8

Some special estimation cases

8.1. This chapter discusses a number of specific estimation cases. Chapter 8.1 discusses some special characteristics concerning (the valuation of) agricultural land and wooded land available for wood supply. Chapter 8.2 elaborates an asset type that is closely related to land: land improvements. The compilation and valuation of government owned land is described in Chapter 8.3.

8.1 Agricultural land and wooded land available for wood supply

8.2. In Chapter 5 the direct estimation method of land is explained. Chapter 6 addresses the indirect estimation of land, where three approaches were discussed that can be used to separate structures from the underlying land. The main principles that are elaborated in these two chapters are also applicable for agricultural land and wooded land available for wood supply. However, there are some peculiarities that make it worthwhile to pay separate attention to these types of land in this chapter.

8.3. Therefore, first part of Chapter 8.1 will discuss specific characteristics of agricultural land and the second part will elaborate details regarding wooded land available for wood supply. A case study at the end of the chapter illustrates the Finnish practice regarding the valuation of land underlying timber.

Agricultural land

Introduction

8.4. In many countries agricultural land represents an important part of the total land area. For that reason and because prices of the different types of agricultural land can deviate from each other considerably, this section pays attention to the issue of agricultural land and its valuation. In the history of economics, the three fundamental factors of production were considered to be land, labour and capital; land meant agricultural land in this context. Land, in addition to being a factor of production, is an important store of value and can be used by landlords and owner-occupier farmers as collateral for loans. Policy makers are interested in the extent to which agricultural policy measures are capitalised into land values.

8.5. Four issues related to agricultural land are addressed below. The first section discusses the distinction of different types of agricultural land. The second section addresses the data sources that countries could use to derive quantity and price data. Section three provides methodological recommendations on the prices that should be used for the correct valuation of agricultural land and the final section briefly addresses the issue of determining the total value of agricultural land.

Classification of agricultural land ([78])

8.6. Various types of agricultural land can be distinguished: permanent grassland, arable land (irrigable and non-irrigable) and permanent crops. Permanent crops include orchards, vineyards, olive groves etc. In principle all land that is used for agricultural purposes should be classified under AN.21121, see paragraph 3.23.

8.7. In most countries permanent grassland and arable land are by far the most important types of agricultural land; their definitions are mentioned below. Areas devoted to permanent crops are usually less important, in some countries even negligible.

8.8. Agricultural statistics where the primary focus is for agricultural purposes includes kitchen gardens as a separate category of agricultural land. Traditionally, farm households have a garden in which they grow fruit and vegetables for their own consumption. Any surplus, which may be considerable, is sold on the market. In certain countries and at certain times, fruit and vegetables grown in such gardens may have a significant share of the market. However, for national accounts purposes they should be included in AN.2111 land underlying buildings and structures. Usually they are not of major importance. Also see Chapter 3 on land classification.

8.9. Arable land is land worked (ploughed or tilled) regularly, generally under a system of crop rotation. It can be broken down into irrigable arable land and non-irrigable arable land. Irrigable arable land is defined as arable land area which could, if necessary, be irrigated in the reference year using the equipment and the quantity of water normally available on the holding. Non-irrigable arable land can be defined as arable land area which cannot be irrigated due to the lack of water for irrigation on the holding.

8.10. Countries for which the irrigable land area is relatively large and for which its price is significantly higher than the price of non-irrigable land, are advised to implement the above mentioned breakdown of arable land and to determine the value of both types of arable land separately.

8.11. More concretely, those countries for which the irrigable arable land area exceeds 15 per cent of the total utilised agricultural area and the prices per hectare are more

([78]) The definitions and descriptions in paragraph 8.6–8.13 are mainly derived from Commission Regulation (EC) No. 1200/2009 of 30 November 2009. Available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:329:0001:0028:EN:PDF.

than 50 % higher than the prices for the non-irrigable arable land price per hectare, are recommended to implement this breakdown.

8.12. Permanent grassland is land used permanently (for five years or more) to grow herbaceous forage crops, through cultivation (sown) or naturally (self-seeded) and which is not included in the crop rotation on the holding.

8.13. Land for permanent crops comprises orchards, vineyards, olive groves and the like. It includes fruit plantations, nurseries and 'other permanent crops' such as Christmas trees.

Sources

8.14. In order to calculate the value of the different types of agricultural land sources on quantities (areas in square metres) and prices have to be collected. Below an overview is provided of sources that countries can possibly use for these purposes.

Area

8.15. Many countries collect data on the areas of various types of agricultural land: permanent grassland, arable land (irrigable and non-irrigable), permanent crops, and kitchen gardens through a survey. Data are often available at the national and, in the European Union (EU), at the regional NUTS 2 ([79]) levels.

8.16. The cornerstone of agricultural statistics in the EU is the Farm Structure Survey (FSS) which is carried out in all Member States of the EU. Analogous surveys exist in other countries. The FSS is a farm census that is carried out every 10 years (most recently in 2010) and for which a large sample survey is held every 3–4 years in between. It covers the numbers of farms of various sizes and records many characteristics of each farm surveyed. This information enables the total area of the various types of agricultural land to be estimated for small regions (NUTS 2) and larger ones (NUTS 1), and for each Member State as a whole. The common methodology used means that the areas are comparable across EU Member States.

Prices

8.17. Statistical data on prices of agricultural land can be collected by means of:

— Direct observation of land prices by category of agricultural land. In this case, the agricultural holding is contacted directly and asked about prices of actual transactions related to the holding or about an average theoretical price/rent. The data can be collected through separate surveys or be integrated into the system of surveys which already exists (i.e. land use surveys, agricultural economic indicators, etc.).

— Statistical data collection via a network of experts — 'expert estimates'. This practice could involve experts from the regional statistical offices, local representations of the Ministries of Agriculture, agents from the real estate agencies at the regional level, the agricultural advisory service, etc.

— Use of administrative data to obtain statistical information. This method of data collection should be used only when the information provided by administrative sources proves to be of equal quality to the information obtained from statistical surveys (the information from administrative sources is often prone to significant under-reporting and does not provide any breakdown by type of land).

In some cases, countries could combine one or both of the first two data collection methods mentioned above with the administrative data sources.

8.18. In most cases the national authorities of the EU Member States (national statistical institutes) and/or Ministries of Agriculture are responsible for collecting land prices and rents, and calculating the corresponding average prices for their country.

8.19. It is recommended to collect separate price data for arable land and permanent grassland. If no separate price data for permanent crops land is available they may be approximated using the price data for grassland and arable land ([80]). Where possible, it is advised to collect this price data at the regional level (NUTS 2).

Methodology on agricultural land prices

8.20. The price of one hectare of agricultural land sold/purchased for agricultural use is proposed as the observation unit. The field of observation should include agricultural land and/or permanent grassland sold to (or purchased from) private owners or estate agencies who sell land for agricultural use. In order to keep the price of agricultural land as pure as possible transactions for non-agricultural purposes (lifestyle buyers, construction sites etc.) and transactions of land between relatives should be excluded.

8.21. The agricultural land prices should represent the average price of the sold/purchased land in a calendar year.

([79]) See footnote 46.

([80]) Data for Agricultural Price Statistics are stored in the Eurostat dissemination database, Eurobase. This database can be consulted by external users via the Eurostat website http://ec.europa.eu/eurostat/data/database

It is not usual to take into account the value of any crops on the land at the time of sale. This is because the value of the crop is much smaller than the value of the land itself.

8.22. According to the market price concept, the price of agricultural land is the price received/paid by the holder in free trade without deduction of taxes or levies (except deductible value added tax) and without the inclusion of subsidies.

8.23. Prices can be collected from the owner of agricultural land who is selling agricultural land for agricultural use (selling prices) or from the person who is purchasing agricultural land for agricultural use (purchase prices).

8.24. The selling/purchase price of land should:

— include the value of related levies/taxes (other than deductible value added tax);

— exclude the entitlements related to the land;

— exclude the value of any monetary compensation received by farmers for the sale/acquisition of the utilised agricultural area;

— exclude the value of any building on the sold/purchased agricultural land;

— exclude inheritance transfers.

In practice, fees of estate agents and the like are usually borne by the seller and implicitly included in the sale price. On the other hand, lawyers' fees are usually borne by the buyer; they are generally invoiced separately and thus not included in the land price.

Valuation of agricultural land

8.25. In Chapters 5 and 6 the direct and indirect method to calculate the value of land are discussed. In case of agricultural land, ownership is registered and thus changes in ownership can be discovered. Most countries have an active land market with part of the land sold publicly. Thus for agricultural land the direct method will most likely be used. The value of the agricultural land can be determined by multiplying the areas of agricultural land and its prices per hectare. However, this assumes that the land coming on the market is representative of all agricultural land of the same type, an assumption which is difficult to test.

8.26. In order to get the best possible results it is recommended to perform this calculation at the most detailed level: by different types of land and by region. National estimations can be determined by aggregation.

8.27. Sometimes, it might be impossible to measure land area adequately or to obtain appropriate prices for agricultural land. In this case, net present value of future income expected from the agricultural land at time t (LV_t) could be applied as an approximation to the value of agricultural land by

(1) $$LV_t = \sum_{t=1}^{\infty} \frac{R_t - C_t}{(1+i)^t}$$

where R_t, C_t and i indicate revenue from agricultural land, cost for agricultural cultivation and discount rate, respectively.

Although this method may not be easily applied due to lack of information on relevant variables, it could be used as an alternative when other methods are not feasible.

Wooded land available for wood supply

8.28. This section briefly discusses two issues relevant for wooded land available for wood supply (hereafter also called 'land underlying timber'): the classification and registration and the estimation and valuation of wooded land including the separation of the trees from the underlying land.

Classification and registration of wooded land available for wood supply

8.29. Forestry land, as discussed in paragraph 3.23, is defined as wooded land under cultivation and includes not only land under cultivation for wood supply but also other types of wooded land under cultivation. However, this section focuses only on wooded land that is available for wood supply. Therefore, for the purposes of classifying land on the balance sheet, a distinction should be made for land underlying cultivated timber versus non-cultivated timber ([81]).

8.30. The first category of land underlying timber concerns land used for regular wood production. This type of wooded land is cultivated for economic exploitation since regular human intervention takes place. In this case, the standing timber — that is, the trees on the land — is classified as a produced asset and the value added corresponding to the growth of timber is considered production, and thus contributes to gross domestic product. The timber, according to ESA 2010 and SNA 2008 guidelines, is registered on the balance sheet under AN.1221 inventories, work in progress on cultivated biological resources. The growth of the timber is registered as changes in inventories (P.52) and the land itself is classified under forestry land (AN.211 land, sub-item AN.21122).

([81]) In the European Framework for Integrated Environmental and Economic Accounting for Forests (IEEAF) 2002, the concept of forest and other wooded land is used. This is not the same as the classification of forestry land presented in Chapter 3. The IEEAF proposes a further breakdown on wooded land from the perspective of trees that are or are not available for wood supply. See for more information Eurostat, *The European Framework for Integrated Environmental and Economic Accounting for Forests — IEEAF*, 2002. Available at http://ec.europa.eu/eurostat/documents/39314/44178/Handbook-IEEAF-2002.pdf/c7b2aeaa-c4dd-49ce-bf25-05740d90e043

8.31. The second category of land underlying timber concerns natural forests in which no human intervention has taken place for many years. Non-cultivated timber stands do not give rise to direct cultivation costs, but the timber is deemed available for wood supply.

8.32. Trees from the second category are registered under the balance sheet item non-cultivated biological resources (AN.213). The natural growth of trees classified as non-cultivated biological resources is entered in the flow accounts as economic appearance of assets (K.1). As soon as they are harvested, this is registered as economic disappearance of non-produced assets (K.2).

8.33. The paragraph directly above discusses the classification of the trees themselves on the balance sheet. The land underlying the trees is within the asset boundary and should be registered on the balance sheet if the land is deemed to provide economic benefits to the owner (or user). However, only land underlying cultivated timber should be classified as forestry land (AN.21122). Land underlying non-cultivated timber (if it is deemed to be within the asset boundary) should be classified depending on the main use of the land, most likely under other land and associated surface water (AN.2119).

8.34. The categories discussed above may be important for the correct valuation of the timber and the underlying land. Of course, other characteristics, like damage to trees, level of biodiversity, forest soil acidification or degradation are also of importance for a correct valuation.

Estimation and valuation of wooded land available for wood supply, possible sources

8.35. The value of wooded land available for wood supply can be estimated using the methods that are elaborated in the Chapters 5 and 6 of this compilation guide.

8.36. The direct method (as discussed in Chapter 5) can be applied if separate data on the bare land — that is the land underlying the timber — are available. In some countries, prices of transacted bare land are available, for example from administrative sources. Alternatively, the price of bare land may also be approximated by the price of comparable land, e.g. starting from prices of marginal agricultural land. In cases where land is rented, a third option could be to estimate the net present value of the future rents.

8.37. However, usually only the combined value is available and, therefore, the indirect method (as discussed in Chapter 6) must be used to isolate the value of the underlying land.

8.38. The combined value of the wooded property may be available from a register of transactions managed by a land registry office or from a fiscal database. However, a major drawback is that there are usually only a few transactions in a given time period, thus it may be difficult to derive prices that are representative for all types of wooded land available for wood supply. In addition, data that come from fiscal databases may suffer from systematic underreporting.

8.39. As a next step in an indirect approach, the value of the standing timber is estimated. In forest economics the net present value method is recommended; this method is also in line with ESA 2010 guidelines. According to this method the value of forest assets is calculated as the net present value of future economic benefits. However, the full application of this method raises some complex problems and requires detailed data. Therefore some simpler variants are also proposed in forest economics: the stumpage value method and the consumption value method.

8.40. In its simplest variant, the stumpage value method calculates an average stumpage price for the total harvest. This average price is applied to the whole stock. This method is rather simple: the stumpage value of the felled timber after deduction of the logging costs is divided by its volume. The resulting price is multiplied by the stock of standing timber. Physical data are generally available from forestry statistics and forest inventories. More detailed variants apply average stumpage prices e.g. per species to the volume of standing timber (or the natural growth) per species.

8.41. In the consumption value variant, different stumpage prices are used for the various categories of timber in terms of both species and age or diameter classes. These prices may be directly available, or have to be calculated starting from the prices of the various assortments of felled timber (log prices by diameter class, pulp wood prices, fuel wood prices, etc. by species). These stumpage prices are applied to the respective stocks (per species and per age or diameter class), as given by the forest inventories.

8.42. After having applied one of the above described methods, the value of land can be calculated as a residual. An average annual value of land may be calculated to estimate the trend and, therefore, smooth the annual volatility of market prices.

8.43. A more detailed description of the valuation of timber and forests goes beyond the purpose of this compilation guide. However, detailed (also technical) elaborations of the proposed methods can be found in two publications on forests and other wooded land: The European Framework for Integrated Environmental and Economic Accounting for Forests ([82]), in particular Chapter 3 and Annex 3, and Valuation of European forests ([83]). Although these publications were is-

([82]) See footnote 81.

([83]) Eurostat, *Valuation of European forests — results of IEEAF test applications*, 2000, Available at http://bookshop.europa.eu/en/valuation-of-european-forests-pbKS3100699/?CatalogCategoryID=Oq0KABst8WEAAAEjsZEY4e5L

sued in the first decade of the 21st century and often refer to ESA 1995 (instead of ESA 2010), most of the text is still valid and can rather easily be connected with ESA 2010 guidelines.

Case study estimating the value of land underlying timber: Finland

Introduction

The value of land is estimated by direct method as a rule in Finland. However, using data on real estate transactions to value land underlying timber leads to significant overestimation for the value of land, because transactions of forestry land always include the value of standing timber. As a matter of fact, the vast majority of the value derived from those transactions should be allocated to timber (inventories) instead of the underlying land.

How can the value of forestry land and the value of standing timber be separately identified? Can the value of the underlying land be estimated by deducting the value of timber from the combined value? Or would it be possible to use a direct method to estimate the value of the underlying land? The long history of Finnish forest research gives some tools to make comparative calculations by using different methods.

The residual approach for forestry land

As described in Chapter 6.2, the residual approach can be applied for the cultivated land as well: if the produced asset standing on the land can be evaluated and subtracted from the combined value at market prices, the value of cultivated land can be obtained.

The volume for standing timber by institutional sector in Finland can be obtained by the National Forest Inventory system carried out by the Finnish Forest Research Institute. The system has produced estimates on Finnish forest resources since 1920.

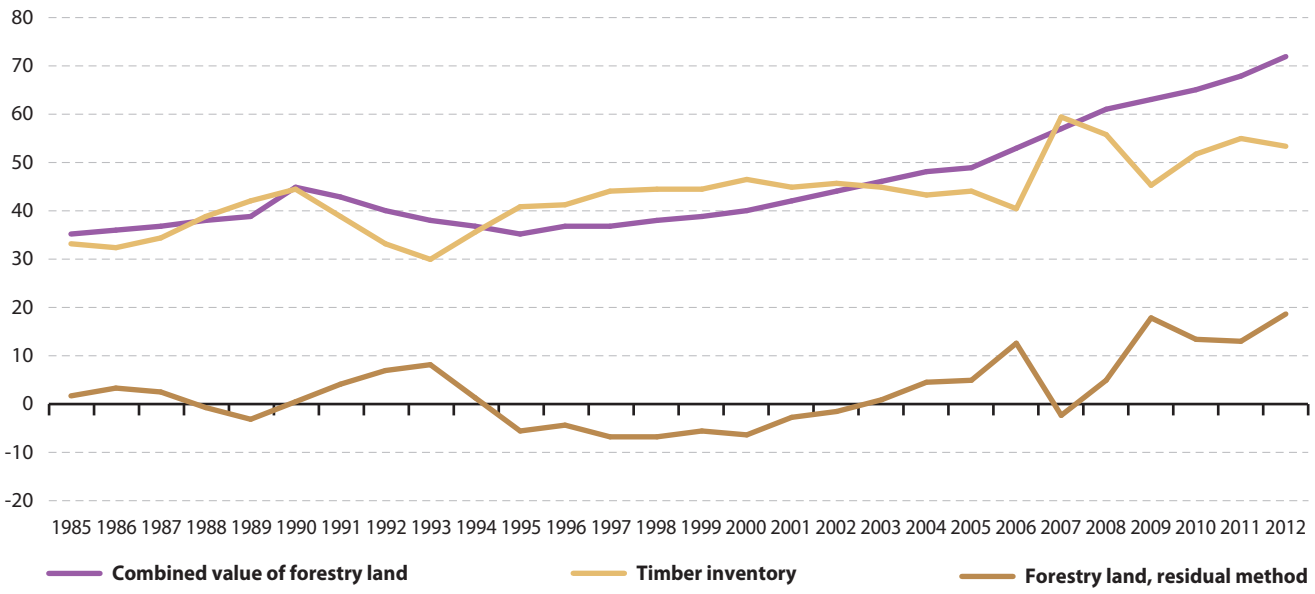
The total volume of standing timber as well as annual growth and fellings are based on extensive field measurements and systematic sampling. The field plots are located in clusters that form a network over the whole country.

The value of standing timber can then be derived by multiplying the timber assortment volumes by corresponding stumpage prices (sale on the stump is by far the most popular form of sale). There are three commercially significant tree species in Finland, for which prices are registered separately for saw timber and pulpwood. The relevant market prices are collected by the Finnish Forest Resource Institute, as well.

The value of standing timber is already currently registered in national accounts as work-in-progress inventories on cultivated biological assets.

Figure 8.1 shows the combined value of forestry land, the value of timber inventories, and the value for underlying land calculated as residual for the period 1985–2012.

Figure 8.1: The value of forestry land estimated with the residual method
(billion EUR)



Source: Statistics Finland, Finnish Forest Research Institute, National Land Survey of Finland

The figure indicates that the residual method leads to negative values for forestry land for some years. This is due to two reasons.

First, the combined value, which is based on transactions of timber and the underlying land, is probably underestimated. This follows from the fact that the transactions used are related to sales of forests with a young tree stand. In other words, the combined value may be downward biased.

Second, the value of timber inventory is revised approximately five years backwards annually, when new information from the National Forest Inventory is gathered every year. This leaves the value of timber inventory with high uncertainty for the recent years.

In addition Figure 8.1 indicates that the residual value for forestry land is quite volatile; i.e. the variance in timber prices is reflected also in the value of underlying land. This is not a reasonable result taking into account the long period of tree growth in Finland (from 50 to 90 years depending on the latitude and the wood species). The value of clean forestry land should develop more smoothly, and reflect the productivity of the land more than cyclical changes in timber prices.

Therefore, the residual approach to estimate forestry land may require some kind of modifications, at least to avoid negative land values.

The direct method

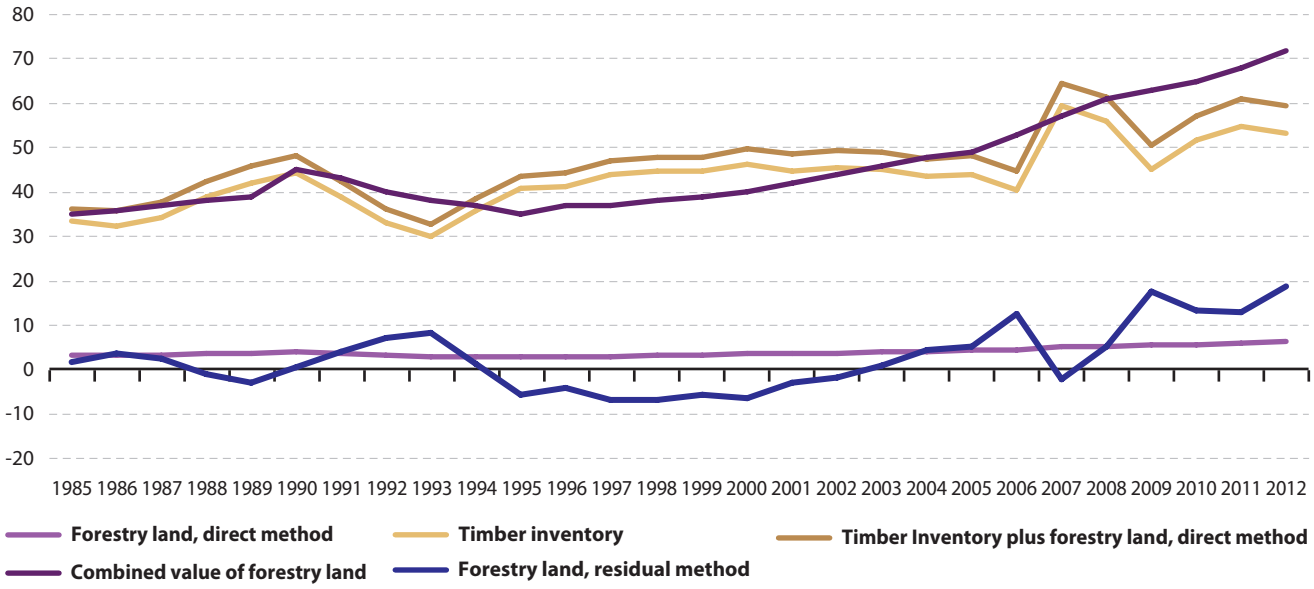
There are active markets for forest real estates in Finland. When an estate is evaluated for trade, usually the so-called summation approach is used. In this method, the total value of a forest real estate is the value of the land plus the standing timber value including expectation values for young growing stands.

The Forestry Development Centre Tapio produces unit prices for different forest land types (excluding timber), to be applied in the evaluation of forest real estates. The price formation process considers different types of soil and several other factors that affect the economic value of forestry land.

Area information for different site fertility classes on mineral soils and on mires on forest land are available from the statistics published by the Finnish Forest Research Institute.

Applying the above mentioned information on unit prices and land area the total value for the land underlying the standing timber in economic use can be calculated for a single year (2012). In order to estimate the value of forestry land for the period 1985–2012, the price index for forest estates from the National Land Survey was applied. The results are shown in Figure 8.2.

Figure 8.2: Comparative results for forestry land value
(billion EUR)



Source: Statistics Finland, Finnish Forest Research Institute, National Land Survey of Finland

Figure 8.2 indicates that the value of forestry land computed by the direct method is less volatile than the results obtained by the residual approach. Because the direct method is not based on realised market prices but on the estimated productive value of forest land types, it implicitly excludes the value of capitalised land improvements. The residual approach instead includes the land improvements by definition. Therefore, if the residual approach is applied, the stock of land improvements should be deducted to obtain the value of forestry land in accordance with ESA 2010 (see Chapter 8.2).

It can be concluded that in estimating the value of Finnish forests the direct method leads to more reliable results. It is known that the market prices of forest real estates are not as sensitive to timber prices as the results of the residual approach would imply. More steady development of the forestry land value is a consequence of long production period (from 60 to 100 years) of timber in Finland. In reality, economic cycles do not have such a strong impact on forest real estate prices, but the prices are more dependent on the productivity of the piece of land.

Then again, if the use of the direct method is not possible, the residual approach could be used as a second best solution to estimate the value of forestry land. It leads to results which are within the same magnitude as the results obtained by applying the direct method. If the residual approach is applied, it is necessary to check the values of underlying land year by year carefully and to eliminate possible outliers like negative land values. Calculations to evaluate forestry land 2009–2011 are shown in Table 8.1.

Table 8.1: Calculation of forestry land value
(million EUR)

Year/Asset	2009	2010	2011
Combined value based on forest estate sales	63 112	65 072	67 967
Timber inventory value	45 227	51 548	54 904
Forestry land value, residual method	17 885	13 524	13 063
Net stock of land improvements on forestry land	3 133	3 313	3 339
Forestry land value with deducted land improvements	14 752	10 211	9 724
Forestry land value, direct method	5 453	5 650	6 068

Source: Statistics Finland

8.2 Land improvements

Introduction

8.44. Activities such as land clearance, land contouring, creation of wells and watering holes will lead to the improvement of land. As land improvements are very closely related to land itself, they are the subject of this chapter of the compilation guide.

8.45. The definition of land improvements, its relationship to land and the position of land improvement in the system of national accounts is described in the first part of this chapter. Here also some possible data sources are mentioned. The second part of the section discusses possibilities to separate land from land improvements and in the third part the borderlines between the assets land, land improvements and dwellings and other buildings and structures are explored. The fourth part of the chapter elaborates four accounting examples. The accounting examples not only serve as an illustration for the borderline cases, but also show how information on stocks, transactions and other changes can be used to derive missing values. At the end of this chapter a country example for Finland is elaborated.

Definition, characteristics and data sources

8.46. Land improvements (AN.1123) are the result of actions that lead to major improvements in the quantity, quality or productivity of land, or prevent its deterioration (SNA 2008 paragraph 10.79, ESA 2010 Annex 7.1). Examples include the increase in asset value arising from land clearance, land contouring, creation of wells and watering holes. Land improvements, according to this definition, may apply to any type of land (and is not restricted to, for example, agricultural land).

8.47. Activities such as land clearance, land contouring, creation of wells and watering holes that are integral to the land in question are to be treated as resulting in the asset land improvements. However, activities such as the creation of seawalls, dykes, dams and major irrigation systems which are in the vicinity of the land but not integral to it, which often affect land belonging to several owners and which are often carried out by government, result in assets that are not to be classified as land improvements, but as structures.

8.48. Land improvements are fixed assets (AN.11) and form part of the asset category AN.112 other buildings and structures.

8.49. Land improvements represent a category of fixed assets distinct from the non-produced land asset as it existed before improvement. Land before improvements remains a non-produced asset and as such is subject to holding gains and losses separately from price changes affecting the improvements.

8.50. The asset land improvements by convention also includes the costs of ownership transfer of land.

8.51. Transactions in the asset land improvements should be registered in the capital account as gross fixed capital formation (GFCF, P.51g). As land improvements are fixed assets, the value of land improvements should be written off (consumption of fixed capital, P.51c). The write-off for land improvements other than the costs of ownership transfer should take place over a suitably long period, but the costs of ownership transfer are written off over the period the owner expects to own the land.

8.52. If other changes in the volume of assets and nominal holding gains and losses apply to land improvements, they have to be registered on the other changes in volume of assets account and the revaluation account, respectively — separately from those of land.

8.53. The sources to be used for the estimation of land improvements are quite heterogeneous. They strongly depend on the specific country situation. Only in a limited number of cases will direct sources on the stocks of land improvements be available. Such stock data might be directly available as part of investment surveys for several industries like construction or agriculture. Alternatively, stock data might be available from administrative sources, for example from Ministries (e.g. Ministry of Agriculture, Ministry of Economic Affairs), or from information from large companies working on the area of land clearing and land contouring or their trade organisations.

8.54. If no (reliable) direct information on stocks is available, an alternative could be to use the available flow information that is often available from investment surveys for industries that work on the area of land improvements. The available information on flows — part of P.51g GFCF — can probably be accumulated in order to get an estimate for the stock of land improvements. Another, more sophisticated method could be to use the perpetual inventory method (PIM) and make assumptions on service lives and depreciation rates to derive the stock values of land improvements.

8.55. In some cases the values of land improvements might be an integral and inseparable part of the stocks of AN.111 dwellings, AN.1121 buildings other than dwellings, or AN.1122 other structures. In these cases these stocks will be overestimated while the stock value of AN.1123 land improvements will be underestimated for the same amount. As a consequence, at the more aggregated level the over- and underestimation cancel out and the values are expected to be correct.

Separation of land improvements from land

8.56. Land improvements can sometimes only be observed in combination with the land itself. However, as can be concluded from the above, in the ESA 2010 and SNA 2008 land and land improvements are classified as separate assets. In case land and land improvements cannot be separated from each other, ESA 2010 and SNA 2008 recommend to register the composite asset in the category representing the greater part of its value. In the Manual on the Changes between ESA 1995 and ESA 2010, this case is elaborated in Chapter 11 ([84]). Accounting examples are included as well.

8.57. However, in order to keep the asset categories as 'pure' as possible and to enhance international comparability, this compilation guide advises to make serious attempts to separate land improvements from the land itself.

8.58. If only a combined value is available, it might be possible to make an estimate of land improvements by using the residual approach discussed in Chapter 6.2. The value of the land improvements can be determined by using PIM. Subsequently the value of land can be derived as the difference between the combined value and the PIM-based estimates for land improvements.

8.59. The PIM enables the compilation of a net stock estimate for land improvements, using data on GFCF and consumption of fixed capital in land improvements. This is only possible if sufficiently long time series of both the GFCF and consumption of fixed capital in land improvements is available. The PIM is described in detail in Measuring Capital (OECD, 2009) ([85]).

8.60. As land improvements will lead to major improvements in the quantity, quality or productivity of land, the value of the land will usually rise significantly because of the improvements. Data on value changes could be helpful to separate the land improvements from the land. In the paragraphs 8.73–8.76 accounting examples 3 and 4 will show how this separation can be realised.

([84]) Eurostat, *Manual on the Changes between ESA 1995 and ESA 2010*, 2014, Chapter 11. Available at http://ec.europa.eu/eurostat/documents/3859598/5936825/KS-GQ-14-002-EN.PDF/b247b032-6910-4db8-8f29-cb71d575752f

([85]) Organisation for Economic Co-operation and Development, *Measuring Capital: OECD Manual, Second edition*, Paris, 2009. Available at http://www.oecd.org/std/productivity-stats/43734711.pdf

Borderline between land improvements and dwellings and other buildings and structures

8.61. A first borderline case concerns costs of site clearance to prepare it for construction. One might argue that these costs could be considered as a type of land clearance and therefore should be considered as land improvements. However, the costs of clearing and preparing the site for construction are included with the costs of new dwellings or other buildings and structures and are thus included in the value of the buildings and structures (AN.111, AN.1121, AN.1122) on the balance sheet. They should not be considered as land improvements (AN.1123).

8.62. SNA 2008 paragraph 13.46 mentions that land improvements 'includes site clearance, preparation for the erection of buildings or planting of crops and costs of ownership transfer' should be interpreted in a very restrictive way. These activities should only be classified as land improvements if they would, eventually in the future, facilitate the erection of buildings on the land.

8.63. As mentioned in paragraph 8.47, some types of other structures form a second borderline case (which is, however, only relevant on the four digit level detail). Three possibilities can be distinguished.

8.64. Firstly, wells and watering holes that are integral to the piece of land in question are to be registered as land improvements (AN.1123). In exceptional cases structures like dams, dykes and irrigation systems could also be considered as land improvements, provided that they are integral to the land and belong to one owner.

8.65. Secondly, seawalls, dykes, dams and major irrigation systems which are in the vicinity of the land but not integral to it, which often affect land belonging to several owners and which are often constructed by government, are not to be classified as land improvements, but as other structures (AN.1122).

8.66. Thirdly, a structure like a dam can also be built with another purpose besides keeping out water. For example, a dam may be built to produce electricity. In such a case the dam is always to be registered as other structures (AN.1122), even if it is integral to the land.

Accounting examples

8.67. In the paragraphs below four accounting examples are elaborated. First, each of the examples shows under what circumstances a certain asset should be registered as land, land improvements or other structures. In that sense they illustrate the borderline cases that were discussed above. Second, the examples show how information on stocks, transactions and other changes can be used together to derive missing values. Third, the examples illustrate what transaction, other changes and asset codes/categories should be used in different situations.

Example 1: land entering the asset boundary as a consequence of activity in the vicinity

8.68. Not all land included in the geographic surface area of a country is necessarily within the asset boundary of the SNA 2008 and ESA 2010. Land may make its economic appearance when it is transferred from a wild or waste state to one in which ownership may be established and the land can be put to economic use. It may also acquire value because of activity in the vicinity, for example, land that becomes more desirable and thus more valuable because of a new development being established nearby or the creation of an access road.

8.69. Assume that a piece of land is in a wild state and is not yet within the asset boundary. In year *t* a road is constructed that gives access to this piece of land; construction costs amount to 25. Consumption of fixed capital in year *t* will be 2. After the road construction, the land can be used for agricultural purposes. The government, that is now the owner of this parcel, will be able to sell this land to a farmer for a value of 40. No changes in price levels are considered.

Table 8.2: Elaboration example 1

Classification of assets	IV.1	III.1 and III.2	III.3.1	III.3.2	IV.3
	Opening balance sheet	Transactions	Other changes in volume	Holding gains and losses	Closing balance sheet
Other structures (road) (AN.1122)	-	25 (P.51g) -2 (P.51c)	-	-	23
Land (AN.211)	-	-	40 (K.1)	-	40

Source: TF on Land and other non-financial assets, fictitious data

8.70. The construction costs (25) and consumption of fixed capital (– 2) should be registered as transactions in GFCF and consumption of fixed capital respectively. At the end of year t the balance of these entries will appear on the closing balance sheet (25 – 2 = 23). The road is in the vicinity of the land, but not integral to it. Therefore the road should be classified as other structures (AN.1122) and not as land improvements (AN.1123). Because of the improved accessibility of the land, the land (AN.211) can be put to economic use and will enter the asset boundary. Its value on the closing balance sheet equals 40. The difference between the value of the land on the closing balance sheet and the opening balance sheet also equals 40; this change should be registered in the other changes in volume of assets account as an economic appearance of assets (K.1).

Example 2: land value change as a consequence of activity in the vicinity

8.71. A second example concerns land that is included within the asset boundary, but that has a low value, for example because it is very dry and infertile. The building of an irrigation channel may lead to a significant rise in the value of the land. Assume that at the beginning of year *t* a dry and infertile area of land has a value of 20. Assume that an irrigation channel will be built in year *t* in the vicinity of the piece of land. As a consequence it will become possible to irrigate this piece of land — and also other parcels in the surrounding area. The construction costs of this irrigation channel amount to 60. The annual consumption of fixed capital for the irrigation channel will be 3. At the end of year *t* the value of this area of the land has increased to 75 (for example determined on the basis of prices of comparable irrigated pieces of land). Again, assume that there are no changes in the price levels.

Table 8.3: Elaboration example 2

Classification of assets	IV.1	III.1 and III.2	III.3.1	III.3.2	IV.3
	Opening balance sheet	Transactions	Other changes in volume	Holding gains and losses	Closing balance sheet
Other structures (irrigation channel) (AN.1122)	-	60 (P.51g) -3 (P.51c)	-	-	57
Land (AN.211)	20	-	55 (K.1)	-	75

Source: TF on Land and other non-financial assets, fictitious data

8.72. In this example the cost of building the irrigation channel (60) is treated as GFCF again. This should be entered in the accounts, together with the consumption of fixed capital (– 3) as a transaction. The irrigation channel is not integral to the land: it is only in the vicinity of the land and it can also serve other pieces of land. Therefore it should not be considered as land improvements (AN.1123), but it must be registered on the closing balance sheet as other structures (AN.1122) for a value of 57. Conceptually, the rise in the value of the land (because it benefits from the presence of the irrigation channel) should be considered as another change in volume of land and thus be registered as an economic appearance of an asset (K.1). However, identifying the driving factors behind such a change in value in practice may be very difficult. Thus, if detailed information does not exist it is reasonable to consider such as change in practice as a revaluation of the land and register this as nominal holding gains and losses (K.7). For further information on this and the decision of the Advisory Expert Group, see Annex A of Chapter 2.

Example 3: land entering the asset boundary as a consequence of activities on the piece of land

8.73. In the third example a piece of land that initially was in a wild state, will enter the asset boundary because the government decides to construct watering holes on this particular parcel. Assume that the construction costs amount to 19 and that the consumption of fixed capital in the first year equals 1. At the end of the year it could be determined that comparable parcels of land have a market value of 35. In this year the prices of land did not change.

Table 8.4: Elaboration example 3

Classification of assets	IV.1	III.1 and III.2	III.3.1	III.3.2	IV.3
	Opening balance sheet	Transactions	Other changes in volume	Holding gains and losses	Closing balance sheet
Land improvements (watering holes)) (AN.1123)	-	19 (P.51g) -1 (P.51c)	-	-	18
Land (AN.211)	-	-	17 (K.1)	-	17

Source: TF on Land and other non-financial assets, fictitious data

8.74. The creation of watering holes has to be registered as a transaction in GFCF (19), while the consumption of fixed capital should be entered for a value of – 1. As only this particular piece of land benefits from the investments, the result of the investments should be expressed on the closing balance sheet under the item land improvements (AN.1123) for a value of 18. The total value of the land including the improvements equals 35; as the land improvements part equals 18, the land part can be calculated as the residual: 35 – 18 = 17. This value should be registered under the item land (AN.211) on the closing balance sheet. As the land was not yet recognised as an asset at the beginning of the year, the full amount of 17 should be registered as an economic appearance of assets (K.1).

Example 4: land improvements as a consequence of activities on the piece of land

8.75. The fourth example considers a case where land is again included in the asset boundary, but has a low value because it is dry and infertile. At the start of year *t* its value equals 20. To improve this situation some ditches are constructed on this particular piece of land. The costs of constructing the ditches amount to 15. The consumption of fixed capital in the first year will be 1. At the end of year *t* the value of this parcel including the ditches has risen to 60 (for example this value could be determined on the basis of prices of pieces of land of comparable quality in the surroundings). No price changes occurred in year *t*.

Table 8.5: Elaboration example 4

Classification of assets	IV.1	III.1 and III.2	III.3.1	III.3.2	IV.3
	Opening balance sheet	Transactions	Other changes in volume	Holding gains and losses	Closing balance sheet
Land improvements (ditches) (AN.1123)	-	15 (P.51g) -1 (P.51c)	-	-	14
Land (AN.211)	20	-	26 (K.1)	-	46

Source: TF on Land and other non-financial assets, fictitious data

8.76. Actions that lead to major improvements in the quality of land should be considered as leading to the asset item land improvements if the actions are limited to this particular piece of land only ('integral' to the land). The improvement actions (15) themselves — digging the ditches — have to be registered as a transaction in GFCF. Consumption of fixed capital should be entered for the value – 1. The resulting item for land improvements on the closing balance sheet will equal 14 (= 15 – 1). The value on the closing balance sheet for land (AN.211) can be calculated as the difference between the total value of the parcel after the improvements minus the value of the land improvements: 60 – 14 = 46. Finally, the difference between the values of land on the closing and opening balance sheet equals the value change resulting from the land improvements: 46 – 20 = 26. In accordance with SNA 2008 paragraph 12.21, the excess in the increase in the value of land over the value of land improvements should be recorded as economic appearance of assets (K.1). However, as in example 2, this may be difficult in practice. Therefore, this value change may be registered as nominal holding gains and losses (K.7), assuming that the economic use of the land does not change as a result of the land improvement. In the case where the use changes, this should be identifiable, and therefore, the value change should be registered as an economic appearance of assets (K.1) on the other changes in volume of assets account. Again, see the annex to Chapter 2 for further information.

Case study estimating land improvements: Finland

In the national accounts of Finland this asset type (land improvements, AN.1123) mainly consists of investments in land under cultivation (AN.2112), i.e. land improvement investments in agriculture and forestry. Land improvements in other industries are mostly included in other structures (AN.1122).

Major improvements in agriculture include fertilising and subsoil drainage. The value of fertiliser use is based on data to be found in agricultural enterprise and income statistics and the Farm Accountancy Data Network. The data sources can be considered quite reliable. Data on the sale of agricultural fertilisers and other land improvement materials are used for control purposes. For the subsoil drainage, the industry organisation Subsoil Drainage Centre collects data about it by area and cost in hectares. Expenditures on land improvements can also be found in Statistics on the Finances of Agricultural and Forestry enterprises collected by Statistics Finland.

In the forestry industry, these investments consist of forest management and land improvement to be found in the Statistics on Forestry and Forest Improvement Activities collected by the Finnish Forest Research Institute. It contains: preparation of renewal area, artificial regeneration, seedling stand care, refining young forest, thinning of thicket and forest fertilisation.

Above mentioned land improvements are recorded as gross fixed capital formation by industries in the national accounts. Because they are part of fixed assets, consumption of fixed capital has to be estimated. This is done by using the perpetual inventory method (PIM). For the land improvements on agriculture, a service life of 30 years is applied, and for the forestry 50 years, respectively. Straight line depreciation function is used for both of the industries concerning land improvements.

As a result of recorded investments and the PIM, the net capital stock for the land improvements (AN.1123) can be calculated. The PIM also includes a price index for the land improvements, and applying that the holding gains and losses can be calculated.

The net capital stock of land improvements can then be utilised in land estimates by deducting the value of the net capital stock from the market value of land. In other words, it is assumed, that the estimated market value of land includes also the value of land improvements.

The case of land improvements in Finland is similar to example 4 presented in this chapter. Tables 8.6 and 8.7 below show the registration of land improvements and corresponding land type in the accounts for agricultural land and forestry land in Finland in 2012.

Table 8.6: Registration of land improvements and land value on agricultural land

Classification of assets	IV.1	III.1 and III.2	III.3.1	III.3.2	IV.3
	Opening balance sheet	Transactions	Other changes in volume	Holding gains and losses	Closing balance sheet
Land improvements (ditches) (AN.1123)	1 270	33 (P.51g) -89 (P.51c)	-	72	1 286
Market value of agricultural land (AN.211 + AN.1123)	20 976	-	-	-	22 000
Land (AN.211)	19 706	-	-19 (K.1)	1 027	20 714

Source: TF on Land and other non-financial assets, fictitious data

Table 8.7: Registration of land improvements and land value on agricultural land

Classification of assets	IV.1	III.1 and III.2	III.3.1	III.3.2	IV.3
	Opening balance sheet	Transactions	Other changes in volume	Holding gains and losses	Closing balance sheet
Land improvements (ditches) (AN.1123)	3 339	212 (P.51g) -229 (P.51c)	-	116	3 438
Market value of forestry land	9 407	-	-	-	9 683
Land (AN.211)	6 068	-	-	177	6 245

Source: TF on Land and other non-financial assets, fictitious data

8.3 Treatment of government owned land

Introduction

8.77. The compilation of balance sheets needs information about the values of the stocks of assets held by individual institutional units or groups of units (sectors). According to the SNA 2008 and ESA 2010, government is one of the five mutually exclusive institutional sectors that make up the total economy.

8.78. As one essential asset, land owned by the government can be used for carrying out a range of tasks pertaining to urban planning, environmental protection, real estate management, and economic development more generally. To this end, a good measure of land in terms of both physical quantities and monetary values is of crucial importance.

8.79. The measurement of total land owned by the government as well as the information on the composition of the land across different types is indispensible for the purpose of policy making, decision taking, and economic analysis.

8.80. For instance, the financial crisis of 2007–2008 has given rise to an increasing concern about the capability of payment of some debt-entrenched nations. To address this concern, information on the liquidity condition among a variety of assets, including different types of land owned by the government in question is of significant value.

8.81. In addition to the common issues associated with the measurement of land in general, which are covered by other chapters of this compilation guide, measuring government owned land has some special characteristics that are worth being discussed and clarified.

8.82. This chapter provides some discussions in respect of government owned land, with the view of putting forward a number of recommendations for treating government owned land in a way that is consistent with the SNA 2008 and ESA 2010.

8.83. The rest of the chapter is organised as follows. The next section points out that land owned by government should be registered in the balance sheets only if it is within the asset boundary as defined by the SNA 2008 and ESA 2010. A suggested classification of government owned land into different types is also presented in this section.

8.84. In the following section, the three most common cases related to licences and permits to use government owned land are discussed. The focus is put on how to appropriately record land owned by government, but used by other institutional units, into the relevant balance sheets.

8.85. Valuing government owned land is the main topic in the subsequent section, which makes it clear that despite thin markets and scarce information, all land owned by government and within the asset boundary should be valued.

8.86. To facilitate the empirical estimation in practice, the last two sections provide country cases that consist of an overview about national practices in this regard, drawn from a 2013 OECD-Eurostat survey, and a specific case study with Germany as an example.

Scope of balance sheets for government owned land

8.87. Besides the land that is unambiguously recognised as being owned by the government, any other land within the border of a nation's territory over which ownership cannot be acknowledged could also be considered as owned by the government by default. But this pragmatic treatment does not mean that all the land should be recorded in the balance sheets of the nation.

8.88. Some kinds of remote and inaccessible land such as deserts and tundras are outside of the asset boundary as stipulated by the SNA 2008 and ESA 2010, and therefore should not be included in the balance sheets at all. The reason is that even though the ownership could be identified to these lands, they are not capable of bringing any economic benefits to their owners, given the technology existing at the time.

8.89. Within the asset boundary as defined by the SNA 2008 and ESA 2010, land owned by the government can be sub-classified into different types of land. One option for classification as suggested in Chapter 3 of this compilation guide is displayed in Table 8.8. All the different types of land as listed in Table 8.8 and owned by government should be recorded in the balance sheets with the government as owner.

8.90. Information about the physical quantities (areas) of land is relatively easy to collect, for example, by means of national land use and land cover statistics. But in general, the evaluation of government owned land involves several complicated issues, even though some useful information can be extracted directly from public records, such as national cadastres.

Table 8.8: Composition of government owned land

Classification of land
1. Land underlying buildings and structures (AN.2111)
1.1 Land underlying dwellings (AN.21111)
1.2 Land underlying other buildings and structures (AN.21112)
2. Land under cultivation (AN.2112)
2.1 Agricultural land (AN.21121)
2.2 Forestry land (AN.21122)
2.3 Surface water used for aquaculture (AN.21123)
3. Recreational land and associated surface water (AN.2113)
4. Other land and associated surface water (AN.2119)

Source: TF on Land and other non-financial assets

Licences and permits to use government owned land

8.91. In many countries licences and permits to use land are generally issued by government since government claims ownership of the land on behalf of the community at large. There are basically three different cases that may apply to the use of land that is owned by the government, but used by other institutional units ([86]).

8.92. The first case is that the government may permit the land to be eternally used by other institutional units, which is equivalent to the outright sale of land to the user. As a consequence, this case should be recorded as the ownership transfer from the government to the user.

8.93. With the second and most frequent case, the government may extend or withhold permission to continued use of the land from one year to the next. Then the use of the land should be treated as a resource lease. The user as the lessee will regularly pay resource rent to the government as the lessor. As a result, the land should be recorded in the balance sheets of the government.

8.94. The third case is that the government may allow the land to be used for an extended period of time in such a way that in effect the user controls the use of the land during this time with little if any intervention from the government as the legal owner. This case leads to the creation of an asset for the user, distinct from the land itself but where the value of the land and the created asset (licence and permit) allowing use of the land are linked.

8.95. For example, a buyer of a private building situated on government owned land may sometimes pay for the right to use the land for an extended period in an upfront payment, which is normally recorded as the acquisition of an asset, rather than a payment of resource rent. When the building changes ownership, the purchase price includes an element representing the present value of future rent payments.

8.96. In such a case, the land is recorded in the SNA 2008 as if the ownership is transferred along with the building above the land. If, at the end of the land lease, a further payment is liable for extension of the lease for another long-term period, this should be recorded as capital formation and an acquisition of an asset in a manner similar to costs of ownership transfer on purchase and sale of an asset.

8.97. The borderline between the second and third cases is not always clear-cut. For instance, a resource lease on land may be considered as a sale of an asset connected to land if the lease satisfies most or all of the same criteria as those listed for payments for a mobile phone licence to be considered a sale of an asset (SNA 2008 paragraphs 17.317–17.318).

Valuation of government owned land

8.98. Not all tracts of land owned by government are subject to licences and permits. It is common that certain parts of government owned land, such as national parks and public roads, may be provided for use by other institutional units with either no or economically insignificant fees being charged.

8.99. Another observation concerning government owned land is that it is rarely, if ever traded on the market compared with land owned by private owners, even if the latter is not often traded either. All these characteristics regarding government owned land have brought about thorny valuation issues.

8.100. Under such circumstances with scarce market information, the common rule to follow for evaluating government owned land is to seek out land with similar attributes (size, quality, location, etc.) but owned by private owners, and to which the market information could be found.

8.101. This rule may apply reasonably well for valuation of some types of land, such as land under cultivation, and land under dwellings. However, for some other types of land, in particular, the land underlying public infrastructure like national parks and roads, there are significant difficulties.

8.102. Some argue that the value of the land underlying public infrastructure has already been included in the value of the adjacent land, since the latter depends, i.a., on its accessibility to public infrastructure; including a separate value in the balance sheets for the land underlying public infrastructure will lead to double counting.

8.103. Further, the land underlying public infrastructure does not seem to generate any economic benefits to the government, and thus does not have a genuine market value

([86]) The same treatments discussed here apply if the land is privately owned and its use by other institutional units is permitted.

as long as it is used as such. In many countries, land underlying public roads and dams may not be allowed to be sold since the roads and dams built on it have public functions (e.g. providing access to residential areas, and protecting the surroundings from being flooded) that have been predetermined by a government urban development plan.

8.104. Based on these arguments, but also due to measurement difficulties, the land underlying public infrastructure is frequently not valued in the balance sheets for land in some countries. However, these arguments do have their weaknesses.

8.105. First of all, there is no land in the world whose value would not be affected by the surrounding lands and structures. In this case, the surplus value accrued to the adjacent land due to easy accessibility may well be used to estimate the value of the land underlying the public infrastructure. But recording the value of both lands in the balance sheets is not double counting, simply because each land has its own value, no matter how the one is reflected in the other.

8.106. Second, given that the fundamental function of government is to provide public services, it is customary to expect government not to benefit from owning public infrastructure and the land underlying. However, even though the government benefits nothing economically and the land underlying cannot be sold on the market, it does not necessarily mean that the underlying land is of no value.

8.107. The land underlying public infrastructure is obviously different from inaccessible deserts and remote tundras. Because the former has value and can be realised if allowance is made for use by other institutional units ([87]), however, the latter has no value even if allowance is made for use by other institutional units, given the technology level and scientific knowledge at the time.

8.108. It is conceptually clear that the land underlying public infrastructure should also be valued in spite of measurement difficulties that will be encountered in practice. In some countries, there are now examples of privately owned toll ways and railways, from which information may be drawn for evaluating the comparable land owned by government.

8.109. In cases where it is almost impossible to find the comparable land, other methods may be employed. One alternative is to start with surface data of public infrastructure and to find an appropriate price per surface unit. Another alternative is to use relevant information from nearby privately owned land. More research along these lines should be encouraged.

Overview of country practices

8.110. In the 2013 OECD-Eurostat survey of general methods applied by national statistical institutes for estimating depreciation, and net capital stocks of dwellings and other buildings and structures, a question was raised about whether and how the value of government owned land is estimated in each country participating in the survey ([88]). Among the survey respondents, the vast majority do not have any estimates of government owned land. Nonetheless there are a few countries that do have such estimates.

8.111. In the Czech Republic, estimates of government owned land are derived from the cadastral data for the whole economy by using information from the State Land Office, the Forest Management Institute and other statistical surveys. In Romania, for the balance sheets of general government, data for agricultural land is provided, which is generated by the statistics in the Ministry of Finance.

8.112. The Australian Bureau of Statistics obtains relevant data on government owned land from the Australian Commonwealth and State Treasuries, and public non-financial corporations. Although the majority of government owned land is captured, for some States, however, the value of land under roads is missing because the Treasuries of these States do not include it.

8.113. Draft estimates of land underlying dwellings and land underlying buildings other than dwellings that are owned by general government are available in Italy. They are obtained by applying the land-to-structure ratio (i.e. the ratio of underlying land to net capital stock of buildings) for total economy to the relevant net capital stock of buildings owned by general government. All the estimates of the net capital stock of buildings just mentioned are derived by means of the perpetual inventory method. However, no estimates are currently available for land underlying other structures, due to the lack of information.

8.114. In the Netherlands, the capital stock of dwellings and non-residential buildings by institutional sector is used to divide land underlying dwellings and buildings into sectors including general government. For agricultural land, government reports are used to divide leased farmland into sectors. Nevertheless, the Netherlands do not have appropriate data to estimate government owned land underlying roads and other structures.

([87]) In principle, the public infrastructure together with the underlying land could be sold to private owners. Under the discretion of private owners, economic benefits can be drawn by charging fees from the users. The land underlying public infrastructure could also be reallocated for other purposes, then the increase (or decrease) in value due to this change should be treated as other changes in volume due to reclassification of assets.

([88]) The survey was designed and sent to countries by the Eurostat-OECD Task Force on Land and other non-financial assets. More on this survey and its corresponding results can be found in Chapter 6.5 of this compilation guide.

8.115. Drawing upon the survey results, one may conclude that though conceptually clear, valuing government owned land, in particular, those types of land underlying other structures such as public infrastructure, is still challenging in practice. One of the main difficulties is lack of appropriate data.

8.116. In the following paragraphs, a specific country case study is presented with the view of showing how the statistics within and beyond national statistical institutes can be utilised to draw helpful information about the value of government owned land, especially the land underlying public infrastructure such as public roads.

Case study government owned land: Germany

In Germany at least two possible sources exist that can be employed to generate useful information about the value of government owned land. The first is the annual budget funds provided by the Federal Ministry of Finance, the other is the statistics of land purchasing values published by the Federal Statistical Office.

Source 1: information from budget funds data

The budget funds contain information on the amount of money not only planned, but also actually spent by the central government for acquisition of land, including land used for federal roads and its corresponding building projects. Table 8.9 provides such information over a number of years.

Table 8.9: Money spent by the German central government for acquisition of land
(million EUR)

Year	Money spent
2000	66.56
2001	67.01
2002	67.36
2003	59.29
2004	64.78
2005	47.71
2006	40.32
2007	24.68
2008	49.11
2009	23.54
2010	27.76
2011	28.50
2012	22.27
2013	22.09

Source: German Budget funds

Although the information revealed in Table 8.9 is rather rough and only at a highly aggregated level, once supplemented with other data on the corresponding physical quantities (such as area in square metres), it is of use for deriving information about the average transaction price of government owned land under public roads.

Source 2: information from transactions data

The second source in Germany, the statistics of land purchase values, has more detailed information with regard to government owned land. It includes data about transactions covering both selling and buying of land by government, the number of transactions, the transacted areas, and the corresponding average purchasing values ([89]).

Table 8.10 provides information about the land that is purchased by the central/state government from different sellers, including natural and legal persons, housing associations, other central/state government institutions, and local government. Table 8.12 gives the corresponding information about land that is sold by the central/state government to the others. Table 8.11 and Table 8.13 present similar information for local government.

The second row of Tables 8.10 to 8.13 indicates the purposes for which the transacted land is supposed to be used. The heading of 'overall' refers to the transacted land that can be used for all building types; while that of 'building land' means that the transacted land is to be used for industrial and public transport purposes or just as open land.

([89]) More detailed information (in German language) is available at https://www.destatis.de/DE/Publikationen/Thematisch/Preise/AlteAusgaben/BaulandpreiseJAlt.html

Table 8.10: Land purchased by the central/state government from different sellers, 2012

Sellers	Natural person		Other legal person		Housing association		Central/state government		Local government	
Purposes	Overall	Building land	Overall	Building land	Overall	Building land	Overall	Building land	Overall	Building land
Number of transactions	559	514	98	70	11	9	19	16	88	67
Purchased area (1 000 m^2)	1 312	1 265	1 264	1 161	48	26	67	56	374	147
Average purchasing value (EUR/m^2)	6.92	5.66	13.64	8.11	114.93	8.34	5.28	3.45	28.99	16.00

Source: Statistisches Bundesamt

Table 8.11: Land purchased by local government from different sellers, 2012

Sellers	Natural person		Other legal person		Housing association		Central/state government		Local government	
Purposes	Overall	Building land	Overall	Building land	Overall	Building land	Overall	Building land	Overall	Building land
Number of transactions	2 758	1 612	457	300	97	65	131	88	153	114
Purchased area (1 000 m^2)	5 705	2 912	1 973	1 037	160	89	857	262	430	301
Average purchasing value (EUR/m^2)	25.94	16.54	41.92	32.00	31.69	27.73	19.86	14.20	88.50	92.49

Source: Statistisches Bundesamt

Table 8.12: Land sold by the central/state government to different buyers, 2012

Sellers	Natural person		Other legal person		Housing association		Central/state government		Local government	
Purposes	Overall	Building land	Overall	Building land	Overall	Building land	Overall	Building land	Overall	Building land
Number of transactions	1 005	56	173	58	11	:	19	16	131	88
Purchased area (1 000 m^2)	1 103	160	1 767	1 338	47	:	67	56	857	262
Average purchasing value (EUR/m^2)	71.86	25.61	70.23	13.63	87.36	:	5.28	3.45	19.86	14.20

Source: Statistisches Bundesamt

Table 8.13: Land sold by local government to different buyers, 2012

Sellers	Natural person		Other legal person		Housing association		Central/state government		Local government	
Purposes	Overall	Building land	Overall	Building land	Overall	Building land	Overall	Building land	Overall	Building land
Number of transactions	22 876	1 728	1 668	745	312	9	88	67	153	114
Purchased area (1 000 m^2)	20 350	5 315	10 136	6 610	652	63	374	147	430	301
Average purchasing value (EUR/m^2)	84.01	37.57	55.55	37.32	243.32	167.55	28.99	16.00	88.50	92.49

Source: Statistisches Bundesamt

Compared with Table 8.9, information drawn from Tables 8.10 to 8.13 is much richer. It provides information of transacted government owned land not only in values but also in physical quantities. This allows the construction of the average purchasing values that can be further applied to valuing the government owned land with comparable characteristics.

In addition, by offering the detailed information about the transactions of government owned land among different institutional sectors (shown as buyers and sellers in Tables 8.10 to 8.13), Tables 8.10 to 8.13 make it possible to provide valuable information for constructing the relevant sector accounts.

The information drawn from Tables 8.10 to 8.13 is, however, still highly aggregated, although the heterogeneity has been reduced to some extent if compared with that from Table 8.9, because the latter provides information at an even more aggregated level.

Therefore, it is worth mentioning that to value government owned land, the average purchasing values at this level as shown in Tables 8.10 to 8.13 should be applied with due caution. Nonetheless the German case study has clearly demonstrated the possibility and feasibility of valuing government owned land, even the land underlying public roads.