overview of current international classifications. Three approaches for classifying land were evaluated based on the best possibility of finding a common sub-classification across countries:

a) Dividing land into taxable and non-taxable land:

The main concern about this approach is the lack of appropriate source data. Not all countries can draw on tax authorities to provide data on taxable and non-taxable land. In addition, countries have different tax regimes leading to discrepancies of which land is taxable across countries.

b) Valuing only tradable land:

The main concern about this approach is how to define tradable land. Certain types of land may be tradable but in practice a trade rarely occurs (such as land underlying roads, railways, and surface water). Clear criteria would be needed regarding rights and prices. For example, a road may be tradable but only when the buyer obtains the right to levy a toll. This also brings into consideration the treatment of government owned land (see below).

c) Disaggregating by land-type/-use

Even though national data are heterogeneous, this approach appears to be the best possibility of finding a common sub-classification because all countries compile land-use statistics. This approach also seems to lead to the best possible comparability of data across countries. The most limiting factor is the existence of price data because the most exact sub-classification is hardly usefull without appropriate prices.

Classification proposal:
Given the goal of a consistent classification across countries, the working group proposed to classify land by type/use at the following level of detail (more detailed considerations on the classification of land have been added as Annex 2):

Land underlying buildings and structures
- land underlying dwellings
- land underlying other buildings and structures

Land under cultivation
- agricultural land
- forestry land
- *surface water used for aquaculture (this should be a voluntary item)*

Other land

Main conclusions:

(a) The TF agreed with the valuation of all types of land according to the SNA definition of assets (SNA 2008 para. 1.46), that is land should not be valued if no economic ownership can be assigned to it and/or no economic benefits can be derived from it. In addition, the TF agreed with the land use statistics as a basis for the sub-classification of land.
(b) The TF proposed to seek the opinion of the AEG with respect to the valuation of government owned land and to write a short note to address this issue (see next section 'discussion question');
(c) The TF agreed with the proposed division of land underlying buildings, with the amendment that 'land underlying dwellings' should be separated from 'land underlying other buildings and structures'. The TF also agreed with the proposed division of agricultural and forestry land;
(d) The TF proposed to distinguish 'surface water' as a voluntary item under 'land under cultivation';
(e) The TF thought that from a practical viewpoint it would probably be difficult to create a separate subcategory for 'constructional land'.

Issue for discussion: how should government owned land be valued?
For certain parts of government owned land one may argue that the value of this land is already included in the value of adjacent land. Including in the balance sheet a value for this government owned land would in this case lead to double counting. One may argue that this surplus value of the adjacent land is a spill over effect. However, this is only the case when the government owned land has a demonstrated value on its own.

This self-standing asset value does not seem to exist for roads and railways that have only one function namely giving access to residential areas or for dikes which main function is to protect the surrounding land from flooding. On the other hand, the value of most privately owned land depends, among other things, on its accessibility to the public infrastructure. An accessible house (including the land) has usually a higher value than a remote house next to a dirt road. This surplus value is created by roads or public means of transport with which the house is easily accessible. This surplus value follows the land owners trust that the government will neither sell the land underlying these roads nor will use it for other purposes. As soon as the government would reallocate the land underlying roads the adjacent privately owned land would quite likely decrease substantially.

A second argument against valuing land underlying public infrastructure is that it does not seem to have a real market value as long as it is used as such. For example, a dike including the land may not be sold as such as it has a public function to protect surrounding areas. Based on these arguments, but also due to measurement difficulties, land underlying public infrastructure is currently not valued as such, for example in the Dutch national balance sheet for land.

However, there are also many arguments in favour of including land underlying public infrastructure. For example, if the government spends money on land with a public function one may argue that this value should also be shown in the balance sheet. As the outcome of this discussion is important for the remaining work in the Task Force a common position on this issue would be most welcome.

Do AEG members have a (preliminary) opinion with respect to the valuation of government-owned land? If needed, at a later stage, the Task Force could produce a more detailed issues paper on the valuation of land, for which these preliminary views could be helpful.

3.2 Capturing housing bubbles

The ECB presented an overview of items that could be addressed in the chapter on housing bubbles. After outlining the significance of this topic, the main issues that could be elaborated in the compilation guide were summarised. The first one is a description of housing and households' characteristics (such as residential property price developments, households housing wealth, ownership ratio, disposable income). The second one is a discussion on housing market indicators (like savings and investment ratios, valuation and debt components).

Main conclusions:

(a) The TF was of the opinion that it will be very useful to include a chapter on housing bubbles in the compilation guide on land;

(b) The items proposed by the ECB were considered appropriate; the link with the main issue – the measurement of land – could probably be made a little bit clearer.

3.3 Questionnaire on service lives

A major goal of the TF is to provide a better understanding of how countries estimate stocks of land as a residual. According to the 2011 OECD Survey on Land Valuation in the National Accounts, many countries estimate net stocks of land through a “residual approach”: they estimate the total stock of land and structures, and then subtract an estimate of the stock of structures obtained through a perpetual inventory model. Therefore, the TF designed a survey in order to gain a better understanding of the methods countries employ to estimate net stocks, identify best and current practices, and promote international discussion on a number of issues.

At the second TF meeting, the working group presented the draft questionnaire on service lives. A proposal for a time schedule for finalising the questionnaire, launching it and processing the replies was presented as well. A number of questions were raised, for example on the scope, the industry/sector details needed and the transfer of ownership costs.

Main conclusions:

(a) The scope of the questionnaire should be limited to 'land related assets' (structures), but the questions about these assets should be rather detailed (including questions on maintenance and costs of ownership transfers);

(b) In 2014 an extension of the questionnaire to other areas/assets could be considered;

(c) The questionnaire will be checked on the use of the correct SNA/ESA terminology;

(d) Concerning the time schedule: the questionnaire should be finalized by end-January. First results of the analysed questionnaires could then be presented in the June 2013 TF meeting.

The questionnaire, including a clarification of its purpose, has been added as Annex 3 to this note.

3.4 Separation of land and structures

It is often easier to collect the value of structures including the value of the land and, therefore, one is confronted with the rather difficult estimation exercise to separate the value of land from the value of the structure which is on the land. In practice, the difficulty in separating these assets is primarily related to the non-availability of appropriate source data. The subgroup on separation of land and structures, firstly, produced a very detailed and useful overview of the existing literature on the measurement of land. Secondly, the subgroup worked on three methods to separate structures from the underlying land:

- Residual approach
- Hedonic approach
- Land-to-structure ratio approach

The working group presented the main characteristics, data requirements and (dis)advantages of two of these methods: the residual approach and the hedonic approach. (The third method, that uses the land-to-structure ratio, will be elaborated later). In the accompanying note (see Annex 4, where a slightly amended version has been added), a first rough text proposal describing the two methods was provided as well.

Main conclusions:

(a) the TF felt it very important to have a clear description of the requirements for each of the three methods;

(b) the TF decided not to rank the methods, as for some countries it will not be possible to use a (highly ranked) methods because of limitations in data availability;

(c) OECD will contact relevant Dutch colleagues concerning their experience with the hedonic approach.

4. Provisional time schedule

The table below presents a rough time schedule of the TF work in the coming 1½ years.

When	**What**
July 2012 (1st TF meeting)	Preliminary decisions on mandate (scope, organisation, output of TF)
	Establishment of 4 subgroups
December 2012 (2nd TF meeting)	Proposals of 4 subgroups concerning the content of their studies
	Decision on content compilation guide
	Establishment of additional subgroups
July 2013 (3rd TF meeting)	First drafts (made by subgroups) of all chapters/subjects addressed in compilation guide; as a minimum, a detailed annotated list of issues to be discussed and lines of arguments to be used will be provided Presentation of analysed results questionnaire on service lives
December 2013 (4th TF meeting)	Revised drafts (made by subgroups) of all chapters/subjects addressed in compilation guide
July 2014 (5th TF meeting)	Final drafts (made by subgroups) of all subjects addressed in compilation guide
October/November 2014	Discussion/approval of final draft compilation guide by

	National Accounts Working Groups of OECD and Eurostat
	Discussion/decision about possible continuation of TF work for other financial assets
December 2014 (6th TF meeting)	Content and editorial work compilation guide finalised
2015?	Continuation of TF work for other non-financial assets?

Annex 1: mandate of the TF on Land and other non-financial assets

1. Background

In the 3 November 2011 meeting of the Council Working Party on Statistics (CWPS) table 26 'Balance sheets for non-financial assets' was discussed. Some Member States indicated to have problems with the estimation of some new mandatory items, and more specifically with the estimations for land. It was concluded that there was a need for additional proposals to ensure a stepwise implementation of the transmission requirements.

As a follow-up, in the NAWG meeting of 30 November 2011 Eurostat presented some additional proposals for a gradual implementation of the transmission requirements, based on suggestions done by NAWG members by written procedure. More concretely, it was proposed to postpone the first transmission for items AN.211 Land (S.14+S.15), AN 115 Cultivated biological resources (for institutional sectors), AN.117 Intellectual property products (for institutional sectors) to 2017 and b) to establish a Task Force on Land (and possibly some other items).

The NAWG welcomed these proposals and in majority agreed with them. Subsequently the revised proposals for table 26 were incorporated in the initial ones by the Council Presidency and adopted in the CWPS meeting of 15 December 2011.

As one of the decisions was that a Task Force on Land and other non-financial assets should be established, this mandate outlines the purpose of this TF, the composition of the TF and the organisation of the work as well as a provisional time schedule.

2. Purpose and output

It is widely acknowledged that balance sheets information, as provided by the items of table 26 'Balance sheets for non-financial assets' is of a growing importance, because it provides valuable information on assets and, more general, countries' wealth.

The purpose of the TF is to study possible sources and methods that will enable Member States to compile estimates for the different balance sheet items. The output of the TF will be a set of papers that will provide descriptions of available sources, methodologies and calculation methods.

First priority of the TF will be the study of the variable AN.211 Land for the combined institutional sectors S.14+S.15 households and non profit institutions serving households. This item is of specific interest because it is of high importance for the measurement of households' wealth. The TF aims to make information on this item available in order to enable Member States to fulfil their transmission requirements in 2017.

Second priority will be the study of the balance sheets items AN 115 Cultivated biological resources and AN.117 Intellectual property products. Focus of the study will be on the estimates for the institutional sectors, as these have to be transmitted on a compulsory basis from 2017 onwards.

Third priority will be the study of other non-financial balance sheet items. A more concrete content of this study will be discussed in the TF.

3. Composition of the Task Force and organisation of the work

The TF will comprise about 15 members, including 3 Eurostat representatives.

The TF members are expected to contribute to the work of the TF actively. TF Members will:

- provide an outline of the main estimation problems they face in their countries;
- carry out studies, written in English, that propose solutions – useful methodologies, calculation methods – for estimation problems;
- be prepared to inform other TF Members by presenting national practice and results of the studies carried out in the TF meetings.

Eurostat will facilitate the work of the TF by organising and chairing the TF meetings and managing the secretariat. A dedicated part of the circa site will be made available for storing the TF documents.

Apart from the TF meetings, in which the produced documents and reports will be discussed, TF members are invited to discuss questions and (preliminary versions of) documents electronically.

Cooperation will be sought with the OECD that is also carrying out investigations on this area.

4. Time schedule

The TF will start its activities in May/June 2012 and finalise the work in 2014. It is foreseen to organise three meetings a year: in February, June and October.

Regular reports of the progress and the results of the work will be presented in the meetings of the NAWG. If desirable, the progress of the TF work may also be communicated with other working groups.

Annex 2: Considerations concerning subclassification of land

1. Objective

As agreed at the first meeting of the Task Force on non-financial assets the aim of this paper is to give

a) an overview of existing topics
b) an overview of existing literature

dealing with the classification of land.

The proposed compilation guide shall contain these two issues which will be part of chapter 3 (see paper "land manual-outline revised draft 121025" of the second meeting of the Task Force).

Chapter two of this contribution concerns the current definitions of classifying land in the National Accounts literature. Chapter three follows with different problems of defining an appropriate land classification. A first suggestion of structuring land is given in chapter four. It can be seen as a contribution for a prospective discussion in the Task Force to find a common classification. Chapter five contains a proposal of existing topics for the chapter "classification of land" of the compilation guide. The topics are derived from chapters two to four. Finally chapter six gives an overview of the collected literature regarding classifying land.

2. Current Classifications of land

At the moment there are three international classifications of land in the National Accounts literature. First of all, the SNA 2008 does not contain any formal disaggregation of land (cf. SNA 2008, p. 264). It attaches importance to exclude the value of buildings located on the land which indicates a split between land underlying buildings and structures and other land.
This is reflected in the classifcations of land of the SNA 1993 (cf. SNA 1993 – Annex Definition of Assets) and the European System of National Accounts (ESA) 1995 Annex 7.1. They show the following classifications:

SNA 1993	ESA 1995
Land (AN.211)	Land (AN. 211)
Land underlying buildings and structures (AN. 2111)	Land underlying buildings and structures (AN. 2111)
Recreational land and associated surface water (AN. 2113)	Land underlying cultivation (AN. 2112)
Other land and associated surface water (AN. 2119)	Recreational land and associated surface water (AN. 2113)
	Other land and associated surface water (AN. 2119)

Conspicuous is the missing classification of land under cultivation in the SNA 1993.

Moreover there is another classification in the System of Environmental-Economic Accounting of 2012 (SEEA). At paragraph 5.252 land is divided into seven subcategories. Furthermore inland water is separated and also divided into four subcategories:

1 Land
1.1 Agriculture
1.2 Forestry
1.3 Land used for aquaculture
1.4 Use of built up and related areas
1.5 Land used for maintenance and restoration of environmental functions
1.6 Other uses of land n.e.c.
1.7 Land not in use
2 Inland waters
2.1 Inland waters used for aquaculture or holding facilities
2.2 Inland waters used for maintenance and restoration of environmental
2.3 Other uses of inland waters n.e.c.
2.4 Inland waters not in use

These three classifications are not binding for the development of a new subclassification but can be used as guidance. The SNA/ESA classifications are focussed on valuation. They deal with the importance as assets for the production. In contrast the SEEA focuses on area and use for environmental purposes.

Needless to say is that there are several national classifications of land which may differ significantly (cf. AEG 2012, p. 4). In addition, the European classification of the LUCAS-project could be considered. It deals with an area sample to receive area estimates of important crops. The project focuses on the agricultural land-use but also contains land underlying buildings and structures (cf. Eurostat, 2009, p. 5).

3. Different approaches of classifying land

As mentioned in the paper of the Advisory Expert Group on National Accounts there is no commonly used approach to the sub-classification of land (cf. AEG 2012, p. 4). First of all the Task Force must clarify which kind of method has to be chosen. The following approaches are under consideration:

a) dividing taxable and non-taxable land
b) valuing only tradable land
c) approach of land-type/-use disaggregation

The target of approach a) is the valuation of only taxable land. The approach contains the problem of an appropriate source in the states. Not all states can draw on the tax authorities to receive data to divide the land area in taxable and non-taxable land. Furthermore countries have different tax regimes. Some countries tax certain kind of land, other countries may not.
Approach b) poses the question which kind of land is tradable. This is a tricky issue because certain types of land may be traded although in practice a trade rarely occurs. Examples of these types of land are land underlying roads, railways, and surface water. This raises the question how to define ‘tradable land’. At least it should be clear which requirements should be met regarding accompanying rights and prices. For instance, a road may tradable but only when the buyer obtains the right to levy a toll. Also, a forest may be sold but only when the trees are allowed to be chopped or when the price is significantly lowered. Thus, to assess

whether land is tradable it must beforehand be clear which criteria should be met. Furthermore, government ownership should be considered. At the AEG meeting in 2012 there was a general consensus that land owned by the state should be valuated (cf. AEG 2012, p. 5). The state may act, for example, as a market participant in behalf of private households. Finally, the problem of double counting due to spill over effects has to be reflected. Roads and railways influence the value of surrounding land obviously. But which kind of land-use does not influence the surrounding area? Industrial complexes and parks influence the surrounding area as well. We can assume that every kind of land-use has a negative or positive influence of surrounding areas.

Valuing all types of land according to the SNA definition of assets (cf. SNA 2008, Para. 1.46) implies that land to which no economic ownership can be assigned and/or no economic benefit can be derived, should not be valued. This might be the reason that the Canadian and Australian methods do value large areas of their states.

The most limiting factor for the choice of a suitable approach for determining a subclassification for land is the available data source of the states. Approach c) takes the advantage that all states compile a land-use statistic. Of course, they differ more or less, but this approach seems to be the best possibility to find a common ground. Another important (limiting) factor is the existence of price data. The best and most exact determination of the physical stock of land is useless without appropriate price data.

Questions for discussion

- Which kind of method should be approached?
- Should land owned by government be valued?
- Do the Task Force members agree to value all types of land according to the SNA definition of assets?
- Do areas like deserts or forests without any economical use belong to the government and can economic benefit can be derived from them.

4. Proposal of classifying land

Given the differences between the national classifications, the aim of the Task Force is to find the lowest common denominator for a classification of land. From the abovementioned approaches, a classification based on the land-use statistics seems to be the most promising. Undisputedly, land underlying buildings and structures is the most valuable type of land. To highlight the importance of land underlying dwellings, which has on average the highest value, it is suggested to divide land underlying buildings and structures into land underlying dwellings and land underlying other buildings and structures. The latter category also contains land underlying roads and railways as well as recreational land as far as sporting areas, parks, etc. are concerned. Not included should be natural reserves and the like. Recreational land is defined as “Land that is used as privately owned amenity land, parklands and pleasure grounds and publicly owned parks and recreational areas, together with associated surface water” (cf. SNA 1993, Annex Definitions of Assets and ESA 1995, Annex 7.1). All of these land-uses are overbuilt or structurally modified probably excepting surface water which should not be integrated in this subcategory. It is suggested to deviate from the disaggregations of the SNA and ESA and to integrate recreational land into land underlying buildings and structures.

Another subcategory is land under cultivation which is defined as “Land on which agricultural or horticultural production is carried on for commercial or subsistance purposes, including, in

principle, land under plantations, orchards and vineyards" in the ESA (cf. ESA 1995, Annex 7.1). It is proposed to integrate wooded areas here as well, but further discussion on this is desirable. The question remains whether forests that do not yield economic benefits or of which ownership cannot be determined should be classified. This raises the question whether the wooded area belongs to agricultural land or should be placed as a single subcategory.

The last subcategory should be called "other land". It should contain wasteland, exploitation areas and surface water. Possibly surface water used for aquaculture has a higher meaning for some countries. In most cases the total value of these areas is very low and the public interest of corresponding values seems to be low as well. This question has to be discussed in the future for a final decision as well as the possible integration of constructional land into this subcategory. It would be desirable to keep the reclassification of agricultural land into building land and finally into land underlying buildings and structures, visible.

The following subclassification of land is a mix of all three mentioned classifications (SNA, ESA, SEEA) and represents a basis for discussion at the following Task Force meetings:

- land underlying buildings and structures
  - land underlying dwellings
  - land underlying other buildings and structures
- land under cultivation
  - *agricultural land*
  - *forestry land*
  - *surface water used for aquaculture*
- other land

Questions for discussion
Do the Task Force members agree to divide land underlying buildings and structures?
Do the Task Force members agree with the integration of recreational land into land underlying other buildings and structures?
Do the Task Force members agree to integrate wooded area as an own subcategory as far as the land fulfills the SNA definition of assets?
How should we proceed with the integration of surface water, especially aquaculture?
What is the opinion of the Task Force members regarding the suggestion to integrate constructional land?

5. Conclusions

Independent of the suggestions done in chapters two to four of this annex, the compilation guide should contain a chapter of classification of land. The chapter can be subdivided into different parts. The relation to the SNA, ESNA and SEEA definitions and classifications as basis for the new subclassification can be one topic. An explanation of the application of a specific approach, for example the land-use statistics, should be integrated as well. Furthermore the definitions of single subclassifications and their aggregation have to be explained.

6. Literature

- Advisory Expert Group, 2012: issues note: the recording and measurement of land and natural resources (and dwellings) 7th Meeting of the Advisory Expert Group on National Accounts, 23-25 April 2012, New York
- Arbeitskreis der Vermessungsverwaltungen der Länder der Bundesrepublik Deutschland, 2011: AdV Land Use Catalog
- Bundesamt für Statistik (CH), 2011: Arealstatistik 2004/09/ Statistique de la superficie 2004/09
- Bureau of Rural Sciences: Land Use in Australia – At a Glance
- Department for Communities and Local Government, 2006: Generalised Land Use Database Statistics for England 2005
- Eurostat, 1996: European System of National Accounts 1995.
- Eurostat, 2009: LUCAS 2009 (Land Use / Cover Area Frame Survey) Technical reference document C-3: Land use and Land Cover: Nomenclature
- OECD, 2012: internal note - Examples of different types of land classification
- United Nations, 2012: System of Environmental-Economic Accounting – Central Framework
- United Nations, 2009: System of National Accounts 2008
- United Nations, 1993: System of National Accounts 1993
- United States Department of Agriculture, 2011: Major Uses of Land in the United States, 2007. In: Economic Information Bulletin. Number 89. December 2011

Annex 3: questionnaire on service lives

Introduction

The Eurostat-OECD Task Force on land and other non-financial assets has endorsed a survey of general methods for estimating depreciation and net capital stocks ("wealth stocks") of dwellings and other buildings and structures in national accounts. The purpose of this survey is to provide a better understanding of the methods countries employ to estimate net stocks, identify best practices, and promote international discussions on a number of issues.

A major goal of the Task Force is to provide a better understanding of how countries estimate stocks of land as a residual. According to the 2011 OECD Survey on Land Valuation in the National Accounts, many countries estimate net stocks of land through a "residual approach": they estimate the total stock of land and structures, and then subtract an estimate of the stock of structures obtained through a perpetual inventory model. Under this residual approach, inaccurate assumptions about service lives and depreciation rates of dwellings and structures can lead to unrealistic estimates of stocks of land. To address this problem, the Task Force hopes to provide a compilation guide that provides practical guidance for statisticians seeking to provide improved data on stocks of land.

It is hoped that responses to this survey can be provided by no later than 15 April 2013 so that the TF will be able to develop an issues paper for discussion at its meeting on June, 24-26. For any assistance in completing the survey please contact Mr. Bob Kornfeld at Robert.Kornfeld@bea.gov. Completed forms should be returned to Mr. Hans Wouters (Johannes.Wouters@ec.europa.eu) and Mr. Bob Kornfeld (Robert.Kornfeld@bea.gov).

The survey is designed as a tool to motivate wider discussions at the international level and so we hope it does not raise any issues of confidentiality. If however your response raises confidentiality issues we ask you to please stipulate, if necessary, whether the responses provided should be considered as confidential and not to be circulated in the public domain.

For a detailed explanation of methods for estimating net stocks, the perpetual inventory method, and the terms used in this survey, please see OECD (2009) *Measuring Capital: OECD Manual*, Second edition. Link: http://www.oecd.org/dataoecd/16/16/43734711.pdf

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OECD/Eurostat Survey of National Practices in Estimating Service Lives, Depreciation, and Net Stocks of Dwellings and other Buildings and Structures

Country:……..

In your responses to the next several questions, please describe the assumptions (such as service lives) and methods you employ to estimate depreciation and net stocks of dwellings and other buildings and structures. In the *System of National Accounts* 2008 (SNA2008) these assets are classified as (see Chapter 10, 10.68-10.77) :

- Dwellings (AN111)
- Other buildings and structures (AN112)
    - Buildings other than dwellings (AN1121)
    - Other structures (AN1122)

- Land improvements (AN1123)

Part A: Basic Assumptions of the Perpetual Inventory Model (PIM)

Please answer the following questions (questions 1-7) in the format of the table below. Please provide as much information as possible. If it is not possible to use the table then please provide your answers after the questions in any other format.

1. Asset Category	2. Net Stock Estimation Method (PIM or other)	Assumptions of the PIM (if used)				7. Is this estimate used to estimate the stock of land?
		3.Service lives	4. Other assumptions (age-price profiles, depreciation functions, retirement patterns)	5. Do service lives and assumptions vary over time?	6. Source of information	

1. (Column 1 in the table above). Please list the most detailed asset categories of dwellings and other buildings and structures for which separate estimates of service lives, depreciation functions, net stocks and depreciation are available.

If possible, please also indicate whether, for each asset category, the methods and assumptions (such as service lives) vary by industry (ISIC, NAICS, NACE or similar industry categories.) or by institutional sector (in the SNA2008, sectors are non-financial corporations, financial corporations, general government, households and non-profit institutions serving households.)

If such a detailed list of assumptions is not available, please provide as much detail as possible. Options include a list of assumptions by asset category only (without industry/sector detail), or ranges of assumptions (for example, asset lives of 50-60 years) by asset category, industry and/or sector, or whatever detail is readily available.

1(b) What are the reasons for this categorization?
2. (Column 2 in the table above) Please select from the following list the method(s) of net stock estimation employed for each of the asset categories, industries, and institutional sectors for which distinct net stock estimation methods exist (see *Measuring Capital*, Chapter 15).

a. Perpetual Inventory Model (PIM), based on an available time series of investment
b. PIM, based on an imputed time series of investment (derived from an estimated relationship with GDP or other method)
Benchmark-year estimates based on
c. Wealth surveys
d. Population censuses
e. Fire insurance records
f. Company accounts
g. Administrative property records
h. Share valuations.
i. Other, namely….

2(a) For responses b-h, please give further details about their nature.

3. (Column 3) Please list the service lives assumed for each of these asset categories (and sector and industry, if available). If a detailed list of specific assumptions is not available, please provide ranges (50-60 years, for example). For a discussion of service lives, please see Chapter 13 of *Measuring Capital*.

4. (Column 4) Please list the other assumptions (age-price profiles, depreciation functions, retirement patterns, etc) employed in estimates of depreciation for each of these asset categories (and sector and industry, if available). If a detailed list of specific assumptions is not available, please provide ranges.

For a discussion of age-price profiles, depreciation functions, retirement patterns, etc, please see Chapter 12-13 of *Measuring Capital*. Depreciation functions may be straight line or geometric, for example. Retirement patterns or "mortality patterns" may be Normal (NM), Winfrey (WF), Weibull (WB), Log-normal (LN), Gamma (GM), Truncated-normal (TN), Delayed linear (DL), or Poisson (PS).

5. (Column 5) Do the assumed service lives and other assumptions vary over time?

5(a) If yes, please explain how they are assumed to change.

6. (Column 6) How did your agency estimate or determine the service lives and other assumptions? (please refer to the methods and sources of information outlined in *Measuring Capital*: 13.1.1).

· Choose from tax lives, company accounts, statistical surveys, administrative records, expert advice, other countries' estimates, implicit service lives in depreciation rates, or other sources
· If others, please specify.

7. (Column 7) Is the estimate of this asset category (and sector or industry) used to estimate the stock of land, through the "residual method" described above?

Part B: Additional Questions

8. The estimates of net stocks also depend on estimates of Gross Fixed Capital Formation and prices.

8(a). Please describe (in general terms) the source data and quality of the estimates of gross fixed capital formation (GFCF) used for the PIM estimates.

8(b). Please describe (in general terms) the source data and quality of the price indexes for gross fixed capital formation used for the PIM estimates. Are chain prices used?

8(c). To your best knowledge, do the limitations in the GFCF data lead to problems in estimates of stocks of land? Please specify as much as possible the main problems.

9. How are transfer of ownership costs treated in estimates of structures? Are they included in GFCF (as the SNA 2008 recommends)? How are they defined and depreciated?

10. Are special methods used to estimate net stocks of historic buildings, and/or the underlying land? If so, please explain.

11. How frequently are the estimates of depreciation updated, and how soon are annual and quarterly estimates produced?

12. How confident are you in the assumptions (especially service lives and depreciation functions) used for these estimates? What would you say are the most significant problems in your estimates of net stocks of dwellings, other buildings, structures, and land? How could the estimates be improved?

13. What are your plans, for example in response to the transition to SNA 2008 or ESA 2010, for the future regarding estimates of net stocks of dwellings, other buildings, structures, and land?

14. Please submit details of any other national documentation, additional estimates, tables, and so on, you feel may be useful for the purposes of this survey.

15. Please supply the contact details of a person who could be approached for clarification and further information regarding your submission.

Annex 4: methods for splitting structures from the underlying land

In order to separate structures from the underlying land three methods could be considered: the residual approach, the hedonic approach and the land-to-structure ratio approach. A first provisional elaboration of the first mentioned two methods will be elaborated below, the description of the third method will follow later.

A. Estimation of Land - Residual Approach[1]

Description:
The value of land underlying buildings (dwellings and other buildings and structures) (L) is obtained as a residual, by subtracting the estimate of constructions (B) from an aggregated building and land value (T).

$$L=T-B$$

For applying the residual approach, the aggregated value of land and buildings (T) and the value of buildings (B) must be known. Often, completely different sources are used for compiling the 2 variables.

Estimating the combined value of land and buildings (T):

A "quantity x price approach" is generally used to estimate T, resorting to the prices observed on the real estate market. An average price per square meter at time t is calculated, by type of buildings or for the whole stock existing in a country in a given period of time. It is then multiplied by the total surface of the relevant buildings, in order to obtain the total value.
To be representative, each price should take into account every type of buildings, as to its use (for example, dwellings, factories, offices, shops, banks, garages, deposits), its location (for example, city centre, outskirt, rural area), its age and other quality features (for example, floor, maintenance status); so, a stratification of units with respect to these characteristics is required.

However, only a fraction of buildings are traded at a given period of time. Moreover, some kinds of constructions, mainly non-residential buildings (such as factories, shopping centres), are treated on thin markets, characterized by a low number of transactions. In all cases in which the market price is unknown, non-existent or not representative, the task is to find a proper price. This can be done, for example, on the bases of statistical models using as input the known market prices, for other types of buildings.

Where prices and/or quantities are unknown, the combined value T can also be obtained indirectly. For example, tax assessments may be used, if such information is available. The idea is to calculate, for each type of traded buildings, the ratio between T at the market prices and the tax assessment; then to use this ratio to estimate T for the non-traded (or few traded) units (Italy, 2012). This can be done in case the tax assessments relate to both rentals and stock values.

T may also be estimated indirectly on the basis of the net present value of future rentals or on the bases of the depreciated value of construction cost (The Netherlands, 2009).

[1] Paola Santoro, Istat - Italy, 21/11/2012.

Valuation of buildings (B):

The value of B can be estimated by applying the Perpetual Inventory Method (PIM): land is a tangible non-produced asset, therefore its acquisition is not included in gross fixed capital formation, with the exception of major improvements to land (ESA95 3.105)[2]. Since the value T is obtained using the price for which buildings are sold, it excludes the value of the ownership transfer cost, while the PIM estimate B includes this value; as a consequence, for estimating the value of land underlying buildings, ownership transfer cost should be excluded from the PIM value B. Sometimes the separated value of buildings B can be obtained directly (Sweden, 2011).

Advantages:

1) As separate data sources for buildings and land do not exist in many countries, it is often easier to collect the value of constructions which also includes the value of underlying land. Sometimes, statistic surveys or administrative sources are available for the two assets separately but they are not updated and/or accurate (at national level or for some zones); in particular, it can be difficult to estimate separated accurate market values of land on the bases of enterprises balance sheets (where historic costs are recorded).
2) Almost all the European countries obtain the value of buildings - for total economy and by industry - by applying the PIM; so, B is already known and it is based on a well established, common and shared estimation methodology.
3) The outcomes obtained by applying the residual approach may be helpful in refining PIM, so to improve the estimates of B.

Disadvantages:

1) Most of the holding gains/losses for real properties (the aggregate value of land and buildings) will be attributed towards holding gains for land. This is because the PIM estimate of B just includes the changes in prices driven by fluctuations in the construction prices. Therefore the value L, calculated as a residual, will include all the other changes in value that differ from the changes in the costs of construction. That one is certainly the main factor in the capital gains/losses for buildings but, actually, other kinds of revaluations may exist, even if with minor impact. For example, in a given period of time, buildings characterized by a specific quality feature (historical buildings vs. new buildings, apartment vs. detached house, apartment at the top/first floor) could be very appreciated and demanded, so their prices increase. As a consequence, if it is not feasible to calculate and to isolate these revaluation factors, the value of land obtained by applying the residual approach could result overestimated, even if marginally.
2) Estimating constructions by applying the PIM approach implies that every bias of the procedure affects the value of underlying land.
3) If buildings are calculated using PIM, estimation is feasible only at macro level (PIM is often available for state/province or a whole country and not for small zones).
4) The estimates of the value of land can result negative if the value of B is higher than T. Statistics Denmark's use of the residual approach has resulted in negative values for land (L) for Denmark for a period of years, when the Danish economy was hit by an economic recession. This is not an economic meaningful result. So, if a residual approach is used, then the final estimates should be checked to ensure they are sensible and economically coherent.

[2] Sometimes the separated value of buildings B can be obtained directly (Sweden, 2011).

References

- Australia, Recording land in the national balance sheet, 2009
- Italy, Estimating land underlying buildings: main outcomes and open issues in the Italian experience, 2012
- Korea, Land valuation in Korea and its relevance to National Accounts, 2012
- OECD, Internal working document, 2012
- OECD, Estimation of the stock of land in OECD countries, 2008
- Sweden, How to accomplish balance sheets in the Swedish NA, 2011
- The Netherlands, Compiling Complete Balance Sheets for The Netherlands, 2009

B. Estimation of Land – hedonic approach

Introduction

The hedonic approach is an alternative method to separate the value of land and buildings. A hedonic regression model is the centre of this approach and it requires technical skills to make the estimations. However, when applied, it returns values for both the value of land and the value of buildings which match with the total values for the properties, which is one of the approaches very positive characteristic.

The outcome of the hedonic regression model is in practice an estimate of the representative price for one square meter of land for one period of time. As a useful secondary outcome is a representative price for one square meter of building located on the land. The total value for land is derived by multiplying the representative price per square meter of land with the total number of square meters of land for the area where the value of land should be measured. Inputs into the calculations are price per property (combined value of land and structure), number of square meter of building and number of square meter of land.

If the aim is to calculate the value of land for an entire country, it is most unlikely that estimation of a price for one square meter can be done at country level with meaningful results, because of local variations in prices for land and different use of land which must be assumed to impact the price of land. It would properly be more sensible to calculate a representative price per square meter for each different use of land (residential, agriculture, factory, office or commercial) and different locations. In other words, using the hedonic approach most likely require many regression models because data has to be divided into homogenous subsamples.

A simple hedonic regression model

For a given period of time, location and type of land (for instance a specific zip-code and residential land), the hedonic regression model in its most simplistic form is given by:

$$P_i^P = P^B * B_i + P^L * L_i + \epsilon_i, \quad i=1,..,n.$$

The outputs of the model are values for 2 parameters; P^B, which is the prise per square meter of building, and P^L, which is the price for one square meter of land. Input to the model is P_i^P,

which is the property price for observation number i, B_i is size of the building measured in square meters for observation number i, and L_i is size of the land measured in square meters for observation number i. The sample contains n observations, and ε_i is the error term.

Expanding the model

In the simplest form the hedonic regression model treat one square meter of building equally regardless of the age of the building; the price for one square meter of a 1 year old building is assumed to be the same as the price for one square meter of a building which is 30 years old. This is not what one would expect since buildings depreciate in value as it ages. The regression model can be expanded to take account of depreciation of buildings. The expanded model is given by:

$$P_i^P = P^B * (1 - \delta A_i)B_i + P^L * L_i + \varepsilon_i, \quad i=1,..,n.$$

In the expanded model δ represent the yearly depreciation rate. The parameter A_i represent the age of the building, and the combined value δA_i increases with the age of the building. The term $(1- \delta A_i)B_i$ can be interpreted as quality adjusted square meters for buildings.

An example

It might be useful to illustrate the exercise with a numerical example, see table 1. Assume 7 property sales (dwellings) has taken place in a given period, they are listed together with the number of square meters of land and buildings for each transaction. Also listed are the year of construction and the implicit age of the buildings.

TABLE 1

		----- Land -----		----- Buildings -----					
Property transaction	Property price, DKK	Price	Square meter	Price	Square meter	Quality adjusted sq. m.	not explained	Year of construction	Age of building
1	2.700.000		886		136	58	ε_1	1969	43
2	3.200.000		843		143	74	ε_2	1976	36
3	2.115.000	P^L	729	P^B	110	34	ε_3	1960	52
4	3.600.000		761		162	73	ε_4	1971	41
5	2.800.000		749		143	72	ε_5	1975	37
6	3.050.000		791		143	72	ε_6	1975	37
7	3.850.000		814		171	121	ε_7	1990	22
	21.315.000		5.573		1.008	505			

The task is to estimate the values P^L and P^B for the 7 transactions with the restriction that the error terms should be minimized. The values P^L and P^B are shared for all the observations. Information about the age of the building could optionally be included in the calculations. Quality adjusted square meters can be derived by using information on the age of the buildings. The average service life is assumed to be 75 years for the buildings; this corresponds to a yearly depreciation rate equal to 0.0133.

If the expanded model is used on the data shown in table 1, the prices per square meter are P^B = 19,629 and P^L = 2,037. The observed total value for the 7 real properties is 21,315,000 DKK. The value for land and buildings can in this case be calculated to 11,351,000 DKK and 9,919,000 DKK. The combined value for land and buildings is 21,270,000 DKK which is 45,000 DKK less than the observed value. Using the simplified regression model for the 7

observations, the results are P^B = 20,991 and P^L = -80.4, which is not an economic meaningful result.

Construction of price indices

The description in this section of a hedonic regression model is based on theory from the Residential Property Price Index Handbook (Eurostat RPPI Handbook) and an article by Diewert, de Haan and Hendriks (2010). The Handbook present a hedonic regression model for decomposing a general residential property price index into 2 separate indices, one for the price development for land and one for the price development for structures (the building). The 2 separate price indices measure the price development across time (quarters).

Measuring the price development across time – which is the aim of the model presented by the Handbook – and calculating a representative price for a square meter of land – which is the goal of this manual – is off course not exactly the same. However, the required data for running the regression model and the set-up of the regression model is very much related. For that reason, this manual borrows from the theory described in the RPPI Handbook. If a more technical presentation of the hedonic method is required, the original sources are recommended.

The authors of the Handbook mention multicollinearity and the fact that the method is data intensive as the main disadvantages for using hedonic regression approach for deriving separate price indices for land and buildings. The advantages are the hedonic approach generates separate indices for land and buildings which is almost impossible to compile otherwise. Because of being almost the same approach, the same weakness must be assumed for compiling values for land and buildings. The advantage is that this method properly will result in reliable figures should other – and easier – methods fail.

Data requirements

The data requirements for running the hedonic regression is a set of observations for sales of real properties, including number of square meters of land and number of square meters of buildings for the traded real properties. If the sample is non-homogeneous with respect to location or type of buildings, it would properly improve the reliability of the estimations if the sample could be subdivided into subgroups with similar characteristics. The hedonic regression model can be compiled without information on year of construction, but it clearly improves the quality of the results, if this information is included in the calculations. Sometimes it is a necessity.

References

- Diewert, W.E. (2010), “Alternative Approaches to Measuring House Price Inflation”, Discussion Paper 10-10, Department of Economics, University of British Columbia, Vancouver, Canada, V6T 1Z1, December.
- Diewert, W.E., J. de Haan and R. Hendriks (2010), “The Decomposition of a House Price index into Land and Structures Components: A Hedonic Regression Approach”, Discussion Paper 10-01, Department of Economics, University of British Columbia, Vancouver, Canada, V6T 1Z1.
- Eurostat (2011): Handbook on Residential Property Prices Indices.