



Cross-cutting Topic (2)

– SPPI sampling method and sources

2020 Voorburg meeting
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1. Sampling Frame.

- Source for sampling frame
- Sample structure (e.g. classification)

2. Sampling Techniques

- Sampling Methods
- Evaluation of index quality (e.g. sampling error)
- Sample Rotation

3. New Initiatives and Challenges



Sampling Frame

Sampling Frame

Source

- ✓ Various kinds of sources are available for sampling frame.
 - Output survey
 - Business register
 - Administrative data

Sample Structure

- ✓ Both countries use revenue and turnover data to order the establishments by size.
- ✓ Classifications used in sampling are based on both of product (CPA in France) and industry (NAICS in Mexico).



Sampling Techniques

Sampling Techniques

Sampling Methods

- ✓ 2 stages of sampling are attempted in both countries.
 - Selection of establishments
 - Selection of service products
- ✓ Statistical methods are mostly used in the selection of establishments while expert choice (e.g. discussion with a company manager) is conducted in the selection of service products.
- ✓ Sampling methods depend on data availability (e.g. lack in output data by service) and characteristics of the market where services are provided (e.g. concentration).

Sampling Techniques

	Non-probability	Probability
Sampling Methods	<ul style="list-style-type: none">✓ Samples are chosen by experts to be representative.✓ This is also known as Judgmental or purposive sampling, or expert choice.	<ul style="list-style-type: none">✓ Samples are chosen from a larger population using a method based on the theory of probability.✓ Each producer and service product is drawn from a known universe and has a known chance of selection.
Pros	<ul style="list-style-type: none">✓ Less time, effort and money in sampling✓ High degree of coverage among larger units (especially when the market is concentrated, it works well)	<ul style="list-style-type: none">✓ Impartiality of selection (especially when small units have different price movements, it works well)✓ Calculation of sampling error
Cons	<ul style="list-style-type: none">✓ Risk of introducing bias to the index✓ Difficulty in estimating quality of the index	<ul style="list-style-type: none">✓ More time, effort and money in sampling✓ Need to know the population and distribution

Sampling Techniques

Sampling Methods		Details
Non-probability	Cut-off sampling	✓ All units at or above a chosen threshold (usually in terms of size) will be included in the sample.
Probability	Simple random sampling	✓ Every possible unit has an equal chance of being drawn.
	Systematic random sampling	✓ Every K^{th} unit is selected, after random start.
	Proportional probability to Size	✓ Each unit has a probability of selection in proportion to its size.

Note: probability sampling can be supplemented by clustering or stratification techniques to improve survey efficiency.

Sampling Techniques

PPI manual says...

- ✓ In an ideal world, it would always be possible to use statistically sound sampling techniques to produce price indices with a high degree of accuracy and within given resource constraints.
- ✓ Reality, however, is usually very far away from this ideal because of (1) lack in accurate estimates of population variances, (2) missing some key information, and (3) unpredictability and deficiency of response rates.
- ✓ The aim of the sampling statistician is, therefore, to make the best use of what is available and to apply the principles of sampling theory in a common sense and practical way.

Sampling Techniques

Evaluation of Index Quality

- ✓ For probability sampling, sampling error (variance) can be measured using statistical methods.
 - Bootstrap
 - Taylor Series Linearization Method
- ✓ For non-probability sampling, although sampling error can not be calculated, index quality can be maintained checking parameters.
 - Coverage of the establishments
 - Distribution of companies by employment size
 - Maximum number of firms
 - Minimum number of firms

Sampling Techniques

Sample Rotation

- ✓ SPPI samples are updated every 5 years in both countries.
- ✓ Sample rotation has two main benefits;
 - It ensures that most producers participate in the survey for a limited time and, therefore, the burden is shared among enterprises.
 - It helps to alleviate the problems caused by being out of date (i.e. sample deletion and not being representative of current trend).



Difficulty & New Initiative

Difficulty

Difficulty

- ✓ There is difficulty in sampling establishments.
 - Small businesses are not sampled because of law and response burden.
 - Non-response results from informant's refusal
- ✓ Samples are not sufficient in some services. Especially, growing services are not easily captured in real time.

New initiative and Challenges

New Initiative

- ✓ Both countries have been continuously developing their sampling methods.
 - A prioritization method was implemented in France in 2017, which aims to reduce the sampling bias due to small part of sample in building maintenance and improvement works.
 - An annual renewal of the sample of establishments will be launched in Mexico based on the updates of the Statistical Business Register of Mexico. This will allow the sampling frames to be kept up to date and reduce the burden on informants.
- ✓ These new initiatives can enhance the index quality.



Discussion Topics

Discussion Topics

- ✓ For further understanding, we would like to discuss…
 - Sample Rotation
 - In the countries that carry out the sample rotation process, what challenges did they face or face in the product chaining procedure and the impact that this has on price indices?
 - Has the bias that the rotation of the sample may introduce to the index been measured? After long years of rotation, is the bias important?
 - Total Sample Size and Allocation
 - How do you determine the total number of samples?
 - How do you allocate samples to each establishment and service (e.g. Neyman allocation)?

Discussion Topics

- ✓ **Coronavirus pandemic** significantly affects economic activity.
Under this difficult situation, some issues are occurring.
- Resampling
 - Do you plan any study to measure the impact of pandemic in order to find out which industry or service needs to be resampled?
 - Do you plan to resample establishments and services to adapt to new normal as for the industry or service significantly affected by the pandemic (even if it is not the year when resampling is to be done)?
 - Has initiation response rate declined since pandemic? How much impact has it put on resampling?

Discussion Topics

- ✓ **Coronavirus pandemic** significantly affects economic activity. Under this difficult situation, some issues are occurring.

➤ Data for Sampling

- What do you think about the relevance of using 2020 revenue or turnover data for sampling and weighting?
- Is there any idea to adjust the 2020 revenue or turnover data (e.g. eliminating the data during lockdown as outlier)?

➤ Other Issues?

- How do you get a cooperation from new establishments when initiation (e.g. online meeting)?



Your comments would be appreciated.

Reference

- ✓ PPI manual (2004) Chapter 5.
- ✓ SPPI Guide (2014) Chapter 3.3.2.