# EUROSTAT-OECD SURVEY OF NATIONAL PRACTICES IN ESTIMATING NET STOCKS OF STRUCTURES

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# Preface and acknowledgements

This report presents the responses to a 2013 Eurostat-OECD survey of national practices for estimating depreciation and net capital stocks ("wealth stocks") of dwellings and other buildings and structures in national accounts. The survey, endorsed by the Eurostat-OECD Task Force on land and other non-financial assets, asked national accountants from several countries to provide, for a detailed list of structures, the assumptions and methods used for the perpetual inventory model (PIM). Responses, in general, reflect practices in place in 2013 and part of 2014. It is possible that some countries revised their estimation methods after they responded to the survey.

The goal of providing these responses is to promote discussions, facilitate detailed comparisons of PIM assumptions, and provide concrete options for those seeking to produce improved internationally comparable estimates of net stocks of structures and underlying land.

Representatives from various European Union (EU) and non-EU OECD countries were represented in the Task Force and the European Central Bank participated as well. The Task Force was chaired by Silke Stapel-Weber/Hans Wouters (Eurostat) and Peter van de Ven/Jennifer Ribarsky (OECD). Other members of the Task Force were, in alphabetical order: Taehyoung Cho ( Korea), Florian Gruber/Elisa Huber (Austria), Christian Gysting (Denmark), Ville Haltia/Martti Pykari (Finland), Wesley Harris (United Kingdom), Ruben van der Helm/Zlatina Balabanova (ECB), Marllena Ifrim/Brenda Bugge (Canada), Bob Kornfeld (US), Gang Liu (Norway), Martina Nemeckova (Czech Republic), Paolo Passerini (Eurostat), Ghislain Poullet (Belgium), Paola Santoro (Italy), Oda Schmalwasser/Sascha Brede (Germany), Tatjana Smokova (Eurostat), Nina Strazisar (Slovenia), Martha Tovar ( Mexico), Erik Veldhuizen/Joy Sie Cheung (The Netherlands).
The Task Force on Land and other non-financial assets met six times:

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|---|---|
| 9–10 July 2012 | Eurostat, Luxembourg |
| 10–11 December 2012 | OECD, Paris |
| 24–25 June 2013 | Statistics Austria, Vienna |
| 2–3 December 2013 | Destatis, Wiesbaden |
| 26–27 June 2014 | Statistics Canada, Ottawa |
| 8–9 December 2014 | Czech statistical office, Prague |

This report could not have been possible without the contributions of many countries that replied to the questionnaire on depreciation and service lives. The drafting of this report was led by Bob Kornfeld (US) and responses to the questionnaire were collated and compiled by Taehyoung Cho (Korea) and Hee Soo Jeon (Korea). Jennifer Ribarsky (OECD) provided assistance with editing and formatting the document.

Eurostat and OECD would like to thank all those who contributed to the Eurostat-OECD Report on Survey of National Practices in Estimating Net Stocks of Structures.

## Contents

# Eurostat-OECD survey of national practices in estimating net stocks of structures

## Introduction

This report presents the responses to a 2013 Eurostat-OECD survey of national practices for estimating depreciation and net capital stocks ("wealth stocks") of dwellings and other buildings and structures in national accounts. The survey, endorsed by the Eurostat-OECD Task Force on land and other non-financial assets, asked national accountants from several countries to provide, for a detailed list of structures, the assumptions and methods used for the perpetual inventory method (PIM). Respondents reported whether they use the PIM or other methods (census, administrative records, etc); assumed service lives, depreciation patterns, and retirement patterns; sources of information used to make these assumptions; and other information. The survey asked respondents to provide these assumptions for a detailed list of structures to assist comparisons of similar types of structures, such as dwellings, office buildings, and schools.

This report begins with a section that summarizes the results of the survey and is also presented as Chapter 6.5 of the Eurostat-OECD Compilation Guide on Land Estimation. The next section shows a copy of the survey questionnaire. The following section presents the responses to the "Part A" survey questions about the basic assumptions of the PIM. The final section presents the responses to the additional questions in "Part B" of the survey.

Please note that the format of the responses differs somewhat across countries, reflecting differences in the way respondents answered the survey and our attempts to present these responses in a way that is compact, readable, and useful. The answers are mostly presented as we received them; we generally retained the informal language of many responses, with minimal editing. Some of the responses link to publicly available documents with more extensive documentation.

Also note that the responses reflect practices in place in 2013 and part of 2014. It is possible that some countries revised their estimation methods after they responded to the survey.

The goal of providing these responses is to promote discussions, facilitate detailed comparisons of PIM assumptions, and provide concrete options for those seeking to produce improved, internationally comparable estimates of net stocks of structures and underlying land.

# The importance of service lives and depreciation for indirect land estimates

The Eurostat-OECD compilation guide on land estimation represents the first comprehensive overview of conceptual and practical issues related to the compilation of the balance sheet item 'land' in the national accounts. The aim of the compilation guide is to provide conceptual and practical guidance to statisticians concerning the estimation and valuation of land and to increase international comparability.

The methods used in compiling estimates of land for the balance sheet can be constrained in large part by the nature of the data available. In chapters 5 and 6 of the compilation guide guidance is given on how to estimate land depending on what sources of information are available. Chapter 5 discusses the estimation of land using the direct approach. This may be viewed as a physical inventory method where the area of each parcel of land is multiplied by an appropriate price. Because separate price and quantity information may not be available especially when the land has a structure on it, chapter 6 discusses estimating the value of land through an indirect method.

An indirect estimation method, as the name implies, either obtains the value of land indirectly or obtains the price of the land indirectly. Based on countries' current practices, there are three different indirect estimation methods discussed in the compilation guide: the residual approach, the land-to-structure ratio (LSR) approach, and the hedonic approach. The first two indirect approaches derive the value of the land indirectly. The residual approach obtains the value of the land by subtracting the depreciated structure value from the combined total value. This method controls to the estimated real estate value of the property. The LSR approach derives the value of the land indirectly by multiplying the depreciated structure value by the LSR. The LSR approach does not control to the total real estate value. The hedonic approach utilises a hedonic regression model to deconstruct the real estate property value (that is, the combined value of land and structures) into separate prices for the land and for the structure. The total value of land is then derived by multiplying the indirectly derived price by the area of land.

The residual approach and the LSR approach (LSR) rely on estimates of the net stock of structures usually obtained through the perpetual inventory method (PIM), in which, gross fixed capital formation (GFCF) adds to the stock, and depreciation and retirements of assets subtract from the stock. Although the PIM has many advantages, a disadvantage of the PIM is that precise information on service lives and patterns of depreciation is difficult to obtain. Errors in the assumptions of the PIM, estimates of GFCF, and prices can all lead to errors in estimates of net stocks of structures, which can then lead to errors in the estimates of the value of the underlying land.

Because of the importance of the net stock of structures estimates in 2013 Eurostat-OECD conducted a survey of national practices. The survey asked national accountants to provide, for a detailed list of structures, the assumptions and methods used for the PIM. The goal was not to select a single 'best' approach for the PIM, but to promote discussions, facilitate detailed comparisons of PIM assumptions, and provide concrete options for those seeking to produce improved, internationally comparable estimates of net stocks of structures and underlying land. This section provides an overview of the survey and the theory of capital measurement; summarises and compares reported patterns of depreciation (linear, geometric, other), patterns of retirement, and other aspects of the PIM; and describes respondents' sources of information, main concerns, and plans for the future.

## Overview of the survey

The survey asked respondents to provide the methods and assumptions for their estimates of net stocks of structures. Respondents reported whether they use the PIM or other methods (census,

administrative records, etc); assumed service lives, depreciation patterns, and retirement patterns; sources of information used to make these assumptions; and other information.

The survey asked respondents to provide these assumptions for a detailed list of structures to assist comparisons of similar types of structures, such as dwellings, office buildings, and schools. The list of assets conforms to widely used classifications found in the SNA 2008, ESA 2010, and the Central Product Classification v2 (CPCv2) ([1]):

- For dwellings (AN.111) — one- and two-dwelling residential buildings, multi-dwelling residential buildings, major improvements, and costs of ownership transfer.
- For buildings other than dwellings (AN.1121) — warehouses, manufacturing or industrial buildings, office buildings, buildings for shopping and entertainment, hotels, restaurants, schools, hospitals, farm buildings, prisons, major improvements, and costs of ownership transfer.
- For other structures (AN1122) — several types of assets including roads, railways, harbours, dams and other waterworks, mining structures, flood barriers, communication and power lines, sewage and water treatment plants, electric power plants, and natural gas structures.

The survey also asked respondents to provide information about recent ratios of net stocks to gross domestic product (GDP), sources of information for estimates of GFCF and prices, the treatment of transfer of ownership costs and major improvements to structures, frequency of updates of estimates, estimates of government owned land, major concerns and plans for the future.

## Respondents and the use of the PIM

Responses were received from a total of 32 countries — Australia, Austria, Belgium, Canada, Chile, Cyprus ([2]) ([3]), Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Israel ([4]), Italy, Japan, Korea, Latvia, Lithuania, Malta, Mexico, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Sweden, the United Kingdom, and the United States.

The vast majority of respondents reported using the PIM to estimate net stocks and depreciation of structures. Most countries base these estimates on years of GFCF and price data that reflect construction spending and costs and not land values. Some countries (including Canada, France, Hungary, Iceland, Korea, Mexico, Slovenia) obtain initial or periodic benchmark-year capital stock estimates, based on a census, survey, or administrative records, and then use a PIM to extrapolate subsequent changes in the capital stock. A few countries rely on administrative records or surveys of stocks rather than a PIM to estimate the stock of fixed assets (Poland; Denmark, for dwellings and other buildings; Lithuania for dwellings and roads; Malta and Sweden, for dwellings). However, since the majority of the respondents derive the estimates of net stock using the PIM this section focuses mainly on the PIM methodology and does not discuss methods for the direct estimation of the stock of fixed assets.

Only a few countries currently use the residual approach (Australia, Belgium ([5]), France, Italy, the

([1]) See SNA 2008 paragraphs 10.68–10.78, ESA 2010 annex 7.1, and the Central Product Classification v2 which is available at http://unstats.un.org/unsd/cr/registry/docs/CPCv2_structure.pdf

([2]) The information in this document with reference to Cyprus relates to the southern part of the island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the 'Cyprus issue'.

([3]) The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the government of the Republic of Cyprus.

([4]) The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

([5]) Belgium does not currently produce and publish stocks of land. However, a feasibility study using the residual approach was conducted in 2013. Belgium plans to produce official estimates of the stock of land using the residual approach by 2017.

Netherlands) or the LSR approach (Canada) to estimate stocks of land with the PIM-based estimates of net stocks of structures. Korea uses the residual method as a check on its direct estimates. Some respondents expressed an interest in using the residual method in the future.

## Overview of capital measurement and the PIM

Measuring Capital (OECD 2009) ([6]) explains the theory and methods of capital measurement, and both Measuring Capital and ESA 2010 offer recommendations as to how to measure net stocks. A brief overview of these perspectives is useful for understanding and interpreting the survey responses.

Measuring Capital emphasises that PIM-based estimates of net stocks should be part of a broader set of capital measures that reflect capital's dual role as both a storage of wealth and a source of capital services in production. The age-price profile of a single homogeneous asset shows how its price declines as it ages and reflects depreciation or consumption of fixed capital, defined as the loss in value of an asset due to physical deterioration (wear and tear) and normal obsolescence. The age-efficiency profile of a single homogeneous asset summarises the change of its productive capacity over time, as measured by capital services. For a single asset, these two profiles are related: a particular age-efficiency profile implies an age-price profile (depreciation pattern) and vice versa, so, in theory, depreciation patterns and age-efficiency profiles should be set together.

Two common depreciation patterns are linear and geometric. With simple linear or 'straight line' depreciation, a homogeneous asset with a service life of T years loses a constant proportion (1/T) of the initial asset value each period, until the asset's value becomes zero at the end of year T. With geometric depreciation, an asset stock loses value at a constant depreciation rate (say, 2 percent) each year. Geometric depreciation patterns (with the value of an asset stock on the vertical axis and time on the horizontal axis) are 'convex to the origin' in that the amount of depreciation (in currency units) is largest at the beginning of the asset's life and declines over time. Over time, the remaining stock becomes smaller but does not disappear unless forced to do so.

When measuring net stocks of entire cohorts of assets that are similar but not quite homogenous (such as all one-unit dwellings), national accountants may assume that not all assets in a cohort will retire at the same time. Retirement refers to the removal of an asset from the capital stock because the asset is exported, sold for scrap, dismantled, or abandoned. Under the assumption of linear depreciation and a distribution of retirement ages for a cohort of assets, for example, some 'sub-cohorts' will depreciate linearly with shorter service lives while other sub-cohorts will depreciate linearly with longer service lives. With a typical bell-shaped retirement pattern, the probability of retirement is low in the early years of an asset's life, gradually increases to a peak near the average service life of the cohort and gradually falls in the years after the average service life.

As Measuring Capital explains, for a cohort of assets, the combined age-efficiency and retirement profiles, or the combined age-price and retirement profiles, often tends to produce depreciation patterns for a cohort that are convex to the origin and resemble geometric depreciation. With linear depreciation for a homogeneous asset and a bell-shaped retirement distribution for a cohort of assets, for example, the asset cohort's value tends to decline more rapidly initially (in currency units) and less rapidly later, consistent with geometric depreciation. Measuring Capital also points out that geometric depreciation is supported by empirical studies. Accordingly, Measuring Capital 'recommends the use of geometric patterns for depreciation because they tend to be empirically supported, conceptually correct and easy to implement.' (page 12).

ESA 2010 paragraph 3.143 recommends that 'consumption of fixed capital shall be calculated according to the 'straight line' [linear] method, by which the value of a fixed asset is written off at a

([6]) Organisation for Economic Co-operation and Development, *Measuring Capital: OECD Manual, Second edition*, 2009. Available at http://www.oecd.org/std/productivity-stats/43734711.pdf . This section is a brief summary of a more detailed explanation of capital measurement found in chapters 3–5 of Measuring Capital.

constant rate [of its initial value] over the whole lifetime of the good.' ESA 2010 also recognises the advantages of geometric depreciation, stating that (ESA 2010 paragraph 3.144) 'In some cases, the geometric depreciation method is used when the pattern of decline in the efficiency of a fixed asset requires it.'

In practice, national statistical institutes may use several ways to derive depreciation rates, service lives, and retirement patterns. Some might start with information about an asset's age-efficiency profile and then derive age-price profiles, depreciation rates, and perhaps retirement patterns. Some might start with information about an asset's service life and then infer a depreciation pattern and possibly the retirement pattern for the purpose of estimating depreciation. Some may derive depreciation patterns through empirical studies of used asset prices. The survey attempts to record these different approaches, with no intention to select a 'best' approach.

## Linear depreciation, with and without additional retirement distributions

The most common reported approach for estimating depreciation assumes a linear pattern. A total of 20 respondents report using linear depreciation — Belgium, Chile, Czech Republic, Denmark, Estonia (except dwellings), Finland, France, Germany, Hungary, Israel ([7]), Italy, Latvia, Lithuania (for buildings other than dwellings and for structures other than roads), Malta, Mexico, Poland, Portugal, Slovakia, Slovenia, and the United Kingdom. With linear depreciation, the speed of depreciation depends partly on the assumed service life, which can vary widely even for very similar assets (see table 1).

As the previous discussion implies, comparing the service lives of similar assets across countries in table 1 is not straightforward because retirement patterns must also be taken into account. For countries that use linear depreciation without a retirement pattern, the pattern of depreciation depends on the service life in a straightforward way. With a commonly used bell-shaped retirement pattern, on the other hand, some assets will retire before and after the average service life.

([7]) For Israel, see footnote 4.

**Table 1: Service life assumptions for countries using linear depreciation for estimates of net stocks of structures**

(years)

| | One-unit dwellings | Manufacturing buildings | Retail buildings | Hospitals | Schools | Roads | Retirement pattern |
|---|---|---|---|---|---|---|---|
| **Belgium** | 60 | 35 | 40 | 40 | 60 | 55 | Lognormal |
| **Chile** | 40 | 40 | 40 | 40 | 40 | 40 | S-3 Winfrey |
| **Czech Republic** | 90 | 60 | 60 | 70 | 70 | 50 | Lognormal |
| **Denmark** | 75 | 55 | 55 | 65 | 65 | 50 | Winfrey |
| **Estonia*** | N/A | 50 | 50 | 50 | 50 | 55 | Linear |
| **Finland** | 60 | 40 | 40 | 50 | 50 | 55 | Weibull |
| **France** | 90 | 90 | 75 | 75 | 75 | 120 | Lognormal |
| **Germany** | 77 | 53 | 53 | 66 | 65 | 57 | Gamma |
| **Hungary** | 83 | 83 | 83 | 75 | 75 | 75 | Normal |
| **Israel** | 50 | 25 | 50 | 50 | 50 | 50 | Truncated normal |
| **Italy** | 79 | 35 | 65 | 35 | N/A | N/A | Truncated normal |
| **Latvia** | 75 | 53 | 52 | 56 | 66 | 50 | Lognormal |
| **Lithuania*** | N/A | 95 | 95 | 95 | 95 | N/A | Logistic |
| **Malta** | 85 | 100 | 100 | 100 | 100 | 100 | Normal (non-dwellings) |
| **Mexico** | 60 | 60 | 60 | 60 | 60 | 60 | None |
| **Portugal** | 50 | 50 | 50 | 50 | 50 | 60 | Delayed linear |
| **Slovakia** | 55 | 60 | 60 | 60 | 60 | 60 | None |
| **Slovenia** | 58 (owner-occupied) 73 (all other types) | 33 | 33 | 70 | 70 | 50 | None |
| **UK** | 59 | 60 | 80 | 75 | 75 | 80 | Normal |

* Estonia uses geometric depreciation for dwellings only; Lithuania uses geometric depreciation for dwellings and roads only

Source: TF on land and other non-financial assets, based on OECD-Eurostat survey of national practices in estimating service lives, depreciation, net stocks

Some respondents report using a linear depreciation method with no additional retirement pattern (Mexico, Slovakia, Slovenia). While this assumption may be unrealistic in a literal sense, it may provide a reasonable, computationally simple approximation of an asset cohort's depreciation over time. ESA 2010 recommends using linear or geometric depreciation. Among the countries that use simple linear depreciation, service lives for similar assets vary noticeably.

Other respondents report combining linear depreciation with a retirement distribution to produce a depreciation pattern for an asset cohort that is, in many cases, convex to the origin and similar to geometric depreciation, which Measuring Capital recommends. The countries that combine linear depreciation with retirement distributions employ a range of mathematical retirement functions to produce bell-shaped or other retirement patterns, and the specific parameters of these chosen distributions vary as well. This range of assumptions further complicates comparisons of depreciation patterns of similar assets across countries. (See Measuring Capital, chapter 13, for

more information on these retirement distributions.)

- The normal distribution for retirements (Hungary, Malta for non-dwellings, United Kingdom) is symmetric, with 95 % of the probabilities lying within two standard deviations around the mean.
- The lognormal retirement distribution (Belgium, Czech Republic, France, Latvia) is a distribution whose logarithm is normally distributed; it is right-skewed, with a low probability of retirement in the first years of an asset's life and higher retirement probabilities later in an asset's life.
- A truncated normal retirement distribution (Israel ([8]), Italy) has a retirement period that is restricted to fall within a specified range of years before and after an asset's average service life.
- Chile and Denmark combine linear depreciation with an S-3 Winfrey retirement distribution, which is also symmetric and bell-shaped.
- Germany uses the gamma distribution to calculate the distribution of retirements. The choice of this function was based on empirical data of motor vehicle registration. The parameters (and shape) of the gamma function were chosen based on empirical studies ([9]). The gamma distribution leads to a nearly bell-shaped retirement distribution and an age-price profile that is convex to the origin.
- Finland uses a Weibull retirement distribution, which is flexible, widely used, and can accommodate a range of shapes.

Respondents using linear depreciation also vary in terms of the level of asset detail at which service life assumptions are made. Separate PIM-based estimates of net stocks for detailed categories of structures enable statisticians to produce estimates of values for detailed categories of land, assuming the underlying PIM assumptions are reliable. Some (such as Finland, and Germany, the UK) report assumptions that vary by detailed categories of types of assets or industries. Others (such as Chile, Mexico, Portugal, Slovakia, or Slovenia) report assumptions for the PIM for a few broadly defined asset types (such as one assumption for all buildings that are not dwellings).

## Geometric depreciation

Geometric depreciation is the second most commonly reported functional form. Austria, Canada, Estonia (for dwellings), Iceland, Japan, Lithuania (for dwellings and roads), Norway, Sweden, and the United States use geometric depreciation rates in their PIM estimates. Measuring Capital recommends the use of geometric depreciation; ESA 2010 recommends straight-line or geometric depreciation. Respondents did not report separate retirement distributions with geometric depreciation; this convex pattern is already broadly consistent with the pattern of attrition produced by number of retirement distributions.

Across countries that choose geometric depreciation pattern, the assumed annual depreciation rates vary even for very similar assets (table 2). In the case of dwellings, for example, annual depreciation rates range from a low of 0.0114 for the USA and Sweden (which borrows the USA's assumptions) to a high of 0.055 for wooden dwellings in Japan; other countries tend to use depreciation rates that range from 0.02 and 0.03. Across countries that choose geometric depreciation patterns, the annual depreciation rates range from 0.0182 to 0.081 for schools. Other assets display similar ranges of depreciation rates.

([8]) For Israel, see footnote 4.

([9]) Schmalwasser, Oda and Michael Schidlowski, Kapitalstockrechnung in Deutschland', June 2006. Available at (German) https://www.destatis.de/DE/Publikationen/WirtschaftStatistik/VGR/Kapitalstockrechnung.pdf?__blob=publicationFile or (English) https://www.destatis.de/EN/Publications/Specialized/Nationalaccounts/MeasuringCapitalStockWista1106.pdf?__blob=publicationFile .

These differences in depreciation rates can lead to substantial differences in the proportion of a cohort of an asset that remains in the stock over time, especially for long-lived assets such as structures. After 25 years, for example, the percentage of the original value of a dwelling that is left ranges from 75 percent in the United States to 30 percent in Japan (for non-wooden and wooden dwellings combined). After 50 years, the percentage of the original value of a dwelling that is left ranges from 56 percent in the United States to 9 percent in Japan (for non-wooden and wooden dwellings combined). Even small differences in assumed annual depreciation rates can lead to substantial differences in estimates of the value of land, estimated through the residual method.

**Table 2: Depreciation rate assumptions for countries using geometric depreciation for estimates of net stocks of structures**

%

| | One-unit dwellings | Manufacturing buildings | Retail buildings | Hospitals | Schools | Roads |
|---|---|---|---|---|---|---|
| **Austria** | 0.020 | 0.024-0.030 | 0.024 | 0.020 | 0.020 | 0.030 |
| **Canada** | 0.020 | 0.072 | 0.091 | 0.061 | 0.055 | 0.106 |
| **Estonia*** | 0.020 | : | : | : | : | : |
| **Iceland** | 0.025 | 0.040 | 0.025 | 0.025 | 0.025 | 0.030 |
| **Japan (wooden)** | 0.055 | 0.081 | 0.081 | 0.081 | 0.081 | : |
| **Japan (non-wooden** | 0.040 | 0.059 | 0.059 | 0.059 | 0.059 | 0.033 |
| **Lithuania*** | 0.016 | : | : | : | : | 0.033 |
| **Norway** | 0.025 | 0.070 | 0.040 | 0.040 | 0.040 | 0.033 |
| **Sweden** | 0.0114 | 0.0314 | 0.0262 | 0.0188 | 0.0182 | 0.0202 |
| **USA** | 0.0114 | 0.0314 | 0.0262 | 0.0188 | 0.0182 | 0.0202 |

* Estonia uses linear depreciation for non-dwellings; Lithuania uses linear depreciation for non-dwelling buildings

Source: TF on land and other non-financial assets, based on OECD-Eurostat survey of national practices in estimating service lives, depreciation, net stocks

## Other patterns of depreciation and retirement

The Australian Bureau of Statistics (ABS) and the Bank of Korea employ hyperbolic age-efficiency profiles ([10]). The ABS combines the hyperbolic age-efficiency profile (which tends to be concave to the origin) with a bell-shaped Winfrey pattern of retirement. Specifically, ABS assumed a Winfrey S3 retirement pattern for all structures except major improvements in dwellings, which assume a Winfrey S0 retirement pattern. Together, the hyperbolic age-efficiency profile and the Winfrey retirement distribution imply a cohort age-price profile that resembles a geometric pattern of depreciation for structures, with average service lives varying by type of asset (table 3). The Bank of Korea employs a hyperbolic age-efficiency function with a Winfrey R3 retirement distribution. The age-price profile is based on these assumptions ([11]).

Other respondents report a variety of assumptions. Statistics Netherlands ([12]) uses hyperbolic age-

([10]) The hyperbolic age-efficiency function (Measuring Capital, chapter 11) can be represented by gn(T) where n is the asset's age (0 toT). Because the efficiency of a new asset has been set to equal one, every gn(T) represents the relative efficiency of an asset of age n compared to a new asset. $G_n = (T - n)/(T - b \cdot n)$, with $0 < b < 1$. For structures, b is set to 0.75 for both Korean and Australian estimates, implying a concave age-efficiency pattern.

([11]) The service lives of buildings increase after 1980 because of improvements in the quality of new construction over time. The Korean accounts also analysed the relationship between a structure's age and its service life based on data on all buildings registered in the Architectural Information System (AIS). For a reference, see Cho, Taehyoung, Byungchang YI and Kyeongtak Do, 'Measuring service lives of assets in Korean capital measurement', 2012.

([12]) Bergen, Dirk van den, Mark de Haan, Ron de Heij, and Myriam Horsten. 'Measuring Capital in the Netherlands'; 2009. Available at http://www.cbs.nl/NR/rdonlyres/FAECCC9A-75E0-4545-9C2C-E42E44371DE4/0/200936x10pub.pdf

efficiency profiles with a Weibull retirement distribution to describe the decline in the value of an asset cohort over time. The form of the Weibull distribution used assumes that the probability of retirement rises over time ([13]). Cyprus ([14]) employs a lognormal retirement distribution.

**Table 3: Service life assumptions for countries using other depreciation patterns for estimates of net stocks of structures**
(years)

| | One-unit dwellings | Manufacturing buildings | Retail buildings | Hospitals | Schools | Roads | Assumed age-efficiency and retirement patterns |
|---|---|---|---|---|---|---|---|
| **Australia** | 88 | 38 | 50 | 50 | 50 | 33 | Hyperbolic age-efficiency profiles, S-3 Winfrey retirement pattern |
| **Cyprus** | 75 | 60 | 75 | 75 | 75 | 55 | Lognormal retirement pattern |
| **Korea** | 55 | 47 | 50 | 55 | 55 | 60 | Hyperbolic age-efficiency profiles, Winfrey R-3 retirement pattern |
| **Netherlands** | 75 | 27-46 | 27-46 | 27-46 | 27-46 | 25-55 | Hyperbolic age-efficiency profiles,Weibull retirement distributions |

Source: TF on land and other non-financial assets, based on OECD-Eurostat survey of national practices in estimating service lives, depreciation, net stocks

## Comparing depreciation patterns across countries

Because there is no single best set of assumptions for estimating net stocks of structures, national accountants may take a more practical approach, and may simply want to know whether their chosen depreciation patterns are roughly comparable with the patterns chosen by national accountants in other countries with roughly comparable types of structures. Based on the tables of service lives and depreciation rates and the descriptions of different depreciation and retirement patterns, however, it is not easy to compare and contrast the different assumptions for the PIM across countries.

One way to facilitate these cross-national comparisons of depreciation patterns is to calculate, for specific types of assets such as dwellings, the proportion of an initial cohort of assets that remains in the stock after a specific number of years. The calculations for each country should be based on each country's assumed functional forms and parameters for depreciation and retirement. This information would enable one to assess whether their assumptions produce unusually fast or slow rates of depreciation. Some examples of these calculations are shown in the following graphs. In some cases, these calculations are approximations based on the information provided by the survey respondents. They are intended to be broadly illustrative of the variation in depreciation and retirement patterns across countries that use the PIM.

The results indicate that the proportion of the initial investment left in the stock after 25, 50, and 75 years varies widely. One important lesson from these results is that countries that employ similar patterns of depreciation (linear or geometric) and retirement often display very different age-price

([13]) The Weibull frequency function (Measuring Capital, chapter 13) is written as: $F_T = \alpha\lambda\,(\lambda T)^{\alpha-1}\, e^{-(\lambda T)^{\alpha}}$ where T is the age of the asset, $\alpha>0$ is the shape parameter (which measure of changes in the risk of an asset being discarded over time) and $\lambda > 0$ is the scale parameter of the distribution. Specifically, $0 < \alpha < 1$ indicates that the risk of discard decreases over time; $\alpha = 1$ indicates that the risk of discard remains constant; $1 < \alpha < 2$ indicates that the risk of discard increases with age but at a decreasing rate; $\alpha > 2$ indicates a progressively increasing risk of discard. For dwellings, $\alpha=2.5$; for other buildings: $\alpha=1.01–2.2$; for other structures and improvements: $\alpha=1.5$.

([14]) For Cyprus, see footnotes 2 and 3.

profiles. After 25 years, for example, the proportion of an initial investment remaining in the stock of dwellings varies noticeably across countries that employ linear depreciation. Among countries that use geometric depreciation (such as Canada, Japan, and the United States,), the proportion of the stock of dwellings that remains after 25 years also varies considerably. After 25 years, the countries that show a similar amount of value for dwellings remaining in the stock (50–60 percent) employ a range of different depreciation and retirement patterns. The conclusions are similar when one examines the proportion of the stock of dwellings remaining after 50 and 75 years and also the results for manufacturing buildings, hospitals, schools, and roads. These results all suggest that national accountants interested in comparing depreciation and retirement patterns across countries should examine these comparative calculations in addition to assumptions about service lives or the functional form of retirement and depreciation.

The percentages of stock remaining after a certain year are calculated for the aggregated categories. To ensure international comparability of the chart, Japan has calibrated, among the investments in dwellings, manufacturing buildings, or schools as of the year 2012, how much the remaining values would be, taking into account the variation in depreciation rates depending on the buildings being wooden or non-wooden. It should be noted that in Japan's national accounts they do not assume any variety in the depreciation rates according to the usage of the buildings (other than whether it is for residential or non-residential).

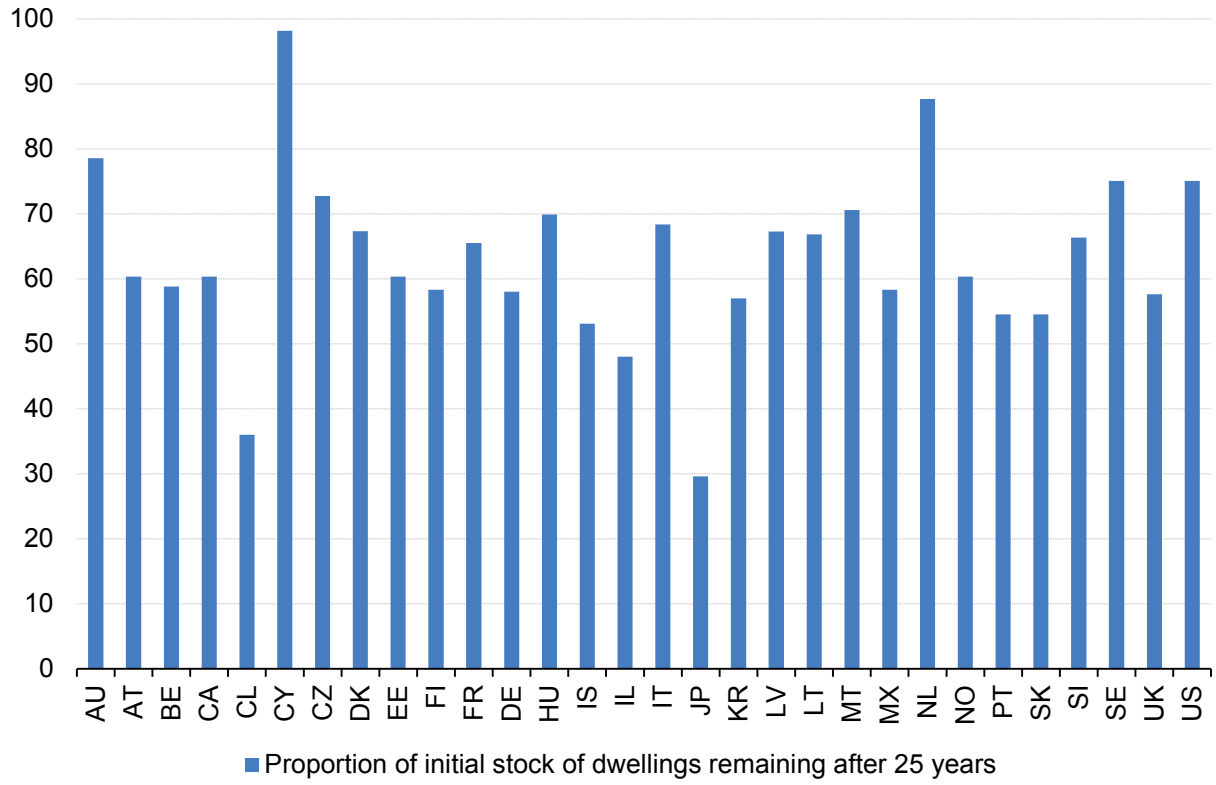
In other words, Figures 1 to 4 of the report have been calibrated using more refined estimates received from Japan than the depreciation rates shown in table 2. The difference is that the depreciation shown in table 2 of, say, 'roads' is 'average' of the depreciations of several assets consisting of roads, the more accurate information is based on more detailed information on depreciation rates.

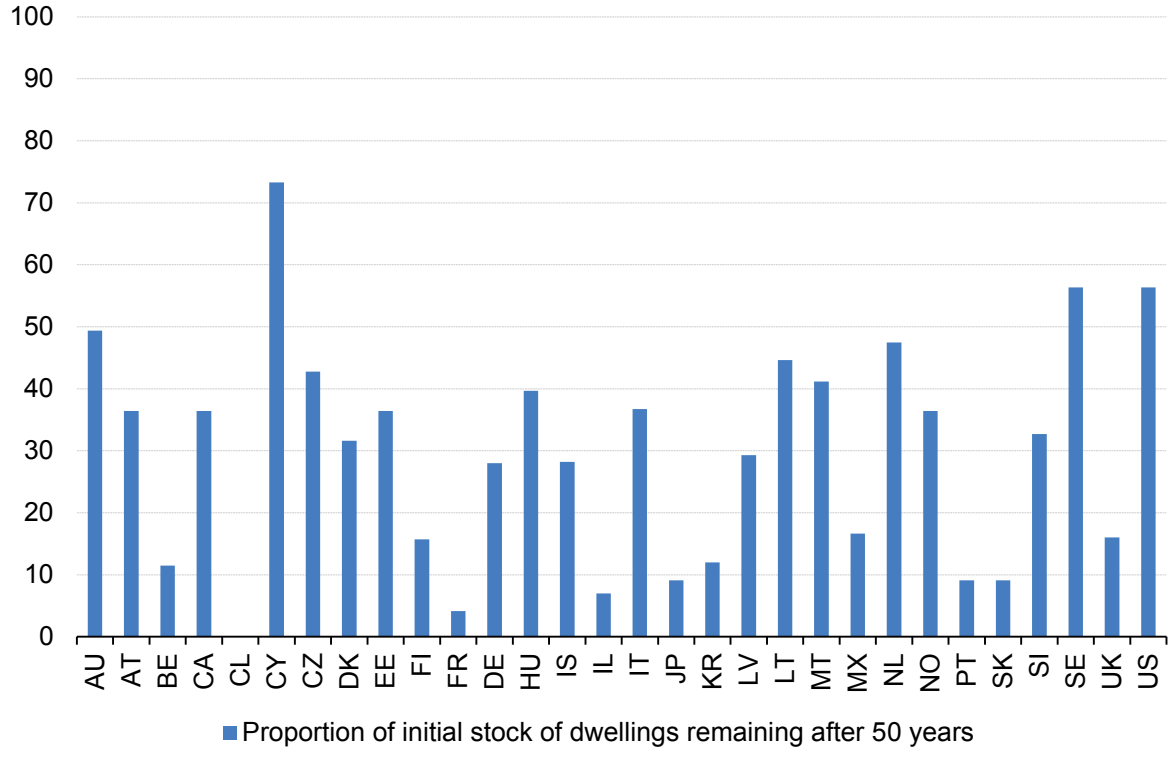
The two-letter ISO codes are used as the country abbreviations for figures 1 to 4: Australia (AU), Austria (AT), Belgium (BE), Canada (CA), Chile (CL), Cyprus (CY) ([15]), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Hungary (HU), Iceland (IS), Israel (IL) ([16]), Italy (IT), Japan (JP), Korea (KR), Latvia (LV), Lithuania (LT), Malta (MT), Mexico (MX), Netherlands (NL), Norway (NO), Portugal (PT), Slovakia (SK), Slovenia (SI), Sweden (SE), United Kingdom (UK), United States (US).

([15]) For Cyprus, see footnotes 2 and 3.

([16]) For Israel, see footnote 4.

**Figure 1: Proportion of initial stock of dwellings remaining after 25, 50 and 75 years**
(% of stock of dwellings)




Source: TF on Land and other non-financial assets, based on OECD-Eurostat survey of national practices in estimating service lives, depreciation, net stocks

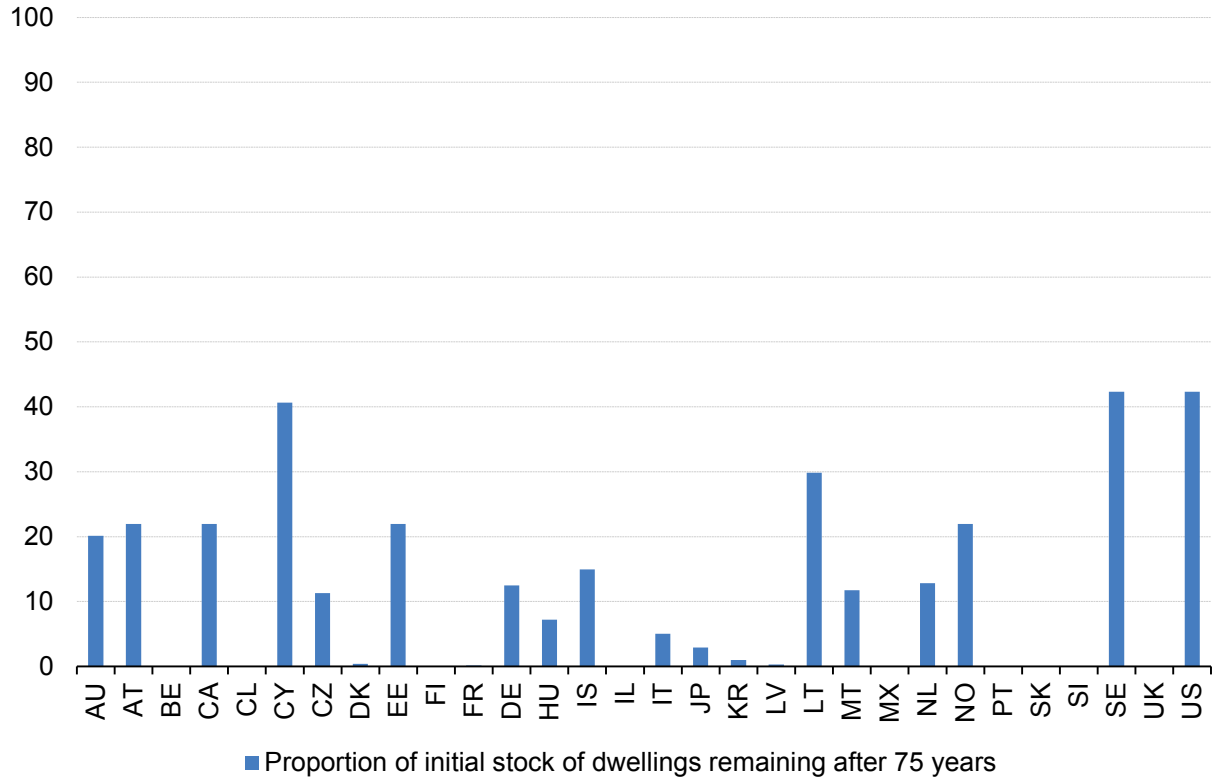
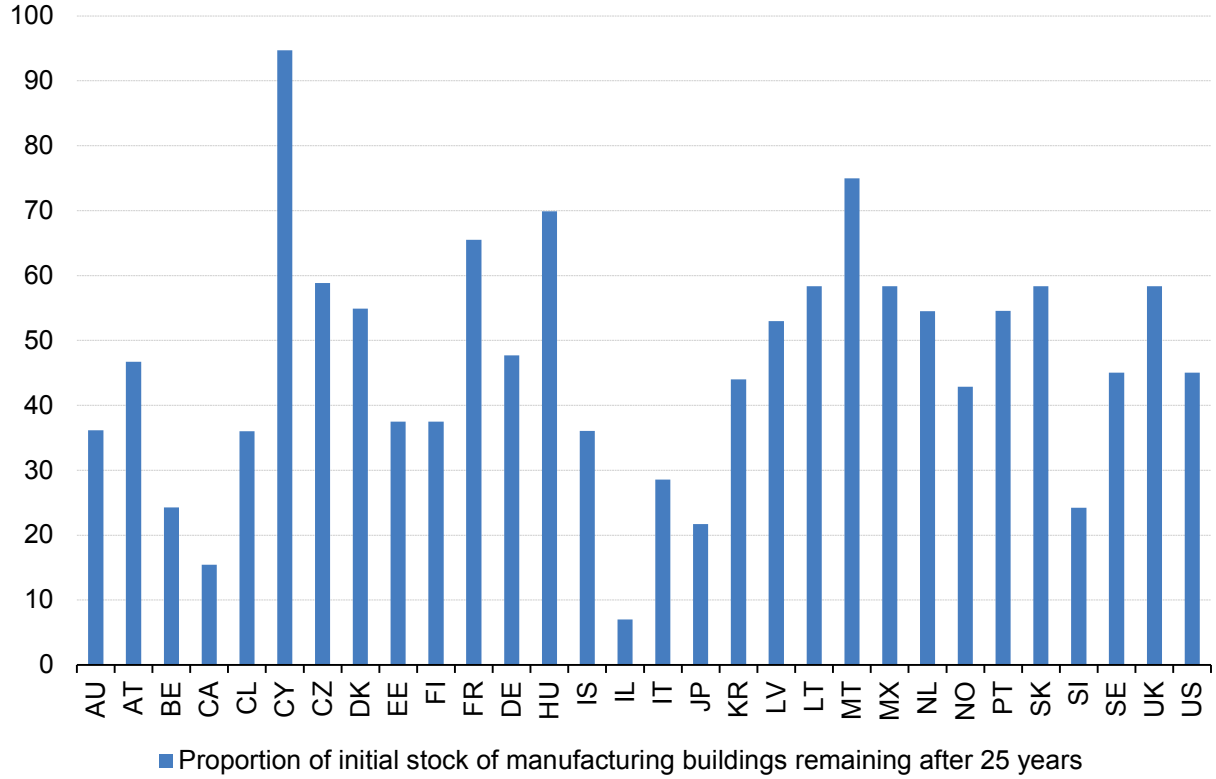
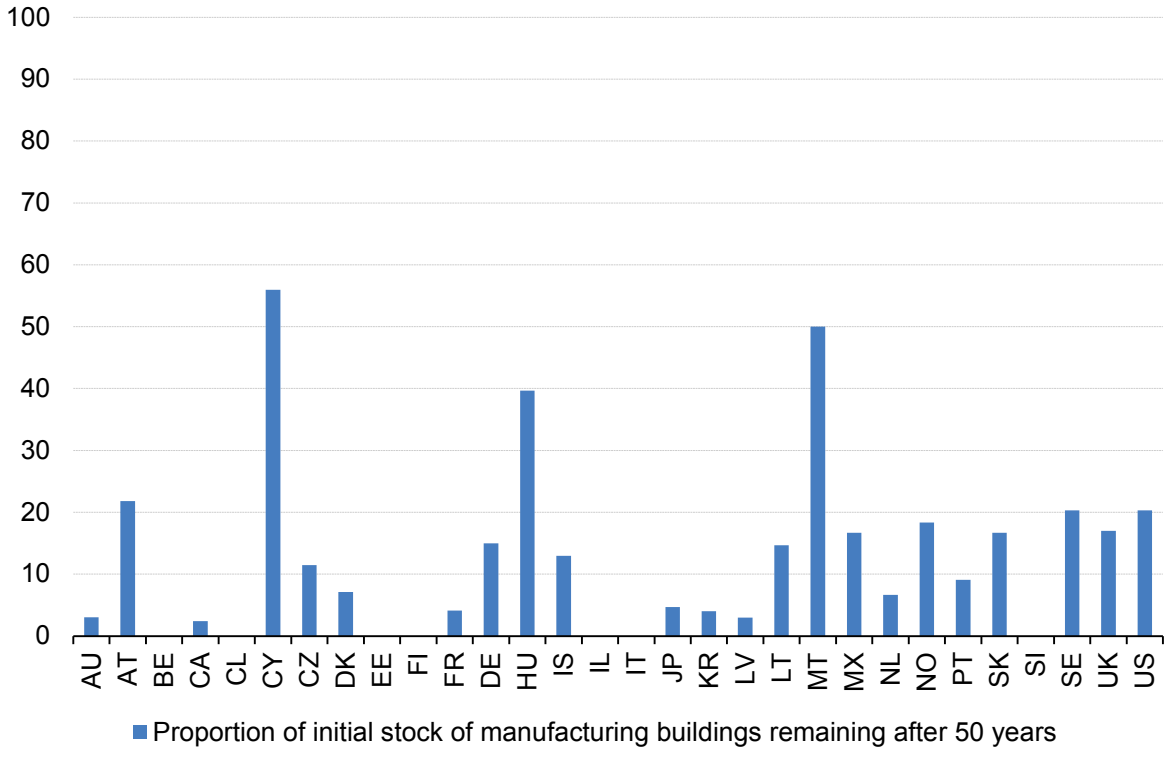
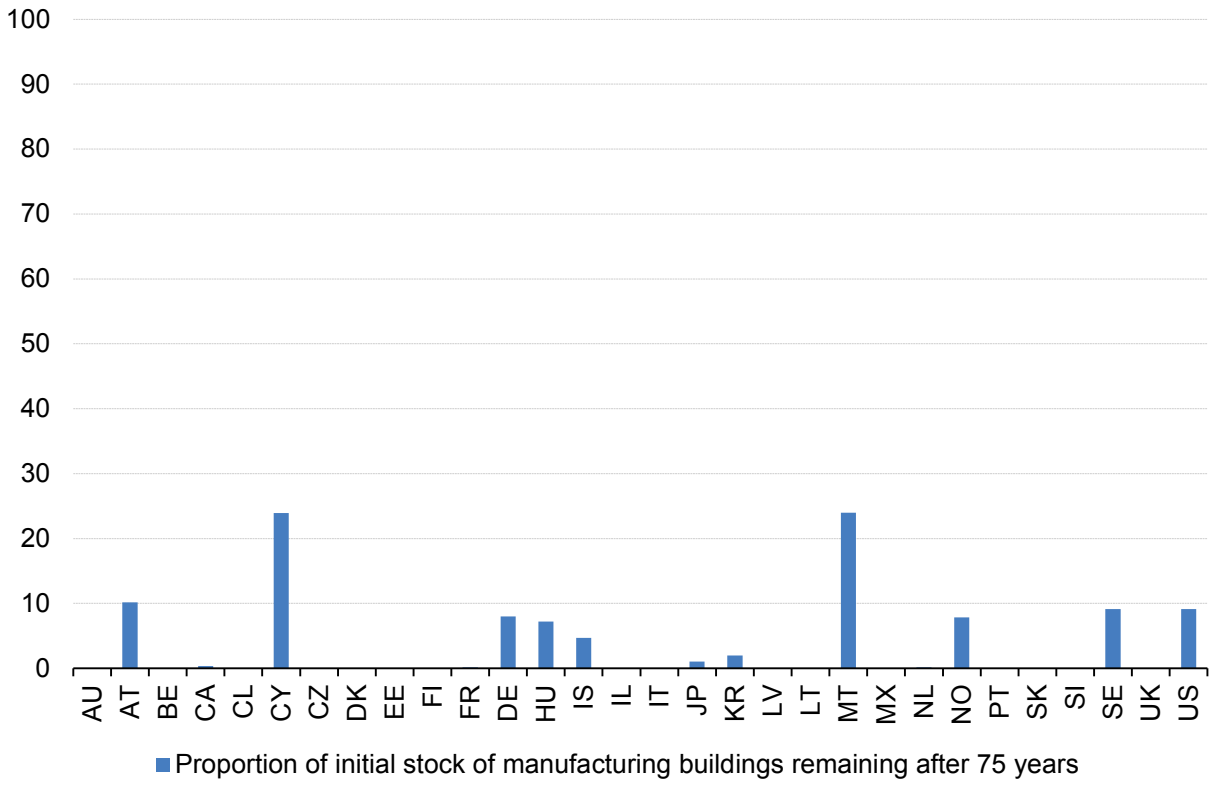



**Figure 2: Proportion of initial stock of manufacturing buildings remaining after 25, 50 and 75 years**
(% of stock of manufacturing buildings)

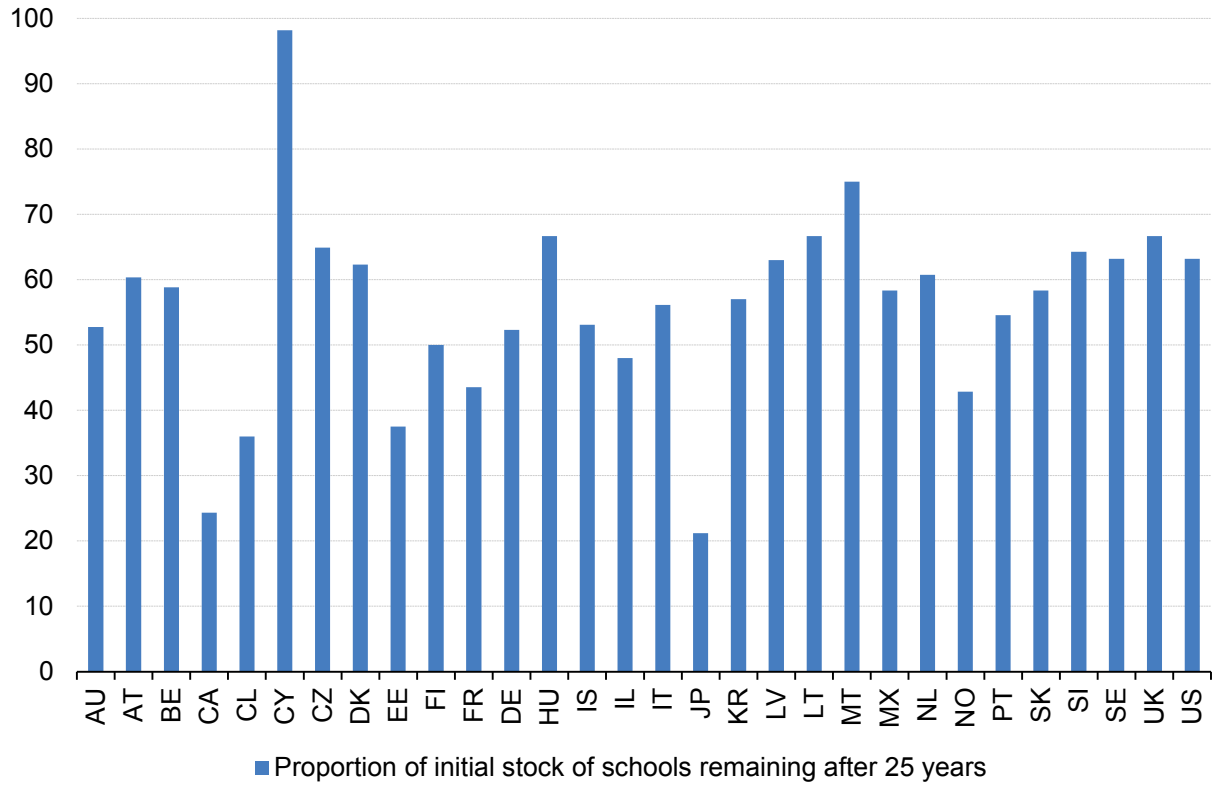


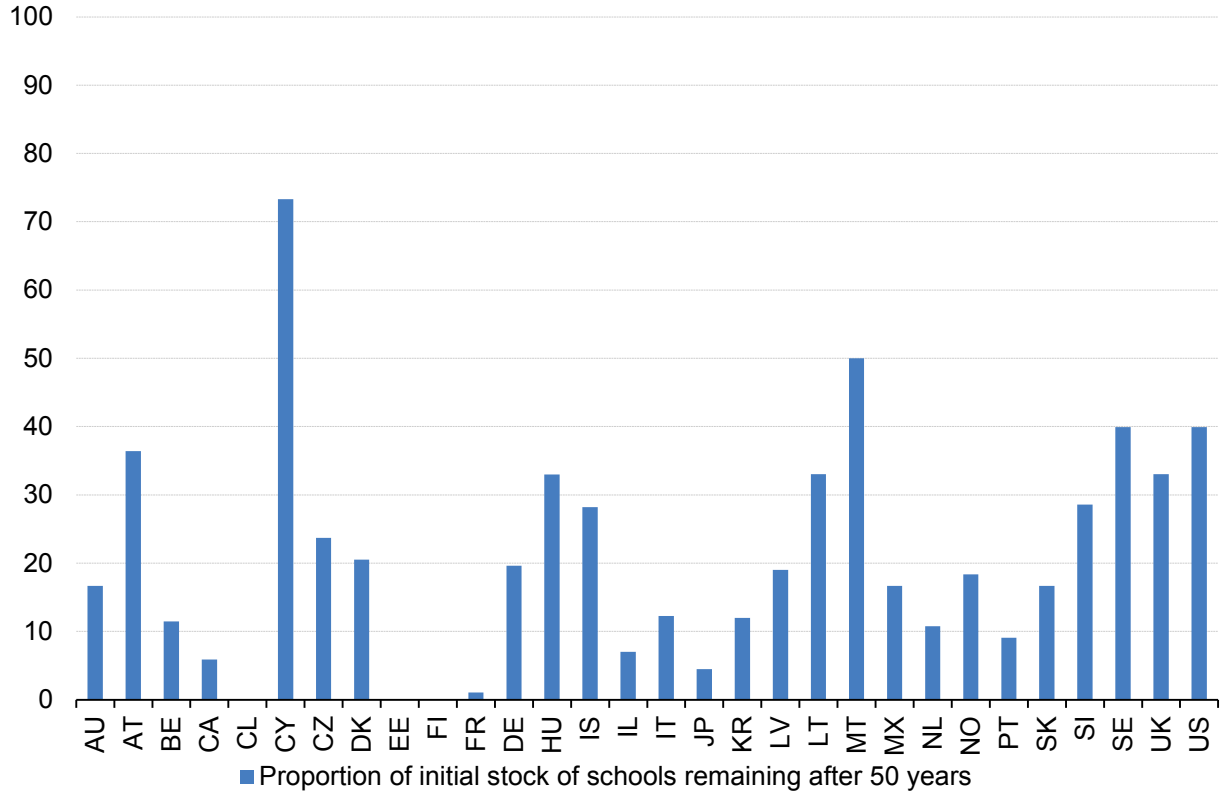


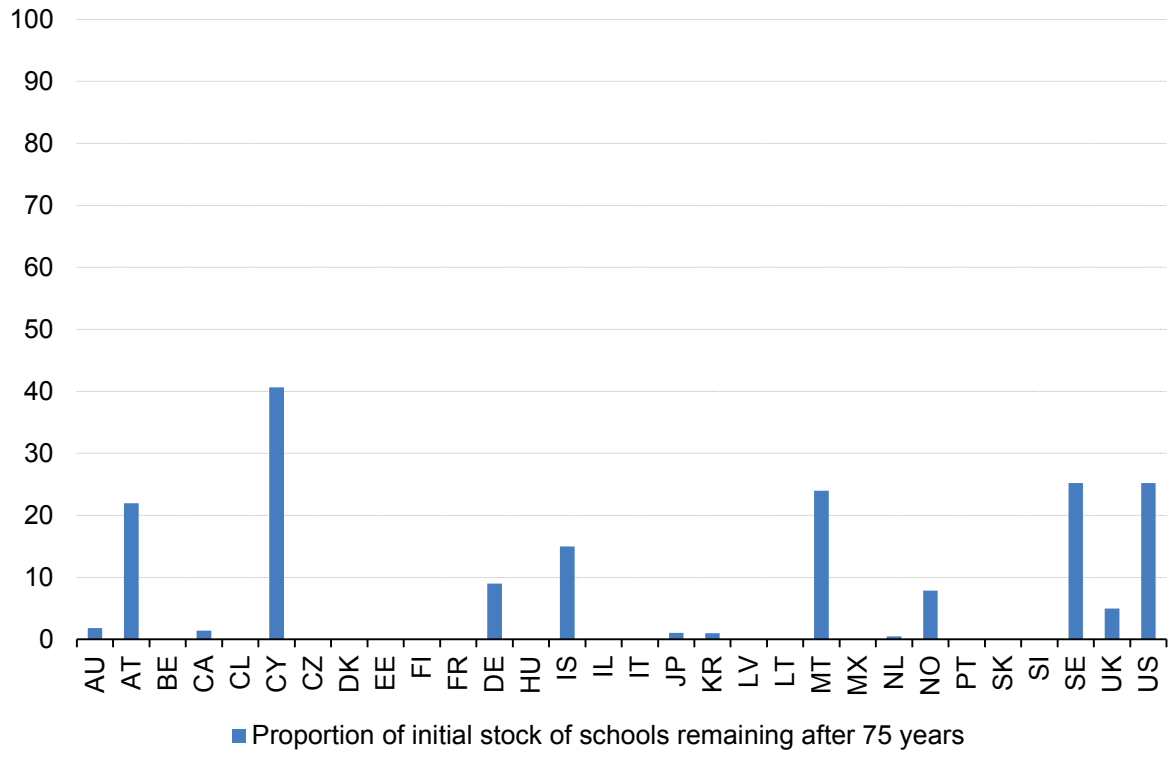




Source: TF on Land and other non-financial assets, based on OECD-Eurostat survey of national practices in estimating service lives, depreciation, net stocks

**Figure 3: Proportion of initial stock of schools remaining after 25, 50 and 75 years**
(% of stock of schools)

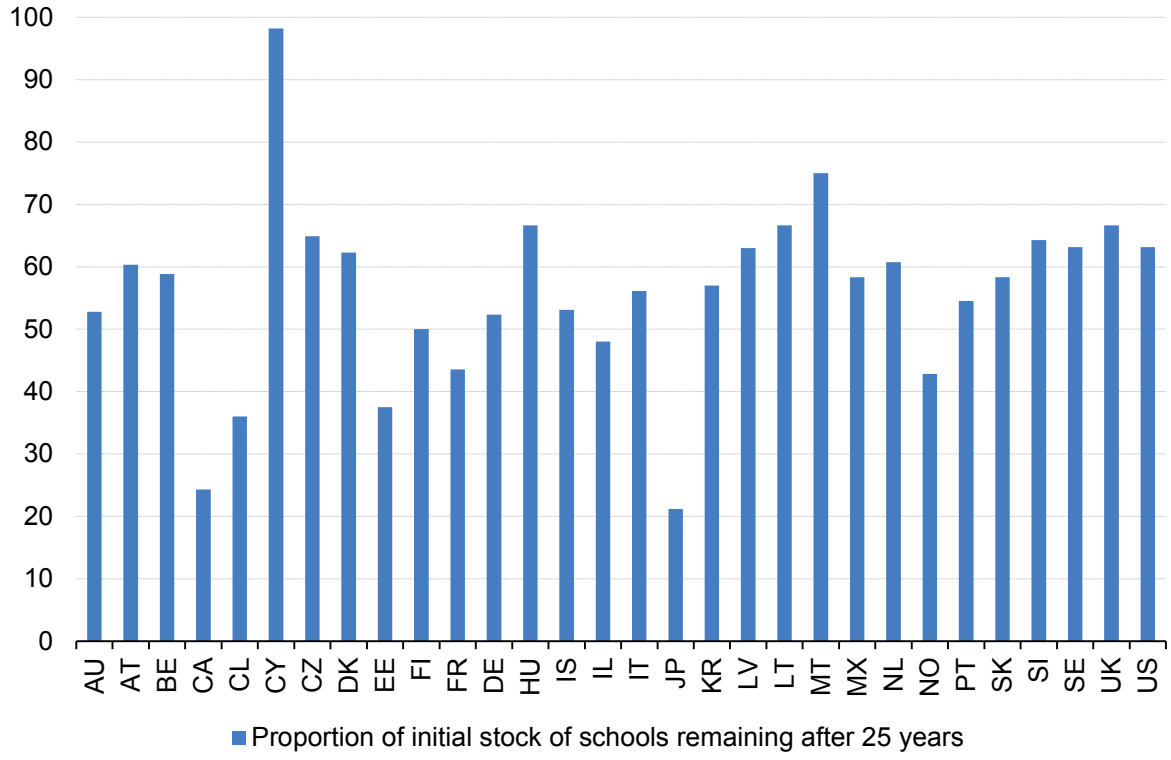


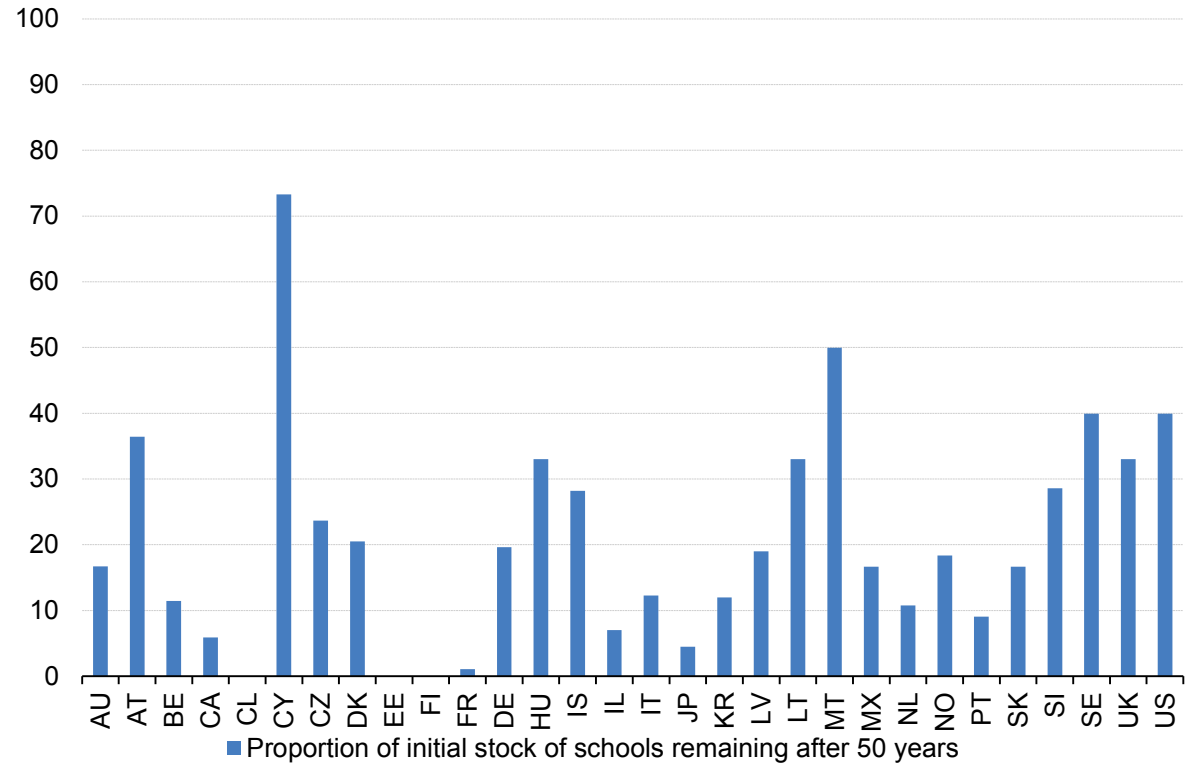



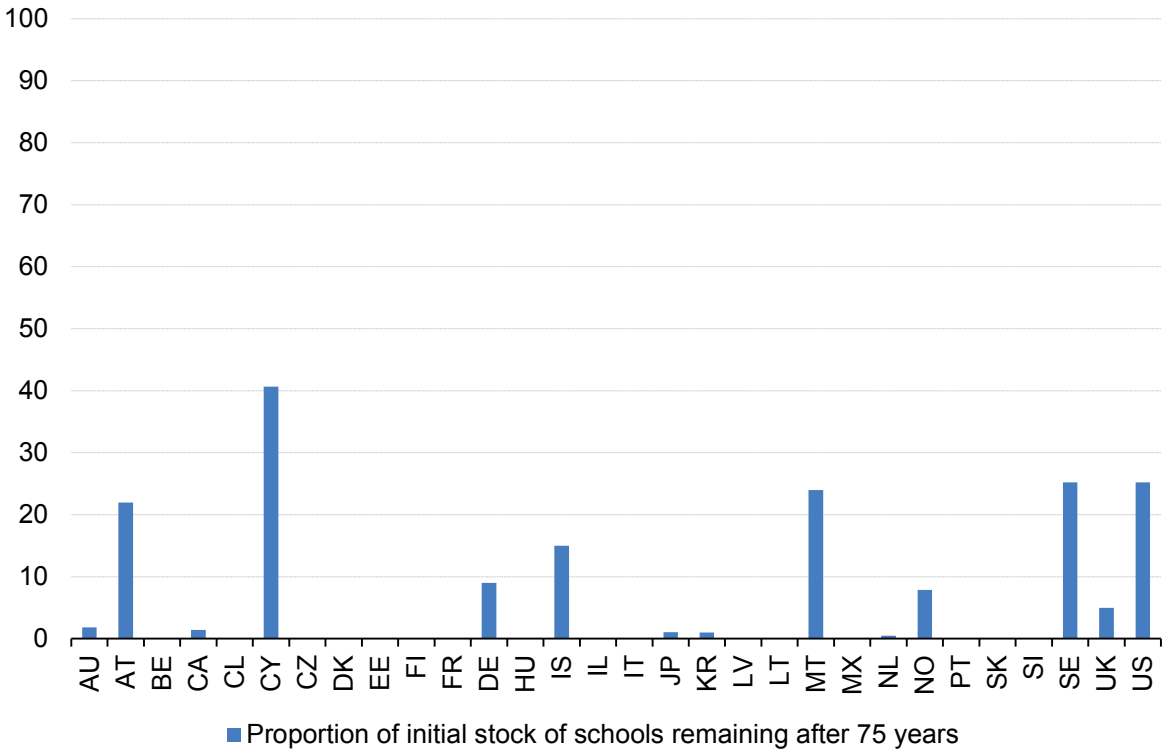



Source: TF on Land and other non-financial assets, based on OECD-Eurostat survey of national practices in estimating service lives, depreciation, net stocks

**Figure 4: Proportion of initial stock of roads remaining after 25, 50 and 75 years**
(% of stock of roads)






Source: TF on Land and other non-financial assets, based on OECD-Eurostat survey of national practices in estimating service lives, depreciation, net stocks

## Sources of information for the assumptions of the PIM

To estimate service lives and patterns of depreciation and retirement, respondents relied on several sources of information, including tax authorities, company accounts, administrative property records, expert advice, econometric studies, other countries' estimates, and statistical surveys. It is difficult to compare the reliability of these sources of information. Some of the notable statistical surveys and studies are briefly summarised below (and see the case study for the United States).

Japan's Capital Expenditure and Disposal survey, conducted annually since 2005, collects observations on the disposal of assets by private corporations. The survey provides detailed information on disposed assets, the time of acquisition, the acquisition value, whether the asset is sold for continued use or for scrap, and its sales value. Nomura and Momose (2008) ([17]) estimated ratios between disposal and acquisition prices (adjusted for inflation and other factors) to estimate geometric age-price profiles. Japan also conducted National Wealth Surveys in 1970, and these surveys provide benchmark service lives for capital stocks owned by corporations, government and households.

Statistics Canada's annual Capital and Repair Expenditures Survey, conducted annually since the 1980s, collects data on the service lives and prices of used assets that are sold, the original cost of these assets, and companies' expected service life of assets. A recent study used these data to estimate age-price profiles and compared these estimated depreciation patterns with expected service lives reported by companies. The estimated age-price profiles and the expected service lives were generally similar to one another and similar to previous results. Note that the depreciation rates from Canada and Japan (which are based on annual surveys) often differ substantially from the depreciation rates from the USA (which are based on numerous occasional studies of used asset markets.) ([18])

For Korea, the service life for dwellings is estimated based on several versions of the Housing Census, which provide data on how many dwellings had been built in each previous year and how many had survived. The average life is set to equal the age at the point of time when half of the houses newly-built at a certain year in the past are retired. The estimates of service lives for non-residential buildings are based on the estimates for residential buildings and also a survey ([19]).

For France, most assumptions about the service lives of non-residential assets were set in 1996 based on a review of other countries' assumptions, business surveys that collected data on the age of assets, and a review of stocks and flows of capital reported in companies' balance sheets. These data were used to estimate retirement patterns ([20]). For dwellings, estimates of the stock of housing from the National Housing Survey, conducted about every five years, have been used to refine the PIM estimates.

Other countries have also conducted notable surveys or studies of capital stocks. The Netherlands has conducted surveys of discards (second-hand use and scrap) for manufacturing firms annually since 1991. For Germany, the service lives of buildings and structures, in particular residential buildings, commercial buildings and public buildings, were extracted from the long-term property accounts ([21]). Other countries, including Spain, Lithuania, and Slovenia, have also conducted surveys of fixed assets.

These surveys and associated studies (see the case study for the United States) provide very useful information about depreciation and retirement patterns and can be more reliable than depreciation

([17]) Measurement of Depreciation Rates Based on Disposal Asset Data In Japan (OECD, 2008)

([18]) See Baldwin, John, Huju Liu, and Marc Tanguay 'An Update on Depreciation Rates for the Canadian Productivity Accounts', January 2015. Available at http://www.statcan.gc.ca/daily-quotidien/150126/dq150126d-eng.htm

.([19]) For Korea, see footnote 10.

([20]) For an earlier reference, see Atkinson, Margaret and Jacques Mairesse, 'Length of life of equipment in French manufacturing industries', 1978.

([21]) See footnote 8.

patterns based on tax records, which often reflect changes in tax policy rather than true economic depreciation. The survey based results have some limitations. Sold assets may not be representative of all assets, and do not include those that have already been scrapped. For second-hand assets, survey respondents may provide an age of the asset under its current ownership and not the full age of the asset. Survey results may also be less applicable for other countries with assets that have dissimilar physical characteristics or face different conditions.

## Transfer of ownership costs and improvements to structures

Costs of ownership transfer consist of costs required to take ownership of an asset and include taxes and fees paid to brokers, surveyors, engineers, and so on. SNA 2008 recommends depreciating costs of ownership transfer over the period the asset is expected to be held by the purchaser; when data are insufficient for this treatment, SNA 2008 recommends depreciating costs of ownership transfer in the year of acquisition.

Because the period of ownership is typically shorter than the service life of the structure, and because the price deflator for these costs often differs from the price deflator for the structure, the costs of ownership transfer are often measured as a separate asset category and depreciated faster than the structure. Among the countries that follow this practice, the service lives of costs of ownership transfer range from one year (UK) to 10 years (Norway), 12 years (USA), 17 years (Korea), 17 years for costs associated with dwellings and 27 years for costs associated with assets that are non-dwellings (Australia), 17–30 years (Denmark), 20 years (Netherlands), 25 years (Finland and Italy). Some countries lack separate data sources for these costs and estimate them as a proportion of GFCF (Czech Republic, Netherlands, Hungary). Other countries either do not measure costs of ownership transfer or include them as part of total GFCF. The depreciation of these costs at the same rate as the structure may lead to an upward bias in the estimated stock of structures.

The SNA 2008 and ESA 2010 both recommend treating major improvements and renovations to structures as GFCF and depreciating them. Several countries report measuring improvements as part of GFCF and/or depreciating improvements separately (Austria, Australia, Belgium, Canada, Estonia, Finland, Germany, Hungary, Iceland, Israel ([22]), Italy ([23]), Latvia, Lithuania, Malta, Portugal, Sweden, UK, USA). As expected, the service lives and depreciation functions vary across these countries.

## Net stocks of structures relative to GDP

Still another way to compare the estimates of net stocks of structures is to compare ratios of net stocks of structures to GDP. These comparisons are difficult to interpret: they may reveal countries with measurement problems or unrealistic PIM assumptions, or they may simply reveal true variation in trends in investment or depreciation over time. As the figure shows, the ratios of net stocks of all structures to GDP for 2012 average about 2.7 among survey respondents providing this information. Some countries, such as Austria, Czech Republic, France, Hungary, Iceland, Italy, Latvia, Portugal, Slovakia, and Slovenia have ratios above 3; Israel ([24]) and Poland (which does not use a PIM) have ratios below 1.3. Ratios of net stocks of dwellings to GDP average close to 1.2 among respondents, with Austria, Germany, Iceland, Italy, Malta, the Netherlands, Portugal, Slovenia, and the UK reporting ratios of 1.4 or more, while Chile, Japan, Lithuania, and Poland report ratios below 0.8. The ratios of net stocks of other buildings and structures to GDP also vary noticeably across countries.

The two-letter ISO codes are used as the country abbreviations for figure 5: Australia (AU), Austria

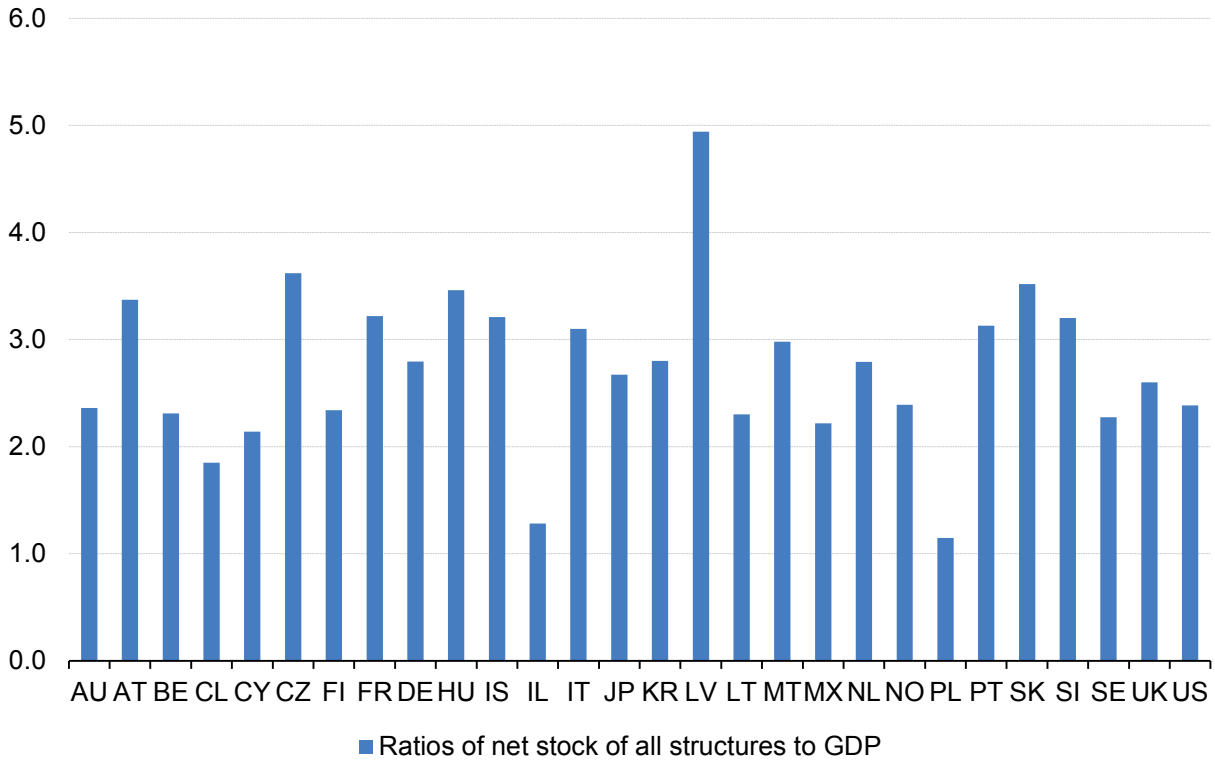
([22]) For Israel, see footnote 4.

(23) Italy differentiates between investments in new dwellings and investments in major renovations/ improvements to existing dwellings. Extraordinary maintenance is recorded separately only for internal analytical purposes and it is not depreciated separately from dwellings.

([24]) For Israel, see footnote 4.

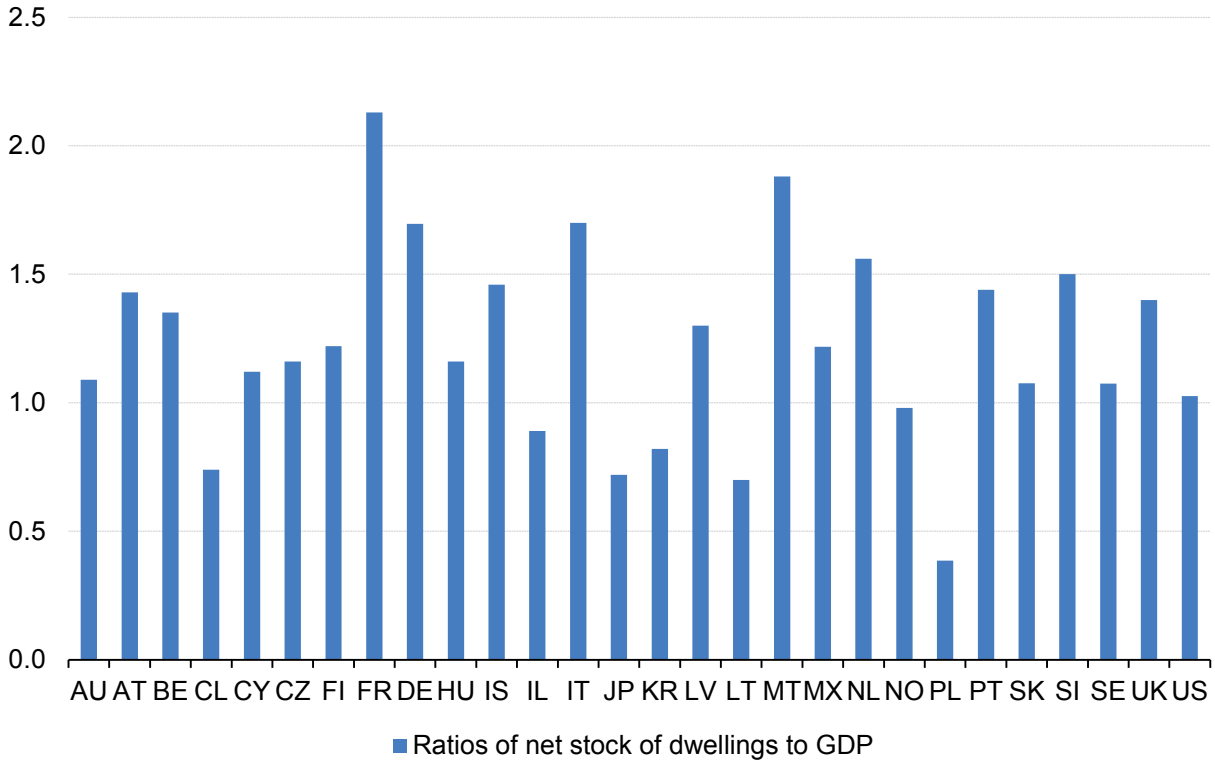
(AT), Belgium (BE), Chile (CL), Cyprus (CY) ([25]), Czech Republic (CZ), Finland (FI), France (FR), Germany (DE), Hungary (HU), Iceland (IS), Israel (IL) ([26]), Italy (IT), Japan (JP), Korea (KR), Latvia (LV), Lithuania (LT), Malta (MT), Mexico (MX), Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Slovakia (SK), Slovenia (SI), Sweden (SE), United Kingdom (UK), United States (US).

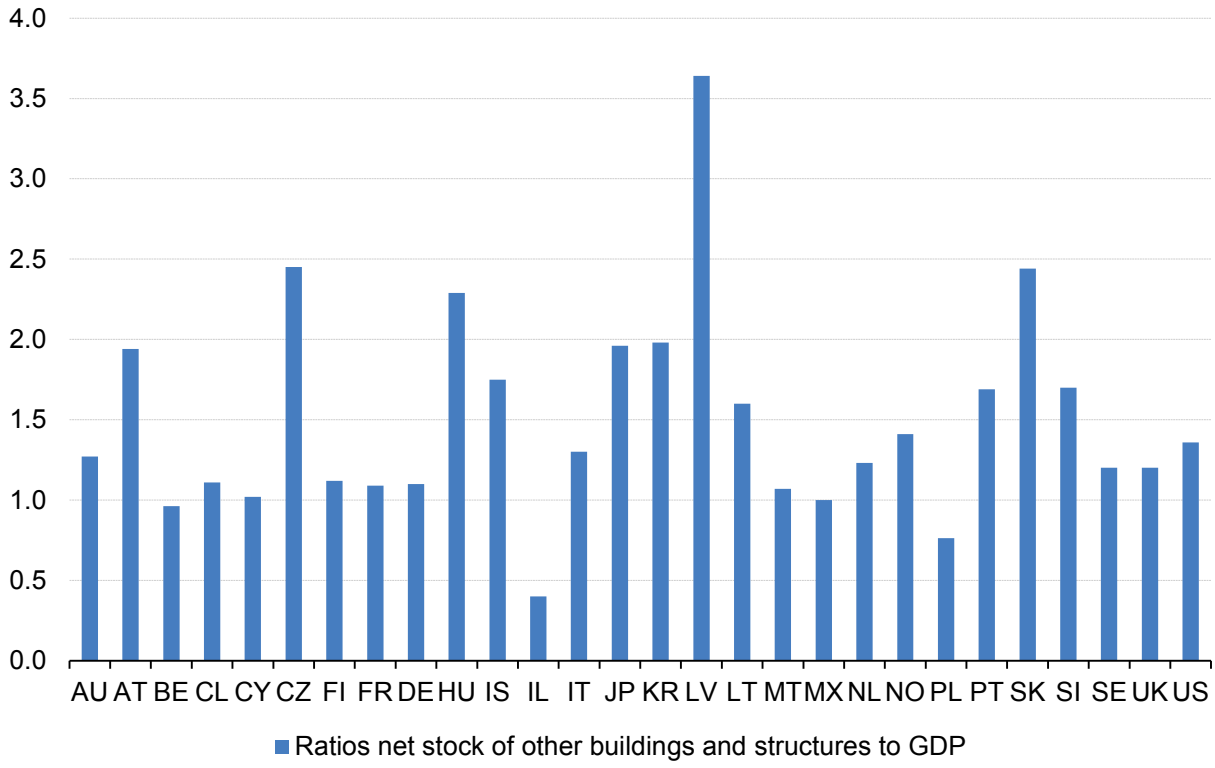
**Figure 5: Ratios of net stocks of all structures, dwellings, and other buildings and structures to GDP, 2012**




([25]) For Cyprus, see footnotes 2 and 3.

([26]) For Israel, see footnote 4.




Source: TF on Land and other non-financial assets, based on OECD-Eurostat survey of national practices in estimating service lives, depreciation, net stocks

## Government owned land

Chapter 8.3 of the compilation guide on land notes the importance of estimates of government owned land. The survey finds that only a few countries report producing measures of the stock of government-owned land, through the residual approach or any other way. The countries that report estimates of government-owned land are Australia, the Netherlands (although not land under roads), Czech Republic, Japan, Italy (for land under dwellings and buildings, by applying the residual approach), Korea (for all government-owned land) and Romania (for agricultural land). Several countries report PIM assumptions for net stocks of typical government-owned assets (roads, bridges, airports, waterways, and so on) but these estimates are usually not used to estimate underlying stocks of land.

## Major concerns and plans for the future

Respondents were generally confident about the quality of their estimates but also expressed a range of concerns. The major concerns include the reliability of assumptions of service lives and depreciation; the quality of GFCF data and price deflators (especially for earlier decades); price indices that do not adequately capture quality and productivity gains; inadequate measurement of costs of ownership transfer, improvements, or second-hand sales; measures of GFCF that are on net terms (acquisitions less disposals) instead of separately identifying new investment; and inaccurate estimates of stocks of land through the residual or ratio approaches.

The most common plans for improving estimates in the future include the implementation of the provisions of SNA 2008 and ESA 2010 along with research to improve the estimates of nonfinancial assets for national balance sheets. Many expressed an interest in improving estimates of the total value of land and structures, improving estimates of land through the residual approach, improving assumptions about service lives and depreciation, and improving price measures.

## Summary

As the survey results indicate, national accounts across countries vary — sometimes considerably — in their assumptions and sources of information for estimates of net stocks based on a PIM. Different assumptions for the PIM can, in turn, lead to different estimates of land values obtained through the residual or LSR approach. These assumptions may vary across countries with similar ‘true’ patterns of depreciation because of measurement errors. Even without measurement error, differences in assumptions across countries may also correctly reflect real differences in factors that affect depreciation (the physical nature of structures, building materials, maintenance, climate, variation in the use of structures, etc.). Thus, disparities in estimates of land values across countries can be difficult to interpret. As this section notes, one way to facilitate comparisons of approaches across countries with different functional forms of depreciation and retirement is to compute the proportion of a cohort of assets left after a number of years, using each country’s assumptions for the PIM.

Despite the uncertainties in estimating net stocks of structures through the PIM, the PIM and the residual and ratio approaches for estimating stocks of land still have many advantages. For many countries, these indirect approaches may be the only credible approach for estimating stocks of land underlying structures. The residual approach gives countries a useful credibility check for estimates of the combined value of structures and land and estimates of net stocks and depreciation, which are needed for national income accounting. The presence of negative or unrealistic estimates of land values can indicate problems in one or both of these estimates. Balance sheets could arguably rely solely on estimates of the combined value of structures and land (through real estate data, for example), but these estimates alone provide an incomplete picture. The residual approach can help countries assess whether increases in the total value of land and structures arises mainly from land or from structures. Assuming bubbles are most likely to appear as increases in land values under the residual approach, year-to-year changes in the residual estimates of land values may be useful in

identifying bubbles.

The results of the survey will hopefully lead to sharing of information across countries and useful discussions about how best to produce reasonable, internationally comparable estimates of net stocks of structures. A more detailed presentation of the responses to the survey is presented in Part A and Part B of this report.

# Eurostat-OECD survey of national practices

**Introduction**

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

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

Please provide your responses to this survey by no later than 18 October 2013 so that the TF will be able to develop an issues paper for discussion at its meeting on 2-3 December 2013. For any assistance in completing the survey please contact Mr. Bob Kornfeld at Robert.Kornfeld@bea.gov. Completed forms should be returned to Mr. Bob Kornfeld (Robert.Kornfeld@bea.gov) with copy to Mr. Hans Wouters (Johannes.Wouters@ec.europa.eu).

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

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

For those who already responded to an earlier version of the questionnaire (sent in March 2013) the prior submission of the survey can be edited and resubmitted with the additional information requested, if this option is more convenient. Please provide sufficient information so that the Task Force can calculate the percentage of stocks of the selected assets that remain after a number of years. See the table for the additional details requested, in particular the asset types requested and information requested in column 4 of the table (column 8 is optional). Part B is the same as the previous version except for questions 1, 2, 5, and 9.

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

**Country:……..**

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

- Dwellings (AN111)
- Other buildings and structures (AN112)
    - Buildings other than dwellings (AN1121)
    - Other structures (AN1122)
    - Land improvements (AN1123)

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

We would like to compare rates of economic depreciation and retirement for several specific types of buildings and structures in different countries' national accounts. For a specific type of building or structure, we would like to measure how much of an initial investment remains in the capital stock after 10 years, 20 years, 50 years, 100 years, and so on.

To help us accomplish this goal, please answer the following questions in the format of the table below. Please provide as much information as possible. If it is not possible to use the table then please provide your answers after the questions in any other format.

1. (Column 1 in the table at the end of this questionnaire). Please list the most detailed asset categories of dwellings and other buildings and structures for which separate estimates of service lives, depreciation functions, and retirement functions are available.

- The list of asset types you provide, should, at a minimum, enable us to estimate depreciation and retirement trends for the types of assets listed in the table below.

- If you estimate depreciation/retirement trends for a less detailed list of assets (for example, a single set of assumptions for all nonresidential buildings), please indicate this so we can apply the same set of assumptions for several assets listed.

- If you estimate depreciation/retirement trends for a more detailed list of assets (or a different categorization of assets), please provide this additional detail instead, and enough information so we can compare depreciation/retirement for all of the assets listed.

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

If such a detailed list of assumptions is not available, please provide as much detail as possible.

2. (Column 2 in the table at the end of this questionnaire) Please select from the following list the method(s) of net stock estimation employed for each of the asset categories, industries, and institutional sectors for which distinct net stock estimation methods exist (see *Measuring Capital*, Chapter 15).

a. Perpetual Inventory Model (PIM), based on an available time series of investment
b. PIM, based on an imputed time series of investment (derived from an estimated relationship with GDP or other method)
*Benchmark-year estimates based on*
c. Wealth surveys

d. Population censuses
e. Fire insurance records
f. Company accounts
g. Administrative property records
h. Share valuations.
i. Other, namely….

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

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

4a,b,c. (Columns 4a,b,c) Please list the assumptions (depreciation function and parameters, retirement function and parameters, and any other assumptions employed in estimates of depreciation for each of these asset categories (and sector and industry, if available). Please provide enough information so we may calculate the proportion of stock of these assets remaining for each year after an initial investment.

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

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

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

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

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

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

8. Optional estimates of actual depreciation/retirement trends of assets.
We plan to use your information to estimate the proportion of an initial stock of investment remains after a number of years. If you would also like to provide estimates of the proportion of an initial stock of investment remains after a number of years, please provide your estimates in the table.

If a geometric approach is applied in capital stock estimation, the actual depreciation rate is directly available. If a non-geometric age-price applied, the depreciation rate can be calculated by using the formulae in the following box.

How to measure a depreciation rate for an asset i in volume terms when a linear age-price profile or any other non-geometric age-price profile is applied.

$$\delta_t = \frac{D_t}{[K_{t-1} + I_t/2]} = \frac{D_t}{[K_{t-1} + (K_t - K_{t-1} + D_t)/2]}$$
$$= \frac{D_t}{[(K_t + K_{t-1} + D_t)/2]} = \frac{2D_t}{[K_t + K_{t-1} + D_t]}$$

Here, $\delta_t$ indicates the depreciation rate of asset i in time t:

$D_t$ the amount of depreciation of asset i in time t:

$K_t$ the net (wealth) stock of asset i in time t:

$I_t$ the amount of investment in asset i in time t.

**Part B: Additional Questions**

1. Net stock/GDP ratios: For the most recent year, what is the ratio of…
   - The total net stock of dwellings (AN111) and other buildings and structures (AN112) to GDP?
   - The total net stock of dwellings (AN111) to GDP?
   - The total net stock of other buildings and structures (AN112) to GDP?

Note: If you already report these statistics in the OECD DB, please indicate this.

2. Net stock of structures/land ratios: For the most recent year, what is the ratio of…
   - The total net stock (without land) of dwellings (AN111) and other buildings and structures (AN112) to the total stock of underlying land?
   - The total net stock (without land) of dwellings (AN111) to the total stock of underlying land?
   - The total net stock (without land) of other buildings and structures (AN112) to the total stock of underlying land?

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

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

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

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

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

5. Do you differentiate between investments in new dwellings and investments in major renovations/ improvements to existing dwellings? For the most recent year, can you provide investment in new dwellings

as a share of the total investment in dwellings (which includes both new dwellings and the value of major renovations/improvements)?

6. How frequently are annual and quarterly estimates produced and updated?

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

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

9. Do you provide estimates of the value of government-owned land? If so, what general methodology do you employ? Do these estimates exclude some parts of government owned land?

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

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

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | | | | | 7. Used to estimate stocks of land? | Optional: Calculated percentage of stock remaining after…(Years) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3.Service lives | 4a. Depreciation function and parameters | 4b. Retirement function and parameters | 4c. Other assumptions | 5. Do assumptions vary over time? | 6. Source of infor-mation | | 10 | 25 | 50 | 75 | 100 |
| **AN111 Dwellings** | | | | | | | | | | | | | |
| One- and two-dwelling residential buildings | | | | | | | | | | | | | |
| Multi-dwelling residential buildings | | | | | | | | | | | | | |
| Major renovations /improvements to existing dwellings | | | | | | | | | | | | | |
| Ownership transfer costs | | | | | | | | | | | | | |
| **AN1121 Buildings other than dwellings** | | | | | | | | | | | | | |
| Warehouses | | | | | | | | | | | | | |
| Manufacturing or industrial buildings | | | | | | | | | | | | | |
| Office buildings | | | | | | | | | | | | | |
| Buildings for shopping | | | | | | | | | | | | | |
| Buildings for public entertainment | | | | | | | | | | | | | |
| Hotels | | | | | | | | | | | | | |
| Restaurants | | | | | | | | | | | | | |
| Schools | | | | | | | | | | | | | |
| Hospitals | | | | | | | | | | | | | |
| Farm buildings | | | | | | | | | | | | | |
| Prisons | | | | | | | | | | | | | |
| Major renovations /improvements | | | | | | | | | | | | | |
| Ownership transfer costs | | | | | | | | | | | | | |

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | | | | | 7. Used to estimate stocks of land? | Optional: Calculated percentage of stock remaining after…(Years) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3.Service lives | 4a. Depreciation function and parameters | 4b. Retirement function and parameters | 4c. Other assumptions | 5. Do assumptions vary over time? | 6. Source of infor-mation | | 10 | 25 | 50 | 75 | 100 |
| **AN1122 Other structures** | | | | | | | | | | | | | |
| Shafts, tunnels and other structures associated with mining mineral and energy resources | | | | | | | | | | | | | |
| Construction of sea-walls, dykes/levees, and flood barriers | | | | | | | | | | | | | |
| Infrastructure for aquaculture such as fish farms and shellfish beds | | | | | | | | | | | | | |
| Highways, streets, and roads | | | | | | | | | | | | | |
| Railways | | | | | | | | | | | | | |
| Airfield runways | | | | | | | | | | | | | |
| Bridges | | | | | | | | | | | | | |
| Tunnels and subways | | | | | | | | | | | | | |
| Waterways | | | | | | | | | | | | | |
| Harbours | | | | | | | | | | | | | |
| Dams and other waterworks | | | | | | | | | | | | | |
| Long-distance pipelines | | | | | | | | | | | | | |
| Long-distance communication and power lines | | | | | | | | | | | | | |
| Local pipelines and cables | | | | | | | | | | | | | |
| Sewage and water treatment plants | | | | | | | | | | | | | |
| Electric power plants | | | | | | | | | | | | | |
| Natural gas structures | | | | | | | | | | | | | |
| Wind and solar energy structures | | | | | | | | | | | | | |
| Outdoor sport and recreation facilities | | | | | | | | | | | | | |

# Part A Basic Assumptions of Perpetual Inventory Methods (PIM)

# Australia

Net stock estimation method: PIM, based on an available time series of investment
Depreciation: Hyperbolic efficiency function, reduction parameter = 0.75; age-price function is calculated by normalising the net present value of future capital services which are derived by using average age-efficiency functions and a real discount rate
Retirement: Winfrey S0 for major renovations /improvements to existing dwellings; Winfrey S3 for other assets
Other assumptions: Real discount rate of 0.04
Source of information for the assumptions of the PIM: CSM 14.63 for AN111, AN1121 and AN1122. ABS reviews asset lives every 10 years, and also monitors changes in the rates of use, technology advancement and quality changes of assets. This applies to all of AN111, AN1121 and AN1122.
Is the PIM used to estimate stocks of land? Estimates for residential buildings and their major improvements are used to estimate stocks of underlying land

| **1. Asset category** | **Service lives*** |
|---|---|
| **AN111 Dwellings** | |
| One and two dwelling residential buildings | 88 (brick), n. a<br>58 (timber-fibro and other), n. a |
| Multi-dwelling residential buildings | 58, n. a |
| Major renovations, improvements to existing dwellings | 39, n. a |
| Ownership transfer costs | 18, n. a |
| **AN1121 Buildings other than dwellings. (Classified by ANZSIC)** | |
| Warehouses (Wholesale Trade), Buildings for shopping (Retail Trade) | 50, 38 |
| Manufacturing or industrial buildings (Manufacturing) | 38, 38 |
| Office buildings (Professional, scientific and technical services) | 57, 57 |
| Buildings for public entertainment (Arts and Recreation Services); Schools (Education and Training); Hospitals (Health Care and Social Assistance) | 50, 50 |
| Hotels, restaurants (Accommodation and Food Services) | 50, 41 |
| Farm buildings (Agriculture, Forestry and Fishing) | 41, 41 |
| Prisons (Public Administration and Safety) | n. a, 54 |
| Major renovations /improvements | 39, n. a |
| Ownership transfer costs | 32, n. a |
| **AN1122 Other structures (Classified by ANZSIC)** | |
| Shafts, tunnels and other structures associated with mining mineral and energy resources; Natural gas structures (Mining) | 29, 29 |
| Infrastructure for aquaculture such as fish farms and shellfish beds (Agriculture, Forestry and Fishing) | 41, 41 |
| Highways, streets, and roads (Construction) | 33, 33 |
| Construction of sea walls, dykes/levees, and flood barriers; railways; airfield runways and bridges; tunnels and subways; waterways and harbours; dams and other water works; long-distance pipelines; long-distance communication and power lines; local pipelines and cables; sewage and water treatment plant; electric power plants; wind and solar energy structures; outdoor sport and recreation facilities (Construction) | 44, 44 |

*In the table, the left column represents financial and non-financial corporations; the right column represents public non-financial corporations and general government

# Austria

Net stock estimation method: PIM, based on an available time series of investment
Depreciation: Geometric
Source of information for the assumptions of the PIM: Other countries' estimates
Is PIM used to estimate stocks of land? No

| 1. Asset category | Geometric depreciation rate |
|---|---|
| Dwellings: NACE 68; S.11, S.13, S.14<br>Other buildings and structures: S.11, S.14, NACE: 01, 02, 49, 50, 51, 53, 55-56, 58, 59, 60, 61, 62-63, 68, 69, 70-75, 77, 78 ,80-82, 85, 86, 87-88, 90, 91, 92, 93, 94, 96 | 0.02 |
| Other buildings and structures: S.11, S.14, NACE: 03, 10, 11, 12, 13, 14, 15, 17, 18, 23, 29, 30, 31, 32, 35, 36, 41, 42, 43, 45, 46, 47, 64, 65, 66, 95 | 0.024 |
| Other buildings and structures: S.11, S.14, NACE: 05-07, 08-09, 16, 19, 20, 21, 22, 24, 25, 26, 27, 28, 33, 37-39, 52, 79 | 0.03 |
| Other buildings and structures: S.15 (non-market producer), NACE: 85, 86, 87-88, 93, 94<br>Other buildings and structures, Buildings: S.1312, Market Producer, NACE: 68, 86, 87-88, 91<br>Other buildings and structures, Buildings: S.1313, Market Producer, NACE: 01, 02, 55-56, 62-63, 68, 86, 87-88, 93, 96 | 0.02 |
| Other buildings and structures, Buildings: S.1313, Market Producer, NACE: 10, 36 | 0.024 |
| Other buildings and structures, Buildings: S.1311, Market Producer, NACE: 52<br>Other buildings and structures, Buildings: S.1313, Market Producer, NACE: 37-39, 52<br>Other buildings and structures, Streets: S.1311, Market Producer, NACE: 52, 85<br>Other buildings and structures, Streets: S.1313, Market Producer, NACE: 01, 02, 36, 37-39, 68, 87-88, 93, 96<br>Other buildings and structures, Other structures: S.1312, Market Producer, NACE: 87-88, 91<br>Other buildings and structures, Other structures: S.1313, Market Producer, NACE: 01, 02, 36, 37-39, 52, 68, 87-88, 93, 96 | 0.03 |
| Other buildings and structures, Buildings: S.1311, Non-Market Producer, NACE: 49, 52, 55-56, 68, 71, 72 ,79 ,84, 85, 87-88, 90, 91, 94<br>Other buildings and structures, Buildings: S.1312, Non-Market Producer, NACE: 55-56, 59, 68, 71, 72, 79, 84, 85, 86, 87-88, 90, 91, 93, 94<br>Other buildings and structures, Buildings: S.1313, Non-Market Producer, NACE: 10, 49, 52, 55-56, 68, 71, 74-75, 77, 80-82, 84, 85, 86, 87-88, 90, 91, 93, 94<br>Other buildings and structures, Buildings: S.1314, Non-Market Producer, NACE: 84, 86 | 0.02 |
| Other buildings and structures, Streets: S.1311, Non-Market Producer, NACE: 84, 85<br>Other buildings and structures, Streets: S.1312, Non-Market Producer, NACE: 68, 84, 85, 86, 94<br>Other buildings and structures, Streets: S.1313, Non-Market Producer, NACE: 55-56, 68, 77, 80-82, 84, 85, 86, 87-88, 90, 91, 93<br>Other buildings and structures, Streets: S.1314, Non-Market Producer, NACE: 84<br>Other buildings and structures, Other structures: S.1311, Non-Market Producer, NACE: 52,55-56, 71, 84, 85<br>Other buildings and structures, Other structures: S.1312, Non-Market Producer, NACE: 55-56, 68, 84, 85, 86, 87-88, 91, 94<br>Other buildings and structures, Other structures: S.1313, Non-Market Producer, NACE: 49, 55-56, 68, 74-75, 77, 80-82, 84, 85, 86, 87-88, 90, 91, 93<br>Other buildings and structures, Other structures: S.1314, Non-Market Producer, NACE: 84 | 0.03 |

# Belgium

Net stock estimation method: PIM, based on an available time series of investment

| 1. Asset category | Assumptions of the PIM (if used) | | | | | | 7. Used to estimate stocks of land? |
|---|---|---|---|---|---|---|---|
| | 3.Service lives | 4a. Depreciation function and parameters | 4b. Retirement function and parameters | 4c. Other assumptions | 5. Do assumptions vary over time? | 6. Source of information | |
| **AN111 Dwellings** | 60 | Straight line | Log-normal (L=2 and s=3) | No | No | See More detailed answers | Plan to use |
| **AN1121 Buildings other than dwellings** | 30-60 | | | | | | |
| Manufacturing buildings<br>Retail buildings and hospitals<br>Schools | 35<br>40<br>60 | | | | | | |
| **AN1122 Other structures** | 30-60 | | | | | | No |
| Highways, streets, and roads | 55 | | | | | | |
| Waterways | 70 | | | | | | |

**More Detailed Answers : Belgium**

| Question | Answer |
|---|---|
| 3. Service lives | In Belgium, average service lives are estimated by branch of activity and by product. See the link to the note "Methodological note on capital stock " (table 3) for the details and a detailed list of service lives by type of asset. This note has been updated in October 2014 in accordance with European System of Accounts (ESA) 2010.<br><br>https://www.nbb.be/doc/dq/e_method/m_sec2010d2_en.pdf |
| 4. Retirement function and parameters | L = the maximum service life of the fixed assets; s = the standard deviation for the normal distribution corresponding to ln(x)<br><br>For information on the determination of the services lives, see annex 1 of the above mentioned note "Methodological note on capital stock". |

# Canada

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | | | 7. Used to estimate stocks of land? |
|---|---|---|---|---|---|---|
| | | 3.Service lives | 4a. Depreciation function and parameters | 5. Do assumptions vary over time? | 6. Source of information | |
| **Dwellings: Single and multiple dwellings** | PIM, based on an available time series of investment | 75years ; 2% depreciation rate | Geometric | No | See More Detailed Answers | Yes |
| **Buildings other than dwellings: 37 assets for building construction, Other structures: 58 assets comprise engineering construction** | | Varies depending on NAICS, asset and province: See reference below for detailed estimates by type of asset and industry | | Yes, new 1987 survey based service lives gradually incorporated | | Yes |

**More Detailed Answers: Canada**

| Question | Answer |
|---|---|
| 6. Source of information | Dwellings: The depreciation rate based on studies:<br>1) by Kostenbauer, Klaus. 2001. « Housing Depreciation in the Canadian CPI». Statistics Canada, Ottawa.<br>2) Grebler, Blank and Winnick 1956. «Capital Formation in residential Real Estate» NBER, Princeton University Press, Princeton.<br>- Service lives based on study by Firestone, O.J. 1951 «Residential real estate in Canada» University of Toronto. Buildings other than dwellings and other structures: service lives for assets, NAICS and province are based on results from the STC Capital and repair expenditures survey.<br>Benchmark-year estimates are also based on population census.<br><br>For buildings other than dwellings and other structures, the estimates of depreciation rates by asset/NAICS categories are based on an analysis of data from the Annual Capital and Repair Expenditure Survey. The depreciation rates shown here were updated in November 2014, see Baldwin, John, Huju Liu, and Marc Tanguay(2015), " An Update on Depreciation Rates for the Canadian Productivity Accounts" *Canadian Productivity Review* for more recent information at *http://www.statcan.gc.ca/pub/15-206-x/15-206-x2015039-eng.pdf* . This document contains a detailed list of depreciation rates by asset type and industry. |
| 7. Used to estimate stock of land? | The stock of residential and non-residential structures combined with land-to-structures ratios are the basis for the estimate of land. |

# Chile

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | | | | | 7. Used to estimate stocks of land? |
|---|---|---|---|---|---|---|---|---|
| | | 3.Service lives | 4a. Depreciation function and parameters | 4b. Retirement function and parameters | 4c. Other assumptions | 5. Do assumptions vary over time? | 6. Source of information | |
| **AN111 Dwellings** | | | | | | | | |
| Multi-dwelling residential buildings | PIM, based on an available time series of investment | 40 | Linear | Winfrey S3 | See Detailed Answers | See More Detailed Answers | See Detailed Answers | We have not measured it |
| **AN1121 Buildings other than dwellings** | PIM, based on an available time series of investment | 40 | Linear | Winfrey S3 | See Detailed Answers | Prices. | See Detailed Answers | We have not measured it |
| **AN1122 Other structures** | | | | | | | | |

## More Detailed Answers : Chile

| Question | Answer |
|---|---|
| 1. Assets category | Some categories of the service lives are divided by industry, for further details,<br>See (page 27 in Spanish): http://www.bcentral.cl/estudios/estudios-economicos-estadisticos/pdf/see63.pdf |
| 4. Other assumptions | They are measured with a linear depreciation function, with Winfrey S-3 retirement patterns, and additionally, we use the implicit price of the investment by asset to measure the net capital stock at current prices. |
| 5. Variation in service lives and other assumptions | In the case of Multi-dwelling residential buildings: It has been assumed that the service life is decreasing through their life (With a maximum of 100 years to 50 years), when buildings are over 50 years old. (Source: Henriquez, 2008) |
| 6. Source of information | We used the data provided by the Internal Revenue Service (Tax office) and the information provided by other studies about these issues in Chile. Specifically, for the case of other structure, we used the investment data by type on structure and the information of the Internal Revenue Services. When the tax lives were not available, the information of company financial statements or the average of the industry was utilized. |

| Period | 1885-1896 | 1897-1907 | 1908-1918 | 1919-1929 | 1930-1940 | 1941-1951 | 1952-1962 | 1963-1973 | 1974-1984 | 1985-1995 | 1996-2002 | 2003-2005 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dwellings** | 98 | 93 | 88 | 84 | 79 | 74 | 70 | 65 | 60 | 56 | 52 | 20 |

## Cyprus [27]

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | | | | 7. Used to estimate stocks of land? |
|---|---|---|---|---|---|---|---|
| | | 3.Service lives | 4b. Retirement function and parameters | 4c. Other assumptions | 5. Do assumptions vary over time? | 6. Source of information | |
| **AN111 Dwellings** | PIM, based on an available time series of investment | 75 | Log-normal | Dispersion factor = 2 | No | Statistical surveys, Expert advice | No |
| **AN1121.Buildings other than dwellings** | PIM, based on an available time series of investment | 60-75 | Log-normal | Dispersion factor = 2 | No | Statistical surveys, Expert advice | No |
| Warehouses | PIM, based on an available time series of investment | 69 | Log-normal | Dispersion factor = 2 | No | Statistical surveys, Expert advice | No |
| Manufacturing or industrial buildings | | 60 | | | | | |
| Office buildings | | 75 | | | | | |
| Hotels | | | | | | | |
| Restaurants | | | | | | | |
| Schools | | | | | | | |
| Hospitals | | | | | | | |
| Farm buildings | | | | | | | |
| **AN1122.Other structures** | | | | | No | | No |
| Highways, streets and roads | PIM, based on an available time series of investment | 55 | Log-normal | Dispersion factor = 2 | No | Statistical surveys, Expert advice | No |
| Airfield runways | | | | | | | |
| Bridges | | | | | | | |
| Harbours | | | | | | | |

[27] For Cyprus, see footnote 2 and 3.

## Czech Republic

Net stock estimation method: PIM, based on an impute time series of investment

Used to estimate stocks of land? No

| 1. Asset category | Assumptions of the PIM (if used) | | | | |
|---|---|---|---|---|---|
| | 3.Service lives | 4a.Depreciation function | 4b. Retirement function | 5. Do assumptions vary over time? | 6. Source of information |
| **AN111 Dwellings** | | | | **No** | |
| One- and two-dwelling residential buildings | 90 | Linear | Log-normal | | |
| Multi-dwelling residential buildings | 80 | | | | |
| **AN1121 Buildings other than dwellings** | | | | **No** | |
| Warehouses | 90 | Linear | Log-normal | | See detailed answers |
| Manufacturing or industrial buildings | 60 | | | | |
| Office buildings | 90 | | | | |
| Buildings for shopping | 60 | | | | |
| Buildings for public entertainment | 70;75 | | | | |
| Hotels, Restaurants | 80 | | | | |
| Schools | 70 | | | | |
| Hospitals | | | | | |
| Farm buildings | 40 | | | | |
| **AN1122 Other structures** | | | | **No** | |
| Highways, streets, roads, Bridges, Tunnels and subways | 50 | Linear | Log-normal | | |
| Railways | 30 | | | | |
| Dams and other waterworks | 100 | | Simultaneous exit | | |
| Sewage ; water treatment plants | 80; 30 | | Log-normal | | |
| Electric power plants | 50 | | Simultaneous Exit | | |
| Natural gas structures | 30 | | | | |

**More Detailed Answers :Czech Republic**

| Question | Answer |
|---|---|
| 6. Source of information | AN111 Dwellings: SL: expert advice; historical TS: tax return statistics; other Assumptions:(census, statistical survey)<br>AN1121 Non-residential buildings: land registry, expert advice. AN1122 Other buildings: expert advice |

## Denmark

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | | | | | 7. Used to estimate stocks of land? |
|---|---|---|---|---|---|---|---|---|
| | | 3.Service lives | 4a. Depreciation function and parameters | 4b. Retirement function and parameters | 4c. Other assumptions | 5. Do assumptions vary over time? | 6. Source of information | |
| **AN111 Dwellings** | Other | 75 years | | | | Yes. Old buildings have longer service lives. | Study, Administrative records. | |
| **AN111 Dwellings, costs of ownership transfer** | PIM, based on an available time series of investment | 30 | Straight line* | Winfrey | | No | Assumption | |
| **ANN1121, Other buildings, varying between industries.** | | 51-70 | | Based on research | | Yes. Old buildings have longer service lives. | Study, Administrative records. | No |
| Hospitals<br>Schools<br>Manufacturing<br>Retail | Administrative property records | 65 years<br>65<br>55<br>55 | | | | | | |
| **ANN1121, Other buildings, Costs of ownership transfer** | | 17-30 | | Winfrey | | Yes, but only for buildings used for agriculture. | Assumption | |
| **Other structures, varying by industry** | PIM, based on an available time series of investment | 23-120 years | | Winfrey | | No | Assumption | |
| Roads | | 50 | | | | | | |

*For most types of assets; Winfrey approach is used until 2008, and the geometric approach is used for subsequent years

## Estonia

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | | | | | 7. Used to estimate stocks of land? |
|---|---|---|---|---|---|---|---|---|
| | | 3.Service lives | 4a. Depreciation function and parameters | 4b. Retirement function and parameters | 4c. Other assumptions | 5. Do assumptions vary over time? | 6. Source of information | |
| **AN111 Dwellings** | PIM, based on an available time series of investment | 67 (apartments)<br>80 (houses) | Geometric (DBR=1.6) | | | No | Statistical surveys | No |
| **AN1121 Buildings other than dwellings (except unfinished construction works in S.13)** | PIM, based on an imputed time series of investment | 50 | Straight line | Linear | | No | Tax lives, other countries' estimates, Statistical surveys | No |
| Unfinished construction works (Only in S.13) | | | | | | | | |
| **AN1122 Other structures (except highways, streets and bridges)** | | 34 | | | | | | |
| Highways, streets, and roads (Only in S.11 and S.13) | | 55 | | | | | | |
| Bridges (Only in S.11 and S.13) | | | | | | | | |

## Finland

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | | | | | 7. Used to estimate stocks of land? |
|---|---|---|---|---|---|---|---|---|
| | | 3.Service lives | 4a. Depreciation function and parameters | 4b. Retirement function and parameters | 4c. Other assumptions | 5. Do assumptions vary over time? | 6. Source of information | |
| **Dwellings (AN111)** | PIM, based on an available time series of investment | 60 | Linear | Weibull | | No | International experience, expert advice | No |
| **Buildings other than dwellings (AN1121)**<br>Manufacturing buildings<br>Retail Buildings<br>Hospitals<br>Schools | | 20-52<br>40<br>40<br>50<br>50 | | | | Yes | Questionnaire on manufacturing industries, expert advice, Eurostat recommendations | |
| **Other structures (AN1122)**<br>Roads | | 35-70<br>55 | | | | | Questionnaire on manufacturing industries, expert advice | |
| **Land improvements (AN1123)** | | 30-70 | | | | No | Expert advice, Eurostat recommendation | |
| **Ownership transfer costs** | | 25 | | | | | | |

In 'AN111 Dwellings' we have only one asset category. In 'AN1121 Buildings other than dwellings' and 'AN1122 Other structures', the service lives vary by industry and sector, not by different building types.

# France

Net stock estimation method: PIM, based on an available time series of investment (and for dwellings, benchmark-year estimates based on The National Housing survey)
Depreciation: Straightline
Retirement function: Log-normal(LN)
Do assumptions vary over time? No
Source of information for the assumptions of the PIM: Companies' accounts, statistical surveys, other countries' estimates
Is PIM used to estimate stocks of land? Yes, for dwellings

| 1. Asset category (Base-year 2005,Esa95) | 3.Service lives |
|---|---|
| **AN111 Dwellings** | Around 90 years. Average service life : 30 years |
| **AN1121 Buildings other than dwellings** | Service life : 75 or 90 years, depending on industries (NAF Rév2 in 38 codes) Average service life : 25 or 30 years |
| **AN1122 Other structures** | Service life : 120 years. Average service life : 60 years |

## More Detailed Answers : France

| Question | Answer |
|---|---|
| **1 .Asset Category** | In France, the asset categories of dwellings and other buildings and structures for which separate estimates of services, depreciations functions and retirement functions are available are :<br>-Dwellings : AN111 in base-year 2005 (Esa95).<br>-Non residential buildings : AN1121 in base-year 2005 (Esa95).<br>-Others structures : AN1122 in base-year 2005 (Esa95).<br>All these categories of assets do not include the land underneath the structures.<br>In the French balance sheet, the assumptions of services lives are different for each asset. The average services lives are the same for each institutional sector, but can vary by industry, depending on the type of asset. For the 3 assets above in particular, the average services lives of non-residential buildings varies by industry, as shown in the table below. The services lives are equal to 2 or 3 times the average service lives, depending on the assets. |

**French base-year 2005 (Esa95) : average services lives assumptions (in years) by asset and industry**

| Industry, NAF (French Classification) | Industry (labels) | Assets (Structures including costs of ownership transfer) | | |
|---|---|---|---|---|
| | | non residential buildings | dwellings | others structures |
| BRA38_AZ | **AGRICULTURE, FORESTRY AND FISHING (section A)** | 25 | 30 | 60 |
| BRA38_BZ | **MINING AND QUARRYING (section B)** | 30 | 30 | 60 |
| | **MANUFACTURING (section C)** | | | |
| BRA38_CA | Manufacture of food products, beverages and tobacco products (Section C.10,11,12) | 25 | 30 | 60 |
| BRA38_CB | Manufacture of textiles, wearing apparel, leather and related products (Sectoin C. 13,14,15) | 30 | 30 | 60 |
| BRA38_CC | Manufacture of wood and of products of wood and cork except furniture ; except furniture, manufacture of articles of straw and plaiting materials ; Manufacture of paper and paper products ; Printing and reproduction of recorded media (Section C.16,17,18) | 30 | 30 | 60 |
| BRA38_CD | Manufacture of coke and refined petroleum products (Section C.19) | 30 | 30 | 60 |
| BRA38_CE | Manufacture of chemicals and chemical products (Section C.20) | 30 | 30 | 60 |
| BRA38_CF | Manufacture of basic pharmaceutical products and pharmaceutical preparations (Secton C.21) | 30 | 30 | 60 |
| BRA38_CG | Manufacture of rubber and plastic products and other non-metallic mineral products (Section C.22,23) | 30 | 30 | 60 |
| BRA38_CH | Manufacture of basic metals and fabricated metal products, except machinery and equipment (Section C.24,25) | 30 | 30 | 60 |
| BRA38_CI | Manufacture of computer, electronic and optical products (Section C.26) | 25 | 30 | 60 |
| BRA38_CJ | Manufacture of electrical equipment (Section C.27) | 25 | 30 | 60 |
| BRA38_CK | Manufacture of machinery and equipment n.e.c. (Section C.28) | 25 | 30 | 60 |
| BRA38_CL | Manufacture of transport equipment (Section C.29,30) | 25 | 30 | 60 |
| BRA38_CM | Other manufacturing, repair and installation of machinery and equipment (Section C.31,32,33) | 30 | 30 | 60 |
| BRA38_DZ | **ELECTRICITY, GAS, STEAM AND AIR CONDITIONING SUPPLY (Section D)** | 30 | 30 | 60 |
| BRA38_EZ | **WATER SUPPLY; SEWERAGE, WASTE MANAGEMENT AND REMEDIATION ACTIVITIES (Section E)** | 30 | 30 | 60 |
| BRA38_FZ | **CONSTRUCTION (Section F)** | 25 | 30 | 60 |
| BRA38_GZ | **WHOLESALE AND RETAIL TRADE; REPAIR OF MOTOR VEHICLES AND MOTORCYCLES (Section G)** | 25 | 30 | 60 |
| BRA38_HZ | **TRANSPORTATION AND STORAGE (Section H)** | 25 | 30 | 60 |
| BRA38_IZ | **ACCOMMODATION AND FOOD SERVICE ACTIVITIES (Section I)** | 25 | 30 | 60 |
| | **INFORMATION AND COMMUNICATION (Section J)** | | | |
| BRA38_JA | Publishing activities ; Motion picture, video and television programme production, sound recording and music publishing activities ; Programming and broadcasting activities (Section J.58,59,60) | 25 | 30 | 60 |
| BRA38_JB | Telecommunications (Section J.61) | 25 | 30 | 60 |
| BRA38_JC | Computer programming, consultancy and related activities ; Information service activities (Section J.62,63) | 25 | 30 | 60 |
| BRA38_KZ | **FINANCIAL AND INSURANCE ACTIVITIES (Section K)** | 25 | 30 | 60 |
| BRA38_LZ | **REAL ESTATE ACTIVITIES (Section L)** | 25 | 30 | 60 |
| | **PROFESSIONAL, SCIENTIFIC AND TECHNICAL ACTIVITIES (Section M)** | | | |
| BRA38_MA | Legal and accounting activities ; Activities of head offices; management consultancy activities ; Architectural and engineering activities; technical testing and analysis (Section M.69,70,71) | 25 | 30 | 60 |
| BRA38_MB | Scientific research and development (Section M.72) | 25 | 30 | 60 |
| BRA38_MC | Other professional, scientific and technical activities (Section M.73,74,75) | 25 | 30 | 60 |
| BRA38_NZ | **ADMINISTRATIVE AND SUPPORT SERVICE ACTIVITIES (Section N)** | 25 | 30 | 60 |
| BRA38_OZ | **PUBLIC ADMINISTRATION AND DEFENCE; COMPULSORY SOCIAL SECURITY (Section O)** | 25 | 30 | 60 |
| BRA38_PZ | **EDUCATION (Section P)** | 25 | 30 | 60 |
| | **HUMAN HEALTH AND SOCIAL WORK ACTIVITIES (Sectoin Q)** | | | |
| BRA38_QA | Human health activities (Section Q.86) | 25 | 30 | 60 |
| BRA38_QB | Residential care activities and social work activities without accommodation (Section Q.87,88) | 25 | 30 | 60 |
| BRA38_RZ | **ARTS, ENTERTAINMENT AND RECREATION (Section R)** | 25 | 30 | 60 |
| BRA38_SZ | **OTHER SERVICE ACTIVITIES (Section S)** | 25 | 30 | 60 |
| BRA38_TZ | **ACTIVITIES OF HOUSEHOLDS AS EMPLOYERS; UNDIFFERENTIATED GOODS- AND SERVICES-PRODUCING ACTIVITIES OF HOUSEHOLDS FOR OWN USE (Section T)** | 25 | 30 | 60 |
| BRA38_UZ | **ACTIVITIES OF EXTRATERRITORIAL ORGANISATIONS AND BODIES (Section U)** | 25 | 30 | 60 |

| | |
|---|---|
| **2. Net stock estimation method** | For the dwellings, the PIM is supplemented by benchmark estimates based on a survey carried out by Insee and known as “National Housing Survey (NHS)”. The PIM is improved in order to integrate this additional data. The total value of the housing stock (dwellings + land) is known approximately every five years, provided by the NHS. This survey gives detailed information about the national park of dwellings (it is based among nearly 43,000 units in France), including a direct estimate of the |

| | |
|---|---|
| | stock in current prices since 1973. However, this data source does not split buildings from land underneath. This specific data source is used to initialize the PIM and also to allow a benchmark for the results, especially for the recent period. |
| **4. Other assumptions** | In the PIM, the coefficients are based on the hypotheses of a log-normal mortality function and a straight-line depreciation. The coefficients of mortality and depreciation are computed for each type of asset of each industry (since assets have different service lives depending on the industry whereby they are used in). For each type of asset, constant price estimates of gross capital stock, retirements, consumption of fixed capital and capital net stock are derived for each year by multiplying the appropriate coefficient vector with the corresponding vector of constant price estimates of GFCF. For each type of asset, the constant price estimates of gross capital stock and net capital stock are multiplied by end-year price indexes with the same reference year, so as to get end-year current prices estimates. |
| **6. Source of information** | Most assumptions about the service lives were fixed in 1996 thanks to a study based on three sources: 1) 40 businesses were surveyed on the age of their assets, 2) a comparison of stocks and flows of capital reported by companies in their balance sheet has been done ; 3) some comparisons with the assumptions of other countries. |
| **7. Used to estimate stocks of land?** | See the "Value of land and dwellings: Treatment in French National Accounts OECD Working Party on National Accounts" http://www.oecd.org/std/na/Presentation-OECD-VA.pdf. |

## Germany

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | | | | 7. Used to estimate stocks of land? |
|---|---|---|---|---|---|---|---|
| | | 3.Service lives | 4a. Depreciation function | 4b. Retirement function | 5. Do assumptions vary over time? | 6. Source of information | |
| **AN111 Dwellings** | PIM, based on an available time series of investment, population censuses. S.1 is calculated by PIM. For the split into sectors census information by the owners of dwellings is used in addition. | 77(2010) | Straight line | Gamma distribution | See More Detailed Answers | Yes. See More Detailed Answers | No; See note |
| **AN1121 Buildings other than dwellings** | | | | | | | |
| Office buildings | PIM, based on an available time series of investment | 65(2010) | Straight line | Gamma distribution | See More Detailed Answers | Yes. See More Detailed Answers | No |
| Hotels | | 60(2010) | | | | | |
| Schools | | 65(2010) | | | | | |
| Farm buildings | | 67(2010) | | | | | |
| **AN1122 Other structures** | | | | | | | |
| Highways, streets, roads (including bridges, tunnels) | PIM, based on an available time series of investment | 57(2010) | Straight line | Gamma distribution | See More Detailed Answers | Yes. See More Detailed Answers | No; See note |
| Waterways | | 74(2010) | | | | | |
| Harbours | | 83(2010) | | | | | |

***More Detailed Answers : Germany**

| Question | Answer |
|---|---|
| 1 .Asset Category | SNA/ESA asset classification +ESA transmission programme including gross value added for non-market producers;<br>land improvements are not available separately, they are included in structures (mainly of general government) |
| 5. Variation in service lives and other assumptions | Yes, revision of assumptions if new information are available and structural effects in the breakdown of assets |
| 6. Source of information | Tax lives from the Federal Ministry of Finance and other local authorities, other service life information from Federal Ministries, investigations made by economic institutes and other expert advices. |
| 7. Used in the estimation of stock of land? | No; direct method of land valuation is applied in Germany so far<br>(preliminary estimates of land underlying buildings and structures initiated by the Deutsche Bundesbank) |
| Optional: Calculated percentage of stock remaining after(Years) for AN111 Dwellings: | |

| 10 | 25 | 50 | 75 | 100 |
|---|---|---|---|---|
| 82.3% | 58.0% | 28.1% | 12.5% | 5.0% |

## Hungary

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | | | | 7. Used to estimate stocks of land? |
|---|---|---|---|---|---|---|---|
| | | 3.Service lives | 4a. Depreciation function | 4b. Retirement function | 5. Do assumptions vary over time? | 6. Source of information | |
| **AN111 Dwellings** | Population census | 47.5 -160<br>Avg: 83 | Linear | Normal | No | Expert advice | No |
| **AN1121 Buildings other than dwellings and AN 1122 Other structures** | PIM | 40-150<br>Avg: 83 (private corporation)<br>Avg: 75 (local government) | | | | | |
| **AN1122 Other structures** | | | | | | | |
| Highways, streets, roads | | 75 | Linear | Normal | | Expert advice | No |
| Dams and other waterworks | | 150 | | | | | |
| Sewage and water treatment plants | | 56 | | | | | |

Service lives vary by NACE and by sectors. See Hungarian Central Statistical Office GNI Inventory of Hungary Version 2.2
http://r.search.yahoo.com/_ylt=AwrBT9pealtVMQsAw_BXNyoA;_ylu=X3oDMTEzZzZmMGM5BGNvbG8DYmYxBHBvcwMxBHZ0aWQDVklQNjE1XzEEc2VjA3Ny/RV=2/RE=1432083167/RO=10/RU=http%3a%2f%2fwww.ksh.hu%2fdocs%2feng%2fxftp%2fmodsz%2fgni_inventory_ver_2_2.pdf/RK=0/RS=D1okF3e94v__FziOBMfJileuuVs-

# Iceland

Net stock estimation method: PIM
Depreciation: Geometric
Source of information for the assumptions of the PIM: Administrative records
Is PIM used to estimate stocks of land? No

| 1. Asset category | 2. Net stock estimation method | 3.Service lives/depreciation rate |
|---|---|---|
| **AN111 Dwellings** | | |
| One-and-two-dwelling residential buildings***, Multi-dwelling-residential buildings | PIM* | 90 ; 2.5% (We have a residual value of 10%) |
| **AN1121 Buildings other than dwellings** | | |
| Warehouses, Manufacturing or industrial buildings | PIM** | 57 ; 4.0% |
| Office buildings, Buildings for shopping and public entertainment, hotels, restaurants | | 90 ; 2.5% |
| Schools, Hospitals | PIM | 90 ; 2.5% |
| Farm buildings | PIM** | 38 ; 6.0% |
| Prisons | PIM | 90 ; 2.5% |
| **AN1122 Other structures** | | |
| Shafts, tunnels and other structures associated with mining mineral and energy resources | PIM** | 44 ; 5.0% |
| Construction of sea-walls, dykes, levees, and flood barriers | PIM | 90 ; 2.5% |
| Highways, streets, and roads | | 77 ; 3.0% |
| Airfield runways | PIM** | 77 ; 3.0% |
| Bridges, tunnels and subways, waterways | PIM | 77 ; 3.0% |
| Harbours, Dams and other waterworks, Long-distance pipelines, Long-distance communication and power lines | PIM** | 44 ; 5.0% |
| Local pipelines and cables | PIM | 44 ; 5.0% |
| Sewage and water treatment plants | PIM** | 90 ; 2.5% |
| Electric power plants | | 44 ; 5.0% |
| Outdoor sport and recreation facilities | PIM | 90 ; 2.5% |

* Derived from administrative property records from REGISERS ICELAND, extrapolated from benchmark year 2007
** Derived from annual accounts of all enterprises from DIRECTORATE OF INTERNAL REVENUE, extrapolated from benchmark year 1997
*** For dwellings there has been a mixture of PIM method and direct valuation of the stock from Registers Iceland. The depreciation rate has been constant 1990-2012

## Israel[28]

Net stock estimation method: PIM, based on an available time series of investment
Depreciation: Straightline
Retirement: Truncated-Normal
Do assumptions vary over time? No
Is PIM used to estimate stocks of land? No

| 1. Asset category | Assumptions of the PIM (if used) | |
|---|---|---|
| | 3.Service lives | 6. Source of information |
| **AN111 Dwellings** | | |
| One- and two-dwelling residential buildings, Multi-dwelling residential buildings, Major renovations /improvements | 50 | Other countries estimates |
| **AN1121 Buildings other than dwellings** | | |
| Manufacturing or industrial buildings | 25 | Other countries estimates |
| Warehouse, Office buildings, Buildings for shopping and public entertainment, Hotels, Restaurants, Schools, Hospitals, Major renovations/ improvements, Prisons | 50 | |
| Farm buildings | 25 | Expert advice |
| **AN1122 Other structures** | | |
| Transportation, storage ,postal and courier activities | 40 | Expert advice |
| Highways, streets, roads and Bridges | 50 | Other countries estimates |
| Information and communications | 40 | Expert advice |
| Electricity supply | 25 | |
| Water supply, sewerage and waste management | 40 | |

| Calculated percentage of stock remaining after (Year) by Asset Category | 10 | 25 | 50 | 75 | 100 |
|---|---|---|---|---|---|
| **AN111 Dwellings:** One and two dwellings residential buildings**,** Multi dwelling residential buildings**,** Major renovations/improvements to existing dwellings | 80 | 48 | 7 | 0 | 0 |
| **AN1121 Buildings other than dwellings:** Manufacturing or industrial buildings | 58 | 7 | 0 | 0 | 0 |
| Warehouses, office buildings, Buildings for shopping, Buildings for public entertainment, hotels, Restaurants, Schools, Hospitals, Major renovations/improvements | 80 | 48 | 7 | 0 | 0 |
| Farm buildings | 58 | 7 | 0 | 0 | 0 |
| **AN1122 Other structures:** Transportation, storage, postal and courier activities | 74 | 35 | 1 | 0 | 0 |
| Highway, streets, roads and Bridges | 80 | 48 | 7 | 0 | 0 |
| Information and communications | 74 | 35 | 1 | 0 | 0 |
| Electricity supply | 58 | 7 | 0 | 0 | 0 |
| Water supply, sewerage and waste management | 74 | 35 | 1 | 0 | 0 |

[28] For Israel, see footnote 4.

# Italy

Net stock estimation method: PIM, based on an available time series of investment
Depreciation: Linear
Retirement: Truncated-Normal
Do assumptions vary over time? No

| 1. Asset category | Assumptions of the PIM (if used) | | 7. Used to estimate stocks of land? |
|---|---|---|---|
| | 3.Service lives | 6. Source of information | |
| **Dwellings (AN111 excluding costs of ownership transfer)** | 79 | Expert advice | Yes; See More Detailed Answers |
| **Other buildings and structures (AN112, excluding costs of ownership transfer)** | Service lives vary across industries(See table below) | Expert advice; Eurostat Task Force on consumption of fixed capital on roads, bridges etc. | |
| Costs of ownership transfer of dwellings | 34 | Expert advice | No |
| Costs of ownership transfer of buildings other than dwellings | | | |

***More Detailed Answers: Italy**

| Question | Answer |
|---|---|
| 7. Used in the estimation of stock of land | Yes, through the "residual method"<br>**1)** By private institution sector (non-financial corporations, financial corporations, households and non-profit institutions serving households)<br>In order to estimate the net stock of buildings by institutional sector, PIM is not used: the time series of GFCF by institutional sector currently available are too short to apply it for these assets. As to residential and non-residential buildings, a combined value (buildings +underlying land) at market prices for Total Economy is obtained on the bases of annual cadastral data, by kind of construction; cadastral information on legal form of the owner is then used to allocate this value among institutional sectors.<br>For Total economy the value of underlying land is calculated through the "residual method" (as the difference between the combined value at market prices and the PIM estimate).<br>On the bases of the assumption that the ratio land/building +land is the same for all the institutional sectors, the value of land underlying buildings and the net stock value of buildings are obtained for each institutional sector.<br><br>**2)** General Government. For the net stock of General Government we follow the basic assumptions illustrated in Table 1. |

**Table. Service lives for Other buildings and structures (AN112) used in the estimates by industry (Italy)**

| Industry | Service life |
|---|---|
| Agriculture, forestry and fishing | 51 |
| Mining and quarrying | 35 |
| Manufacture of:<br>food products; beverages and tobacco products; textiles, wearing apparel, leather and related products; wood, paper, printing and reproduction;<br>coke and refined petroleum products; chemicals and chemical products; basic pharmaceutical products and pharmaceutical preparations;<br>rubber and plastic products and other non-metallic mineral products; basic metals and fabricated metal products, except machinery and equipment;<br>computer, electronic and optical products; electrical equipment; machinery and equipment n.e.c.;<br>motor vehicles, trailers, semi-trailers and of other transport equipment; furniture; jewellery, musical instruments, toys;<br>repair and installation of machinery and equipment | |
| Electricity, gas, steam and air conditioning supply | |
| Water supply; sewerage, waste management and remediation activities | 40 |
| Construction | 35 |
| Wholesale and retail trade; repair of motor vehicles and motorcycles | 65 |
| Transportation and storage | 50 |
| Accommodation and food service activities | 65 |
| Publishing, motion picture, video, television programme production; sound recording, programming and broadcasting activities | |
| Telecommunications | 50 |
| Computer programming, consultancy, and information service activities | 65 |
| Financial and insurance activities | |
| Real estate activities | 80 |
| Legal and accounting activities; activities of head offices; management consultancy activities; architectural and engineering activities; technical testing and analysis | 65 |
| Scientific research and development | |
| Advertising and market research; other professional, scientific and technical activities; veterinary activities | |
| Administrative and support service activities | |
| Public administration and defence; compulsory social security | 60 |
| Education | 57 |
| Human health activities | 35 |
| Residential care activities and social work activities without accommodation | 56 |
| Arts, entertainment and recreation | |
| Other service activities | |

## Japan

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | | | 7. Used to estimate stocks of land? |
|---|---|---|---|---|---|---|
| | | 3. Depreciation rates (average) | 4a. Depreciation function and parameters | 5. Do assumptions vary over time? | 6. Source of information | |
| **AN111 Dwellings:** | PIM, based on an available time series of investment | | Geometric | | | No |
| wooden | | 0.055 | | Yes (e.g. 0.079 in 1970) | ADR, NWS, PRS | |
| non-wooden | | 0.040 | | Yes (e.g. 0.050 in 1970) | ADR, NWS, PRS | |
| **AN1121 Buildings other than dwellings** | | | | | | |
| wooden | | 0.081 | | Yes (e.g. 0.116 in 1970) | EPD, NWS, CED | |
| non-wooden | | 0.059 | | Yes (e.g. 0.074 in 1970) | EPD, NWS, CED | |
| **AN1122 Other structures** | | | | | | |
| Highways, streets and roads (including road bridges) | | 0.033* (0.015-0.182) | | No | PDM, IWE, TJA | |
| River improvement, dams and other waterworks | | 0.010* (0.006-0.039) | | No | PDM, IWE, TJA | |
| City park | | 0.029* (0.021-0.042) | | No | PDM, IWE, TJA | |
| Sewage system and treatment equipment | | 0.016* (0.011-0.055) | | No | PDM, IWE, TJA | |
| Port improvement | | 0.019 | | No | PDM, IWE | |
| Airport | | 0.071 | | Yes (e.g. 0.063 in 1970) | PDM, IWE, NWS | |
| Fishing port | | 0.018 | | No | PDM, IWE | |
| Waste disposal and treatment facilities | | 0.061 | | No | IWE | |
| Agricultural irrigation and drainage system | | 0.020 | | No | IWE, TJA | |
| Railroad structures | | 0.044 | | Yes (e.g. 0.039 in 1970) | NWS, IWE, CED | |
| Electric power plants and supply system | | 0.063 | | Yes (e.g. 0.056 in 1970) | NWS, IWE, CED | |
| Communication and broadcasting facilities | | 0.063 | | Yes (e.g. 0.056 in 1970) | NWS, IWE, CED | |

**More Detailed Answers: Japan**

| Question | Answer |
|---|---|
| 1. Assets category | On buildings and structures, we don't vary the methods and assumptions either by industry or by institutional sector. |
| 3. List of the service lives | Depreciation rates followed by "*" are the averages of the related geometric depreciation rates on finer classifications, weighted by the components of "latest asset vintage" (i.e. the components of acquisition value of assets for the latest year, 2012). |

| | |
|---|---|
| | So, “percentages of stock remaining” are calculated from the total value of the components of the "latest asset vintage" remaining after the target years. |
| 5. Variation in service lives and other assumptions | For some types of asset, we can compare the service lives of different vintage by some special surveys or preceding studies. We first set the benchmark service lives for 2 vintages, 1970 and 2005, and vary the service lives linearly between 2 vintages. For other vintages, before 1970/after 2005, we keep the same service life as 1970/2005. |
| 6. Source of information | We generally determine the service lives of assets from following materials.<br>1. Statistical surveys: for buildings (both dwelling and non-dwelling) and some structures owned by private companies.<br>National Wealth Survey (NWS) in 1970: Directly investigation of detailed capital stocks owned by corporations, government and households.<br>Capital Expenditure and Disposal survey (CED), annually since 2005: collected data of detailed assets disposed by private companies, which have the time and the value of their acquisition and disposal.<br>2. Administrative records (ADR)<br>Dwellings (records for property taxes)<br>3. Other methods<br>Some preceding studies in economics, architecture and civil engineers. (PRS)<br>Estimates based on physical durability of materials used in structures. (PDM)<br>Interview with engineers or specialists. (IWE)<br>Tentative judgment and/or assumptions. (TJA) |
| 7. Used in the estimation of stock of land | We directly estimate the value of land by the sum of products, the area multiply each unit price of land. |

# Korea

Net stock estimation method: PIM

| 1. Asset category | 3.Service lives |
|---|---|
| **AN111 Dwellings** | Until 1980: 40 Since 1996: 55 Service life changes usually every five years |
| **AN1121** | |
| Agricultural or Manufacturing buildings | Until 1980: 36 Since 1991: 47 Service life changes usually every five years |
| Commercial service buildings | Until 1980: 40 Since 1991: 50 Service life changes usually every five year |
| Buildings for governments, education and health | Until 1980: 44 Since 1996: 55 Service life changes usually every five year |
| **AN1122 Other structures** | |
| Highways, streets, roads (and airports) | Until 1980: 45 Since 1996: 60 Service life changes usually every five year |
| Railways (and subways) | Until 1980: 55 Since 1991: 65 Service life changes usually every five year |
| Waterways | Until 1980: 25 Since 1991: 30 Service life changes usually every five year |
| Harbours | Until 1970: 40 Since 1986: 55 Service life changes usually every five year |
| Dams and other waterworks | Until 1960: 30 Until 1980: 33 Since 1986: 37 Service life changes usually every five year |
| Electric power plants | 40 |
| Engineering works for agriculture and fishery | 60 |
| Urban civil engineering works | Until 1980: 45 Since 1991: 55 Service life changes usually every five year |
| Telecommunication facilities | 30 |
| Other civil engineering works | 45 |
| Forestry | 60 |
| Cost of ownership transfer of land | 17 |

***More Detailed Answers : Korea**

| Question | Answer |
|---|---|
| 2. Method of net stock estimation | The initial stock of each asset is estimated as of year-end of 1953. A Winfrey retirement function, hyperbolic efficiency function and the constant real rate of return of 4% are adopted in estimating age-survival profiles, age-efficiency profiles and age-price profiles.<br>The age-depreciation profiles are computed from age-price profiles. |
| 4. Other assumptions | The Bank of Korea adopts the general approach as explained in the OECD Manual, by which gross stock, productive stock and net stock are all estimated.<br>The efficiency parameter is set at 0.75 for buildings and structures and 1.0 for cost of ownership transfer of land.<br>-Age-price profile: Present Value of Efficiency Model (PVE Model). The age-price profile is the time pattern of the value of an old asset to a new asset, with the value of the new asset as one and that of the retired asset as zero.<br>The value of an asset is assumed to be equal to the discounted stream of future benefits that the asset is expected to yield. The stream of future benefits is assumed to follow the hyperbolic function. In the base model, the constant real rate of return of 4% is applied as the discount rate.<br>-The depreciation function of an asset is directly derived from its age-price profile. |
| 5. Variation in service lives and other assumptions | Yes, service lives are usually assumed to be longer.<br>=> Dwellings built before 1980 showed rather a short service life. Many existing buildings have been renovated or rebuilt well before they arrive at the end of their physical lives as the demand for high-quality housing has soared in line with the high growth of per capita income and the rapid reshaping of metropolitan areas due to a radical process of urbanization. However, it is reasonable to expect that the service lives of buildings will be lengthened to a |

| | |
|---|---|
| | normal life, as the Korean economy enters a more stable growth stage and urbanization has run its course to a considerable extent. In addition, the following points support our conjecture of a lengthening of the service lives of buildings; the quality standards of new buildings have been progressively raised; the minimum building age for the reconstruction of existing buildings has been further extended by local governments since the mid-2000s; and the real estate market has stabilized on the maturity of Korea's physical capital accumulation. For structures, the service life is estimated mainly as the average life of the sub-processes or the sub-assets comprising the structure, weighted by their compositional share of costs. Thus, the service life of an individual structure is allowed to vary over periods in order to reflect the fact that the composition of sub-processes and their share of costs change over years. For highways, changes in route were frequent from the 1970s owing to urbanization and increased vehicle stock, and the average life of rebuilt bridges surveyed in 1995 was quite short at 30 years. But with the stabilization of growth and urbanization together with progress in construction technology, the service life of roads is assumed to be lengthened to a normal one as in the case of buildings. For harbours, the share of investment in dredging was reduced remarkably. For dam and river works, expenditure on restoration of damaged structures by typhoons also decreased greatly. |
| 6. Source of information | Dwellings: Housing Census and own estimate<br>Buildings other than swellings: Service lives of dwellings and own estimate<br>Other structures: Expert advice and own estimate.<br>Additionally, Statistical survey and Administrative record are used to estimate Water supply and sewerage, Cost of ownership transfer of land respectively. Plus, Company accounts are used for Electric power facilities, Telecommunication facilities.<br>Answers are presented in the table. More detailed information is given in the attached file, “Measuring service lives of assets in Korean capital measurement”, though it is not the final version. |
| 7. Used in the estimation of stock of land | Dwelling, Buildings other than dwelling are used to estimate the stock of land, but not directly<br>In Korea, the value of stock of land is basically estimated by using a direct approach. In other words, land area of a specific type in a specific location is multiplied by its market price or market price equivalent. However, as the market price or market price equivalent is not available for the whole land, the resulting value can be faced with a high risk of measurement error. Accordingly, land is also valued using a residual approach especially for building sites and both results are compared to cross-check the validity of the above value derived from the direct approach. |

Optional estimates of actual depreciation/retirement trends of assets

In Korea, net capital stock is also estimated by using a geometric approach together with the general approach.
Both estimates are very similar in scale. And in the following table, depreciation rate of an asset can be computed by the expression of δ=DBR/T.
As the service lives change, depreciation rate is also changeable.

## Fixed asset types, service lives, Winfrey types, efficiency parameters, depreciation rates and DBRs

| | Time-varying service lives of assets | | | | | | | | | | | | Winfrey Type | Efficiency parameter[1] | $\delta_0$[2] in 2011 (%) | $\delta$[3] in 2011 (%) | DBR[4] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Until 1960 | 1961 -65 | 1966 -70 | 1971 -75 | 1976 -80 | 1981 -85 | 1986 -90 | 1991 -95 | 1996 -2000 | 2001 -05 | 2006 -10 | Since 2011 | | | | | |
| **Buildings** | | | | | | | | | | | | | | | | | |
| Residential buildings | 40 | | | | | 43 | 48 | 53 | 55 | 55 | | | R3 | 0.75 | 1.5 | 2.4 | 1.24 |
| Buildings for agriculture, mining and manufacturing | 36 | | | | | 40 | 45 | 47 | | | | | R3 | 0.75 | 1.9 | 3.2 | 1.30 |
| Buildings for private services | 40 | | | | | 44 | 48 | 50 | | | | | R3 | 0.75 | 1.7 | 2.6 | 1.26 |
| Buildings for public services | 44 | | | | | 47 | 52 | 54 | 55 | 55 | | | R3 | 0.75 | 1.5 | 2.3 | 1.21 |
| **Other structures** | | | | | | | | | | | | | | | | | |
| Highways and airports | 45 | | | | | 48 | 53 | 58 | 60 | 60 | | | R3 | 0.75 | 1.3 | 2.0 | 1.11 |
| Railways and subways | 55 | | | | | 58 | 63 | 65 | | | | | R3 | 0.75 | 1.2 | 1.6 | 1.05 |
| Harbors | 40 | | | 43 | 48 | 53 | 55 | 55 | | | | | R3 | 0.75 | 1.5 | 2.1 | 1.26 |
| Dam and river works | 30 | 33 | | | | 35 | 37 | 37 | | | | | R3 | 0.75 | 2.6 | 4.1 | 1.42 |
| Water supply and sewerage | 25 | | | | | 27 | 29 | 30 | | | | | R3 | 0.75 | 3.3 | 5.6 | 1.48 |
| Engineering works for agriculture and fisheries | 60 | | | | | | | | | | | | R3 | 0.75 | 1.3 | 2.2 | 1.14 |
| Urban civil engineering works | 45 | | | | | 48 | 53 | 55 | | | | | R3 | 0.75 | 1.5 | 2.2 | 1.15 |
| Electric power facilities | 40 | | | | | | | | | | | | R3 | 0.75 | 2.3 | 3.7 | 1.27 |
| Telecommunication facilities | 30 | | | | | | | | | | | | R3 | 0.75 | 3.3 | 6.4 | 1.49 |
| Other civil engineering works | 45 | | | | | | | | | | | | R3 | 0.75 | 2.0 | 3.0 | 1.24 |
| Forestry | 60 | | | | | | | | | | | | R3 | 0.75 | 1.3 | 2.7 | 1.11 |
| Cost of land ownership transfer | 17 | | | | | | | | | | | | S3 | 1.00 | 4.3 | 9.1 | 1.34 |

Notes: 1) These are applied to hyperbolic age-efficiency functions. In Korea, an age-price function of each asset is derived from the present value of future efficiency expected from that asset (PVE model), which can be called a general approach as stipulated in the OECD's *Measuring Capital* (2009) manual.
2) This is the rate of depreciation over the first year for a new asset. In calculation, the extant net stock is used as the weight, because the service life is time-varying.
3) This is the rate of depreciation for all cohorts of an asset as of 2011.
4) The declining balance rate (DBR) is computed by multiplying the depreciation rate (δ) times the service life (T). The yearly depreciation rate is multiplied by the net stock-weighted yearly service life to compute the yearly DBR. The representative DBR of an asset is simply the average of its yearly DBRs over 30 years.

## Latvia

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | |
|---|---|---|---|---|
| | | 3.Service lives | 4a. Depreciation function | 4b. Retirement function |
| **AN111 Dwellings** | B-PIM, based on an imputed time series of investment.<br>GFCF for dwellings before 2000 was estimated applying data of the Land Cadastre.<br>There were collected data on the number of square metres built according to the construction year. After that, the method square metre*price was used. | S11-S12- 86 years<br>S13- 88<br>S14;S15- 75 | Straight Line | Lognormal |
| Major renovations /improvements to existing dwellings | B-PIM, based on an imputed time series of investment- the average value of the capital repair investments for one square metre using year 2000 data was calculated, and the same value was applied to years before 2000 (accumulated square metres *value of the capital repair per sq metre) | Major renovation investments are added to dwelling stock, not estimated separately | | |
| Ownership transfer costs | B - PIM, based on an imputed time series of investment, years 2000 till 1995 are extrapolate using GDP growth rates, for years before 1995 it is assumed that transaction costs decreased by 20 % a year | | | |
| **AN1121 Buildings other than dwellings** | The average services lives used for roads and bridges is 56 years, and for other building and structures 70 years.<br>The gross stock is calculated using m2 and average price of square metre information, the straight line deprecation is used. | | | |
| **AN1122 other structures** | PIM is now introduced | | | |

### *More Detailed Answers: Latvia

| Question | Answer |
|---|---|
| 4b.Retirement function and parameters. | The bell shaped lognormal frequency distribution;: $f_x = \frac{1}{\sqrt{2\pi}*\sigma} * \frac{1}{x} * \exp(-(\ln x - \mu)^2/2\sigma^2)$<br>Where, x are years 1, 2...T;<br>$\sigma$- Standard deviation of lognormal distribution. Is calculated as:$\sigma = \sqrt{\ln(1 + \frac{1}{(m/s)^2})}$<br>$\mu$ -The mean of the lognormal distribution and is calculated as:$\mu = \ln m - 0.5\sigma^2$<br>m- Estimated average service life;<br>s- Standard deviation is set to between m/2 and m/4 |
| 6. Source of information | Approach of service lives are based on 1 ) Republic of Latvia Cabinet Regulation No. 440, Adopted 21 June 2005 Regulations regarding Fixed Asset Depreciation Norms of Budget Institutions and Application Conditions Thereof (the service lives of dwellings regarding on walls materials)<br>2) Information from the Cadastre Register –square metre and wall material. |

## Lithuania

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | | | |
|---|---|---|---|---|---|---|
| | | 3.Service lives, depreciation rates | 4a. Depreciation function | 4b. Retirement function | 4c. Other assumptions | 6. Source of information |
| **AN111 Dwellings(incl. Major renovations/ improvements, Ownership transfer costs)** | Stock of dwellings is obtained from rent series by user cost approach | | | | | |
| One- and two-dwelling residential buildings | Quantity X Price | 80 ; 1.6% | Geometric | No mortality function | | GFCF time series starting in 1995 |
| Multi-dwelling residential buildings | | | | | | |
| **AN1121 Buildings other than dwellings (incl. Major renovations/ improvements, Ownership transfer costs)** | **P**IM based on available GFCF time series since 1995; **O**ther-Age Structure Survey (2004), NACE red.1.1; Age structure Survey (2011), NAVE red.2 | Min-Max Service Life S11(16;60-130); S12(124); S13(70-130); S14(56-130); S15(70) Vary also by activities | Straight line | Symmetrical mortality function is bell-shaped, based on a quasi-logistic survival function. Parameters for the shape of the mortality function: Steepness=3, Skewness=0.5 | Constant prices of a base year (currently 2000) are used; Base-year 1995 as well as it was the last revaluation year; No age-efficiency schedules | Age Structure Survey (2004), S11,S12; NACE red.1.1;Age structure Survey (2011) S13s; NACE red.2; GFCF time series starting in 1995 |
| **AN1122 Other structures** | | | | | | |
| Roads& streets and bridges | "Quantity X Price" method for initial separate stocks' estimates for roads& streets and bridges with respect to their own functional properties and vintage | 60, 3.3% | Geometric, declining balance rate=2 | No mortality function | Constant prices of a base year (currently 2000) are used; | GFCF time series based on Statistical survey on total investments of roads infra-structure |
| **Other structures (excl. Roads& Bridges)** | Same as AN1121 | Min-Max Service Life S11(25-101); S12(21); S13(24-71); S14(-); S15(23) Vary also by activities | Straight line | Same as AN1121 | Same as AN1121 | Same as AN1121 |

# Malta

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | | | 7. Used to estimate stocks of land |
|---|---|---|---|---|---|---|
| | | 3.Service lives | 4a. Depreciation function | 4b. Retirement function | 6. Source of information | |
| **AN111 Dwellings** | | | | | | |
| One-and two-dwelling residential buildings | Benchmark estimate | 85 | Linear | | Census of population and housing | No |
| Multi-dwelling residential buildings | | | | | | |
| **AN1121 Buildings other than dwellings** | PIM | 40 to 100 | Linear | Symmetrical mortality function | Tax service lives and OECD countries | No |

## *More Detailed Answers : Malta

| Question | Answer |
|---|---|
| 1. Assets category | Separate estimates for service lives are applied to Buildings other than dwellings (AN 1121) and other structures (AN 1122).<br>Other structure consists of: Construction work, Cable Infrastructure and Pipeline Infrastructure.<br>The PIM method is used by institutional sector but the assumptions such as service life are the same. |
| 2. Method of net stock estimation | The calculation of Capital Stock and CFC is based on two approaches. In case of dwellings the direct approach is applied.<br>For the remaining assets PIM method is applied. The method of net stock estimation for each of the asset categories (excluding dwellings) and institutional sectors is: a. Perpetual Inventory Model (PIM), based on an available time series of investment.<br>For S.13 data going back to 1919 is available at a very high level of detail at the National Library, the main sources being the Government Department Reports and the Government Statements of Expenditure. The data collected from the National Library cover the years 1919 to 1975. The years 1977 to 1994 were covered using the Government Financial Report, available at the NSO. Data from 1995 onwards were forwarded to the National Accounts Unit by the Government Finance Unit.For the remaining institutional sectors data at 2-digit NACE in line with ESA 1995 was available up till 1995. Data on GFCF was available up till 1954 in the former National Accounts system and thus and extrapolation system was based on the old series. b. PIM, based on an imputed time series of investment (derived from an estimated relationship with GDP or other method) Given that the highest average service life is equal to 50 years and the discard function applied in the PIM model is assumed to be symmetric, then the time series of GFCF data should go back to the year 1895.In case of the Government Sector for which GFCF figures are available as from 1919, data had to be extrapolated backwards for the period 1845 to 1918. This was done by applying a correction factor of 0.5. In case of all other sectors, data had to be extrapolated backwards for the period 1845 to 1953. This was done by applying a correction factor of 0.5 for the period 1941 to 1953, whilst a correction factor of 0.4 was used for the years prior to 1941. Given the average service lives listed in Box 4.12.3, the extrapolated figures (i.e. prior to 1954 in case of all sectors except S.13 and prior 1919 for S.13) will only have an effect on 'Construction Work' which has a maximum service live of 100 years. The CPH (d) is available for the years 1995, 2005 and 2011 and provides comprehensive data on the dwelling stock by type of dwellings, number of rooms, locality and state of repair. No data on square meters is available from the CPH. The Living Space Survey, carried out by NSO in 2002, is used to impute the size of the dwelling stock in square meters. The final estimate of the total dwelling stock in square meters is then combined with specific data received from architects on the construction costs per square meter of various types of dwellings – a house, and flats of different sizes, to estimate the total construction cost value of the dwelling stock for the benchmark years 1995, 2005 and 2011. |
| 3. List of the service lives | For all industries and institutional sectors the service lives are: Construction work – 100 Cable infrastructure – 40 Pipeline Infrastructure - 40<br>Assumption: tax service life in Malta combine with data on service life of OECD avg of 8 European countries (Belgium, Finland, France, Germany, Iceland, Norway, Sweden, UK). |

| | |
|---|---|
| 4. Other assumptions | For the dwelling stock consumption of fixed capital is estimated using the straight-line depreciation method – the depreciation rate is calculated as the inverse of the service life of a dwelling. For all other asset categories the PIM is applied. The four main functions applied in this model are the following:<br>$g(i) = 1 / \left[1 + exp(c * M * \left(\frac{p}{M+1-i} + \frac{1-p}{1-i}\right)\right]$ Survival function (G_I)<br>$h(i) = g(i) - g(i-1)$ Mortality function (H_I)<br>$g(i)^{net} = \sum_{i=1}^{M} h(i)^{net}$ Net value function (G_net)<br>$h(i)^{net} = \sum_{k=i}^{M} \frac{h(k)}{k}$ Depreciation function H_net)<br>Where: M maximum service life of a vintage of an asset (i.e. 2 * the average service life)<br>c steepness of the mortality function (assumed to have the value of 3)<br>p skewness of the mortality function (assumed to have the value of 0.5)<br>k remaining years of service of a piece of a vintage of investment<br>i age of a capital asset (the actual service life of a piece of a vintage of an investment)<br>t year |
| 6. Source of information | The service life of dwellings – set at 85 years – was determined from the average age of the dwelling stock from the CPH.<br>In case of all other assets the tax service life in Malta combined with data on service life of other European countries were considered.<br>For other building and structures the tax service lives applied at first seemed to be too short as the experience showed that firms use asset for a longer time period. These tax service lives were compared to the OECD average of 8 European countries (Belgium, Finland, France, Germany, Iceland, Norway, Sweden and UK). The most relevant to Malta results were applied. |
| 7. Used in the estimation of stock of land | The value of the stock of land is not calculated using the residual method, but as follows: Total dwelling stock is subdivided by type:<br>House or Flat and by locality. An estimate of the total square meters of the land underlying this dwelling stock is calculated by dividing the total square meters of houses by a factor of two (representing the number of floors in a house); and for flats by a factor of three or more (where the factor represents the number of floors). The factor chosen depends on the locality in which the flats are situated. Certain localities allowing a concentration of tall buildings, and hence more floors are allocated a higher factor. Prices per square meter of land by locality were derived from a leading real estate agency and allocated to the estimated square meters of land by locality to calculate the total value of land underlying dwellings. The value of stock of land underlying buildings and structures other than dwellings is not calculated in Malta. |

## Mexico

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | | | | 7. Used to estimate stocks of land |
|---|---|---|---|---|---|---|---|
| | | 3.Service lives | 4a. Depreciation function | 4b. Retirement function | 5. Do assumptions vary over time? | 6. Source of information | |
| AN111 Dwellings<br>AN112 Other buildings and structures | PIM, based on an available time series of investment | 60 | Linear | Simultaneous exit | No | See More Detailed Answers | No |

***More Detailed Answers : Mexico**

| Question | Answer |
|---|---|
| 6. Source of information | AN111 Dwellings: Fiscal lives (Micro Themis Fiscal); Advice of experts (PRISA AVALUOS S.A. DE C.V); Administrative data (Parameters of estimation of service lives, Official gazette 15/08/2012); Estimations from other countries (USA, Canada, Check Republic, Netherlands, Chile)<br><br>AN1121 Buildings other than dwellings: Fiscal lives (Micro Themis Fiscal); Advice of experts (PRISA AVALUOS S.A. DE C.V); Administrative data (Parameters of estimation of service lives, Official gazette 15/08/2012); Estimations from other countries (USA, Canada, Check Republic, Netherlands, Chile) |

## Netherlands

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | | | | 7. Used to estimate stocks of land |
|---|---|---|---|---|---|---|---|
| | | 3.Service lives | 4b. Retirement function | 4c. Other assumptions | 5. Do assumptions vary over time? | 6. Source of information | |
| Dwellings | PIM, based on an available time series of investment | 75 | Weibull (discount rate 4%) | α=2,5 β=0,75 | No | Expert advice | Yes |
| Buildings | | 27-46, by industry | | α=1,01-2,21 β=0,75 | | Statistical survey, other countries estimates, expert advice | |
| Other structures and land improvements | | 25-55, by industry | | α=1,5 β=0,75 | | GNI-committee, expert advice | No |
| Ownership transfer costs of dwellings | | 20 | | α=2,5 β=0,75 | | Expert advice | |
| Ownership transfer costs of buildings | | 14-23, by industry | | α=1,01-2,21 β=0,75 | | Statistical survey, other countries estimates, expert advice | |

## Norway

Net stock estimation method: PIM, based on an available time series of investment

Depreciation: Geometric

Used to estimate stocks of land? When the survey of service lives and depreciation rates was first conducted Norway did not use PIM estimates in the derivation of land. However, recently, Norway has made some estimates. The residual approach was used for land underlying dwellings and the land-to-structure ratio approach for land underlying building other than dwellings.

| 1. Asset category | 3. Service lives (based on double declining balance rate) | 4.Depreciation rate |
|---|---|---|
| AN111 | | |
| Dwellings | 80 | 2.5% |
| Transaction costs for used dwellings | 10 | 20% |
| AN1121 | | |
| Buildings other than dwellings (exceptions listed directly below) | 50 | 4.0% |
| Agriculture, forestry, fishing, mining and manufacturing | 28 | 7.0% |
| Transaction costs for buildings other than dwellings | 10 | 20% |
| AN1122 | | |
| Railways including subways and bridges | 55 | 3.6% |
| Electricity transmission lines | 33 | 6.0% |
| Electricity production plant | 67 | 3.0% |
| Roads and streets | 60 | 3.3% |
| Other structures | 25 | 8.0% |
| Oil and gas extraction wells, platforms, drilling rigs and modules | 25 | 8.0% |
| Oil and gas pipelines | 40 | 5.0% |
| AN1123 | | |
| Land improvements for agriculture cultivation | 45 | 4.4% |

### *More Detailed Answers : Norway

| Question | Answer |
|---|---|
| 1. Assets category | PIM and Geometric depreciation are applied to all assets for each industry and institutional sector. The associated service lives vary by industry, institutional sector and asset type. The table shows average service lives by asset type. Some of the asset categories in the PIM are relatively broad (buildings, other structures), and it seems reasonable to assume that they vary by industry and sector |
| 2. Method of net stock estimation | The GFCF time series are available from 1970 onwards. To start the PIM estimates for capital stock and depreciation in the same year, the GFCF series have been extrapolated backwards, in some cases back to 1870. Benchmark-year estimates are not used because there exists long enough time series of investment data and the estimation of net capital stock and depreciation starts from 1970. |
| 6. Source of information | The choice of service lives is based on expert advice and other countries' estimates. In 2014 Statistics Norway conducted a survey of |

| | |
|---|---|
| | expected and actual service lives in businesses. It was commissioned for a government review of the corporate tax system. A summary of the survey in English can be found here: http://www.ssb.no/en/nasjonalregnskap-og-konjunkturer/artikler-og-publikasjoner/levetid-og-verdifall-pa-varige-driftsmidler The report itself is in Norwegian only.<br><br>Based on the results of the survey, Norway made some revisions to the depreciation rates in their PIM model. For structures, the rates have been adjusted upwards in most cases. In order to avoid breaks in the time series, the new rates have been introduced gradually from 2004 onwards. The revised series will be published in September 2015.<br><br>An assumption of a double declining balance rate was used to derive the service lives from the geometric depreciation rates. |

# Poland

Poland does not employ PIM method to estimate fixed assets.

**2. Method of net stock estimation** Net stock estimates are estimated on the bases of wealth survey method

Wealth surveys In Poland exhaustive surveys on investment outlays and fixed assets are conducted on the annual basis. Furthermore, in terms of investment outlays, quarterly surveys are conducted for enterprises with number of employees exceeding 49 persons as well as semi-annual surveys for the enterprises employing more than 9 persons. For different types of units appropriate questionnaires, including both data on investment outlays and fixed assets are elaborated. It ensures the subjective cohesion of the data. Data on investment outlays on fixed assets and on scope not covered by the book-keeping evidence is estimated using the available data sources. Annual surveys on investment outlays and fixed assets cover all institutional units.

Units of the non-financial enterprises sector are covered by:

- exhaustive surveys in scope of enterprises with number of employees exceeding 9 persons and kind of activity included into the sections of the NACE Rev.2:
- from A (division 03), B to I,J (excluding cultural institutions with legal personality), L, M, N, P (excluding higher education), Q (excluding independent public health care establishments), R (excluding cultural institutions with legal personality), S – on the questionnaire SP: questionnaire of enterprise, part III Fixed assets,
- A (division 1 and division 2), J – cultural institutions with legal personality, P – higher education, Q – independent public health care establishments, R – cultural institutions with legal personality – on the questionnaire F-03: questionnaire on state and flows of fixed assets,
- Sample surveys (4%) in scope of enterprises with number of employees up to 9 persons on the questionnaire SP-3: report on the economic activity of an enterprise.

Units of the financial enterprises sector are covered by:

- exhaustive surveys in scope of units with number of employees exceeding 9 persons – on the questionnaire F-03: on state and flows of fixed assets, and
- Sample surveys in scope of units with number of employees not exceeding 9 persons on questionnaire SP-3.

Data on investment outlays and gross value of fixed assets for the general government sector is elaborated on the basis of:

1) reporting data from the following questionnaires:
- F-03 on state and flows of fixed assets (exhaustive survey of the central government and local-government excluding gmina offices); SG-01 Municipality statistic part 4 – Fixed assets;

2) estimates done in agreement with the CSO by ministries in range of infrastructure the value of which is not recorded in the book-keeping evidence of fixed assets, i.e. :
- public roads including bridges, viaducts as well as streets and squares including engineering objects of urban roads (General Directorate of National Roads and Motorways),
- Basic melioration equipments (Ministry of Agriculture and Rural Development).

Data on investment outlays and gross value of fixed assets for the household sector includes:
- data on natural persons with number of employees up to 9 persons that is elaborated on the basis of sample survey SP-3;
- estimates of individual residential buildings; Farm buildings as well as machinery, technical equipment and tools being ownership of individual farmers.

Data on investment outlays and gross value of fixed assets for non-profit institutions serving households sector is calculated on the basis of SOF questionnaire on activity of foundations, associations, social organizations, employers' organizations as well as economic and trade self-governments (and it's appropriate varieties).

Subjective scope of the SP, F-03 and SG-01 part 4 questionnaires is extent and covers data on value of fixed assets and investment outlays by types of groups (kinds) of assets, i.e.:
- residential buildings; other buildings and structures; non-residential buildings; other structures; machinery and technical equipment: transport equipment, other machinery and technical equipment; cultivated assets

In SP-3 questionnaires data is presented in total value divided into: buildings and constructions; machinery and technical equipment; transport equipment.

In SOF questionnaires data is presented in total value, only date on buildings and structures are distinguished.

**3. List of the service lives**: We use the following service lives, for:-Dwellings – 67 years -Other buildings and structures – 45 – 55 years

**6. Source of information**: CSO of Poland estimates service lives on the basis of information from statistical surveys, service lives hidden in rates of depreciation, estimates of other countries.

**7. Estimation of stock of land**: We plan to start estimating the land value on the basis of Task Force recommendations

## Portugal

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | | | | | 7. Used to estimate stocks of land |
|---|---|---|---|---|---|---|---|---|
| | | 3.Service lives | 4a. Depreciation function and parameters | 4b. Retirement function and parameters | 4c. Other assumptions | 5. Do assumptions vary over time? | 6. Source of information | |
| **AN111 Dwellings** | PIM | 45-55 | Straight Line | Delayed Linear | | No | Tax lives, company accounts, expert advice | No |
| **AN1121 Buildings other than dwellings** | PIM | 45-55 | Straight Line | Delayed Linear | | | | |
| **AN1122 Other structures** | PIM | 55-65 | Straight Line | Delayed Linear | | | | |
| Highways, streets, and roads | PIM | 55-65 | Straight Line | Delayed Linear | | No | Recommendations of the GNI Committee's Task Force on CFC (GNIC/011) | No |

## Romania

| Answer |
| --- |
| We cannot provide data for the detailed asset categories of dwellings and other buildings and structures due to unavailability of such detailed data. At present Romania compiles the stocks of capital and depreciation by ESA 95 classification of assets<br>(5 groups of assets for non-governmental sectors and 3 for government sector).<br>Starting 2012 the stocks of capital is estimated using the AN F6 classification of assets for the series 1995-2010, but for the moment there are not enough data for service lives and subsequently for depreciation by the ESA 2010 classification AN F6.<br>The current CFC is compiled using PIM and service lives are determined for each institutional sector.<br>CFC is not available yet by industry.<br>We cannot provide data for the detailed asset categories of dwellings and other buildings and structures due to unavailability of such detailed data. |

## Slovak Republic

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | | 7. Used to estimate stocks of land? |
|---|---|---|---|---|---|
| | | 3.Service lives | 4a. Depreciation function | 6. Source of information | |
| **Dwellings(AN111)** | PIM, based on an available time series of investment | 55 | Straight Line | Other countries estimates, partially both the statistical surveys and expert estimates | No |
| **Other buildings and structures(AN1122)** | | 60 | | | |

## Slovenia

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | 7. Used to estimate stocks of land |
|---|---|---|---|---|
| | | 3.Service lives | 4a. Depreciation function | |
| **AN111 Dwellings** Assumption for all dwelling types and all industries and sector | PIM, based on available time series of investment, Population censuses, Other (See More Detailed Answers.) | For owner-occupied dwellings, the average service life is 58 years. For other types of dwellings, the average service life of 73.4 years. * The average service life for owner-occupied dwellings was updated during the ESA2010 implementation. | Straight line | No |
| Major renovations /improvements to existing dwellings, Ownership transfer costs | See More Detailed Answers | | | |
| **AN1121 Buildings other than dwellings** Special assumptions for the general government sector (S.13) and industries O (84), P(85), Q(86-88) and R(93) (NACE Rev. 2) | PIM, based on available time series of investment, Company accounts, Other, See More Detailed Answers | Average service life of 33 years, except for S.13 and selected industries where average life of 70 years is the best fit. | Straight line | No |
| Major renovations /improvements Ownership transfer costs | See More Detailed Answers | | | . |
| **AN1122 Other structures** One assumption for all types structures other than buildings and all industries and sectors | PIM, based on an available time series of investment; Company accounts; Other. See More Detailed Answers | Average service life of 50 years | Straight line | No |

### *More Detailed Answers : Slovenia

| Question | Answer |
|---|---|
| 1.Asset Category | Council Regulation (EC) No 2223/96 of 25 June 1996 on the European system of national and regional accounts in the Community (ESA95) and Regulation (EC) No 1392/2007 (ESA95 transmission programme). New ESA 2010 regulation will come into force in 2014. There are no deviations from the SNA 2008 classification of non-financial assets. |

| | |
|---|---|
| 2. Method of net stock estimation | Fixed Capital Stock Survey (FCS survey) data were used in the case of capital stock with particularly long service life where the historical investment series were not available. The FCS survey, carried out in 1999 as a combination of census and sample survey, provides initial estimates of the opening stocks at the beginning of 1995, separately for dwellings owned by the government and public/private enterprises, non-residential buildings and other buildings as well as infrastructure such as roads, railways, bridges and other civil engineering works. Values according to the survey were crosschecked, as far as possible, with other available information from statistical surveys and registers (e.g. for roads and associated infrastructure data on the road network from transport statistics were used).<br>For households (S.14) the main data source for estimation of the dwelling stock is 2002 Population and Housing Census: data on number, surface and structural characteristics were used. Available price data were used to calculate data with a quantity-price method for one benchmark value (1995) and the PIM for years 1996 onwards. For estimating the value of the dwelling stock, pure construction costs per square meter are used. Construction costs are costs of construction, finishing and installation works. They are shown separately as the share of the total price.<br>In addition to construction costs, the price includes the costs of engineering, supervision, contributions and other costs and in the last step adjustment for measure output at basic prices.<br>Construction statistics collects data on pure construction costs (without costs of purchase and preparation of land) from construction enterprises separately for non-profit and market dwellings.<br>The value of land associated with owner-occupied dwellings at current prices is estimated at 18% of the value of dwelling. This estimation is made on the basis of data on average prices for dwellings, which are collected by construction statistics. Additional data sources for improving the quality of capital stock derived from the PIM are: annual accounting statements (i.e. company accounts), business register data, employment data, etc. |
| 6. Source of information | At the moment for SVN there are no estimates of service lives based on directly observed data on capital stock and discards.<br>The FCS survey (1999) asked reporting units to indicate average economic service life for asset classes, but service life assumptions adopted for SVN based on a variety of other sources.<br>Depreciation rates, used in the PIM, are adapted to the national specificities, meaning that SVN in determining the depreciation rates mainly followed the requirements of the national accounting standards:-Information on depreciation allowances (i.e. maximum annual depreciation rates) defined by the Corporate Income Tax Act (Official Journal No. 117/06, 33/09, 85/09); -Service lives allowed for legal persons of public law including all central and local government direct budgetary units, agencies and funds and public service providers (market and non-market) of the general government (S.13);<br>-Additional information from statistical surveys, administrative sources and expert advice.<br>For dwellings, service life 2002 Population Census was important source of information – i.e. Information on the age structure of dwellings stock in SVN.<br>Service lives used in SVN are similar to those used in other countries, so other countries' estimates recommended in the OECD manuals (2009 and 2001) on Measuring Capital were taken into consideration as well.<br>There is very little information available on service lives for AN1123 - land improvements. A single average service life of 17 years will be used across industries until international recommendation becomes available. This practice is used in the Economic Accounts for Agriculture as well. For SVN this data will be available with ESA2010 implementation in 2014.<br>Regarding the asset group AN.1122 – Other structures, where roads represent more than 50% of the total value, recommendations of the GNI Committee's TF on the consumption of fixed capital on roads, bridges etc. (Eurostat/B1/GNIC/001/Rev. 1 EN, Luxembourg, November 2003) were taken into account as well. A single average service life of 50 years is applied. |
| 7. Used in the estimation of stock of land | No; SURS is planning to use the residual method to develop and introduce land estimations in non-financial balance sheets.<br>First land estimations will be produced by the end of June 2014 within the project "Eurostat grant 2012".<br>Project results will serve as a basis for an assessment of reliability and international comparability of land estimates for SVN.<br>SURS is planning to use the residual method to develop and introduce land estimations in non-financial balance sheets.<br>Total value of land will be based on available administrative property records.<br>The basic data sources will be the Real Estate Register, and the recently developed mass valuation system based on the market values.<br>Additional information will be obtained from the annual GFCF survey.<br>Using a single data source such as the (real estate) mass valuation system, based on information on land transactions, has the potential to bias the final outcome of land estimates.<br>This could be solved by improving the existing data sources such as the annual GFCF survey with adding some additional questions concerning land.<br>Land estimations produced in the project (Eurostat grant 2012) will be crosschecked, as far as possible, with other available information from statistical surveys and registers.<br>Project results will serve as a basis for an assessment of reliability and international comparability of land estimates for Slovenia. |

## Sweden

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | |
|---|---|---|---|---|
| | | 3.Service lives and Depreciation rate | Declining balance rates | 6. Source of information |
| One- and two-dwelling residential buildings | Administrative property records | 80, 1.14% | 0.91 | US BEA, own estimates |
| Multi-dwelling residential buildings | | 65, 1.4% | | BEA |
| Major renovations /improvements to existing dwellings. One- and two-dwelling residential buildings | PIM, based on an available time series of investment | 80, First year 0.36 % and thereafter 1.14% | 0.91 from the second year onwards | BEA and own estimates |
| Major renovations /improvements to existing dwellings. Multi-dwelling residential buildings | | 65, First year 0.36 % and thereafter 1.4% | | |
| Ownership transfer costs. One and two-dwelling residential buildings | | 80, 1.14% | 0.91 | |
| Ownership transfer costs. Multi-dwelling residential buildings | | 65, 1.4% | | |
| Warehouses (1) | | 38, 2.37% | 0.899 | BEA |
| Manufacturing or industrial buildings (2) | | 31, 3.14% | 0.9747 | |
| Office buildings | | 36, 2.47% | 0.8892 | |
| Buildings for shopping (G45 retail) (3) | | 34, 2.62% | | |
| Buildings for public entertainment (Municipalities COFOG 08EI) | | 50,1.82% | 0.91 | |
| Buildings for public entertainment (R93 ) (4) | | 37, 2.49% | | BEA, own estimates |
| Hotels (5) Restaurants (6) | | 32, 2.81% | 0.8990 | BEA |
| Schools (Central Government COFOG 09) | | 40, 2.28% | 0.91 | BEA and own estimates |
| Schools (Municipalities COFOG 09) Hospitals (Central Government) | | 50, 1.82% | | |
| Hospitals (County councils COFOG 07) | | 40, 2.28% | | |
| Farm buildings | | 38, 2.39% | | BEA |
| Ownership transfer costs (A01 Agriculture) | | 38, 2.39% | | BEA, own estimates |
| Ownership transfer costs (AO2 Forestry) | | 12, 7.51% | 0.9008 | |
| Shafts, tunnels and other structures associated with mining mineral and energy resources (8) | | | | BEA |
| Highways, streets, and roads (Government) | | 40, 3.94% | 1.5775 | BEA, own estimates |
| Highways, streets, and roads (A01 agriculture and A02 forestry) | | 40, 2.39% | 0.956 | Own estimates |
| Railways | | 50,1.9% | 0.948 | BEA, own estimates |
| Long-distance communication and power lines (9) | | 45, 2.11% | | BEA |
| Sewage and water treatment plants (10) | | 38, 2.37% | 0.899 | |
| Electric power plants (9) | | 45, 2.11% | 0.948 | |
| Outdoor sport and recreation facilities (Business sector R93) (11) | | 37, 2.49% | 0.91 | Own estimates |
| Outdoor sport and recreation facilities (Municipalities COFOG 08EI), Prisons (7) | | 50, 1.82% | | BEA |

# United Kingdom

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | | | | | 7. Used to estimate stocks of land? |
|---|---|---|---|---|---|---|---|---|
| | | 3.Service lives | 4a. Depreciation function | 4b. Retirement function | 4c. Other assumptions | 5. Do assumptions vary over time? | 6. Source of information | |
| **Dwellings(AN111)** | PIM, based on an available time series of investment | 59 | Straight line | Normal | See More Detailed Answers | Yes | See More Detailed Answers | No |
| **Other buildings and structures(AN1122)** | | See table below | | | | | | |

## *More Detailed Answers: United Kingdom

| Question | Answer |
|---|---|
| 1. Assets category | The lowest levels are a) Dwellings and b) Other buildings and structures. The methods and assumptions are consistent across industries and sectors.<br>The exceptions are: service lives are consistent across industries for dwellings however they differ across industries for other buildings and structures.<br>They differ as different industries have different types of buildings and structures and these are distinguished by different service lives.<br>These two asset categories meet SNA/ESA international standards and so this is the level at which series are produced.<br>It is also the categorization that is used for data collection and publication. |
| 2. Method of net stock estimation | a. PIM, based on an available time series of investment back to 1828. PIM is used for all assets and all industries. PIM is run at a whole economy or total sector basis and these series are sectorised afterwards. For responses b-h, please give further details about their nature-> Not applicable. |
| 3. List of the service lives | See the table below |
| 4. Other assumptions | **Retirement patterns**: The present UK methodology uses the normal distribution (NM), that is, assets are assumed to retire according to this distribution either side of the average length of life for the group.<br>**Depreciation method**: It is generally considered that the straight-line approach is more appropriate to buildings and structures, and the geometric method to plant and machinery. However, in part reflecting simplicity and part wider convention, the straight-line method is used throughout the calculation in the UK. There are long-term plans to improve the PIM and the depreciation method will be reviewed.<br>**Price indices**: The price indices used are the GFCF implied deflators (that is, current price GFCF divided by constant price).<br>Constant price GFCF is calculated using Producer Price Indices (relating to the prices of goods when they leave the factory), with some allowance being made for import prices. Many of the price indices prior to 1947 are, because of a lack of data, broad estimates, often in the earlier years being based on movements in wage rate and costs of materials. |
| 5. Variation in service lives and other assumptions | Yes. Service lives have been updated from time to time following methodological reviews. |
| 6. Source of information | When the UK's PIM was first developed in the 1950s the estimates of lengths of life for assets that were produced long ago were made almost entirely from Inland Revenue (tax) data and other external sources. In the early 1980s, more up-to-date estimates of asset lives were obtained from manufacturing companies, and these were incorporated in the estimation process.<br>More recently, in 1993, as part of a study by the National Institute of Economic and Social Research (NIESR) for the Office for National Statistics, there was a more general assessment of the estimates of life lengths being used in the model. |

## Table for UK

| Industry | Industry description | Asset | Life length mean | Life length coefficient of variation |
|---|---|---|---|---|
| 01 | Crop and animal production, hunting and related service activities | OTHER BUILDINGS | 30 | 0.142 |
| 02 | Forestry and logging | | 50 | |

| | | | | |
|---|---|---|---|---|
| 03 | Fishing and aquaculture | AND STRUCTURES | | |
| 05 | Mining of coal and lignite | | 60 | 0.209 |
| 06 | Extraction of crude petroleum and natural gas | | 19 | |
| 07 | Mining of metal ores | | 60 | 0.149 |
| 08 | Other mining and quarrying | | | |
| 09 | Mining support service activities | | 20 | 0.208 |
| 10 | Manufacture of food products | | 60 | 0.142 |
| 11 | Manufacture of beverages | | | |
| 12 | Manufacture of tobacco products | | | |
| 13 | Manufacture of textiles | | | |
| 14 | Manufacture of wearing apparel | | | |
| 15 | Manufacture of leather and related products | | | |
| 16 | Manufacture of wood & products of wood & cork, except furniture; manuf. of articles of straw | | | |
| 17 | Manufacture of paper and paper products | | | |
| 18 | Printing and reproduction of recorded media | | | |
| 19 | Manufacture of coke and refined petroleum products | | | 0.144 |
| 20 | Manufacture of chemicals and chemical products | | | 0.142 |
| 21 | Manufacture of basic pharmaceutical products and pharmaceutical preparations | | | |
| 22 | Manufacture of rubber and plastic products | | | |
| 23 | Manufacture of other non-metallic mineral products | | | |
| 24 | Manufacture of basic metals | | 50 | 0.131 |
| 25 | Manufacture of fabricated metal products, except machinery and equipment | | 60 | 0.142 |
| 26 | Manufacture of computer, electronic and optical products | | | |
| 27 | Manufacture of electrical equipment | | | |
| 28 | Manufacture of machinery and equipment n.e.c. | | | |
| 29 | Manufacture of motor vehicles, trailers and semi-trailers | | | |
| 30 | Manufacture of other transport equipment | | | |
| 31 | Manufacture of furniture | | | |
| 32 | Other manufacturing | | | |
| 33 | Repair and installation of machinery and equipment | | | |
| 35 | Electricity, gas, steam and air conditioning supply | | 49 | 0.157 |
| 36 | Water collection, treatment and supply | | 80 | 0.209 |
| 37 | Sewerage | | 75 | 0.142 |
| 38 | Waste collection, treatment and disposal activities; materials recovery | | 64 | 0.138 |
| 39 | Remediation activities and other waste management services | | 75 | 0.142 |
| 41 | Construction of buildings | | 80 | |
| 42 | Civil engineering | | | |
| 43 | Specialised construction activities | | 79 | |
| 45 | Wholesale and retail trade and repair of motor vehicles and motorcycles | | 80 | |
| 46 | Wholesale trade, except of motor vehicles and motorcycles | | | |
| 47 | Retail trade, except of motor vehicles and motorcycles | | | |
| 49.1-2 | Rail transport | | 100 | |
| 49.3-5 | Land transport services and transport services via pipelines, excluding rail transport | | 50 | |

| | | | |
|---|---|---|---|
| 50 | Water transport | 20 | 0.209 |
| 51 | Air transport | | |
| 52 | Warehousing and support activities for transportation | 66 | |
| 53 | Postal and courier activities | 60 | |
| 55 | Accommodation | 80 | |
| 56 | Food and beverage service activities | | |
| 58 | Publishing activities | 60 | |
| 59 | Motion picture, video & TV programme production, sound recording & music publishing activities | 75 | |
| 60 | Programming and broadcasting activities | 80 | |
| 61 | Telecommunications | 60 | |
| 62 | Computer programming, consultancy and related activities | 80 | 0.142 |
| 63 | Information service activities | | |
| 64.1 | Monetary intermediation | | |
| 64.2-9 | Other financial intermediation | | |
| 65.1-2 | Insurance and reinsurance, except compulsory social security | | |
| 65.3 | Pension funding | | |
| 66 | Activities auxiliary to financial services and insurance activities | | |
| 68 | Real estate activities | | |
| 69 | Legal and accounting activities | | |
| 70 | Activities of head offices; management consultancy activities | | |
| 71 | Architectural and engineering activities; technical testing and analysis | | |
| 72 | Scientific research and development | | |
| 73 | Advertising and market research | | |
| 74 | Other professional, scientific and technical activities | | |
| 75 | Veterinary activities | 75 | |
| 77 | Rental and leasing activities | 80 | |
| 78 | Employment activities | | |
| 79 | Travel agency, tour operator and other reservation service and related activities | 66 | |
| 80 | Security and investigation activities | 80 | |
| 81 | Services to buildings and landscape activities | 39 | |
| 82 | Office administrative, office support and other business support activities | 80 | |
| 84 | Public administration and defence; compulsory social security | 75 | |
| 85 | Education | | |
| 86 | Human health activities | | |
| 87 | Residential care activities | | |
| 88 | Social work activities without accommodation | | |
| 90 | Creative, arts and entertainment activities | 80 | |
| 91 | Libraries, archives, museums and other cultural activities | | |
| 92 | Gambling and betting activities | | |
| 93 | Sports activities and amusement and recreation activities | | |
| 94 | Activities of membership organisations | | |
| 95 | Repair of computers and personal and household goods | 67 | |
| 96 | Other personal service activities | 80 | |

| | | | | |
|---|---|---|---|---|
| 97 | Activities of households as employers of domestic personnel | | | |
| 98 | Undifferentiated goods and services-producing activities of private households for own use | | | |
| 41 | Construction of buildings | DWELLINGS | 59 | 0.155 |
| 68 | Real estate activities | | | |
| 81 | Services to buildings and landscape activities | | | |

# United States

| 1. Asset category | 2. Net stock estimation method | Assumptions of the PIM (if used) | | | | | | 7. Used to estimate stocks of land? |
|---|---|---|---|---|---|---|---|---|
| | | 3.Service lives | 4a. Depreciation function and parameters | 4b. Retirement function and parameters | 4c. Other assumptions | 5. Do assumptions vary over time? | 6. Source of information | |
| See BEA depreciation rates | PIM based on available GFCF | See BEA depreciation rates | Geometric | | See BEA depreciation rates | Usually not except for a few assets | See More Detailed Answers | No |

***More Detailed Answers :US**

| Question | Answer |
|---|---|
| 1. Asset category | For the responses to questions 1-6, please see "BEA Depreciation Rates" on the BEA website. http://www.bea.gov/national/pdf/BEA depreciation_rates.pdf<br>The paper includes a detailed table which lists all the fixed asset categories for which BEA has estimates of services lives and depreciation rates.<br>The text discusses the estimates in detail. As the paper indicates, BEA's estimates of service lives and depreciation rates generally vary by asset type, but not by industry or sectors. |
| 5. Variation in service lives and other assumptions | For the vast majority of asset types included in dwellings and other buildings and structures, BEA's depreciation rates do not vary over times.<br>The exceptions are electric light and power structures (which have a service life of 40 years before 1946 and 45 years afterward) and petroleum and natural gas structures (which have a service life of 16 years before 1973 and 12 years afterward). |
| 6. Source of information | BEA's estimates are based on a combination of empirical studies, expert advice, and statistical surveys. BEA bases its depreciation patterns on empirical evidence of used asset prices in resale markets wherever possible. The available research tends to analyse depreciation patterns for specific asset types. For these asset types, geometric patterns are used because the available data suggest that they more closely approximate actual profiles of price declines than straight-line patterns. The geometric rates for specific types of assets are determined by dividing the appropriate declining-balance rate for each asset by the asset's assumed service life. The declining-balance rates used by BEA are primarily derived by Fraumeni from estimates made by Hulten and Wykoff under the auspices of the U.S. Department of the Treasury and are shown in the table in the paper "BEA Depreciation Rates." |
| 7. Used in the estimation of stock of land | In the U.S. statistical system, BEA (as part of its Fixed Asset Accounts) estimates the market value of the stock of dwellings and structures, while the Federal Reserve (as part of its Flow of Funds Accounts) estimates the market value of residential and nonresidential assets (land and structures combined).<br>BEA and the Federal Reserve both caution users against obtaining estimates of the market value of land using the residual method (by subtracting the value of land and structures from the value of structures alone) because the results can be unrealistic. |

# Part B Questions 3 – 10 of the Survey on National Practices

## 3) The estimates of net stocks also depend on estimates of Gross Fixed Capital Formation and prices

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

| Country | Answer |
|---|---|
| **Australia** | The source data used to compile the estimates of Gross Fixed Capital Formation used for the PIM estimates comes from various sources.<br>For Private Capital formation, the source data for dwelling and non-dwelling construction comes from two main surveys, namely, Building Activity Survey (BACS) and Engineering Construction Survey (ECS). The scope of both Surveys covers all construction activity in Australia.<br>They are not industry specific, but aim to capture activity across the entire economy.<br>The Building Activity Survey is based upon a list of building approvals which are collected as part of the ABS building approvals collection. Building approvals is an administrative by-product which collects information from approving bodies across Australia for building approvals worth more than $10,000 for residential and $50,000 for non-residential building work. These approvals are then modelled or sampled in the building activity survey.<br>Engineering Construction is a business register based survey. Selection in the survey is based on the primary industry of the business but the frame is supplemented when necessary to capture the entire economy. Information is collected about work done for the Private sector and for the Public sector as well as work done by the Private sector and by the Public sector. As previously stated, only estimates of work done for the private sector are included in GFCF from ECS, the Public component is sourced from other ABS collections detailed below.<br>For Public Capital formation, data on dwelling and non-dwelling construction are provided by the ABS Public Finance Section.<br>The data is obtained by them from the Australian Department of Finance, State Treasuries and an ABS Survey of Local Government.<br>The overall quality of the estimates is good. Coverage of all surveys covers the complete economy; the private surveys are activity based rather than industry based. The Public surveys cover the complete Public sector. For further information refer to the quality declaration: 8752.0, 8762.0 and 5512.0. |
| **Austria** | Calculation method for capital formation in construction:<br><br>1. Characteristic output of the construction industry<br>2. + Non-characteristic construction output of other industries<br>= Domestic production at manufacturing prices<br>3. + Non-deductible value added tax<br>4. + Goods taxes minus goods subsidies<br>= Domestic volume at purchasers' prices<br>5. + Foreign trade imports<br>Total volume of construction services<br>6. - Foreign trade exports<br>= Domestically available construction volume<br>7. - Private consumption for housing maintenance<br>8. - Construction work which is part of intermediate consumption<br>9. - Capital expenditure on machinery and equipment<br>= Capital to be spent on construction volume<br>10. + Material and architect services made available<br>11. + Transaction costs |

| | |
|---|---|
| | Total = Total capital formation in construction<br><br>The data for the first component are taken from the production accounts of the construction industry.<br>This incorporates output of the construction industry, off the books business and output of special construction interest groups and own-account housing construction. The basis for calculating the second component is the construction output of other industries. After adding non-deductible value added tax and taxes less subsidies on products the domestic volume at purchasers' prices is obtained. Imports and exports are based on the balance of payments statistics. Furthermore private consumption for housing maintenance is deducted, as well as construction work which is part of intermediate consumption. These comprise, for example, repairs to buildings which are charged for within the construction industry. The ninth item comprises construction and maintenance costs in the course of setting up machinery.<br>The tenth item comprises material and architectural services made available. Additions are made for materials used in the course of own-account housing construction and for structures which are not part of intermediate consumption in the building industry but are erected directly, such as prefabricated houses or metal structures for bridges. This item also includes architects' services. After the transaction costs are added, the total sum of capital spending on new construction is obtained. Information from the housing construction statistics on completed dwellings and prices per square meter and data from the Vienna closed account are used to calculate capital formation in dwellings and the value added tax levied on it. Capital formation in dwellings is calculated after the supplementary estimates for refurbishing of old buildings and transaction costs are added. The balance remaining represents the other buildings and structures. |
| **Belgium** | Dwellings:<br>Several source data are used to estimate GFCF of dwellings:<br>1) Statistics on housing starts: these data give information on the number and the type of dwellings, as well as the total surface area and the living area.<br>The results are subject to significant revisions 2-3 years after their publication although estimates are made in order to anticipate the revisions.<br>2) General contractors' survey of construction: this survey collects information on the one hand on the price of global and per $m^2$ construction for new dwellings and the average surface area by type of construction, and on the other hand on the duration of construction and the distribution of payments during the construction period (allowing to transform housing starts in completed housing). This is an ad hoc NBB survey whose quality has declined for several years because of the difficulty of collecting the right information and because of the decline in the number of respondents.<br>3) ABEX index: this index gives information on the change in constructions costs of housing and private dwellings. This index is used when no information is available in the General contractors' survey of construction.<br><br>Non-residential buildings:<br>1) The main source data used to estimate GFCF of non-residential buildings is the annual accounts of corporations filed with the Central Balance Sheets Office of the National Bank of Belgium. After filing, the Central Balance Sheets Office processes and, if necessary, adjusts the annual accounts, after which they are stored as usable statistical source information. An important benefit of using the Central Balance Sheets Office data is that the information provided by the annual accounts of large corporations (the so-called A1 corporations) contains a relatively great amount of detail. Unfortunately that is not the case for the majority of small and medium-sized corporations (SMEs), for which only an abbreviated format of the annual accounts has to be submitted. Therefore, not all the headings are present for the latter group. A distinction is only made between total tangible and total intangible fixed assets. It must however be noted here that the investments of A1 corporations form the overwhelming majority of total investments.<br>2) When the annual accounts of corporations are not usable, a secondary source data is considered: the VAT return. In the VAT return there is one variable reserved for recording investments. This means that only one global amount has to be indicated that is not further specified in any way.<br>3) To estimate the gross capital formation of the general government sector, detailed government accounts are used as a source.<br><u>Other structures:</u><br>For the private sector, the same source data is used as for non-residential buildings. To estimate the gross capital formation of the general government sector detailed government accounts are used as a source. For more details on these source data, please refer to the inventory of ESA 1995. |

| | |
|---|---|
| | In order to break down investments by fixed assets (AN), the five-year matrix developed in the context of the Supply and Use Table, which contains information on GFCF by SUT product, is used. The detailed breakdown by products comes from a specific annex to the structural survey of enterprises (SSE), collected every 5 years. |
| **Canada** | Dwellings: The gross residential capital formation, are divided into three components. The first is new housing construction, which includes single dwellings, semi-detached dwellings, row housing and apartments, cottages, mobile homes and additional housing units created from non-residential buildings or other types of residential structures (conversions). To calculate this component, the data are obtained from the monthly Building Permits Survey (survey no. 2802) and the Starts and Completions Survey of the Canada Mortgage and Housing Corporation (CMHC). The data on building permits are used to associate a value with the number of housing starts. Work-put-in-place coefficients are used to spread the value of housing starts over the construction period.<br>The second component of residential construction investment, renovations, includes alterations and improvements in existing dwellings. These data are calculated by the Statistics Canada's Income and Expenditure Accounts Division. To derive the national level, the provincial distribution and the growth rates, several data sources are used. The Survey of Household Spending – SHS (survey no. 3508) question respondents as to their expenditure on renovations on their home.<br>The provincial distribution for Yukon, Northwest Territories and Nunavut are based on the SHS and Building Permits for renovations. Renovations done by tenants are derived with the SHS. The Annual Survey of Service Industries: Real Estate Rental and Leasing and Property Management (survey no. 4705) questions respondents on expenditure for alterations and improvements on rented or leased residential real estate. Renovations on secondary residences are derived from the SHS.<br>The Survey of Household Spending questions respondents on expenditure for alterations & improvements on owned secondary residences.<br>The third component is ownership transfer cost. This aggregate includes all costs associated with the transfer of residential asset from one owner to another.<br>These costs are as follows:<br>-real estate commissions;<br>-land transfer taxes (including mutations costs)<br>-legal costs (fees paid to notaries, surveyors, experts, etc.) and<br>-file review costs (inspections and surveying)<br>Buildings other than dwellings and other structures: investment is based on expenditures from the Capital and Repair Expenditures Survey, with adjustments to bring into line with the Canadian System of National Accounts concepts. See Baldwin, John, Huju Liu, and Marc Tanguay(2015), " An Update on Depreciation Rates for the Canadian Productivity Accounts". *Canadian Productivity Review* http://www.statcan.gc.ca/pub/15-206-x/15-206-x2015039-eng.htm |
| **Chile** | The gross fixed capital formation used for the PIM estimates is the data utilized in the measurement of the GDP; therefore, the information is in the supply and use tables. In the case of the net capital stock, the series are broken down by assets.<br>The sources used to measure these series are: statistical surveys, administrative records, production account by industries |
| **Cyprus** | Since Net Capital Stock is estimated t+24 months after the end of the reference period (table 20 of ESA transmission programme), the final results for Gross Fixed Capital Formation are derived from the various surveys that are available in time. These data are considered to be of high quality for all the different assets and especially for buildings (construction survey). |
| **Czech Republic** | Data for GFCF come mostly from statistical surveys. Data are later counted up to ensure the completeness and also verified using various administrative sources.<br>Estimation of GFCF can be divided into five basic stages:<br>1) Takeover of individual data sources and compilation of balances of fixed assets,<br>2) Methodological adjustments of the data received,<br>3) Adjustments for completeness,<br>4) Balancing of acquisitions and disposals and of free transfers of existing fixed assets,<br>5) Corrections as a result of commodity flows balancing. |
| **Denmark** | Sources for GFCF: Administrative records, Structural business Statistics. Quality:<br>Special survey on type of GFCF by industries could be a useful addition and improve quality. |

| | |
|---|---|
| **Estonia** | Data on GFCF in non-financial corporations sector are collected with quarterly enterprise statistics and yearly Structural Business Survey (SBS).<br>Data on financial intermediation companies (NACE 2008 64) other than central bank, commercial banks and leasing companies and also on activities auxiliary to financial intermediation (NACE 2008 66) are collected with quarterly and yearly survey 'Financial intermediation and auxiliary services'.<br>Quarterly and yearly data on fixed assets of commercial banks are collected and provided by the central bank. Quarterly and yearly GFCF of General Government is estimated using General Government Accounts data, which are compiled by the Ministry of Finance. For NPISH sector no quarterly data on fixed assets are collected. Quarterly NPISH sector GFCF estimates based on the data of the same period of previous year; growth of salaries by activity is used as an indicator to estimate the growth of GFCF in certain activity compared to the same quarter of the previous year. Yearly data in NPISH sector are collected with annual NPISH survey. |
| **Finland** | Statistics on building and dwelling production, SBS, statistics for renovations. S1311, S1313: State bookkeeping and local government finance statistics |
| **France** | In the French national accounts, GFCF is mainly estimated thanks to company's accounts as the difference between the closing capital stocks and the opening capital stocks in gross terms. For each categories of assets, the national accounts also use the annual business surveys by industry, which provide turnover depending on the status of the customer (individuals, governments, corporations). Finally, the national accounts also have to review the overall consistency of input-output balances.<br>The GFCF data are available by customer type and are turned into institutional sectors. These GFCF series are available in the annual national flows accounts (nomenclature of products with 138 positions turned in nomenclature of assets).<br>For the dwellings in particular, the housing satellite account also produces series of GFCF with data about both residential buildings and associated charges.<br>The GFCF of structures (dwellings, non-residential buildings and other structures) has two different components: the biggest part is the acquisition of new structures and substantial repair and maintenance, the smallest part is the costs associated with the transfer of ownership. In the French national accounts, notary fees represent the largest share of these costs, but we also include the costs of real estate promoters, real estate agents, architects,…. |
| **Germany** | The starting point for the calculation of GFCF in buildings and structures is the information provided by enterprises which perform building work and/or provide other services related to construction (indirect method; not only construction industry). Estimates for own account work are included. There are separate calculations for different types of buildings, namely dwellings, agricultural buildings and structures, industrial and commercial buildings, public buildings, buildings for non-profit institutions, industrial and commercial structures other than buildings, public roads and other public structures besides buildings. |
| **Hungary** | The main source of GFCF estimations is the structural investment survey. Corporations and sole proprietors employing more than 19 persons and, not considering the number of employees, all the public water utility companies, as well as all budgetary and social security institutions are observed exhaustively, while in the case of enterprises and sole proprietors employing between 5 and 19 persons, the observation was based on a stratified sampling.<br>Data collection allies to all units of national sectors are in production and all asset groups of gross fixed capital formation. The GFCF of small business units is estimated from tax records, estimated capital stock data, and other administrative information which primarily is not collected for statistical purposes. Administrative data and book-keeping data are corrected in some cases to align them with ESA95 definitions. Agricultural corporations are not covered by the investment survey. Therefore, the Economic Accounts for Agriculture – a special agricultural survey, conducted by the ministry on capital subsidies – are used to calculate gross fixed capital formation. This also ensures the consistency between Economic Accounts for Agriculture and National Accounts.<br>The use of new dwellings the owner has to obtain a permission. The physical characteristics of new dwellings are reported by owners to local governments.<br>They provide the data to HCSO, which applies them in the calculation of dwelling investments. The annual statistical survey on buildings and other structures owned by local governments provides information on disposals of local government-owned dwellings to households. |
| **Iceland** | GFCF for dwellings is collected from property record from REGISERS ICELAND. It is the additional amount to the housing stock every quarter, valued by building cost.<br>AN112 is derived from annual Enterprise account register (from the tax authorities) and from state accounts from the Financial Management Authority |

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| **Israel** | Estimates of capital formation in buildings is based on two main methods:<br>1. Area under construction and average cost per square meter: The value of capital formation in a given period is obtained by multiplying the average cost per square meter by the area of building in that period according to each type of buildings.<br>The estimate of the building area is based on data obtained in the CBS from the local authorities and from the Ministry of Housings and on the planned area of each building.<br>Financial data on actual expenditure: Data are based on financial data obtained from large enterprises and institutions on their investments in buildings (including reports of the Accountant General, the local authorities and the National Institutions). |
| **Italy** | According to the product-side approach, GFCF by product is measured using statistical sources on economic units expenditure flows (households, enterprises, General Government) and is based on three different typologies of construction works that are in line with international calculation standards (residential buildings, non-residential buildings and other works of civil engineering). However these estimates are disseminated according to AN6 Classification (Regulation n.1392/2007)<br>In general terms, the estimate method for new constructions and enlargement of existing residential and non-residential buildings, follows the "price x quantity" method. More precisely, the price which is observed includes both the building and the value of the land beneath the building, while GFCF, according to national accounts, should only refer to the value of the building. The solution consists in estimating the market prices through construction costs (average square meter cost of building works), these last ones include not only variable costs (labour, materials, rentals and transports) which fluctuate depending on the quantities which have to be produced, and fixed costs which the firm sustains even with no production, but also an estimation of the operating surplus or mixed income strictly deriving from the remuneration of own capital that the entrepreneur/builder and/or the entrepreneur/promoter has invested in the real estate operation.<br>Different data sources contribute to the building up of the by-product construction GFCF estimation. The main data source for estimating capital formation in new constructions and extension for both residential and non-residential buildings is the ISTAT survey on building permits.<br>The data collected refer to building permits issued by municipalities for any project and construction of new buildings and extension of existing buildings, both residential and non-residential. Further, since the production cycle length in this particular sector is on average more than one year, the value of construction work is not registered at the moment of its completion, i.e. its availability, but it has to be split along the whole period in which the construction is carried out.<br>With reference to public works and infrastructures, the main data source is represented by the budgets of the public bodies taken into consideration in National Accounts for estimating capital formation expenditure in the consolidated account of General Government. Due to a not completely representative nature of public works and infrastructures accounting data of general government units, the operation of defining properly the moment of registration could be not easy.<br>In fact, the original budget data could not correspond well to the time of recording prescribed by ESA95, because they could contain amounts arising from advances and also delays in payments. On the other side, commitment data often reflect the legislation-based investment plans and, especially in the case of local government, have little relationship to the investment actually undertaken. To overtake these difficulties, after a comparative analysis of the main types of accounting data available, it was decided that the estimates of public capital formation were based on actual cash movements.<br>These payments had turned out to be more representative of the capital stock increase in the accounting period, due to the closeness of the work-in-progress payments to accrual principle. Estimates of expenditures for exceptional maintenance of residential buildings are based on the information collected in ISTAT Household budget survey with an integration of administrative data (fiscal data), while expenditures for exceptional maintenance of non-residential buildings are based on the information collected in the surveys on large and small-medium-sized enterprises.<br>GFCF in Dwellings (AN111) is entirely assigned to the Real estate activities industry. GFCF in Other buildings and structures (AN112) is broken down by industrial activity using different data sources: the industry distribution of GFCF of sectors S12 and S13 is based on the industry classification of each institutional unit belonging to these sectors. The main data sources for estimating GFCF for these units are represented by the corporation financial statements for S12 while the budgets of the public bodies for S13. Estimates for the other sectors are mainly based on data on GFCF expenditures available from Structural Business Statistics, integrated with supplementary data sources for industries not covered by SBS (e.g. GFCF of agriculture are estimated using Istat survey on building permits). |
| **Japan** | We estimate GFCF for each type of construction from Annual Statistical Construction Report and Integrated Statistics on Construction Works, which are based on the notification from constructors to local governments for new or extension building. We suppose the quality is fairly good for the whole economy. |
| **Korea** | The estimates of GFCF for detailed assets come from detailed information on GFCF in GDP statistics. |

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| | As the GFCF in a matrix form of by asset and industry, and of by asset and institutional sector is limited, so some additional estimation processes are inevitable. |
| **Latvia** | The GFCF data for years from 2000 till now are available from surveys; data of investments in dwellings in household sector were reviewed during the project.<br>The data per square meter were calculated from transactions with new dwellings from the Land Register data base, before the project average construction costs prices were used. For years before 1995 the information was extrapolated from square metres built. |
| **Lithuania** | The commodity flow approach is the main method (GFCF supply model) for calculating gross fixed capital formation, as it is for consumption expenditure. GFCF model covers two areas of GFCF – construction and machinery and equipment.<br>The supply model calculation is based on data from foreign trade statistics, construction statistics and industry statistics.<br>GFCF on construction, including dwellings and other buildings and structures, are measured on the basis of the production output for the construction industry.<br>Calculations of gross fixed capital formation for machinery and equipment are based on the industry survey and foreign trade statistics.<br>The estimation of GFCF by industry covers the survey approach. The supplemented values for GFCF by industry come from statistical surveys and administrative data.<br>The most important survey for the compilation of GFCF by industries is the annual Survey of non-financial enterprises (SBS). The survey of agricultural partnerships and surveys of farmer's farms provide essential information about economic activity in agriculture. The estimates of GFCF figures in agriculture are taken directly from the unit of Agricultural statistics. Statistical surveys of insurance enterprises and other financial intermediaries collect information on the activities of those financial intermediaries, while the information on banks is obtained from the Central Bank of Lithuania. Figures for GFCF of general government sector are based on information from state and local budgets and extra budgetary funds, Social Security fund and Health Insurance fund. Relevant information about households is obtained from the annual investment survey. An annual survey of NPISHs provides information on economic activity in this institutional sector. |
| **Malta** | Data of Gross Fixed Capital Formation used for the PIM combine annual and quarterly estimates. Annually GFCF is presented in form of a matrix by type of fixed assets (further by product) and by activity (further aggregated into institutional sectors).<br>The activity and product breakdown are based are generally based on those used in the production approach i.e. the A60, P.90 for years 1995-2007 and A88, P88 for years 2008-2009. The main sources for the annual compilation are annual reports and financial statements, the structural business statistics survey (SBS), the short-term business statistics survey (STBS) quarterly and annual surveys and censuses carried out by various units at NSO, the Departmental Accounting System in case of sector S.13. Quarterly GFCF is presented by type of assets.<br>Further details required by PIM method are based on the latest Investment matrix (currently year 2012).<br>The estimate of GFCF in dwellings is based on the number of units granted a permit for construction by the Malta Environment and Planning Authority (MEPA).<br>This data is rarely subject to revision. The total number of units granted a permit for construction are then converted, via assumptions on how many were actually taken up and the rate of completion, into the actual number of dwellings constructed in a given year.<br>Data on the average size of dwellings from the LSS 2002 is used to estimate the size of these newly constructed dwellings.<br>This is combined with data on the average construction costs of a dwelling (for houses and flats separately) to calculate the value of GFCF in dwellings for give time period. This data has been received for the years 2000-2002, 2005 and 2010-2012 from an established architect. |
| **Mexico** | The published data of the GFKF in the Goods and Services Accounts are shown by type of good (Construction and Machinery and Equipment) and by type of purchaser (Public Sector and Private Sector) at current prices and at 2008 base year prices. Currently a time series for 2003-2011 is available. Indicators for investment in construction are estimated by asset type (Dwelling, Non-residential buildings and other structures), and by sector of demand (Public and Private).<br><br>**A. Coverage**<br>Dwelling: Including new construction, reconstruction and expansion of residential building whether by contract or by self-account. The coverage of investment in Housing is defined in terms of the typology dwelling in two classes of economic activity origin according with 2007 NAICS guidelines.<br>236111 Construction of single family dwelling 236112 Construction of multifamily dwelling<br><br>Non-residential buildings The coverage is defined in terms of the typology of non-residential buildings for industrial, commercial, institutional and services uses, whether by contract or by self-account including new constructions, maintenance, expansion, remodeling or full reparation of the buildings. |

According to coverage such assets detailed in public and private buildings, following classification criteria guidelines of 2007 NAICS classifier and the purpose of the work. The delineation of this subsector is structured in two classes NAICS.
236211 Construction of industry sheds and plants, except its management and supervision.
236221 Construction commercial, institutional and services buildings, except its management and supervision.
The investment in private non-residential building considers all those buildings whose purpose is an economic agent different from the public sector.
The investment in public construction includes all the types of buildings made by agents different from the public sector including major reparations whether executed directly or by contracts with third parties.

Other structures (Construction of civil engineering works or heavy works)
The coverage of these assets could be classified according the typology, including different types of works whether made by enterprises (public and/or private) o individuals, by contract or by self-account, including new constructions, maintenance, expansion, remodeling or full reparation of the constructions.
The delimitation of typologies of constructions is structured in 14 NAICS classes taken as criteria NAICS guidelines of classification.
237111 Construction of works for water treatment, distribution and supply and drainage
237112 Construction of agricultural irrigation systems
237121 Construction of oil and gas works
237122 Construction of refinery and petrochemical plants
237131 Construction of works for generation and conduction of electric energy
237132 Construction of works for telecommunications
237211 Land division
237212 Construction of urban development works
237311 Installing signals and protection of road works
237312 Construction of highways, bridges and similar
237991 Construction of dams and reservoirs
237992 Construction of maritime, fluvial and underwater
237993 Construction of works for electric transport and railroads
237999 Other constructions of civil engineering and heavy works

In the comprehensive revision for updating the base year to 2013, this classification of assets will be reviewed according to the NAICS 2013. Note that NAICS 2013 in Mexico corresponds to the same classification system called NAICS 2012 in Canada and the United States.

**B. Sources of information (origin data)**

The sources of information are compiled and classified according with the type of investment in Private or Public construction.

| Sources of information for private construction | Sources of information for public construction |
|---|---|
| • Census of Population and Dwelling<br>• Counting of Population and Dwelling<br>• Economic Censuses<br>• National Survey of Construction Enterprises<br>• Consulting enterprises of private costs<br>• National Chamber of Cement<br>• Federal Mortgage Society | • Administrative Records from government agencies<br><br>○ Federal Public Treasury Account<br>○ Financial Statements<br>• Detail investment expenditure in construction by work type |

The information of the Census of Population and Dwelling and the Count of Population allows information availability about dwelling stocks.

For the case of the Economic Censuses of the Construction industry are obtained the levels of investment and cost structure by type of building.
From the national Survey of the Construction Firms, are obtained the value of production by type and purpose of the work and the firms that comprise the Formal Sector of Construction.
In the case of the remaining sources named in Table 1 information available referred to unit prices by square meter of construction for distinct types of buildings. The INEGI publishes within the price indexes per product a series of specific indexes of cost of the public buildings, and the Chamber of Cement releases information regarded to the production by a channel of distribution of cement.
In the case of the sources used in public construction it is feasible to cover all the expenses in investment realized by the different levels of Federal, State and Municipal Governments, also for its Agencies and Enterprises. The governmental economic agents provide information about physical advances of the investment by type of work, also for the State Government the information comes from the Treasury Accounts of each one of them and the Decentralized Organisms, Deconcentrated Organs, Funds and Trusts, Public Sector Enterprises and the information of banks and insurance companies that report financial information of their expenses in fixed assets investments.

**C. Methodology (quality of estimation)**

For the determination of the investment in construction by type of asset (housing, buildings non-residential and other structures) the measurement starts with the calculations necessary for the integration of the SUT namely, by the supply side is generated a level of production by NAICS activity class for the previously classes mentioned in subsection a), then these levels of production are allocated in the side of the uses as GFKF in each of the three different types of assets mentioned (housing, buildings non-residential and other structures) expressed in both current and 2003 prices. For such purpose starts with the quantification of a level of production by NAICS class.
Gross Fixed Capital Formation (current values)
Residential construction is elaborated by separate from the rest of the types of works. Also the non-residential construction and the civil engineering works (Other structures) are generated in such a manner separated depending of the purpose of the work and the origin of the investment whether private or public.
Building residential (dwelling single-family and multifamily)
Based on Population and Dwelling Census and Population Counts is estimated the stock of housing and the net increase of dwelling constructed by type of material. Also the brick housing is subdivided in single-family and multifamily.
Also consider the inter-census rate of growth taken into account the replacement by type of housing and the dynamics of the main inputs for construction (cement, steel, and their derivatives.)
The analysis of the replacement considers the estimation of the useful nominal service lives of walls and roofs during which their maintenance cost does not surpass their replacement cost as shown in the next table:

**Useful nominal lifetime for different groups of materials**

| Walls | | Roofs | |
|---|---|---|---|
| **Material** | **Service lives (Years)** | **Material** | **Service lives (Years)** |
| Cull material | 2 | Cull material | 2 |
| Paperboard sheet | 2 | Paperboard sheet | 2 |
| Asbestos and metallic sheet | 11 | Asbestos and metallic sheet | 11 |
| Reed, bamboo and palm | 15 | Reed, bamboo and palm | 15 |
| Daub and wattle | 5 | Tile | 30 |
| Wood | 15 | Slab, concrete, partition and brick and roof with beams | 50 |
| Adobe | 25 | | |
| Partition, brick, block, stone, quarry, cement and concrete | 50 | | |

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| | Estimated the number of dwelling constructed the medium prices are calculated for each type of dwelling which are related to obtain the gross value of production.<br>Private Sector buildings nonresidential or construction of civil engineering or heavy works (Other structures).<br>Using data of Economic Censuses and the National Survey of Construction Enterprises is identified the production of non residential building and infrastructure.<br>From this statistic is constructed a level of gross value of production by NAICS classification and distributed by purpose of the works and type of asset.<br>Housing, nonresidential building and construction of civil engineering works or heavy works (Other structures)<br>Unlike the manner of integrating the SUT for the private sector, in the public sector case the measurements are realized in the side of utilization namely, it means, is determined directly the GFKF at a detail level coming the information allowed from each one of the public sector agents for this he base is the analysis of expenditure in works for programs of the Government Treasury Account and the budget of investment expenditure of States and Municipalities and from the Financial Statements own and audited of the Public Sector enterprises.<br>From the analysis of this documents is elaborated the gross fixed capital formation in the construction by institutional level and type of work. |
| **Netherlands** | Investment survey, production of construction industry and other sources. Quality is appropriate. |
| **Norway** | The data sources for GFCF are often the same as for output and intermediate consumption, and include Structural Business Statistics, construction statistics, central and local government accounts, etc. In general, data quality for GFCF is not as good as for output |
| **Poland** | PIM method is not used. |
| **Portugal** | In a first stage the GFCF is obtained separately on the production approach and the demand approach.<br>The final figures emerge from the balancing process between both. |
| **Romania** | RO: Data sources used for GFCF are : the Structural business survey, which collects data for S11; economic accounts of agriculture; government data; estimations of GFCF for S14; balance sheets for S15. In PIM estimates, besides GFCF, data from balance sheets and balance of dwellings stock are used. |
| **Slovakia** | GFCF data are based on statistical surveys, administrative data sources and additional calculations (grossing-ups and adjustments for exhaustiveness) |
| **Slovenia** | We briefly outline the annual national accounts data on GFCF as the main data source for estimation of gross fixed capital formation used for the PIM estimates. Data sources for opening (initial) stock values for long-life assets (e.g. AN111) are briefly explained under point 2 (a) by expenditure approach.<br>The main data source is the INV survey (annual questionnaire on GFCF).<br>The PIM requires long time series of GFCF at the most detailed level of asset type, the time series for SVN according to ESA95 are available since 1995. There is no EU regulation for conducting this survey. SURS conducts the survey on the basis of the National Statistics Act and Annual Programmes of Statistical Surveys. Data are available approximately 12 months after the end of the year. For 2010, there were 7.576 reporting units in the survey across sectors and industries (NACE Rev.2).<br>Survey content: In accordance with ESA95 requirements, the INV survey contains information on acquisition of new and used fixed assets and sale of fixed assets in a reference year. This includes modernization, reconstruction and renovation of existing assets, acquisition by financial leasing, and own-account GFCF.<br>Breakdown by asset type (for tangible and intangible fixed assets) is sufficiently detailed concerning ESA TP requirements.<br>Purchase and sale of land is included in the questionnaire as well.<br>Fixed assets are valued at purchaser's prices according to ESA95. Sales of used assets are valued at contract values excluding transaction costs and taxes.<br>Sample frame and observation units: data sources for the sample frame of observation units are Statistical Business Register of Slovenia, annual accounting statements, the VAT database of the Tax Authority, the Statistical Register of Employment, and data from statistical surveys. Observation units are companies, enterprises (also individual private entrepreneurs) and other organizations (incl. those from the government sector). Data on acquisitions and disposals of buildings and structures from the INV survey are compiled by the bottom-up approach (from individual data to aggregate level by sector and industry) and adjusted for exhaustiveness. The latter mainly includes the use of capital formation data from value added tax declarations (data on acquisitions of real estate) and annual accounting statements for units not covered by the survey. Individual unit's industry and sector information is available from the Business Register of Slovenia.<br>Other data sources and adjustments for households' GFCF in buildings: data on dwellings (AN111) are adjusted for own account construction, purchases of new dwellings, major renovations of existing dwellings and transaction costs of existing dwellings.<br>This model adjustment is based upon data from construction statistics, the Survey on Households Own Account Construction, tax statistics and data from production account. In the final step GFCF data are balanced with supply and use tables (SU).More information on quality of the survey can be found in SURS's annual quality |

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| | report for 2009, available at: http://www.stat.si/doc/metodologija/kakovost/12_SPK-INV-1_2009_En.pdf |
| **Sweden** | For further information follow the link to the GNI inventory, page 190 and onwards.<br>http://www.scb.se/Statistik/NR/NR0102/_documents/ESA95%20GNI%20INVENTORY.pdf |
| **U.K** | Source data: The GFCF data is produced using a variety of sources.<br>The main one is the Quarterly Capital Expenditure Inquiry - see the quality and methodological report under question 14 below.<br>Data on dwellings come from the number of new dwellings completed from the Department for Local Government and Communities (DCLG) as well as the value of new construction work. Data on existing land and buildings as well as data on transfer costs come from Her Majesty's Revenue and Customs. Quality:<br>The GFCF data currently has a 'Gross National Inventory (GNI) - Reservation regarding the inclusion of estimates of cinematographic film originals which is planned to be lifted in the National Accounts 2013 publication.<br>The UK has also published an article describing improvements to the GFCF system - see question 14 below. These include improved deflators, improved deflator weights and improvements to the calculations of chain volume measures and seasonal adjustment when dealing with series. |
| **U.S.A** | BEA's NIPA Handbook Chapter 6 http://www.bea.gov/national/pdf/methodology/ch6%202012.pdf<br>Contains a summary of BEA's estimates of investment in structures.<br>Page 7-18 of Chapter 6 contain the key details, including a table that summarizes sources data and estimation methods.<br>In general, the estimates are based on the 5-year Economic Census and widely respected surveys of construction spending from the Census Bureau, as well as widely respected price indexes produced mainly by the U.S. Bureau of Labor Statistics (BLS), the Census Bureau, and private sources.<br>Like all data sources, these data sources contain some measurement error, and these potential measurement errors can have especially important effects on estimates calculated as a difference in two estimates (such as estimates of the value of land calculated through the residual method.) |

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

| Country | Answer |
|---|---|
| **Australia** | The price indexes used for Gross Fixed Capital Formation for the PIM estimates are Consumer Price Index, Producer Price Index and Labour Price Index. The Quality of the above indexes is good. The ABS uses a combination of chain price indexes and implicit price deflators. |
| **Austria** | Since 1971, a construction price index has been calculated in Austria. The construction PI is a Laspeyres price index with a fixed base year. The current base year is2010.<br>The index is broken down into the following subgroups:<br>Construction price index for structural engineering: Dwellings, Other structural engineering<br>Construction price index for civil engineering: Road construction, Bridge construction, Other civil engineering<br>For the purposes of the construction PI, prices are surveyed at master builders and professionals from all Federal states for a total of 58 individual services. The "standardised specification for structural engineering" recommended by the Federal Ministry for Economic Affairs is used as a standard description of the individual groups of services and representative individual services. The construction price index is weighted in three stages:<br>1. Regional weighting by Federal state<br>2. Distribution of the entire sum of contracts amongst the groups of services with standardisation of technical and material changes<br>3. Examination of the weightings of individual services within groups and/or an entire project.<br>Notes: The prices which are accepted on both sides when the contract is awarded are used (contractual prices without value added tax).<br>For all three indices for civil engineering, the contractual prices are also recorded. Any discount which may be agreed upon during the negotiations is taken into account in the valuation. Prices are forwarded to Statistics Austria by means of price reports from the regional building directorate and special companies<br>which award contracts for road and bridge construction and water supply and disposal projects.<br>The price surveys are carried out on a quarterly basis.<br>The individual price figures are aggregated with the weighted arithmetic mean. New products are recorded by regularly changing the base year. |
| **Belgium** | For dwellings, the General contractors' survey of construction collects information on the price of global and per m² construction for new dwellings. As said before, the quality of this survey has declined because of the difficulty of collecting the right information and because of the decline in the number of respondents. The ABEX index (giving information on the change in constructions costs of housing and private dwellings) is used when no information is available in the survey.<br>For other building and structures, the main source data used for the price indexes is the Producer Price Index for materials used, combined with wage data in the construction sectors. Volume data used in the PIM are in constant prices (COP base year 2000) and then converted into chained euros. |
| **Canada** | Dwellings: An implicit price index based on Gross Fixed Capital Formation is used to convert the figures into 2007 constant dollars and chained 2007 dollars.<br>Buildings other than dwellings and other structures: price indexes are based on GFCF prices. Paasche type prices are used to calculate a chained fisher volume index. |
| **Chile** | We use the GFCF at chained volume at previous year prices measured in the calculation of the GDP in the National Accounts.<br>For the PIM estimates, we measure the GFCF at constant prices. |
| **Cyprus** | The price indexes used for the deflation of GFCF are the output prices of construction. Although the quality of these indicators is considered quite satisfactory, certain additional adjustments are made in the balancing procedure in the SUT framework that take into account the volume indexes of construction as well. |
| **Czech Republic** | Price indexes for GFCF are taken over after finishing of balancing supply and use tables. The mixture of imports and domestic production is taken into account. |
| **Denmark** | Indices based on construction costs (wages and material) are used for buildings and structures, availability of output price indices would improve quality.<br>Volume measures are calculated at constant 2000-prices and previous year's prices (chain prices). |
| **Estonia** | Depending on the type of fixed assets different price indexes from price statistics are used.<br>For example, for building and structures, the construction price index is used. Chain prices are not used for the PIM estimates. |
| **Finland** | For dwellings and other buildings: Volume of new buildings index, 1995->, For Other structures (AN1122): Cost index of civil engineering works |

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|---|---|
| | For land improvements price index for forestry activities. Chain prices are used. |
| **France** | The GFCF at current prices is estimated by product and by industry at a detailed level (nomenclature with 38 positions, see table in question 1) for each institutional sector. The price indexes are also based on consistency of input-output balances in the national accounts. Using prices of GFCF by product at the same detailed level, chain Laspeyres price indexes are compiled at the detailed level and are aggregated to obtain price indices for each type of assets. The GFCF time series in constant price are then obtained by type of asset, for each institutional sector and by industry. All the price indexes are chained in order to compute the PIM.<br>To value the GFCF of the structures (buildings and other structures) in particular, the construction cost index is the most frequently used. It is a quarterly index, published by In see since 1953. It measures the changes in prices of housing starts, through the observation of the real-estate market. This index excludes the price of substantial repair and maintenance and the costs of ownership transfers, yet in the GFCF field. |
| **Germany** | Indices of construction operation prices are used for deflation of GFCF in construction.<br>These are producer prices of construction companies for traditionally constructed buildings (residential buildings, office buildings, industrial buildings), civil engineering (roads, bridges and sewers), maintenance of residential buildings, and creation of outdoor installations of residential buildings. For the PIM chain prices are used. |
| **Hungary** | We use investment price indices by industries and by asset types. Different price indices are used of domestic machinery and for domestic transport equipment on the basis of the industrial production price indices. Import price indices are used in case of imported machinery and transport equipment. The deflation of construction works is carried out by applying cost based construction price index. Investment price indices by industries are calculated by taking into account the weights of asset groups in the year t-2. The annual price indices are obtained as the weighted averages of the industrial price indices, where the weights are the annual investments of the industries. Price indexes are chained. |
| **Iceland** | For dwellings it is a mixture of a housing price index and building price index. For AN112 there is the Building price index and price index for imported investment goods. They are chained. |
| **Israel** | Estimates at constant prices are computed by two methods as specified above for the compilation of the estimates at current prices:<br>-Area of Buildings and Average Cost per Square Meter: Estimates at constant prices are derived by multiplying the estimated areas of building, in the period under review, by the average cost per square meter in the base period.<br>-Financial Data on Actual Expenses: Estimates at constant prices are obtained by deflating the current by the appropriate price indices for each item of building. |
| **Italy** | National accounts deflators, both for Dwellings (AN111) and Other buildings and structures (AN112) are chain linked deflators. The main data sources that are used for estimating them are construction costs indexes (that are fixed based indexes). We deflate the GFCF net of value added taxes using construction costs indexes.<br>The value added tax component of GFCF is deflated using the volume extrapolation method (it is assumed that the volume index of VAT is the same than the volume index of GFCF net of VAT).This volume index is applied to the value of VAT in the previous year to derive the volume of VAT in the current year). |
| **Japan** | We estimate the price index for each type of asset (i.e. type of construction) by combining the prices of materials and wage which are employed in construction activities. Chain method is adopted. The prices of materials are derived from CGPI (Corporate Goods Price Index) and wage index is from Monthly Labour Survey. |
| **Korea** | The price indexes are also available from the detailed GDP statistics. At present, the chained index is used for aggregation at the higher level. |
| **Latvia** | For other buildings and structures only construction cost index is available, for dwelling stock Latvia recently started to publish House price indices.<br>Price indices are available from year 2008. |
| **Lithuania** | All price indices used for gross fixed capital formation of PIM estimates are prepared by the Price Statistics Division of the Statistics Lithuania. Construction input price indices (of dwellings; non-residential buildings; other structures except roads; roads and streets), import price indices and export price indices (of corresponding product by CPA), industrial production price indices (of corresponding product by CPA), consumer price indices (for intangible fixed assets) are used. All these early indices are calculated as an arithmetical average of monthly indices. Monthly indices of current and previous year are linked together used the chain linking method. |
| **Malta** | To estimate GFCF at constant prices the main deflators are applied: a *machinery* deflator which is based on the imports of machinery (unit value indices), a *construction* deflator and *other products* deflator which is based on the overall HICP. |
| **Mexico** | The data of the price indexes used for measuring GFKF at constant prices in some cases are generated within the same office of National Accounts and others come from official institutions with a level of detail that allow develop the weighted indexes differentiated by type of asset as shown in the next table. |

**Table 3. Sources of data of the Price indexes for the GFKF**

| Descriptiopn of th Index | Characteristics | Temporariness | Link to internet |
|---|---|---|---|
| National Consumer Price Index | By kind of finality and economic activity, disclosure | Annual | Sheet IPP BASE 2008 |
| National Producer Price Index | By economic activity, disclosure | Annual | Sheet IPC_BASE 2008 |
| Residential contruction by city (before INCEVIS) | National and by city | Annual | http://www.inegi.org.mx/sistemas/indicoeprecios/Estructura.aspx?idEstructura=112000300050001 0&T=Índices de Precios al Productor&ST=Construcción residencial por ciudad (antes INCEVIS) |
| Construction. Materials, leasing of machinery and remunerations | Disclosure by materials, leasing of machinery and remunerations | Annual | http://www.inegi.org.mx/sistemas/indicoeprecios/Estructura.aspx?idEstructura=112000300050002 0&T=Índices de Precios al Productor&ST=Materiales, alquiler de maquinaria y remuneraciones |
| Inputs of the public works. Construction. Updating of costs of the public works | Disclosure by materials | Annual | http://www.inegi.org.mx/sistemas/indicoeprecios/Estructura.aspx?idEstructura=112000300060001 0&T=Índices de Precios al Productor&ST=Actualización de costos de las obras públicas |
| Minimum wage salary | By sector (services, construction, professional, land, commerce) | Annual | ISMG |
| Index of prices of dwelling in Mexico (Federal Mortgage Society) | National and by state | Quarterly | http://www.shf.gob.mx/estadisticas/IndiceSHFPreciosViv/Documents/Indice%20SHF%202011%20to%20Trimestre.pdf |

| | |
|---|---|
| **Netherlands** | Prices are based on producer price indices. The quality is appropriate. |
| **Norway** | The price index for GFCF of an asset is a weighted average of the price indexes of the construction services that make up each asset type.<br>The data sources include construction cost indexes for residential buildings and roads, price indexes for new detached houses, etc.<br>The price indexes have some weaknesses. The cost based indexes are not adjusted for changes in productivity and profitability. For new detached houses, quality adjustment is a challenge. Some assets types (e.g. buildings other than dwellings) are not covered by separate indexes. Chained prices are used. |
| **Poland** | PIM method is not used. |
| **Portugal** | The price indexes for GFCF used for the PIM estimates are essentially the price indexes obtained in the SUT. In practical terms, these prices are chain prices. |
| **Romania** | Used price indices are: IPPI and construction cost indices. Price indices are chained with base year, for PIM compilation. |
| **Slovakia** | We obtain price indices from the Department of the Price Statistics of the SO SR.<br>They are based on the weights of individual types of assets and changes in price volume over the years. Yes, for GFCF chain prices are used. |
| **Slovenia** | The PIM performs most of its calculations in constant prices. To derive the constant price series, the current price GFCF series are deflated using appropriate asset price indices. Components of buildings and structures (non-residential buildings, construction and engineering works and land improvements) are deflated by the construction cost index (CCI) with the exception for dwellings, which are deflated by the CCI and the consumer price index (CPI). Transaction costs are deflated by the CPI.<br>In the Slovenian national accounts the base year for constant price calculation is changed every year and aggregates for each particular year are expressed in prices of the previous year so chain prices are used in the case of SVN.<br>More information on price indices can be found in SURS's publication "Constant price inventory" (2010): http://www.stat.si/doc/pub/03-PP-192-1001.pdf |
| **Sweden** | For further information see "inventories of sources and methods for price and volume measures in national accounts, chapter 3" |
| **U.K** | GFCF price indices come from Producer Prices Indices (PPIs). The UK produces chain volume measures of GFCF. |

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| | These are the most appropriate deflators available for GFCF; the paper on GFCF in section 14 below explains more about changes to the system. |
| **U.S.A** | See the response to 8(a). BEA uses chain prices in its estimates |

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

| Country | Answer |
|---|---|
| **Australia** | Yes, problems arise when there are second hand sales of assets between sectors. For example, if the Government privatises a Port, the value of the asset contains an asset component (buildings and structures) and a land component. It would be very difficult to identify the land component. |
| **Austria** | So far the residual method for valuing land is not applied in Austria. |
| **Belgium** | For Belgium, the residual approach is planned to be followed for the estimation of stocks of land. As a consequence, information from the PIM method has to be used. However, a first feasibility study carried out in 2013 did raise some issues for Belgium. First, a conceptual issue arises from the use of PIM data. Indeed, it is assumed that the service life of buildings is 60 years. This means that a large part of Belgian real estate is no longer included in the PIM building stocks. Therefore, the use of the residual approach results in an overestimation of land underlying buildings. Second, the current method for estimating buildings via the PIM supposes that the government sector (S13) does not hold dwellings. This is an unrealistic assumption since in cadastral data, it can be seen that the government does hold dwellings. This implies that we should find an alternative valuation method for dwellings in this sector. In our very preliminary results, land underlying dwellings owned by S13 were overestimated (since it is made equal to the value of the combined land and dwellings).<br>Third, the rest of the world (S2) is not represented in dwellings and non-residential buildings estimated by the PIM.<br>This also implies that we should find an alternative valuation method for buildings in this sector.<br>Finally, the PIM does not estimate stocks of dwellings and non-residential buildings per Region.<br>To distribute PIM values among Regions, we have simply reported the weightings for each Region in the total value of the stock of the combined land and buildings. This current method does not take into account the fact that some constructions might be older in some Regions (low estimate in the PIM), although highly valued by the market (high estimate of built land). |
| **Canada** | The valuation of land program will be redesigned (possibly 2015). The data source may also be the municipal property tax files in which the structure estimate (From the capital stock program) will be used with the valuation on the tax file. |
| **Chile** | In the estimation of the net capital stock, we have used the information of the GFCF and the PIM method. However, GFCF does not contain information on land; as a result, the stock of land has not been computed. We have not measured the stock of land with other method because of lack of data. |
| **Cyprus** | The various surveys conducted by CYSTAT mark down data for purchases and sales of land and plots.<br>However, there is a limitation in the time series, since data exist only for later years. |
| **Czech Republic** | No, they do not. The stock of land is not estimated by residual approach. It is derived from area data in the land registry and market prices. |
| **Denmark** | No |
| **Estonia** | Due to lack of resources we haven't deal with this subject yet |
| **Finland** | We use the direct method to estimate the value of land. |
| **France** | Land is excluded from our GFCF data |
| **Germany** | No sufficient answer possible, since indirect methods are not applied in Germany. |
| **Hungary** | No |
| **Iceland** | As no work has been done so far in Iceland to estimate the stock of land we really don't know if it will lead to problems.<br>On the other hand there exist a Land Registry Database, maintained by the Iceland Property Registry, which is a centralized data collection system and information source for all land and real estate data that we should be able to use in our future work on estimating the stock of land. |
| **Israel** | The estimate of the average price per square meter building is calculated according to input output tables and being quarterly updated by using the price index of input in construction and will effect on the estimates of stocks of land. |

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|---|---|
| **Italy** | The change of ownership of "Second-hand" assets among sectors/industries is not traced in GFCF, so the relevant stock results overestimated or underestimated for different sectors/industries: due to the PIM, assets belong to the stock of the first purchaser sector industry over their service life. |
| **Japan** | No |
| **Korea** | No information for this question. |
| **Latvia** | We have not yet estimated stocks of land. First we are going to introduce PIM method for other buildings and structures. |
| **Lithuania** | No opinion |
| **Malta** | We have not yet estimated stocks of land. GFCF is not compiled by locality thus valuation of land will be a problem given that land prices vary considerably between localities. |
| **Mexico** | •The source of information does not allow us to determine the surface of the lands on which the constructions are built, preventing measuring the surface of the adjacent land to the construction and its corresponding market value.<br>•On occasion, the information reports the fixed assets in net terms (acquisitions less disposals) preventing an adequate analysis of these two categories.<br>•The information comes in terms of restatement, preventing knowing the historical value (current present value) of the asset.<br>•The information for the case of the non residential structures comes from surveys that obtain information about the income and expenditure by work execution but do not report information about built surfaces and the adjacent lands to the building.<br>•The GFKF of an individual unit may be negative due to sales to other units or sectors, or in the case of public agents the institution goes into a liquidation process.<br>•In the case of measurements of construction when a building or a structure is remodeled its useful life increases which biases the estimation of the useful lifetime of the asset, situations that could not be adjusted in the measurement of the stocks. |
| **Netherlands** | The main problem we recognize is the service live of other buildings, which does not fully correspond with the service lives used to determine the total of the buildings including the underlying land. As a consequence we use an alternative value of other buildings based on straight-line depreciation and a service live of 37 years to calculate the value of land underlying other buildings as a residual. After our next benchmark revision this will be adjusted. |
| **Poland** | PIM method is not used. |
| **Portugal** | At the moment, we don't estimate stocks of land |
| **Romania** | Data on land not available, as regards surfaces by types, prices and values. We will try to identify new data sources |
| **Slovakia** | There is no split for buildings and lands. Working level of asset category is not sufficient, it should be more detailed. |
| **Slovenia** | No; the GFCF survey includes a question asking respondents about the value of purchased land (i.e. acquisition and disposal without transaction costs) and separately about the value of transaction costs incurred in case of land acquisition or sale. All expenditures are valued by the purchaser. Sales of existing assets are valued excluding transaction costs and taxes. |
| **Sweden** | No estimated is done. |
| **U.K** | Yes. The lack of source data means that an estimate of the stocks of land is not currently available. |
| **U.S.A** | See the response to 8(a). There is no single major problem with these estimates, other than some general concerns about measurement error in prices indexes and measures of current-dollar expenditures. BEA and the Federal Reserve both caution users against obtaining estimates of the market value of land using the residual method (by subtracting the value of land and structures from the value of structures alone) because the results can be unrealistic. |

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

| Country | Answer |
|---|---|
| **Australia** | Ownership Transfer Costs are treated as GFCF in the estimates of structures. However, they are collected independently through land title transfers, stamp duties, median house prices and other charges. Ownership Transfer Costs comprises the various fees which are incurred by either the buyer or seller of real estate.<br>Land Title transfers is when a transfer or property has occurred and the deed of the title of property must be altered. Stamp duty is a cost of the valued of the property when being transfer. Median house price is a weighted average of house movements for the eight Capital Cities in Australia. Other Charges include Water Boards and Land Tax office. Ownership transfer costs are depreciated as by be hyperbolic function with a reduction parameter of 0.75 as shown in part A. |
| **Austria** | Transfer of ownership costs are included in GFCF. At present they are depreciated with the same rate as the GFCF. |
| **Belgium** | Transfer of ownership costs are included in GFCF and are depreciated together with GFCF as a whole. |
| **Canada** | Dwellings: They are included in GFCF.<br>Buildings other than dwellings and other structures: transfer costs are added to investment in structures as an adjustment based on GFCF. |
| **Chile** | We have not included this estimate in our statistics |
| **Cyprus** | The investments in new buildings and other civil engineering projects are estimated based on the construction survey (NACE F).<br>For old buildings as well as lands and plots, only the transfer fees are recorded as GFCF. |
| **Czech Republic** | Costs of ownership transfer are definitely included in GFCF.<br>There are two parts of the costs of ownership transfer. One part is composed from the real estate transfer tax and the second one is formed by other costs of ownership transfer. The information about the real estate transfer tax is obtained from the Ministry of Finance of the Czech Republic.The other costs of ownership transfer are counted as 10 % of the real estate transfer tax. These two figures give the value, which is allocated among the industries. We find out which part of the real estate transfer tax and other costs of ownership transfer forms transfer costs of land and the transfer costs of dwelling, buildings and other structures. Especially we also determine transfer costs of buildings and land between households. Transfer costs of land amount to 17, 4 %. Rests of costs are transfer costs of buildings. |
| **Denmark** | Costs of ownership transfer are included in the calculation of the value of buildings. Trade margins are also included in the valuation of other structures. |
| **Estonia** | According to the ESA2010 P3.138 which says that transfer of ownership costs are included in the purchaser's pieces in the case of produced assets<br>These costs are included in GDCF. They are not separated from purchases. |
| **Finland** | Transfer of ownership costs are included on GFCF calculations. The total value of these costs is known but not the division of it in different asset categories.<br>In Finland 50% of it is directed to 'AN111 Dwellings', 40% to 'AN1121 Buildings other than dwellings' and 10% to 'land'. This division is based on assumption.<br>The depreciation of transfer of ownership costs is linked to the industry that invests to this asset. For example, as all AN111 investments are included in the 'housing industries' (68201, 68202), the depreciation of new dwellings, major renovations and transfer of ownership costs follows the same rules. |
| **France** | In base-year 2005 (Esa95), the costs of transfer of ownership are included in the GFCF of structures and the same service lives are used for the both part of the assets. With the implementation of ESA 2010 (base-year 2010), the service lives for the costs of ownership transfer were revised to 10 years, closer to the holding period of the buildings. |
| **Germany** | These costs are included in GFCF, partly in GFCF in construction as far as buildings and structures included and partly in other GFCF<br>(P.513 additions to the value of non-produced non-financial assets) as far as they relate to land only.<br>Both parts are depreciated simultaneously with buildings and structures but with shorter service lives than buildings and structures. |
| **Hungary** | It is included in GFCF data as a ratio of the acquisition of the existed structures. It is depreciated together with the value of structures |
| **Iceland** | Transfer of ownership costs is included in the GFCF. It is not a separate amount in the capital stock and is depreciated at the same rate as the asset |
| **Israel** | Not yet handled |
| **Italy** | The by-product construction GFCF estimates include an estimate of the costs of ownership transfer divided in legal fees and real estate agencies expenses both for residential and non-residential buildings. These costs are depreciated following the same basic assumptions illustrated in Part A with service lives equal to 34 years. |

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| | There is no estimate of the costs of ownership transfer for other structures (infrastructures). |
| **Japan** | No, we don't explicitly include the OTCs in GFCF in the current JSNA. On occasion of the next comprehensive revision of JSNA which is scheduled by the end of FY2016, we plan to include some of OTCs in GFCF. |
| **Korea** | The transfer of ownership costs is included in GFCF.<br>The transfer-related expenses are payment fees to engineers, technicians, architects, lawyers and real estate brokers, and ownership transfer-related taxes, etc.<br>At least, capital stock of costs of ownership transfer of land will be estimated as an independent asset by using PIM and it will be depreciated on its age-price profile. |
| **Latvia** | There is no separate estimate for transfer costs of other structures. |
| **Lithuania** | Transfer costs cover legal fees (land registration fees), professional charges for technical consultancy, commissions paid to estate agents and stamp duties.<br>Estimates are based on information provided from state and local budgets and services statistics - real estate services production. The amount of transfer costs (without land registration fees) is distributed to dwellings and other buildings and structures according to the structure of these types of assets in GFCF. |
| **Malta** | GFCF derived from annual accounts and surveys are inclusive of transfer of ownership costs.<br>For dwellings, transfer of ownership costs are included in GFCF. They are defined to include architects', engineers' fees, real estate fees, notaries fees, and taxes on products.<br>These are depreciated in the same way as the construction cost of the dwelling, using the average 85 years services life assumption. |
| **Mexico** | Currently the methodology of calculation omits transfer of ownership costs, since only we are estimating the Gross Value of Output of the construction of other buildings and structures (AN112), for the side of the "Origin" not for the side of the "Destination" or holders of these assets. |
| **Netherlands** | Transfer of ownership costs are treated separately from the dwellings and other buildings in the PIM. They are based on a fraction of the value of the dwellings and other buildings. In our publications the transfer of ownership costs are not published separately, it is included in the value of the dwellings/other buildings. |
| **Norway** | The costs of ownership transfer are included in GFCF as a separate asset type. In the PIM, they have a shorter assets life than the structure itself. |
| **Poland** | In accordance with the Polish accounting principles transfer of ownership costs is included in gross fixed capital formation. |
| **Portugal** | Transfer of ownership costs are included in GFCF, as the SNA 2008 recommends |
| **Romania** | Transfer of ownership costs are already included within the value of the net investments, thus in the value of GFCF.<br>The values of net investments including transfer of ownership costs are required by Structural business survey. They are not separately identified. |
| **Slovakia** | Costs of ownership transfer are included in the price of each structure, hence the GFCF too.<br>The costs of transfer of ownership is estimated from yearly figures on transfer of the immovable properties – app.5% |
| **Slovenia** | Yes; Transaction costs for dwellings (AN.111), buildings other than dwellings (AN1121) and other structures (AN1122) are included in the value of acquisitions of new or existing asset in the GFCF survey. These costs are not separately depreciated. |
| **Sweden** | The transfer of ownership cost are treated as an integral part of the value of the unit´s gross fixed capital formation. It is depreciated as the underlying asset. |
| **U.K** | Included in GFCF: Yes. Definition: The costs of ownership transfer incurred on purchases and sales of land. Land is not a produced asset.<br>The value of sales of land must therefore be separated from the purchases and sales themselves. Treatment/Depreciation:<br>Costs of ownership transfer are treated as fixed capital formation and written off as consumption of fixed capital in the year of disposal or acquisition. |
| **U.S.A** | For residential fixed assets, ownership transfer costs include brokers' commissions on the sale of new and used structures and the underlying land; title insurance; title, abstract, and attorney fees (that is, closing costs other than those associated with obtaining a mortgage); payments for state and local government documentary and stamp taxes; and payments for surveys and engineering services. Under the new treatment to be released at the end of July 2013, BEA will recognize (for 1929 forward), all of the ownership transfer costs as capital investment and will record the depreciation of these costs over the typical holding period of the asset. In addition, consumption of fixed capital will reflect these capital expenditures, and will be based on the typical holding period of the asset—estimated to be 12 years—rather than the average life of the structure, estimated to be 80 years (as has been assumed in the past).For transfer costs paid at the time of the disposal of the asset, such as brokers' commissions paid by sellers, depreciation will begin prior to the incurrence of the cost in order to align the timing of the depreciation expenses with the economic benefits received by the owner. As a result, brokers' commissions will depreciate much more rapidly than previously estimated. Consistent with recommendations of the SNA, the new treatment will depreciate actual acquisition costs (beginning at the time of ownership transfer) and expected disposal costs |

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| | (beginning at the time of purchase in anticipation of future disposal). Because the depreciation of expected disposal costs begins before the eventual sale of the dwelling by the purchaser, the current-cost net stock of ownership transfer costs (that is, the acquisition costs less the disposal costs) may be negative in some years. These net stocks will be shown in BEA's fixed asset accounts. This new treatment of ownership transfer costs will not apply to nonresidential structures. For nonresidential structures, BEA will continue to capitalize broker commissions only, and will continue to depreciate broker commissions at the same rate as the structure. For more information on BEA's upcoming 2013 comprehensive revision of the NIPAs, please see. http://www.bea.gov/scb/pdf/2013/03%20March/0313_nipa_comprehensive_revision_preview.pdf |

## 5. Do you differentiate between investments in new dwellings and investments in major renovations/ improvements to existing dwellings? For the most recent year, can you provide investment in new dwellings as a share of the total investment in dwellings (which includes both new dwellings and the value of major renovations/improvements)?

| Country | Answer |
|---|---|
| **Australia** | Yes, the ABS differentiates between investments in new and used dwellings, and investments in major renovations improvements to existing dwellings for the Private Sector. For the Public Sector, New and used Dwellings and improvements to dwellings are collected as one item.<br>The private share of new and used dwellings to total dwellings for 2011-12 is: $ 40,000m/70,302m=0.57 or 57% |
| **Austria** | Investment in dwellings is subdivided into investment in refurbishing old buildings and investment in new dwellings.<br>Investment in new dwellings in total investment corresponds to a share of around 81% (in 2012). |
| **Belgium** | This differentiation is made for Belgium. For the year 2012, investment in new dwellings represents 68.8% of total investment in dwellings. |
| **Chile** | No, we don't differentiate between investment in new dwelling and investment in major renovation to existing dwellings. |
| **Cyprus** | For the calculation of Capital Stock and GFCF no such breakdown is available. |
| **Czech Republic** | No, we do not differentiate. |
| **Estonia** | In 2012 the share in new investments in dwellings is 66% of the total investment in dwellings (which includes new dwellings and the value of major renovations and the transfer of ownership costs). |
| **Finland** | In Finland we use the sum of new buildings and major renovations. In 2011 new dwellings covered 61% of the total of 'AN111 Dwellings'. |
| **France** | In the input-output balances, we differentiate the investments in new dwellings and the investments in major renovations but this breakdown is not used to compute the PIM. |
| **Germany** | About 73 %, but the amount is under review for the revision next year (could already be lower). |
| **Hungary** | Yes, we do differentiate between investments in new dwellings and investments in major renovations improvements to existing dwellings. The ratio was in 2011: 0.37. |
| **Iceland** | Yes we differentiate between the investment and major improvements of dwellings. New dwellings are 84 % of the total GFCF in dwellings (2012).<br>Total amount in dwellings include new dwellings, major improvements and transfer of ownership cost |
| **Israel** | Yes, 91% |
| **Italy** | Yes, we do. Gross fixed capital formation in the form of improvements to existing dwellings (also called extraordinary maintenance) is classified with acquisitions of newly built dwellings. However, extraordinary maintenance is recorded separately only for internal analytical purposes.<br>For the year 2010 investment in new dwellings represents the 40.3% of the total investment in dwellings<br>(Including both new dwellings and the value of major renovations/improvements net of costs of ownership transfer). |
| **Japan** | No, we don't have enough information to differentiate between both types of investments for dwellings. |
| **Korea** | In Korea, new buildings are dominant compared with renovations/improvements until now. But with stabilization of Korean economy, the portion of renovations/improvements will increase continuously. We do not have information about this. |
| **Latvia** | For 2009, the share of investments in new dwellings to total investment in dwellings is 0.97. |
| **Lithuania** | Figures on new investment for dwellings are derived from the survey on permits. Information on the number of square meters and average price per square meter is also used for the estimation. Figures on improvements are also based on the Construction survey supplemented with information of non-observed activity in residential construction. Special survey on Non-observed output in construction was made in 2003.<br>The aim of this survey was to identify the amount of capital repair of dwellings, especially a share of the non-registered capital repair.<br>Thus, 10 %-share was recognized as a self-repair of the dwellings. |
| **Malta** | Yes, we do differentiate between investments in new dwellings and investments in major renovations to existing dwellings. |

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|---|---|
| | New dwellings as percentage of Total Investment of Dwellings 2012: 74%. Total Investment in Dwellings 2012 Euro millions:147.786 (NR170_2012)<br>Total Investment in NEW Dwellings 2012 Euro millions: 110.128 |
| **Mexico** | Nowadays only a small proportion of what is considered investment expenditures in extension and remodeling of dwellings is available, across the statistics of the Annual Program of Financings for Housing from the National Commission of Housing, by means of which subsidies are granted to the families to be able to carry out remodeling or extensions in their dwellings. Even when this statistic is available, the measurements are not feasible, because the levels of expenses in this concept could be higher; it is necessary to quantify the part of resources that the own families contribute to complete the total investment in the remodeling and improvement of dwellings. Linked to this, in Mexico exist a great number of residential buildings that are constructed or remodeled in an informal way, it means, do not request licenses of construction to develop the improvements in their dwellings, and it is necessary to measure this part. |
| **Netherlands** | We do not differentiate between investments in new dwellings and investments in major renovations improvements to existing dwellings, since there is no distinction made in our investment survey. |
| **Poland** | Polish statistics presents the total value of investment on new capital assets (construction, purchase) and improvement of existing fixed assets, according to Polish accounting principles and it is impossible to differentiate them. |
| **Portugal** | We differentiate, in terms of GFCF, between investments in new dwellings and investments in major renovations/ improvements to existing dwellings. |
| **Romania** | Yes, we make separate estimates. We estimate the value of investments in new dwellings and in the Structural business survey the values of major renovations for all types of buildings are collected. For year 2010, investment in new dwellings as a share of the total investment in dwellings = 37.3% |
| **Slovakia** | No, we do not have sufficient information for such differentiation. |
| **Slovenia** | Yes; the share of investment in new dwellings was 80.2% of the total investment in dwellings in 2011. Within the balance sheets on non-financial assets for SVN major renovations/improvements are included in the estimation of dwellings. We don't estimate separately this asset category for other buildings and structures as well. |
| **Sweden** | 0.5127(Ratio 2011) |
| **U.K** | We have recently published data that splits up these two components, see link below and then look for reference 001800 on 26 September 2013.<br>For private sector dwellings in 2012, 42% of the total investment in dwellings at current prices was on new dwellings. |
| **U.S.A** | Yes |

## 6. How frequently are annual and quarterly estimates produced and updated, and how soon are annual and quarterly estimates produced?

| Country | Answer |
|---|---|
| **Australia** | The annual estimates are released on the Friday of the fourth month after the end of the reference period (Financial Year).<br>The quarterly estimates are released on the first Wednesday of the first week of the third month after the end of the reference period. |
| **Austria** | Annual, July. For sector S.13 in March. |
| **Belgium** | As regards the GFCF, estimates are produced quarterly and annually, where stocks are computed annually only.<br>Quarterly estimates:<br>At the total investments (P51) level, a distinction is made between dwellings, S13 and the rest (proxy for investments of “enterprises”, sensu lato).<br>Quarterly estimates are produced eight times a year (2 versions for each quarters), with a separate estimate for dwellings only.<br>The other buildings and structures are included either in the total investments of the public sector, or those of the “enterprises”.<br>A first annual estimate of the three above-mentioned categories is computed with a delay of 4 months after the closing of the year based on the quarterly accounts, where the year thus corresponds to the sum of the four quarters.<br>Annual estimates:<br>Detailed annual accounts (estimates of GFCF and price indexes with breakdown by sectors, branches and assets) are produced once a year, nine months after the closing of the year. In a standard production campaign, only the last three years are computed and-/or revised. Across the board revisions of long time series only occur about every five years (in a so-called “occasional revision”).<br>Capital stock (based on those detailed accounts) is computed once a year and published with a 10 to 12 months delay after the closing of the year. |
| **Canada** | Dwellings: Estimates of depreciation for dwellings are not updated. 60 days and 75 days for quarterly and annual estimates are produced.<br>Buildings other than dwellings and other structures: Estimates of depreciation are not updated.<br>The annual estimate of Capital stocks and flows for the current year are available 3-4 weeks before year-end. |
| **Chile** | The net capital stock is produced and updated at annual frequency. The preliminary version is produced at t+3 months. However, the stock of capital is not an official publication of the Central Bank of Chile, and each year we have updated the information and published as part of the "Studies in Economic Statistics N°63". |
| **Cyprus** | Annual data for GFCF and Capital Stock are produced in t+9 months and t+24 months respectively, while quarterly estimates for GFCF are produced in t+70 days. |
| **Czech Republic** | Consumption of fixed capital is estimated for every regular annual version of national accounts preliminary, semi-definitive and definitive in T+9, T+16 and T+28 months. They are revised during stipulated revisions |
| **Denmark** | Statistics Denmark compiles capital stocks and consumption of fixed on an annual basis.<br>A more simplified calculations uses are used for compiling the latest quarterly figures for Consumption of Fixed Capital |
| **Estonia** | GDP calculations are regularly revised. The first estimate of the quarterly GDP is published on the 70th day after the end of the reference period.<br>Annual revision of the quarterly calculated principal national accounts indicators is carried out on the basis of the SBS.<br>The results of SBS are published 21 months after the end of the year subject to revision. The final stage of the regular revision of GDP figures involves correction of the GDP components according to the Supply and Use Tables (SUT) and is released 45 months after the reference year. |
| **Finland** | Estimates are updated annually, lag t+7 months. Lag for quarterly accounts estimates 60 days |
| **France** | The French balance sheet data are produced on an annual basis. At the end of year N, wealth annual estimates for N-1 (provisional), N-2 (semi-definitive) and N-3 (definitive) are published. Quarterly estimates are not available. |
| **Germany** | CFC: Quarterly (t+45days implicit, t+55days CFC figures published, updated every quarter during the reporting year and yearly the following 4 years) and annual estimates first t+15 days implicit, updated t+9months and yearly see stocks. Stocks: first at t+40days, updated at t+70days, t+9months and yearly t+21m…..t+45m |

<table>
<tr><td>Hungary</td><td>
<table>
<tr><th>Subject</th><th>Deadline(months)</th><th>Notes</th></tr>
<tr><td>First preliminary data of quarterly and annual GDP</td><td>T+70 days</td><td>Annual data of the previous year, the sum of the four quarters</td></tr>
<tr><td>Annual National Accounts, second preliminiary data</td><td>T+9</td><td></td></tr>
<tr><td>First revision of quarterly GDP based on annual (T+9) data</td><td>T+10.5</td><td>Published together with flash GDP data ofquarter 3</td></tr>
<tr><td>Annual NA revision, regional GDP</td><td>T+21</td><td>Based on preliminary SUT</td></tr>
<tr><td>Second revision of quarterly GDP based on annual (T+21) data</td><td>T+22.5</td><td>Published together with flash GDP data of quarter 3</td></tr>
<tr><td>Optional revision of annual NA</td><td>T+33</td><td>Based on final SUT</td></tr>
<tr><td>Optional third revision of quarterly GDP based on annual (T+33) data</td><td>T+34.5</td><td>Published together with flash GDP data of quarter 3</td></tr>
</table>
Stock data: annually t+21 months and revision at t+33 months.
</td></tr>
<tr><td>Iceland</td><td>Dwellings are collected at a quarterly basis but AN112 on an annual basis. Capital stock is published annually</td></tr>
<tr><td>Israel</td><td>The annual estimate is updated once a year. The quarterly estimate for the current year is updated every quarter</td></tr>
<tr><td>Italy</td><td>With reference to annual estimates of depreciation by-industry, they are transmitted annually in April. There are no quarterly estimates of depreciation by-industry.</td></tr>
<tr><td>Japan</td><td>We update the estimates of depreciation of JSNA annually (calendar year), and they are produced 12 months after the end of the year.</td></tr>
<tr><td>Korea</td><td>The depreciation can be changed during the revision process of National Accounts.<br>There are quarterly, annual and quinquennial revision processes. Usually the annual revision will be more important with regard to estimates of depreciation.</td></tr>
<tr><td>Latvia</td><td>The estimates of PIM will be made annually.</td></tr>
<tr><td>Lithuania</td><td>Gross Fixed Capital Formation and its components are evaluated and periodically updated depending on quarterly and annual data sets reports.<br>Quarterly estimates are evaluated twice – firstly produced quarterly estimates based on the provisional data are re-estimated in regard to the updated data used in GFCF calculations. Also quarterly data are updated depending on annual provisional and final GFCF data estimations.</td></tr>
<tr><td>Malta</td><td>In case of dwellings the updates depend on the Census of Population and Housing which is generally conducted every 10 years and the Household Budgetary Survey which is done every 5/8 years.<br>These two sources are used for the benchmark years. Quarterly estimates are updated every quarter since our data sources generally provide the data regularly.<br>GFCF is updated annually through various sources with a time lag of t+3 at 2-digit NACE. Quarterly estimates are heavily on imports which are updated regularly.</td></tr>
<tr><td>Mexico</td><td>Usually the update of the depreciation rates takes about on each base year change of the SCNM currently it is every five years.</td></tr>
<tr><td>Netherlands</td><td>Estimates are published at T+6, T+18 and T+30 months for the annual figures. The quarterly figures are published at T+45 and T+90 days.<br>At a benchmark revision, the service lives and other parameters are updated.</td></tr>
<tr><td>Norway</td><td>Final annual estimates are published with a lag of 23 months. Quarterly and preliminary annual estimates are published after about 50 days.</td></tr>
<tr><td>Poland</td><td>Estimates are produced quarterly and updated four times a year (it is connected with availability of data sources on time); annual estimates are produced twice as preliminary and final data</td></tr>
<tr><td>Portugal</td><td>The annual estimates of GFCF are produced once a year; the quarterly estimates are produced four times a year.<br>The estimates of CFC and capital stock are produced annually (once a year).</td></tr>
<tr><td>Romania</td><td>The estimates of GFCF are compiled at quarterly level (provisional version at t+70 days) and at annual level at t+90 days in provisional version, t+12 months in semi-final version and at t+21 months for final version. The most detailed breakdown of GFCF is compiled at t+21 months, at annual level.<br>CFC is compiled only for final version at annual level, being used in the total amount.<br>Only in sequence of accounts is included, since 2010. It was not distributed and included in accounts by industries.</td></tr>
<tr><td>Slovakia</td><td>On yearly basis, until T+36 months</td></tr>
<tr><td>Slovenia</td><td>Balance sheets for non-financial assets are published annually, not later than 31 December.<br>The data published at the end of the previous year (for T-1) are in line with annual national accounts data on GFCF published in September.</td></tr>
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| **Sweden** | Annual accounts are produced once a year and there is a general review every five year. Quarterly accounts are produced five times a year (capital stocks four times. No quick estimate for q2) and the quarterly accounts is updated as follows; When calculating Q1 year t: Quarter 1-4 years t-1 may be revised<br>In this quarter the reference year is changed which brings changes in the volume growth rate reported in the GDP estimates.<br>Quick estimate Q2 year t: When the quick estimations is done for the second quarter no revision is made for previous periods.<br>When calculating Q2 year t: Previous quarters in year t may be revised. Quarter of year t-2 and t-1 may be revised as a result of the final annual estimates for year t-2 conducted. Quarters in year t-5 to t-3 may be revised a result of the adjustment of time series to a new level in year t-2<br>When calculating Q3 year t: Previous quarters in year may be revised. Quarter of year t-1 may be revised as a result of permanent annual statistics for public consumption, production and public saving is received. Quarter t-2 and t-1 may be revised as a result of the balance of payments audited information regarding return/direct investment in year t-2 and t-1 When calculating Q4 year t: Previous quarters in year t may be revised.<br>Quarterly year t-1 may be revised if major revisions have been made in the balance of payments. |
| **U.K** | Annual and quarterly estimates of gross capital stocks, net capital stocks and the consumption of fixed capital are produced annually about 7-10 months after the end of the reporting year. |
| **U.S.A** | BEA's Fixed Asset Accounts (net stocks of dwellings, structures, and other fixed assets) consist of annual series that are updated annually (generally in August). These releases include estimates of annual series through the most recent year (For example, the 2013 release will contain estimates through 2012.) See the BEA FAA web page: http://www.bea.gov/iTable/index_FA.cfm. For the quarterly estimates for national accounts, CFC is updated 30, 60, and 90 days after the end of the quarter.. |

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

| Country | Answer |
|---|---|
| **Australia** | The ABS is confident in the assumptions used for these estimates. We periodically review our Capital Stock assumptions (ABS reviews asset lives every 10 years).The most significant problems in the PIM are the assumptions of asset lives, depreciation functions and the separation of land component from an asset. The estimates may be improved by gaining explicit information on asset lives and depreciation functions of particular assets. |
| **Austria** | Assumptions on depreciation patterns and service lives could be improved by conducting a national survey. Furthermore a better breakdown of other buildings and structures may improve estimations. Calculations on the stock of land are still in progress. |
| **Belgium** | To achieve the coherence between the direct estimation of built land (using cadastral register stock data) and the PIM estimates of buildings, some adaptations will need to be made in the various assumptions used in the PIM (more details can be found in answer to question 3(c) ). |
| **Canada** | Buildings other than dwellings and other structures: The estimates of investment in other buildings and structures, as well as service lives, are based on survey data.<br>The Capital repair and expenditures survey is currently undergoing a redesign, with release slated for 2014.<br>The Capital stock program, for residential and non-residential stocks and flows, is also being modernized, with release in late 2014.<br>As mentioned in #8, the valuation of land program will be redesigned with potential release in 2015. |
| **Chile** | We are confident of the information on service lives and depreciation functions because the sources are quite good.<br>However, we want to change the depreciation from linear to geometric, following the recommendations of the Capital Manual (2009) and the 2008 SNA. |
| **Cyprus** | The assumptions that are introduced in the PIM were made after conducting specific ad-hoc surveys and following also the estimates collected by specialists such as building evaluators. |
| **Czech Republic** | The estimates are provided responsibly by the NA Departments best knowledge. Their confidence is corresponding with data resources and their completeness and reliability. The most significant problem is to determine credible historical prices and indices, as well as average service lives. |
| **Denmark** | Using an output price index for calculation of GFCF at constant prices is the most needed improvement. |
| **Estonia** | The main problem of calculating net stocks is insufficient source data. We are thinking of studying from the experiences of other countries. |
| **Finland** | Price indexes could be improved, distribution of GFCF by industries is uncertain; assumptions are only partly based on empirical information. |
| **France** | Assumptions about service lives and dépreciation functions were established in 1996 thanks to sereval data sources (see question 6). There is always a degree of uncertainty in such estimations |
| **Germany** | We are confident that our assumptions for estimating the stock of dwellings and other buildings and structures are of good quality regarding the limitations of our resources. A new direct method to calculate the stock of all land is in progress.<br>This new method should replace the current preliminary estimates of land underlying buildings and structures initiated by the Deutsche Bundesbank. |
| **Hungary** | The estimation is based on the statistical survey of the capital stock on the reference date 1. January 2000.These initial data are extrapolated for the following years by PIM. Data should be reviewed as the last survey was conducted more than 10 years but we have financial constraints. |
| **Iceland** | Most of our assumptions are either based on depreciation rate from other countries or educated guess after consulting specialist in that field.<br>Could be improved with surveys on service lives. |
| **Israel** | The assumptions used for service lies of net stock of dwellings is based on other countries' estimates and has been updated about five years ago,<br>The estimate of service lives can be improved by re-examination and consultation with experts. |
| **Italy** | We are quite confident with our assumptions and estimates. |
| **Japan** | Not all the assumptions used are based on observations. Further empirical researches would be necessary. The major problems lie in how we can account for quality changes in building and construction in measuring prices and how we can properly evaluate the transaction of existing assets among industries in measuring net |

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| | capital stocks. |
| **Korea** | While we have devoted a lot of time and energy to seeking for kind of appropriate service lives of land-related assets, there is still difficulty in choosing certain figures in that the retirement pattern cannot be surveyed due to their long lives. More continued interest and concern for this matter could improve the estimates. We have strong confidence in deriving the age-price profile by using the PVE method. |
| **Latvia** | None |
| **Lithuania** | PIM: Age Structure Survey (2004) contained information on capital stock still in use at the end of 2004 which was distributed by vintage of indicated period and gave information about how long the considered type of asset has been used in the different activities. Using this information, the maximum service life by type of asset and by activity was estimated. Also, it gave information on the remaining capital stock, which has been invested before 1995. This allowed estimating the average amounts invested before 1995. The geometric depreciation with no mortality function with the assumptions on the declining balance rate 1.6 by Katz method for dwellings has been applied to estimate separately consumption of fixed capital of public, privately rented out and owner-occupied dwellings. The assumed service life of dwellings is 80 years. We used geometric depreciation function also for the calculation of CFC of roads and bridges. As the "Task force on the consumption of fixed capital on roads and bridges" considered the double declining balance rate approach to be most appropriate for roads and bridges. With this approach the central average lifetime 60 years, which corresponds to a geometric depreciation rate of 3.3%, was applied in the absence of reliable information to distinguish the time series of GFCF of roads and bridges. For both dwellings and roads and bridges backward data up to 1995 have been calculated. Land problem: To determine the value of land under buildings and structures preferably administrative sources can be used as well as Real Property Register and Cadastre yearly performs mass valuation based on actual data on all real property transactions in Lithuania. Under the order of the Government, an average market value of land and buildings can be estimated. According to the register only 80% of the total land is registered, of which government-owned land is registered only 46% (For example, the most of underlying land of the state roads, land underlying multi-dwelling buildings particularly in the large cities, land under water bodies is not registered and plots are not formed). Moreover the built-up area is one of the indicators of formed and registered plots of land. So we have no full coverage of land volume. That leads to difficulties of distributing land by types in another manner than register. Also, transactions not always disclose values of all elements, for example the value of land frequently is includes in total value. |
| **Malta** | Malta has never conducted a specific local study on service lives and the ideal depreciation functions to use.<br>We depend heavily on other countries thus the stock of assets mentioned may not be 100% correct. |
| **Mexico** | We consider an adequate confidence level in function of the available information compared with studies realized in other countries such as Chile, Argentina, USA, among others. The lack of a survey about capital assets and a minimum of studies in the country about the service lives of the assets prevent the estimations of the assets of dwelling and nonresidential construction and information about the cadastral value of this type of assets. |
| **Netherlands** | Quite confident. For manufacturing industry the data of discard survey is used. Estimates could be improved with the availability of other data sources for other industries. |
| **Norway** | There are two issues worth further studying. First, the choice of service lives should be updated alongside the ever-changing economy. Second, the quality of price indexes ought to be improved. Both the service lives and the price indexes will significantly affect the quality of final estimation results of net stock and depreciation. |
| **Poland** | We assess our assumptions used for calculating net dwellings and other buildings and structures as good.<br>We have a problem with calculating the value of land, because we do not have any information about the price of lands and service lives of different types of land |
| **Portugal** | We are confident about service lives and depreciation functions used for these estimates.<br>We are committed to the implementation of balance sheets for non-financial assets in the near future, in which we intend to have information about stocks of land. |
| **Romania** | The level of detail revealed by enterprises balance sheets is not appropriate for the AN F6 classification of assets (not required by national accounting legislation).The ratio of GFCF of dwellings in total buildings was used to estimate the value of dwellings in "Buildings and special construction" group of assets. The same method was used to breakdown the "Machines and equipment" group of assets. Since balance sheets are one of the main source of data, a more detailed classification of assets is needed, which would improve the estimates of capital stock. |
| **Slovakia** | Currently, we register dwellings and roads as separate assets. Data sources are statistical surveys carried out by the Statistical Office of the Slovak republic; and the Ministry of Transport of the SK (for roads).<br>Furthermore we are involved in improvements of data calculation regarding land within the framework of ESA2010 implementation. |

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| **Slovenia** | As already mentioned, service lives used in SVN are similar to those used in other countries. Depreciation function used for estimation of the net stock of buildings and structures is used according to ESA95/ESA2010 recommendations. Straight line depreciation method is a starting point.<br>For benchmarking we use available quantitative data on stock of dwellings by the population census. In the future our estimation could be improved by using stock data from the Real Estate Register in combination with other administrative sources on real estate, including market prices. The quality of information on market prices – based on transactions of new and existing buildings and structures to assist in the evaluation of land under buildings and structures is still insufficient.<br>Regarding other buildings and structures the main issues are the quality of the opening stocks at the beginning of 1995 (based on the FCS survey, 1999) and effects on PIM due to the collapse of giant construction companies in the recent years caused by the financial crisis. This situation made a huge impact on the value of real estate in SVN. The situation is being increasingly aggravated in the non-financial sector, where in 2010 negative values of new investments were recorded for the first time. This means that consumption of fixed capital in 2010 in this sector exceeded the value of GFCF in the same year.<br>Therefore, the net stock of fixed assets in this sector is expected to decrease in the future. |
| **Sweden** | We are confident about the assumptions used for the estimates as we are using estimates from the Bureau of Economic Research. This estimate is modified if national information is at hand. However, the most significant problem is the lack of national information about service lives, due to the fact that no studied is conducted. |
| **U.K** | **Confidence**: The current assumptions provide a good estimate of capital stocks and the consumption of fixed capital.<br>However we recognise that review and development of these assumptions has not taken place for some years and that such work would improve the estimates. Hence a complete review of the PIM forms part of the UK's long-term plan for improvement.<br>**Problems**: The reliability of service lives. The UK plans to address this as part of the review of the PIM mentioned above.<br>**Improving**: The ONS is currently progressing work on the implementation of the SEEA framework. As part of this we are investigating improved estimates for land. |
| **U.S.A** | In general, our Fixed Asset Accounts offer solid estimates of net stocks and depreciation that are widely respected and utilized by many of our core data users and researchers. As our documentation shows, a limitation of these estimates is that they are based on a limited number of high quality empirical studies of depreciation patterns. Many of these studies are several years old and have not been updated. Careful empirical studies of depreciation patterns can be very difficult to conduct. Some measurement error in these estimated depreciation rates and services lives could lead to measurement error in net stocks of dwelling and structures, and thus of land estimated as a residual. So, updated empirical studies of depreciation patterns of dwellings and structures might improve our estimates. |

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

| Country | Answer |
|---|---|
| **Australia** | ABS has adopted the System of National Accounts 2008 in the year 2009. |
| **Austria** | In the near future we plan to focus on the estimation of land. Applied methods will depend on the outcome of the TF as well as on data availability. |
| **Belgium** | As mentioned before, a feasibility study on the estimation of net stocks of land has shed light on some inconsistencies between the PIM data and data from the Land Registry Database. Further developments will be carried out, with the goal of publishing statistics of land in 2017, as requested by the European transmission program (TP). Since the end of 2014, the calculation of the PIM is made by institutional sector, in order to fulfil requirements of TP table 26. |
| **Canada** | Modernization of the capital stock program mentioned in #12 will incorporate the changes resulting from the Canadian System of National Accounts incorporation of SNA 2008 |
| **Chile** | We plan to incorporate the geometric depreciation for measuring the PIM, in line with the recommendations of SNA 2008 and our new 2013 benchmark compilation to be released in a few years. |
| **Cyprus** | Following the transition to ESA 2010, changes are foreseen for the calculation of GFCF. Nevertheless, these changes will not have an impact in the estimates of net stock of dwellings, other buildings, structures and land, since they will increase other assets of GFCF by including R&D, military equipments and small tools in our calculations. |
| **Czech Republic** | All estimates are being recalculated during the occasional revision 2014. Subsequently it is supposed to improve estimations of dwellings and non-residential buildings as there is a new project of extracting and processing data from land registry. |
| **Denmark** | Statistics Denmark would change the principle behind the PIM-calculation; from Winfrey curves and straight-line depreciation to geometric depreciation. Further, the calculations would primary be done at current prices and previous years prices. At present the calculations are done at constant 2000-prices and current prices. |
| **Estonia** | Estonia is improving the methodology of calculating stocks and CFC. We are also revising the service lives and discard rates. |
| **Finland** | For the net stock of dwellings the price index will be re-considered to better reflect the market prices. Statistics on real estate trade will be used as a benchmark. The service life for dwellings will probably be increased to 60-70 years. Assumptions in calculating net stocks for the other buildings and structures will remain unchanged. Value of land will be estimated using direct evaluation method by National Land Survey of Finland. |
| **France** | At least three improvements are planned for the transition to the base-year 2010 (Esa2010), to be published in late 2014 :<br>- First, in accordance with the new European system of accounts, the average service life of the costs associated to ownership transfers will be determined separately from that of the residential buildings.<br>- Second, GFCF time series of dwellings will be revised in order to ensure consistency between several data sources, most notably with the housing satellite account.<br>- Third, data of Ter- Uti survey (which provides the main data on the areas of land) will be updated. Time series on land will therefore be revised in national accounts. |
| **Germany** | New method to calculate the stock of land for table 26 (ESA 2010 TP) is in progress. Service lives are under review |
| **Hungary** | We are working on new methods of estimation of land and on the review of estimation of roads, bridge, etc.<br>Data of dwellings will be also checked, as we have a new data sources, the results of the Population Census of 2011. |
| **Iceland** | Follow the current development at OECD/Eurostat and start work on these estimates after 2015 when Statistics Iceland have finished the current work on improving the national accounts |
| **Israel** | We intend to estimate the total stock of land through a “residual approach” |
| **Italy** | We are planning to produce estimates for the net stock of buildings other than dwellings and other structures separately. |
| **Japan** | We plan to implement SNA 2008 on the occasion of the next comprehensive revision of JSNA, which is scheduled by the end of FY2016. |
| **Korea** | The valuation of stock of land at the market price or market price equivalent seems very important for capital measurement. If the value of stock of building sites is estimated, it can also be used for cross-checking the accuracy of the net stock estimates of dwellings and other buildings in view of the residual approach.<br>At present, the residual approach can only be applied in valuing the stock of land underlying dwellings because of data limitation. |

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| | In the future, this approach will also be used for valuation of the stock of land underlying other buildings. |
| **Lithuania** | Due to changes from ESA1995 to ESA2010 Statistics Lithuania plans to estimate and include results of newly appearing under the heading produced asset:<br>1.research and development as intellectual property AN.117<br>2.military weapons and supporting systems under AN.113 Machinery and Equipment;<br>3. land improvements AN.1123-should be recognised as a separate asset from buildings and structures as well as GFCF time series can be carefully reclassified;<br>4. future changes of "small tools" definitions, which should have an influence on estimation of stock, CFC;<br>In order to implement the results of new Age Structure Survey (2011) for S13 sector and new requirements of Transmission Program, PIM have to be converted to NACE red.2 with newly compiled GFCF times series by asset types and activity breakdown A38. So, new service lives and new types of assets must be applied. |
| **Malta** | No plans to change the present methodology with respect to dwellings and PIM.<br>In case of land NSO is waiting for the final report on the valuation of land. |
| **Mexico** | In the research on the measurement of the Land, we continue with the search of information about unitary values of soil (cadastral values) of 2 431 municipalities of the country. Later the rate of market values per federal entity will be applied to the cadastral values, to obtain the value of the urban and rural land. The first phase of the research was exclusively for the municipalities economically more important of the country.<br><br>Derived from the project of cadastral updating where are participating several national agencies and that was undertaken throughout the Mexican Republic, the federal entities continue the task of validating their classifiers with the proposed one by INEGI and the UNAM (Autonomous National University of Mexico); which will enable to identify the land allocated to the different uses or industries, such as dwelling, commerce, industry, crops, historical sites, among the most representative and these are in turn classified according to the services that are available, in these levels: good, regular and bad.<br><br>By now was made exclusively the estimation of land owned by households by applying to the cadastral values the rate of equivalised to market values determined by each federal entity. Because since 2002, the federal entities are obligated to determine this increase in value, unfortunately we do not have this information for the whole series, as well as the equivalised cadastral values, because of this was necessary to compile an index of urbanization, which considers the population growing per stratum at the federal entity. This was useful to determine the increase in the stock of land.<br><br>Regarding the buildings, there are rates of accounting depreciation and in the specific case of buildings stated as archaeological, artistic, historic or heritage monuments, according to the Federal monuments law on archaeological, historical and artistic site, which are accompanied by a certificate of restoration issued by the National Institute of Anthropology and History or the National Institute of Fine Arts, have a depreciation rate of 10% per year. |
| **Netherlands** | The service lives of other buildings are adjusted to correspond better to the estimation of the total value of buildings including the underlying land |
| **Norway** | Statistics Norway is willing, together with other national and international institutions, to continue the work on the improvement of the capital measurement.<br>Recently Norway made some estimates of land values in Norway, where net stock values from the PIM were involved. The residual approach was used for land underlying residential buildings, and the land-to-structure ratio approach for land underlying buildings other than dwellings. |
| **Poland** | We plan to start producing the estimates of stocks of lands after the works of Task Force on Land Valuation.<br>We hope that Manual will solve our problems with estimate of lands. |
| **Portugal** | We are confident about service lives and depreciation functions used for these estimates.<br>We are committed to the implementation of balance sheets for non-financial assets in the near future, in which we intend to have information about stocks of land. |
| **Romania** | Identifying service lives for assets classified under ESA 2010 AN F6 classification in order to determine depreciation and net stocks.<br>Due to lack of assets detailing because of lack of availability of data, several derogations to ESA2010 Transmission Program were required by Romania. |
| **Slovakia** | In the future, we will consider further extending of our time series data for the years 2000-2003, with aim to complement these data on net stock of dwellings and other buildings (currently we have granted derogation for these data until 2020); and also data on land are now in our interest centre. |
| **Slovenia** | The new ESA 2010 transmission program (TP) includes balance sheets for the majority of non-financial assets. |

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| | Of these, only dwellings have been compulsory to report under the current TP. Since 2009 the main efforts of SURS in the field of non-financial balance sheets have been compilation and publication of the annual net stock of fixed assets, first published by SURS in March 2011. Published data on fixed capital stock are the first step in preparing the non-financial balance sheets; publication of inventories (i.e. compulsory item according to the new TP) in March 2013 was the next step. In 2012 we started the Eurostat grant (period: 24 months, start July 2012) aimed to explore the feasibility and practical solutions for completing non-financial balance sheets for SVN according to the new TP requirements. Within the project we are trying to solve difficulties in deriving estimates of the stock of land (separating land and structures in the balance sheets) using available data sources. |
| **U.K** | The UK will be starting the transition to ESA2010 (in terms of published data) in October 2014 with the publication of its annual UK National Accounts.<br>As part of the full transition to ESA2010 over the coming years ONS will be reviewing the PIM model and will be redeveloping survey questionnaires to reflect ESA10 developments and the program me of continuous improvement. Some of this will have an impact on the estimates of dwellings, buildings and structures. |
| **U.S.A** | With the 2013 comprehensive revision of the NIPAs, we will incorporate the new treatment of ownership transfer costs, consistent with the 2008 SNA.<br>The 2013 comprehensive revision will also incorporate revised estimates based on a more recent Economic Census and updated benchmark I-O relationships, and some revisions to other data sources. We may (jointly with the Federal Reserve) explore the topic of residual estimates of land values in the future, but we have not set any deadlines or schedules for this work. |

## 9. Do you provide estimates of the value of government-owned land? If so, what general methodology do you employ? Do these estimates exclude some parts of government owned land?

| Country | Answer |
|---|---|
| **Australia** | For Government owned land, the data comes directly from the ABS Public Finance Section. The data is obtained by them from the Australian Commonwealth and State Treasuries, and Public non-financial Corporations. The majority of Government owned land are captured, however for some States, the value of land under roads are missing because some State Treasuries do not include it. |
| **Austria** | No estimations available at present. |
| **Belgium** | As for the other types of land, no estimation is available for the moment. An estimate of (part of) government-owned land will be sought by 2017. |
| **Chile** | No, we do not provide this information. |
| **Cyprus** | These estimates are not available. |
| **Czech Republic** | Yes, we provide. Cadastral data for the whole economy (S1) are allocated to sectors by help of data of the State Land Office,the Forest Management Institute and statistical surveys. |
| **Estonia** | No, we don't provide. We are planning to implement these estimates in the future. |
| **Finland** | Not for the moment. The methodology is under progress. We will use adjusted direct method to value government owned land<br>Because the market price data for government owned land areas is not representative, the prices gave to be adjusted.<br>Most of Government owned land in Finland is transportation areas, which are valued at relatively low prices compared to other land uses. |
| **France** | The value of government-owned land is available in the French national accounts. The data source for land covers the whole economy. So as to turn the information into institutional sectors (government, households, financial and non- financial corporations), we use the same breakdown than for the GFCF, for the whole housing stock as well as for land areas. |
| **Germany** | No, we do not. |
| **Hungary** | No |
| **Iceland** | We do not provide any estimates of government-owned land. |
| **Israel** | We do not provide these estimates. |
| **Italy** | To date, estimates of land underlying dwellings and land underlying buildings other than dwellings owned by General Government are available but they are not published separately.<br>They are obtained applying the residual approach.<br>No estimate is available for land underlying Other structures, due to the lack of information. |
| **Japan** | Yes, we use the national (government-owned) property register and other several surveys for local governments to estimate the value of government-owned land. |
| **Korea** | We estimate the value of all government-owned land. Basically the price will come from a publicly notice price of adjacent private land and the actual market transaction price of similar land. |
| **Latvia** | The only information what is available is at historical prices from balance sheets |
| **Lithuania** | No. |
| **Malta** | No we do not provide this information |
| **Mexico** | No, we do not have separate estimations for government land |
| **Netherlands** | We do provide estimates of the value of government-owned land. To estimate land underlying dwellings and land underlying non-residential buildings owned by the government, the capital stock of dwellings and non-residential buildings by institutional sector is used to divide land underlying dwellings and buildings into sectors. For agricultural land, Governments reports are used to divide leased farmland into sectors. Regarding land underlying roads and other structures, we assume that its value is already included in the value of the surrounding dwellings and buildings. Next to this, we do not have appropriate data to estimate land underlying roads and |

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| | other structures. So this value is not separately estimated and not included in government owned land as such. |
| **Norway** | No. |
| **Poland** | We do not supply such estimates, because we do not estimate value stocks of lands yet. |
| **Portugal** | We don't have estimates of the value of government-owned land. In the context of the implementation of non-financial balance sheet, with the support of the guidelines produced by the TF, we intend to produce some data in the future |
| **Romania** | In Balance sheets of General Government there are data for: land (AN.2111) and other lands; Here AN2112 means agricultural land.<br>We have no information on land improvements. Data sources are statistics from Ministry of Finance |
| **Slovakia** | No |
| **Slovenia** | This is the subject of the above mentioned Eurostat grant as well. |
| **Sweden** | No |
| **U.K** | No, the UK does not currently provide estimates of Government owned land. |
| **U.S** | No |

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

| Country | Answer |
|---|---|
| **Australia** | None |
| **Austria** | None |
| **Belgium** | 2 documents are available on the internet<br>1) Estimation du stock de capital en SEC 2010 (see chapter 2.2 of the following publication : https://www.nbb.be/doc/dq/f/dq3/histo/nfdc13.pdf )<br>2) Methodological note on capital stock (ESA 2010 update) : https://www.nbb.be/doc/dq/e_method/m_sec2010d2_en.pdf |
| **Chile** | For further information, please see: Net Capital Stock: http://www.bcentral.cl/estudios/estudios-economicos-estadisticos/pdf/see63.pdf<br>GFCF: http://www.bcentral.cl/estudios/estudios-economicos-estadisticos/pdf/see65.pdf |
| **Cyprus** | None |
| **Czech Republic** | http://apl.czso.cz/nufile/GNI_CZ_en.pdf |
| **Estonia** | None |
| **Finland** | None |
| **France** | •Value of Land and Dwellings : Treatment in French National Accounts - OECD Working Party on National Accounts :  <br>•Annual publications on National wealth year by year :<br>http://www.insee.fr/fr/themes/comptes-nationaux/default.asp?page=base_2005/publications/publications-sg.htm#pena<br>•National Accounts methodological note for the balance sheet (base-year 2000) : http://www.insee.fr/fr/themes/comptes-nationaux/default.asp?page=base_2000/documentation/methodologie/resume_nb10.htm |
| **Germany** | Schmalwasser, Oda and Michael Schidlowski: "Measuring Capital Stock in Germany", WiSta 11/2006.<br>https://www.destatis.de/EN/FactsFigures/NationalEconomyEnvironment/NationalAccounts/NationalWealthAccounts/NationalWealthAccounts.html |
| **Hungary** | Capital formation and stock of no financial assets, 2000-2004 stock of Tangible fixed assets 1999-2002: http://www.ksh.hu/docs/hun/xftp/idoszaki/pdf/targyieszk.pdf<br>GNI Inventory of Hungary Version 2.2(Chapter 4.12 and Chapter 5.10) |
| **Iceland** | None |
| **Italy** | Santoro, P., 'Estimating dwellings in the Balance Sheet by institutional sector — Estimating Compilation of Annual Balance Sheets for Non-financial Assets: Methodological Approach, Main Outcomes and Open Issues in the Italian Experience', IMF/OECD Conference on Strengthening Sectoral Position and Flow Data in the Macroeconomic Accounts, 28 February – 2 March 2 2011, pp. 6–25. Available at https://www.imf.org/external/np/seminars/eng/2011/sta/pdf/italy.pdf |
| **Japan** | None |
| **Korea** | Cho, Taehyoung, Byungchang YI and Kyeongtak Do, 'Measuring service lives of assets in Korean capital measurement', Quarterly National Accounts Review, 2012-01, The Bank of Korea, 2012. (originally in Korean but available in English translation upon request). |
| **Latvia** | None |
| **Lithuania** | The time series of annual fixed assets of total economy by industry as well as by type of fixed assets are free on SL website in Database of Indicators and marked as Fixed assets of the economy at the beginning of the year" http://db1.stat.gov.lt/statbank/default.asp?w=1600 |
| **Malta** | Refer to GNI Inventory of Malta. |

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| **Mexico** | Added file demo consumption of housing fixed capital consumption (In Spanish). |
| **Netherlands** | See Bergen, Dirk van den, Mark de Haan, Ron de Heij, and Myriam Horsten. 'Measuring Capital in the Netherlands'; 2009. Available at http://www.cbs.nl/NR/rdonlyres/FAECCC9A-75E0-4545-9C2C-E42E44371DE4/0/200936x10pub.pdf |
| **Norway** | In 2014 Statistics Norway conducted a survey of expected and actual service lives in businesses. It was commissioned for a government review of the corporate tax system. A summary of the survey in English can be found here: http://www.ssb.no/en/nasjonalregnskap-og-konjunkturer/artikler-og-publikasjoner/levetid-og-verdifall-pa-varige-driftsmidler. Based on the results of the survey, we have made some revisions to the depreciation rates in our PIM model. For structures, the rates have been adjusted upwards in most cases. In order to avoid breaks in the time series, the new rates have been introduced gradually from 2004 onwards. The revised series will be published in September 2015. |
| **Poland** | We do not possess any additional information that would be useful for this survey |
| **Portugal** | None |
| **Romania** | None |
| **Slovakia** | None |
| **Slovenia** | Methodological explanation on the Balance sheets for the non-financial assets is available on SURS's website: http://www.stat.si/doc/metod_pojasnila/03-291-ME.pdf<br>More detailed data and time series on the balance sheets for non-financial assets are available at the SI-STAT data portal, which enables simple browsing and exporting of data into various formats: http://pxweb.stat.si/pxweb/Database/Economy/03_national_accounts/27_03291_stock_fix_assets/27 03291_stock_fix_assets.asp |
| **Sweden** | None |
| **U.K** | The Office for National Statistics has produced quality and methodological reports on capital stocks as well as on GFCF.<br>Capital Stocks Quality and Methodological Report http://www.ons.gov.uk/ons/guide-method/method-quality/quality/quality-information/economy/quality-and-methodology-information---capital-stocks-and-capital-consumption.pdf<br>Quarterly Capital Expenditure Inquiry Quality and Methodological Report http://www.ons.gov.uk/ons/guide-method/method-quality/ons-statistical-continuous-improvement/gdp-continuous-improvement.pdf<br>Gross Fixed Capital Formation (GFCF) Quality and Methodological Report http://www.ons.gov.uk/ons/guide-method/method-quality/quality/quality-information/economy/summary-quality-report-for-business-investment.pdf<br>Improvements to the estimates of GFCF http://www.ons.gov.uk/ons/guide-method/method-quality/ons-statistical-continuous-improvement/gdp-continuous-improvement.pdf |
| **U.S.A** | "BEA Depreciation Rates" on the BEA website. http://www.bea.gov/national/pdf/BEA depreciation_rates.pdf |