Q 2016
European Conference on Quality in Official Statistics

Uncertainties in the Swedish PPI and SPPI

Session 25

Methodology

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Madrid, May 31 - June 3

PPI/SPPI and the GDP

- Project: “Sensitivity ananlysis in the Swedish GDP”
- PPI and SPPI in the National Accounts
  - Price indexes are used to deflate current prices into constant prices
  - Uncertainties in the PPI/SPPI are carried directly into the national accounts
  - Sensitivity analysis → How do changes in PPI/SPPI affect the GDP measure?
  - A thourough understanding of the uncertiainties in the PPI/SPPI was needed

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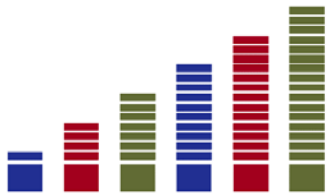
Sources of Uncertainty

- Sampling error
  - We have methodology to estimate
- Non-sampling error
  - Specification error
  - Frame error
  - Non-response error
  - Measurement error
  - Data processing error
  - Model error
- Hard to measure or estimate



Output – Input

- PPI/SPPI perspective
  - Micro data → price index
  - Mitigating sample errors through an effective sample
  - Control for non-sampling errors as far as possible
- National account perspective
  - Indexes are used as input in GDP calculations
  - Quality declarations for the primary statistic sources are important in the process of balancing the accounts
- The methodologist´s perspective
  - How do we deliver something (full quality declaration) we cannot produce with proven scientific methods?

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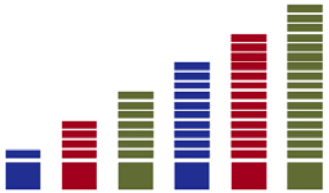
Sampling Error

- Simulation study to find a good method to estimate sampling variance
- We have bigger fish to fry!



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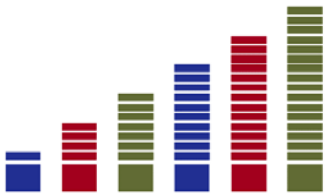
Non-Sampling Errors

- Not possible to determine systematic under- or overestimation of the true index

  → Errors are random in nature
- Even at complete sample coverage of a stratum and thus no sampling error, there can be non-sampling errors
- No way of measuring → We need to evaluate!



Non-Sampling Error Sources

- Examples of non-sampling errors in Swedish PPI/SPPI
  - Quality adjustments, list prices, hourly rates and specification errors
- Error contribution is evaluated for each stratum
  - Expert personnel evaluated all strata according to carefully set criteria
  - Error contribution set to ”Low,” ”Medium” or ”High” for each source – then weighted together to an overall measure
  - A subjective method

Creating a Total Uncertainty Measure

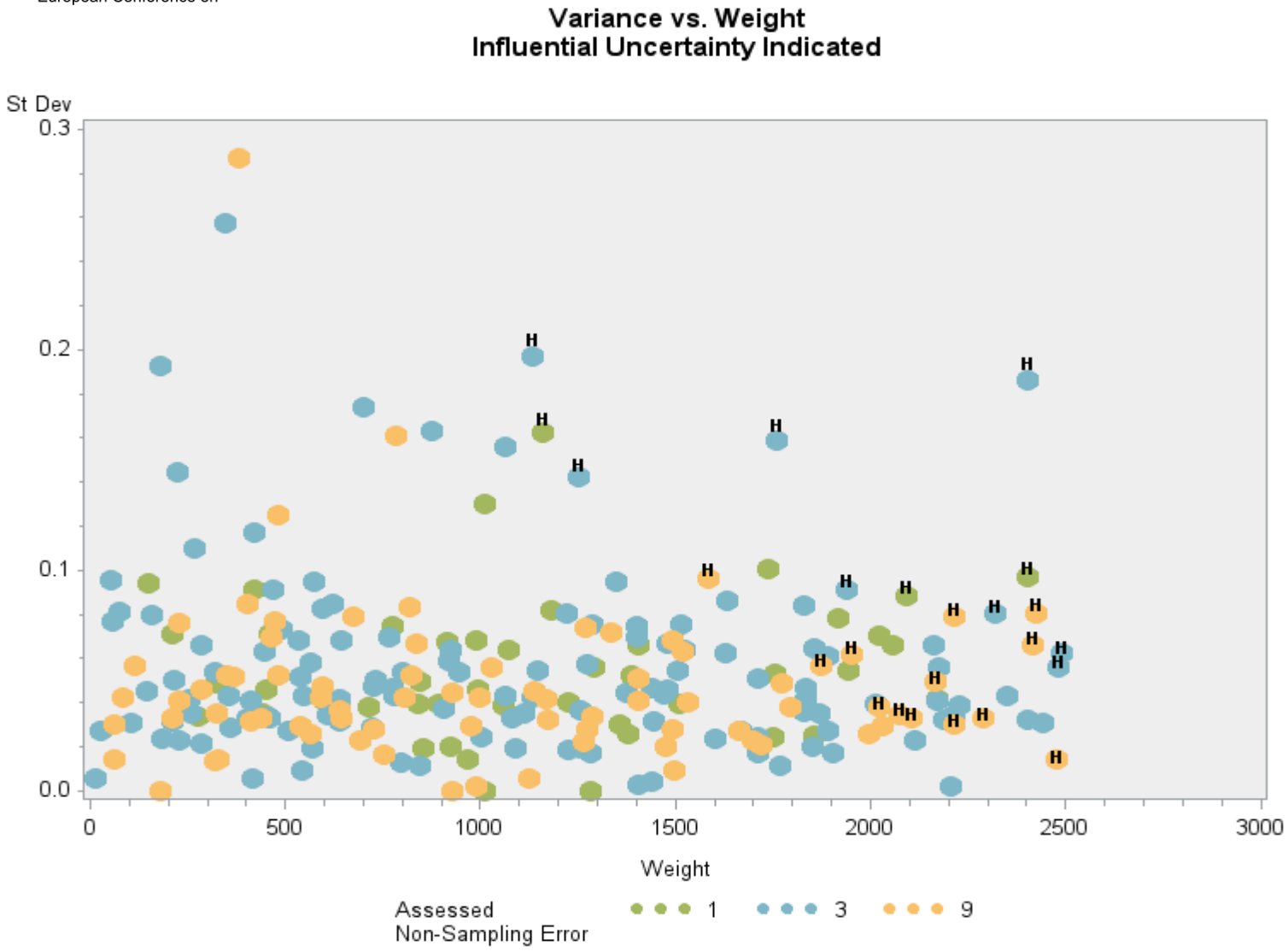
- Give the three levels numeric values
  - Trial and error → 1, 3 and 9
- Relate non-sampling errors to sampling errors, each covering 50% of total uncertainty in the survey
- For each strata, calculate

$$TU = Sampling\ Error + (Non - sampling\ error)^2$$

- Create an indicator as

$$Ind = (weight)^2 * TU$$

- Plot standard deviation vs. weight for all strata and mark strata with the highest values of the indicator


Variance vs. Weight
Influential Uncertainty Indicated
St Dev
0.3
0.2
0.1
0.0
0
500
1000
1500
2000
2500
3000
Weight
Assessed
Non-Sampling Error
1
3
9

Final Remarks

- Throughout the project we gained a better understanding of the error structure of the PPI/SPPI
  - Triggered an effort to create standards for quality declaration work
  - Knowledge → action to improve
- The plot can be used as a tool to identify problematic strata
- Our total uncertainty measure can be used when balancing of the national accounts
  - Better support for manual balancing of the national accounts
  - Automatic balancing scheme: SCM, a generalized least square method, using inverted uncertainty measures for industries and product groups as weights

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Thank you!