Estimation of the stock of land in OECD countries

KIM Young-Hwan

National Accounts Division, Statistics Directory
OECD

Introduction

1.   In 2007 the OECD Secretariat conducted a survey to find out how the stock of land was being estimated in Member countries of the OECD. Preliminary results from the survey were presented and discussed at the Working Party on National Accounts (WPNA) meeting in October 2007 (STD/CSTAT/WPNA(2007)8).

2.   Since the 2007 WPNA meeting, information has been provided by countries that had not previously responded and more detailed information has been provided by some countries that had previously responded. The result is that detailed information has now been received from one third of Member countries. Two of these countries, the Netherlands and Denmark, provided details of the methods they have used to derive experimental, unofficial estimates.

3.   The 2007 paper presented a summary of how each reporting country derives estimates of the stock of the land. This paper is organized differently: it focuses on the different types of methods used by countries and uses details for particular countries only as a means of explaining the type of method.

Purpose of estimating the stock of land

4.   The SNA defines land (AN.211) as:

the ground itself, including the covering soil and any associated surface waters over which ownership rights are enforced. Any buildings or other man-made structures situated on it or running through it are excluded.

5.   In principle, the stock of land should be valued at its current market price, i.e. at the price that would be paid by a willing buyer to a willing seller, but making a division between land and any structures on the land[1].

6.   The 1993 SNA recommends the compilation of a complete set of accounts leading to a set of balance sheets[2] that show the stock of a nation's (and sector's) wealth and by how much it has changed

---

[1] The SNA recommends that the value of land should be separated from the value of structures as follows:

In principle, the value of land to be shown under natural resources in the balance sheet is the value of land excluding the value of improvements, which is shown separately under fixed assets, and excluding the value of buildings on the land which is also to be shown separately under fixed assets. (Revised SNA forthcoming)

[2] The SNA defines the balance sheet to be a statement, drawn up at a particular point in time, of the values of assets owned by an institutional unit or sector and of the financial claims (i.e. liabilities) incurred by this unit or sector; for the economy as a whole, the national balance sheet shows what is often referred to as "national wealth" - the sum of non-financial assets and net claims on the rest of the world.

over the accounting period. However, at present only a few countries publish a complete set of national balance sheets. Many publish estimates of the stock of fixed assets and financial assets, but in order to make a complete national balance sheet it is necessary to estimate the stock of non-produced assets as well.

7.　　For most countries by far the most valuable non-produced asset is land, and so its inclusion in the national balance sheet should be a high priority. Land is also commonly considered as a factor of production, and therefore as an asset that provides a flow of capital services into production. Hence, estimates of the capital services provided by land are also required.

8.　　For analytical purposes, the capital stock of land underlying building and structures (AN.2111), especially land underlying residential buildings (dwelling), attracts much attention because it is subject to great price variation that can have a major impact on the economy. By contrast, land under cultivation (AN.2112) is of more interest as a source of capital services for agricultural production.

Types of land and sectoral breakdown

9.　　There are several alternative classifications for land, but in the 1993 SNA classification of non-financial assets, land (AN.211) is categorized by four types:

- Land underlying buildings and structures (AN.2111);
- Land under cultivation (AN.2112);
- Recreational land and associated surface water (AN.2113); and
- Other land and associated surface water (AN.2119).

10.　　Land underlying buildings and structures (AN.2111) can be further divided into land underlying dwellings and land underlying non-residential buildings.

11.　　The estimation of the stock of land is broken down for the five institutional sectors in the SNA:

- Non-financial corporations (S.11);
- Financial corporations (S.12);
- General government (S.13);
- Households (S.14); and
- Non-profit institutions serving households (S.15).

12.　　Most of the countries that responded in the OECD survey follow the SNA classifications in general, but some countries such as New Zealand do not derive estimates for all of the different types of land due to a lack of data, lack of resources and so on. Despite compiling estimates for all sub-components, Canada currently publishes estimates of only the total of land surrounding residential and non-residential buildings and agricultural land. New Zealand only publishes estimates of rural land.

Data sources

13.　　It is essential to have appropriate sources of data, such as volume, price or the value itself, to estimate the stock of land properly. The results of the survey show that the data sources countries are using can be divided into two groups:

- Administrative sources: a cadastre maintained by a land registry office, tax authorities or land information centre;

- Direct sources: population and housing census, business survey, other ad hoc survey.

14.   Most countries that derive estimates of the stock of land use data from both sources, but they differ in the extent to which they use them and the means by which they use them.

15.   Cadastres are commonly maintained to record the physical status and legal ownership of land, but are often used for taxation purposes too. They usually encompass all land used for economic purposes within a territory and contain comprehensive information on land such as location, size, use, ownership, value and so on. Many countries that derive estimates of the stock of land use cadastral data either fully (volumes and prices) or partly (volumes only).

16.   Direct surveys (e.g. population and housing censuses, business surveys, housing wealth surveys) also contribute to estimates of the stock of land and are often used to supplement cadastral data sources. Direct surveys designed to get the detailed data required typically require considerable resources and can be too expensive to run frequently, e.g. population censuses. Thus, they are often used as benchmarks and extrapolated with higher frequency indicators.

Various methodologies to estimate the stock of land

17.   The results of the survey show that the situation countries face concerning the estimation of the stock of land can be classified into the following three cases:

- Non-existence of data: both volumes and prices;
- Partial existence of data : only volumes, total value of buildings and structures including land;
- Existence of data: value estimates for both structures and land shown separately; and/or, both volume and prices.

18.   Many countries that do not derive estimates of the stock of land cite a lack of resources, a lack of data or it being given a low priority as reasons for not doing so.

19.   In estimating the stock of land the two major difficulties most commonly encountered are how to obtain land prices corresponding with land types; and, how to separate land values from the total combined value of buildings and structures and land, if a reliable estimate of total real estate exists. It turns out that estimating the stock of land is largely concerned with how to deal with these two problems effectively using available data sources.

20.   The remainder of this section discusses the advantages and disadvantages of four common methods used to estimate the stock of land: the direct survey method, using data from cadastres, the land residual method and the method of applying land-to-structure ratios. These methods are not necessarily mutually exclusive, and are regularly used in conjunction with each other.

Direct survey method

21.   As the name implies, the direct survey method entails using surveys to obtain land values directly from respondents. It includes population and housing censuses, business surveys, national wealth surveys including housing wealth surveys, and other ad hoc surveys.

22.   The direct survey method is an alternative when volume and price data from cadastres are unavailable. The Czech Republic and Slovak Republic use this method primarily. The Czech Republic obtains estimates of the stock of land in total and under buildings and the Slovak Republic obtains estimates of the stock of all land types from regular surveys.

23.   The method used by the Czech Republic to estimate the stock of land can be summarized as follows:

   a) Estimating the stock of land in total and land under buildings, excluding land under dwellings owned by households, by an **annual business survey** by institutional sector: non-financial corporations (S.11), financial corporations (S.12), general government (S.13), and non-profit institutions serving households (S.15);

   b) Using more detailed data obtained in a business survey in one year (2004) to calculate the share of each land type ; and

   c) Estimating the stock of land under dwellings owned by households (S.14) in the base year when **population and housing census** was conducted and extrapolating it with a relevant price index.

24.   In the Czech Republic, the share of land under buildings has been estimated to be 80% of the total value of land, using data from a comprehensive survey conducted in 2004 (point (b)). Of the remainder, the share of rural land is about 90% and so the shares of the other two types of land are not very significant. It is therefore reasonable to assume their shares are constant.

25.   A major problem with using surveys to obtain estimates of the stock of land is the difficulty respondents have in reporting accurate market values. Enterprises owning land are likely to value their land at historic cost in their balance sheets, and even if they are able to determine the market price they may be unable to separate the value of land from the value of the structures on it. Moreover, if a sample survey is used rather than a census then account needs to be taken of the fact that many enterprises rent land rather than own it, and ownership is concentrated in certain industries. As a result, the optimal survey design for a land survey may be quite different to that of a general economic survey.

26.   For these reasons direct surveys do not appear to provide a complete solution for estimating the stock of land for most countries. Other sources of data are needed for better estimation.

Using Cadastres

27.   Many of the countries that reported in the survey that they did not derive estimates of the stock of land gave a lack of data as the main reason. Given the need for details about land for land management, planning, local taxes and other administrative purposes it would be strange indeed if not most OECD countries maintained some sort of cadastre(s) for land used for economic purposes.

28.   Considering that the volume or area of land can be obtained from administrative sources or surveys and does not change very much, at least in total, it would seem that the fundamental problem is that there are no adequate land prices. For if accurate land prices exist, the stock of land can be easily estimated by simply multiplying volumes by the relevant prices. However, reliable estimates of land prices by type of land category can be difficult to come by.

29.   As summarized in Table 1, Japan and Korea rely mainly on cadastral data to obtain estimates of the stock of all types of land. Finland estimates the stock of land by this means intermittently. Australia uses cadastral data to estimate some land types, but only uses them to a limited extent in deriving estimates of land under residential buildings. France uses cadastral data in conjunction with other data to obtain its estimates.

30. In the case of Japan and Korea, volume and price data[3] are obtainable from the government authorities concerned. In Korea, for example, the land registry office maintains a lot of information on land (i.e. a cadastre), especially volumes. Price data are compiled by official land appraisal institutions and appear in the "public notice". These institutions appraise the land value, taking account of various factors, and the results are reviewed and adjusted as needed. The purpose of the public notice is to provide a guideline for general transactions in land, to help in evaluating acquisition prices of public use lands and for imposing taxes on land. The price data are so extensive that they give price information on location, land types and ownership. The official land prices are disseminated to the general public every year.

31. A similar situation exists in Australia, where a government body in each state is responsible for maintaining current values of all land parcels for tax purposes. The Australian Bureau of Statistics has found that the values available for residential land can lag current market prices because of lags in the government bodies' updating procedures. Consequently, a different method is used for residential land – see below.

32. In France, land values are estimated by multiplying land areas with unit prices for various types of land.

Table 1. Data sources concerning land prices and applied land types

Country	Data sources concerning land prices	Land types
Japan	Publicly assessed value of land by government	Land underlying buildings and structures Land under cultivation
Korea	Publicly assessed value of land by government	All land types
Australia	Publicly assessed value of land by government	Residential, commercial, rural and other (mainly crown land)
Finland	Prices from cadastral data	All land types
France	Prices[4] from survey of government (house, farmland and urbanisable land price)	All land types other than land underlying dwellings
New Zealand	Land valuation records by government	Land under cultivation

33. When cadastral data are available it is important to understand how the data are obtained in order to make an assessment of their accuracy. The government officials who maintain cadastres face the same difficulties in estimating land values as statisticians, such as separately identifying the value of land from transaction values that include both land and structures[5]. In addition, there is the possibility of

---

[3] How land values are determined is explained in Appendix 1.

[4]

Land types	Prices
Land underlying buildings and structure	House prices, farmland prices
Land under cultivation	Farmland prices , urbanisable land prices
Recreational land and associated surface water	Farmland prices
Other land and associated surface water	Urbanisable land prices, price of forest fund

[5] In this note those issues are not dealt with in detail. However, it is well known that it is hard to get relevant land prices due to practical, tricky issues as follows:

- How to separate land and structure;
- How to obtain timely price data;

underestimating the value of the stock of land because the levels of the official price lag or understate the real market transaction price. In addition, details and quality can vary across regions within a country.

Land residual method

34.   Most transactions in land comprise a combination of land and the structures sitting on the land. There is, therefore, much more data available to estimate the total value of land and buildings and structures at market prices than there is for land alone. The land residual method is used to estimate the stock of land by subtracting the value of buildings and structures from the total value of buildings and structures and land. It is mainly applicable to urban land, especially land underlying dwellings. The value of the stock of buildings and structures is estimated using the perpetual inventory method (PIM).

35.   Two of the countries that have reported using this method to estimate the stock of residential land are Australia and France. Though the details of how the method is applied are likely to vary according to a country's circumstance, the following step-by-step details for Australia and France could provide a useful guide.

Australia

The data in parentheses are in respect of 2004-2005.

Step 1 An estimate of the total household dwelling stock, including land, at market prices is derived by the Reserve Bank of Australia (RBA) using counts of all dwellings (occupied and unoccupied) from the Australian Bureau of Statistics' (ABS) Census of Population and Housing. Censuses are conducted every 5 years, with the latest in respect of 2006. For inter-census years, dwelling counts are extrapolated forward using dwelling completions, net of demolitions. The result is then multiplied by the mean market value of dwellings, including land, which is compiled by a private consultant. Valuers General (VG) data are a key input into the estimate of the mean value of dwellings, including land **(Estimating the total value of dwellings including land for households ($2721.5b))**;

Step 2 The ABS estimates the total value of dwellings including land for all sectors by inflating the overall value of dwellings including land for households by assuming that household ownership is 92% of the total of all sectors. **(Estimating the total value of dwellings including land for all sectors ($2958.2b))**;

Step 3 The ABS subtracts the current price net capital stock of dwellings excluding land for households ($1038.5b) and for all sectors ($1086.2b), derived using the perpetual inventory method (PIM) from the overall value of dwellings including land for households and for all sectors estimated by RBA **(Estimating the value of land underlying dwellings for households ($1683.0b) and for all sectors ($1872.0b));** and

Step 4 The difference between land underlying dwellings for households ($1683.0b) and all sectors ($1872.0b) is allocated to other sectors such as non-financial corporations, general government using certain indicators **(Estimating the value of land underlying dwellings for other sectors).**

- How to compile constant quality price indexes;
- How to accurately determine the real market price (appraisal price vs. sales price); and
- Etc (weight, seasonal adjustment, coverage, and so on).

France

Step 1 The volume index of land underlying dwellings[6] is applied to the value of land underlying dwellings at the period t-1, which provides the volume of land at the end of t at the price of the end of period t-1.

Step 2 The total value of dwellings, including land, at the price of period t-1 (volume at the end of period t x price at the end of period t-1) is then calculated by adding the net capital stock of dwellings[7] at the price of period t-1 (volume at the end of period t x price at the end of period t-1).

Step 3 The total value of dwellings, including land, at the end of period t is calculated using the house price index.

Step 4 The value of land underlying dwellings at the end of period t is derived by removing the net capital value of dwellings excluding land at the end of period t from total value of dwellings, including land.

Step 5 The value of land underlying dwellings is allocated to other sectors using certain indicators.

36.   When the two methods described above are compared, it is evident that estimating the stock of land underlying dwellings requires the following information:

- Total value of dwellings including land:
- A price index of dwellings including land (House price index):
- Net capital stock of dwellings excluding land at current prices;
- Comprehensive volume information; and
- Certain indicators for sectoral breakdown.

37.   The Netherlands considers using this method to estimate the stock of land underlying dwellings but has not proceeded to publish its estimates.

38.   In concept, the land residual method mimics the method used by government officials in Japan, Korea and Australia, albeit at a macro rather than a micro level. Government officials separate the land component from the observed transaction value of individual dwellings including land by subtracting an estimate of the value of the dwellings excluding land. The government officials then use this information to impute the current market values of other parcels of land within relatively small zones, such as a suburb. By contrast the land residual method is applied at a much higher level, such as a state/province or a whole country, and aggregate estimates of dwellings excluding land, derived using the PIM, are subtracted from aggregate estimates of dwellings including land.

39.   There is a trade-off. The land residual method attempts to overcome any deficiencies in land pricing by government officials (due to lags in updating prices or excessive conservatism in valuation) but

---

[6] Ssurface of land underlying dwellings at the end of period *t* / surface of land underlying dwellings at the end of period *t-1*

[7] It is derived using the benchmark year method. In 1988, a separate assessment of houses and their underlying land is available due to the joint use of Housing Census and files on the state of the house and the land market (file IMO) of the Directorate General of Taxes (DGI), which provides a separate assessment of house and their underlying land.

at the cost of doing the estimation at a macro level and incurring errors arising from the use of the PIM to estimate dwellings excluding land.

40.   Several countries that have used the land residual method have experienced problems, including Denmark and the US.

41.   Denmark does not currently publish estimates of the stock of land, but the land residual method was used to derive to derive unpublished, experimental estimates of residential land for the period 1995 to 2002. The estimates of the value of land were negative for some years.

42.   Denmark attributes this phenomenon to the use of price indices relating to new dwellings when using the PIM to estimate the stock of dwellings excluding land. Their estimates showed that the estimates of the stock of land can be negative when there are significant differences in growth between acquisition costs for new assets and used assets during an economic recession when the price of new assets can grow faster than the price of used assets. But for this reason to be valid the value of land must be quite small compared to the value of dwelling structures and the difference in growth between new and used prices must be substantial. The former result is quite contrary to the values reported for Australia, where the value of residential land ($1872b) greatly exceeds the value of dwelling structures ($1086.2b).

43.   The United States used the land residual method to estimate the value of land, but because it observed negative values for some components it stopped publishing estimates of land by institutional sector.

44.   Canada uses a variant of the land residual method to estimate the stock of farm land. The value of buildings (and depreciation thereon) is calculated as a portion of total farm capital[8] (land plus buildings excluding inventory) based on some research several years back.   Then, farm land is calculated as a residual. Given land's relative size in overall farm capital, any measurement errors associated with this process of estimation are relatively small.

Applying land-to-structure ratios

45.   Practically all OECD countries estimate the stock of dwellings (AN.1111) and other buildings and structures (AN.1112) using the PIM. This permits the use of land-to-structure ratios (LSR) to estimate the stock of land. Canada[9] uses this method to estimate the stock of residential land and non-residential land.

46.   The LSR for the stock of residential land in Canada is calculated using three key sources from new building activity by type (singles and multiples) across the country. Of which first two are: building permit value (BPV) and absorption price value[10] (APV). APV is the sale value of the total residential real estate unit.

---

[8] Annual data on the capital value of farms are based on the decennial census, the quinquennial census and intercensal projections. The latter are based on transactions data supplemented by annual farm surveys.

[9] Canada derives estimates of the stock of land for three main categories: land surrounding residential structures, land surrounding non-residential structures and agricultural land. However, only estimates of total land are published. More details in a paper presented to the 2007 NAWP meeting *Estimating Households' Non-Financial Asset* (P. O'Hagan). (http://www.oecd.org/dataoecd/4/26/39370136.pdf)

[10] The absorption price is the selling price of the new residential unit. It includes the building permit value, any upgrades to the structure included at a later date (not reflected on the building permit value) as well as the market value of the serviced land associated with the structure. The absorption price value for all new units is obtained as part of an administrative file that builders regularly transmit to the national housing corporation, and which is

$$LSR = (APV – BPV) / BPV$$

47.   The third key source is information of location, in other words, the physical address of units completed and sold. This helps to identify whether a unit is in a suburban area of a major city or in an urban centre. LSRs are always higher in urban core areas, and a further adjustment is made to the LSR to account for the higher depreciation of older buildings in urban core areas. Census weights are then used to aggregate the LSRs over census metropolitan areas (CMAs) and by region, such that economy-wide LSRs for singles and multiples are derived to apply to the estimates of residential housing stock.

48.   This methodology provides estimates of land that vary by type of structure, by urban and suburban areas and by regions of the country. Sector estimates are based on the composition of singles and multiples (structures by type and tenure) and applying the LSR. Using this method, the bulk of residential land is allocated to households.

49.   In practice, Canada does not exclusively rely on LSR for residential land. Other sources are used to supplement the LSR methodology. First, the LSR approach is labour-intensive and APV come in with a delay, such that this detailed methodology is typically 3-4 years behind the current data, such that LSR are projected using a set of current indicators of real estate activity and prices. These same current indicators, supplemented by quarterly real estate transfer costs, are used to develop quarterly LSR for the balance sheet account. Second, household sector macro estimates of residential real estate (structures plus land) are cross-referenced to the independently-derived household asset-debt survey aggregated micro data estimates. A project is underway that would lead to using the cadastre approach as a further check on the estimates.

50.   The LSR approach can also be found, to an extent, in other countries. Australia uses this method to allocate the aggregate estimates of the stock of land, such as commercial and rural land, by institutional sector. Germany also uses this method when they estimate the stock of land underlying buildings and structures for households.

Other approaches

51.   The Bundesbank (Germany) has developed an innovative approach for deriving estimates of household land using very little data. A summary of the approach is presented in Appendix 1, and a much more detailed description can be found in STD/CSTAT/WPNA(2007)10.

Conclusion

52.   The survey has revealed four principal methods for estimating the stock of land:
   a)   Direct surveys
   b)   Using cadastres
   c)   Deriving land residually
   d)   Applying land-to-structure ratios

These methods are not mutually exclusive. It is evident that a country's choice of method(s) is largely determined by what data are available in that country for the different types of land. As a result, no general method can be recommended

---

submitted to Statistics Canada as part of our economic statistics program.   This file has the building permit value and the absorption price for all new units.

53.   The best approach is to begin by making an assessment of the available data. Administrative data, particularly cadastres, can provide a good basis for developing estimates. They provide at least land areas by type of use, and often values. Nevertheless, they should not be used without first being satisfied as to their quality.

54.   Some countries have shown that estimates can be derived using quite limited data and ingenuity, but others have found their efforts have led to non-credible results. Clearly, estimates and methods need to be tested over a reasonable time span, including the ups and downs of the economic cycle, before proceeding to publication. This should, if possible, include cross-checking the estimates with data from other sources. For example:

- Use of (even infrequent) household asset and debt surveys

- Comparisons of the (1) ratios of land to structure, or (2) proportion of land to wealth for countries with largely similar characteristics in the real estate market (e.g., Canada and U.S.; France and Germany.

- Analysis of the trend-cycle of real estate prices.

Appendix 1. How land values are determined in Korea

In Korea, official reference land prices per square metre are determined by the Korean Association of Property Appraisers (KAPA) and announced by the Ministry of Land, Transport and Maritime Affairs annually. Their principal use is as a reference for determining individual land values. The individual land values are usually derived using the following steps.

Step 1 Selecting the standard types of land and assessing the reference land prices per square metre

 - Describing attributes affecting land values such as uses, size, location, and so on
 - Determining the reference land price per square metre (officially assessed reference land price)

Step 2 Compiling a cross-tabulation of attributes and prices relative to the standard land price

 - Showing the relative prices of different values of all the attributes

Step 3 Determining individual land values

- Comparing the values of the attributes of an individual piece of land with those of the reference land and discerning differences
- Calculating the appropriate relative price level for each attribute from the above cross-tabulation
- Combining the relative price levels of the attributes to determine the aggregate relative price level of the piece of land
- Multiplying the relative price level of the individual land by the reference land price per square metre

A numeric example showing how individual land values are determined is given below for two pieces of land – one urban dwelling land and one rural land

 - Urban dwelling land (A): 200 m^2, Rural land (B): 800 m^2
 - Officially determined reference land price of land A: 50,000 KRW/ m^2
 - Officially determined reference land price of land B: 10,000 KRW/ m^2
 - The relative price of land A : 1.20, The relative price level of land B : 0.70

 Each land value can be determined as follows:

 The unit price of land A: 50,000 * 1.20 = 60,000 (KRW/ m^2),
 The value of land A: 60,000 * 200 = 12,000,000 (KRW)

 The unit price of land B: 10,000 * 0.70 = 7,000 (KRW/ m^2),
 The value of land B: 7,000 * 800 = 5,600,000 (KRW)

Appendix 2. Estimating the stock of land underlying buildings and structures for households in Germany

In Germany, the Bundesbank estimates the stock of land underlying building and structures (AN.2111) for households using very limited data as follows – see STD/CSTAT/WPNA(2007)10 for further details.

Existing Data

- The total stock of land underlying building (m^2) for selected years (1992, 1996, 2000, 2004)
- The total transaction volumes (m^2) for building sales by building area (1991-2006)
- Corresponding nominal market value by building area (1991-2006)

Estimation procedure

Step 1 Stock-flow calculation of the total land underlying buildings and structures and breakdown
      By building areas

  (1) Calculating a breakdown of the total stock of land into building areas in real terms by use of
     the share of cumulated land sales transactions of each building area during the period 1964-2004
     (reference year 2004)

  (2) Extending time series of the breakdown of the stock of land underlying buildings and structures
     on the basis of transaction volumes for the period 1991-2006

  (3) Valuing stock and flows broken down by building areas by average nominal purchase values
     (€/m^2) for each building area for the period 1991-2006

Step 2 Breakdown of the stock-flow calculation into land underlying dwellings and land underlying
      other buildings and structures at the total economy level

  The breakdown is carried out by use of plausible assumption[11] for shares of above two land types

Step 3 Breakdown of land underlying dwellings and land underlying other buildings and structures
     by institutional sector

  The breakdown is done by use of Destatis' sectoral breakdown of the compilation of fixed assets

  (1) Compiling the annual ratio of building value including land to land value at the total economy level
     both for dwelling and other buildings and structures for the period 1991-2006

  (2) Applying those annual ratio to Destatis' breakdown of dwellings and other structures
     by institutional sectors

---

[11]

Type of building area	Share of land building dwellings	Share of land underlying other buildings and structures
Business area	0%	100%
Mixed business and residential area	50%	50%
Residential area	90%	10%
Industrial area	0%	100%
Village area	80%	20%

Appendix 3. Summary of the survey

| Country | Land types | Data source | | Method to estimating the value |
		Price	Volume	
Australia	Residential land	Mean market value of dwellings including land	Population and Housing Census	Land residual method
	Commercial land	-	-	Value data from Valuers General * Valuers General maintains the Cadastre data
	Rural land	-	-	Value data from Valuers General
	Other land (mainly crown land)	-	-	Using Public Finance data
Czech Republic	Land underlying buildings and structures	Unit value of building site (households)	Population Census (households)	Business survey, Population Census for households
	Land under cultivation	-	-	Business survey
	Recreational land and associated surface water	-	-	Business survey
	Other land and associated surface water	-	-	Business survey
Finland * Estimates of the stock of land are compiled intermittently	Land underlying buildings and structures	National land survey	National land survey	Multiplying volumes by prices from cadastre
	Land under cultivation	National land survey	National land survey	Multiplying volumes and prices from cadastre
	Recreational land and associated surface water	National land survey	National land survey	Multiplying volumes and prices from cadastre
	Other land and associated surface water	National land survey	National land survey	Multiplying volumes and prices from cadastre
France	Land underlying buildings and structures	House price, farm land price	Service Central des Enquêtes et Études Statistiques (SCEES)	Land residual method for land underlying dwellings
	Land under cultivation	Farmland prices , urbanisable land prices	SCEES	Multiplying volumes from cadastre with independent prices
	Recreational land and associated surface water	Farmland prices	SCEES	Multiplying volumes from cadastre with independent prices
	Other land and associated surface water	Urbanisable land prices, price of forest fund	SCEES	Multiplying volumes from cadastre with independent prices

Country	Land types	Data source		Method to estimating the value
		Price	**Volume**	
Japan * the values of non-taxable land value are obtained directly from the government or agency	Land underlying buildings and structures	Land price from Ministry of land, infrastructure and transport	Cadastre	Multiplying volumes from cadastre with prices from administrative source (taxable land)
	Land under cultivation (Arable land)	Survey on agricultural land price and farm rent, Survey on timberland and timber price	Cadastre	Multiplying volumes from cadastre with prices from administrative source (taxable land)
	Recreational land and associated surface water	-	-	Derivation from arable land by using conversion factor (taxable land)
	Other land and associated surface water	-	-	Derivation from arable land by using conversion factor (taxable land)
Korea	Land underlying buildings and structures	Land price from Ministry of land, transportation and maritime affairs	Cadastre	Multiplying volumes from cadastre with prices from administrative source
	Land under cultivation	Land price	Cadastre	Multiplying volumes from cadastre with prices from administrative source
	Recreational land and associated surface water	Land price	Cadastre	Multiplying volumes from cadastre with prices from administrative source
	Other land and associated surface water	Land price	Cadastre	Multiplying volumes from cadastre with prices from administrative source
New Zealand	Land underlying buildings and structures	x	x	x
	Land under cultivation	Land valuation records	Agricultural Census or agricultural surveys	Multiplying volumes by prices
	Recreational land and associated surface water	x	x	x
	Other land and associated surface water	x	x	x
Slovakia	Land underlying buildings and structures	-	-	Business survey, Population Census for households
	Land under cultivation	-	-	Business survey
	Recreational land and associated surface water	-	-	Business survey
	Other land and associated surface water	-	-	Business survey

Country	Land types	Data source		Method to estimating the value
		Price	**Volume**	
Canada	Land surrounding residential structures	-	-	Land-to-structure approach
	Land surrounding non-residential structures	-	-	Land-to-structure approach
	Agricultural land	-	-	Land residual method
Germany	Land underlying building and structures owned by households	Nominal market value	Real transaction volumes	See Appendix 1 and STD/CSTAT/WPNA(2007)10 for further details