# Regional Course on 2008 SNA (Special Topics): Improving Exhaustiveness of GDP Coverage

31 August –4 September 2015
Daejeon, Republic of Korea

## Owner Occupied Dwellings-Measurement Issues

**Alick Nyasulu**
**Statistical Institute for Asia and the Pacific (SIAP)**

UNITED NATIONS
SIAP
Statistical Institute for
Asia and the Pacific

---

# Outline

* Introduction
* Rental equivalence method
* User cost methods

UNITED NATIONS
SIAP

# Introduction

* Imputed rents must be estimated in line with international recommendations;

* So that measures of GDP exhaustiveness are comparable across countries.

# Methods of estimating OOH

* Two major methods:

* Method 1:  Rental equivalence  or stratification method
    * Value OOH at the estimated rental that a tenant would pay for the same accomodation.
    * Method 2:  User Cost
        * OOH using the « non-market » approach, based on costs.
    * Other minor methods: self-assessment, fiscal assessment.

## INTERNATIONAL RECOMMENDATION 1-RENTAL EQUIVALENCE

* 2008 SNA recommend stratification approach

* Assumes that rents for owner-occupied dwellings would be the same as rents actually paid for similar dwellings

  * Rented dwellings evenly distributed over all parts of the country & all dwelling types

---

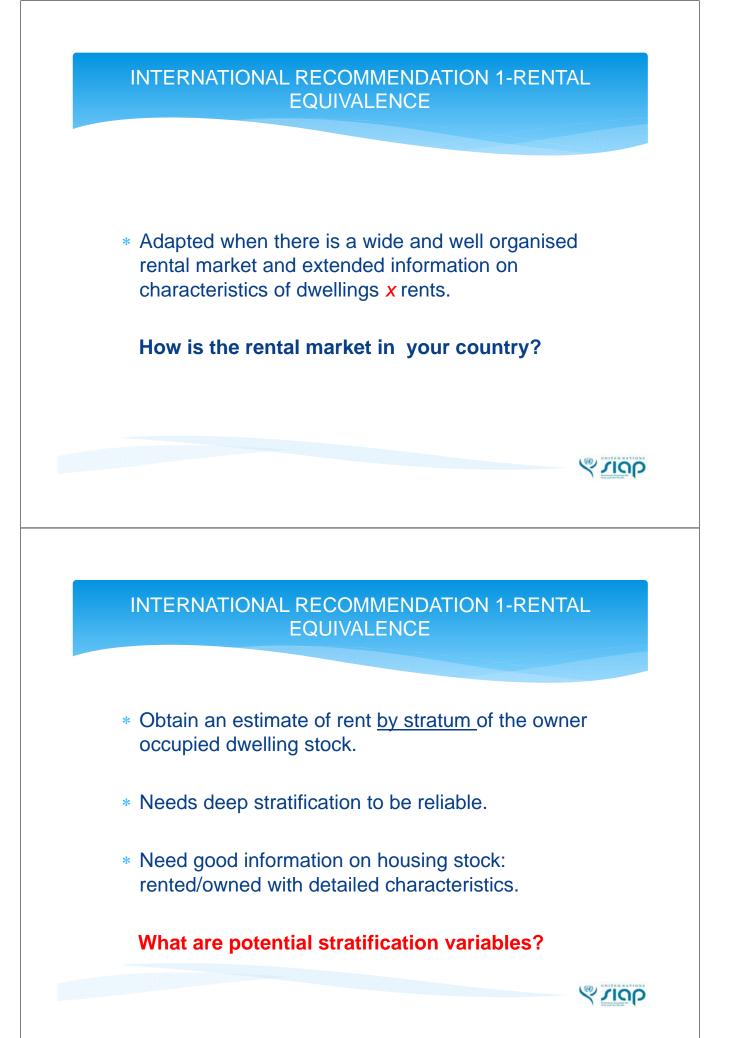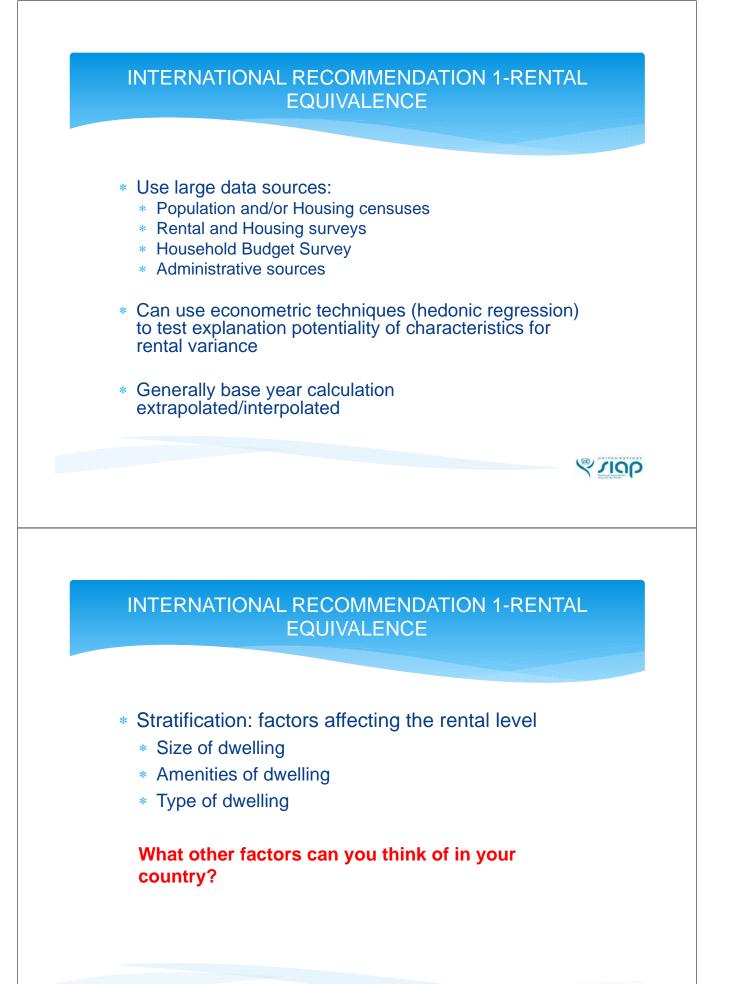## INTERNATIONAL RECOMMENDATION 1-RENTAL EQUIVALENCE

* SNA &6.117: *the output of rental services produced by owner-occupiers is valued at the estimated rental that a tenant would pay for the same accomodation, taking into account fators such as location, neighbourhood amenities, etc. as well as the size and quality of the dwelling itself »*

* Basically: **extrapolation of actual rents to owner-occupied situation**

## INTERNATIONAL RECOMMENDATION 1-RENTAL EQUIVALENCE

* Adapted when there is a wide and well organised rental market and extended information on characteristics of dwellings *x* rents.

   **How is the rental market in your country?**

---

## INTERNATIONAL RECOMMENDATION 1-RENTAL EQUIVALENCE

* Obtain an estimate of rent <u>by stratum</u> of the owner occupied dwelling stock.

* Needs deep stratification to be reliable.

* Need good information on housing stock: rented/owned with detailed characteristics.

   **What are potential stratification variables?**

# INTERNATIONAL RECOMMENDATION 1-RENTAL EQUIVALENCE

* Use large data sources:
    * Population and/or Housing censuses
    * Rental and Housing surveys
    * Household Budget Survey
    * Administrative sources

* Can use econometric techniques (hedonic regression) to test explanation potentiality of characteristics for rental variance

* Generally base year calculation extrapolated/interpolated

---

# INTERNATIONAL RECOMMENDATION 1-RENTAL EQUIVALENCE

* Stratification: factors affecting the rental level
    * Size of dwelling
    * Amenities of dwelling
    * Type of dwelling

**What other factors can you think of in your country?**

* Stratification: factors affecting the rental level
  * Environment characteristics (urban/rural, transport facilities)
  * Socio-economic factors (type of owner)
  * *Use of capital price of dwelling as implicit principal stratification factor is possible.*
  * *Delicate issue of using rents of government owned dwellings (implicit subsidies) to estimate privately owned rents.*

# Derivation-Rental Equivalents

- Rental income = gross revenue – current expenses

- Gross revenue is revenue from gross rents plus revenue from other sources (such as interest receipts, current transfer receipts, and subsidies

- Current expenses include mortgage interest payments, intermediate inputs, consumption of fixed capital (or depreciation), business transfer payments, and taxes on production

## INTERNATIONAL RECOMMENDATION 2-User Cost

* Inspired by estimation of non-market output.
* Output = sum of costs = intermediate consumption + net taxes on production + gross operating surplus (GOS)
  * Easy to measure: Intermediate consumption + net taxes:
  * More difficult: GOS = consumption of fixed capital + net operating surplus (return to capital).

## INTERNATIONAL RECOMMENDATION 2-User Cost

* Recommended alternative to the stratification approach is the user cost approach

* Involves estimating the costs that the owners would need to take into account if they decided to rent it

  * Intermediate consumption
  * Other taxes on production
  * Consumption of fixed capital
  * Net operating surplus

## INTERNATIONAL RECOMMENDATION 2-User Cost

* Starting point is a breakdown of the stock of owner-occupied dwelling, for example:

  * Bosnia Herzegovina: five municipal areas, type of settlement (urban/rural), type of dwelling (single-family/ multi-family), size of dwelling (square metres)

  * Serbia: four regions, type of settlement (urban/rural)

* Object to estimate the user cost for the dwellings in each cell of the breakdown

## INTERNATIONAL RECOMMENDATION -User Cost

* Based on the following (simplified) formula:

$$GOS = i(r + d)S$$

* Where:
  * i = inflation rate
  * r = rate of return of capital (average effective mortgage rate;
  * d = rate of depreciation (geometric depreciation with no mortality function)
  * S = Value of stock of dwellings at current price. In principle includes construction + land.
  * GOS= gross operating surplus

## INTERMEDIATE CONSUMPTION

* Net insurance premiums paid by owners on dwellings

* Maintenance & repair of dwellings

    * Have to be undertaken regularly in order to maintain the dwelling in good working order:

        * Minor, such as interior decoration, carried out by tenants & owners (PFCE)

        * **Major, such as repairing roofs, carried out by owners** (IC)

    * Do not change the dwelling's performance, capacity or expected service life (GFCF)

## OTHER TAXES ON PRODUCTION

* Taxes paid by owners on the imputed value of the dwelling services they derive from owning the dwelling they occupy

    *less* any subsidies that owner-occupiers receive to help them to pay current housing expenses (subsidisation of mortgage rates)

* **Taxes paid by owners on the value of owner-occupied dwellings & associated land  or "property taxes"**

## CONSUMPTION OF FIXED CAPITAL

* CFC on the stock of owner-occupied dwellings is measured at <u>current</u> prices

* Should be obtained from estimates of the stock of owner-occupied dwellings valued at <u>current</u> prices

* Preferable that stock estimates calculated by the Perpetual Inventory Method (PIM) as the derivation of CFC is an integral part of the method

* If countries do not have a long time series of GFCF & prices of capital assets, an alternative to PIM has to be used

## CONSUMPTION OF FIXED CAPITAL

* The commonest way of calculating CFC with a PIM is to assume <u>straight-line depreciation with a bell-shaped morality function</u>

* This can be approximated by <u>geometric depreciation with no mortality function</u> (does not require a long times series of GFCF in order to apply the mortality function)

* Geometric depreciation rate is written as D/L (declining balance rate/average service life of the asset).

* In OECD countries a value of 1.6 for D produces CFC estimates similar to those obtained by straight-line depreciation with a bell-shaped morality function

# Perpetual Inventory Method

➤ The perpetual inventory method (PIM) is a method of constructing estimates of capital stock and consumption of fixed capital from time series of gross fixed capital formation;

➤ it allows an estimate to be made of the stock of fixed assets in existence and in the hands of producers which is generally based on estimating how many of the fixed assets installed as a result of gross fixed capital formation undertaken in previous years have survived to the current period;

---

# Perpetual Inventory Method

∗ The Perpetual Inventory Method requires:

  ∗ Gross Fixed Capital Formation

  ∗ Price indexes for capital goods

  ∗ Service lives

  ∗ Methods of depreciations

25/08/2015

# Perpetual Inventory Method

```
┌──────────────────────────────┐          ┌──────────────────────────────┐
│ Gross Fixed Capital Formation │  ◄────►  │          Asset Prices        │
└──────────────────────────────┘          └──────────────────────────────┘
                       │
                       ▼
        ┌──────────────────────────────┐
        │ Gross Fixed Capital Formation –│
        │        Constant Prices         │
        └──────────────────────────────┘
                       │
                       ▼                        ┌──────────────────────┐
        ┌──────────────────────┐                │    Services Lives     │
        │          PIM         │   ◄────        │          +            │
        │   Gross Capital Stock │                │  Mortality Function   │
        └──────────────────────┘                │          +            │
                       │                         │     Retirements       │
                       ▼                         └──────────────────────┘
┌────────────────┐  ┌──────────────────────┐
│   Method of    │► │ Consumption of Fixed  │              ┌──────────────┐
│  Depreciation  │  │       Capital         │   ◄────      │ Asset Prices │
└────────────────┘  └──────────────────────┘              └──────────────┘
                       │
                       ▼
            ┌──────────────────────┐
            │   Net Capital Stock   │
            └──────────────────────┘
```

23

---

## CONSUMPTION OF FIXED CAPITAL -Mid Year Stock Value

* The proposed alternative to PIM is

  * First to determine the mid-year net value of the stock of each type of owner-occupied dwelling for the current year

  * Then to multiply these mid-year net values by D/L where D = 1.6 and L is the average service life for the dwelling type **[D=1.6 is an example for OECD countries]**

# MID-YEAR NET VALUE OF DWELLING STOCK 1

* Number of owner-occupied dwellings in the middle of current year

    * most recent census
    * annual growth in stock of dwellings

* Price (excluding land) of a dwelling of average age in the current year

    * average price (excluding land) of newly constructed dwellings in the current year
    * average age of dwellings
    * average service life of dwellings
    * annual growth in stock of dwellings

---

# MID-YEAR NET VALUE OF DWELLING STOCK  2

$$P_{average} = P_{new}\left(\frac{L-A}{L}\right) or \left(1 - \left(A/L\right)\right)$$

$$A = \frac{\sum\limits_{i}^{L} i(1+r)^{L-i}}{\sum\limits_{i}^{L} (1+r)^{L-i}}$$

* $P_{average}$ = price of average-aged dwelling
* $P_{new}$ = price of new dwelling
* L = average service life of dwelling
* A = average age of dwellings
* r = annual growth in stock of dwellings
* i = age of dwelling and takes the values of 1, 2, 3, …. , L

## NET OPERATING SURPLUS

* Rate of return times the mid-year net value of dwelling stock in the current year

* Rate of return should equal the rate of return that the owner-occupier would expect to get if he had invested in a financial asset rather than a dwelling

* In countries without a well-developed financial market it is recommended that 2.5% be used

* The mid-year net value of dwelling stock should also include the value of land on which the dwellings stand

* Adjust the mid-year net value of dwelling stock land used for CFC (which excluded land) to include the value of land

* Thank YOU