IMPROVING AGRICULTURAL & RURAL STATISTICS
Global Strategy

Food Balance Sheets

FBS component: Seed

Learning Objectives

At the end of this session, the audience will know:

- Different data sources for seed
- Recommended approach for imputation and estimation of seed use

Outline

1. Introduction (Concepts and Definitions)
2. Data sources
3. Imputation and Estimation

1. Introduction

DEFINITIONS

Seed = any quantity of a commodity set aside for reproductive purposes in the following year.

This can include :

- seed for sowing
- plants for transplanting
- eggs for hatching
- fish used as bait

This quantity should also take into account double or successive sowing.

2. Data sources

Although official estimates for seed may not exist, the process of imputing missing values is straightforward:

> seed use is the product of an average seeding rate and the sown area in the following year (since seed use in year *t* is actually just set aside in year *t* to use for sowing in year *t+1*).

Where:
seeding rate = the amount of seed needed for a given sown area

NOTE THAT:

- Usually, the seeding rate does not vary substantially from year to year within a given country.
- Gradual changes in the seeding rate could be due to : the adoption of new technologies; different planting methods; in cases where production shifts to new areas within a country.
- After production and trade, seed estimates are the balance sheet variable for which official data is most.

2. Data sources

Official data sources

- Most official measurements of seed use data are sourced from **agricultural surveys**
  - most surveys include questions on both **(i)** purchases of improved seed and **(ii)** quantities of own reserved seed,
- In the case that these surveys exclude purchases of improved seed, it may be possible to access the **sales records of commercial seed companies**.
- **Trade data** may also give some indications about seed quantities if most seed is imported.

2. Data sources

Alternative data sources

If an estimate of total seed use is not available and a historical seeding rate cannot be calculated → search for information on **seeding rates**.

Information on seeding rates may be available from a variety of sources, e.g.:

- commercial seed companies (to inquire about recommended seeding rates)
- agricultural research institutions and/or extension specialists
- publication *Technical Conversion Factors for Agricultural Commodities*

http://www.fao.org/fileadmin/templates/ess/documents/methodology/tcf.pdf

3. Imputation and estimation

Seed use in a given year *t* are a function of a seeding rate and a sown area in the following year, *t+1*.

$$Seed\ use\ (MT)_t = Seeding\ rate\ \left(\frac{MT}{HA}\right) * Sown\ area\ (HA)_{t+1}$$

The three steps to impute value for seed quantity:

Step 1: Calculate/estimate a seeding rate

Step 2: If missing, impute a value for sown area in the following year

Step 3: Multiply the two values together for an estimate of total seed use

3. Imputation and estimation

Step 1: Calculate/estimate a seeding rate

- If the country has previously planted the commodity in question → calculate the seeding rate using data from previous years :

$$Seeding\ rate\ \left(\frac{MT}{HA}\right) = \frac{Seed\ use\ (MT)_t}{Sown\ area\ (HA)_{t+1}}$$

- If seed use is being estimated for the first time or if FBS compilers wish to ensure that utilized seed rates are current, compilers should :
  - consult agricultural experts; and/or
  - using seed rates from products in the same commodity group, or even use seed rates for the same product from other similar countries.

3. Imputation and estimation

Step 2: Impute a value for sown area in the following year

- If an estimate for sown area in the year *t+1* is available, then skip to Step 3
- If no estimate for sown area in the year *t+1* is available, then sown area must be imputed.

3. Imputation and estimation

Step 2: Impute a value for sown area in the following year

- **Approach 1 –** The *Ratio Approach* is the preferred approach, but requires historical data on both sown and harvested area.

- Consist of using the average ratio of sown area to harvested area over the historical series, $\overline{\text{RatioSH}}$,

  Where:

  $\overline{\text{RatioSH}}$ is the average of the annual ratio of $\frac{\text{Sown area}}{\text{Harvested area}}$ calculated in each year for which there is a value for both variables

- Once $\overline{\text{RatioSH}}$ has been calculated, then that value can be multiplied by harvested area in the following period, t+1.

$$\text{Sown area}_{t+1} = (\overline{\text{RatioSH}}) * \text{Harvested area}_{t+1}$$

3. Imputation and estimation

Step 2: Impute a value for sown area in the following year

- **Approach 1 – Example**

In 2014 estimate of harvested area of sunflowers is available, but no value for sown area.

However, historic data on sown area and harvested area for sunflowers are available for 2010-2013.

How to impute sown area for 2014?

(i) calculate $RatioSH_t$ for each year

(ii) calculate the average to derive $\overline{\text{RatioSH}}$

(iii) calculate sown area in 2014 as $\text{Sown area}_{t+1} = (\overline{\text{RatioSH}}) * \text{Harvested area}_{t+1}$

Year	Sown area (HA) (A)	Harvested area (HA) (B)	$RatioSH_t$ (C=A/B)
2010	400	388	400/388 = 1.03
2011	425	405	425/405 = 1.05
2012	420	395	420/395 = 1.06
2013	390	370	390/370 = 1.05
2014	?	385	$\overline{RatioSH} = \frac{1.03+1.05+1.06+1.05}{4} = 1.05$

3. Imputation and estimation

Step 2: Impute a value for sown area in the following year

- **Approach 1 – Example (…cont.)**

  Now that both $\overline{\text{RatioSH}}$ and harvested area in 2014 are available, **(iv)** calculate sown area as:

  $$\text{Sown area}_{t+1} = (\overline{\text{RatioSH}}) * \text{Harvested area}_{t+1}$$

  $$\textbf{Sown area}_{\textbf{2014}} = 1.05 * 385 = \textbf{404}$$

3. Imputation and estimation

Step 2: Impute a value for sown area in the following year

- **Approach 2 –** *Abandonment Adjustment*

- Sown area can be estimated using the harvested area data and an approximation of the amount of area that is sown but not harvested (= abandonment rate).

$$Harvested\ area_{t+1} = (1 - abd) Sown\ area_{t+1}$$

Where: ***abd*** = % of abandoned land

$$Sown\ area_{t+1} = \frac{Harvested\ area_{t+1}}{(1 - abd)}$$

Example: Area harvested of wheat in 2015 = 95 ha; sown area commonly abandoned before harvest = 5%

→ $Sown\ area_{2015} = \frac{95}{(1-0.05)}$ = 100

3. Imputation and estimation

Step 2: Impute a value for sown area in the following year

- **Approach 3 –** *Using harvested area as an approximation for sown area*

- If it is not possible to calculate a historical ratio of sown to harvested area and an estimate of land abandonment is not possible, but data on harvested area is available → use harvested area in the following year to approximate sown area in the following year.

  NOTE THAT:

  This approach should only be used when either of the two first options are not possible.

3. Imputation and estimation

Step 3: Multiply the two values

- Once a seeding rate and sown area in *t+1* have been estimated for the product in question, the two values are multiplied to arrive at the quantity of seed needed in year t:

$$\text{Quantity of seed } (MT)_t = \text{Seeding Rate } \left(\frac{MT}{HA}\right) * \text{Sown area} (HA)_{t+1}$$

Reference

Global Strategy to improve agricultural and rural statistics, 2017. *Handbook of Food Balance Sheet*, Rome, Italy, chapter 3.5, section 3.5.7

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Thank You