

European Establishment Statistics Workshop

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**Methods for estimating Structural Business
Statistics variables not available from
administrative sources**

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On behalf of Work Package 3 of ESSnet Admin Data

OVERVIEW

- Introduction to the ESSnet Admin Data
- Work Package 3
- Identification of variables
- Full Time Equivalent
- Payments for Agency Workers
- New Orders
- Change in Stocks
- Purchases of Goods and Services for Resale
- Evaluation and results
- Conclusions and future work

INTRODUCTION TO THE ESSNET

- ESSnet on the Uses of Administrative and Accounts Data for Business Statistics
- Nine work packages:
 - 0 – Management and administration
 - 1 – Uses of administrative data
 - 2 – Checklist for administrative data
 - 3 – Methods of estimation for variables
 - 4 – Timeliness of administrative data
 - 6 – Development of quality indicators
 - 7 – Statistics and accounting standards
 - 8 – Creation of an Information Centre
 - 9 – Training and exchange of best practice

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WORK PACKAGE 3

- **Aim:** Estimation methods for variables not directly available from administrative sources
- **Motivation:** to reduce costs and burden through use of admin data to replace survey data
- Not all variables are directly available from admin sources
- WP3 aims to identify estimation methods in this situation
- Collaboration between Netherlands, Lithuania, Italy, Germany and UK (2009 to June 2011)
- Collaboration between Netherlands, Lithuania and UK (July 2011 onwards)

IDENTIFICATION OF VARIABLES

- Variables of interest identified from STS & SBS regulations
- WP3 members checked the availability of admin data sources in their countries
- Literature study to discover potential estimation methods
- Five variables identified for study:
 - Employees in FTE
 - Payments for Agency Workers
 - New Orders
 - Change in stocks
 - Purchases of goods for resale

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 - Employees in FTE (Germany and Netherlands)
 - Payments for Agency Workers (Lithuania and Germany)
 - New Orders (Netherlands and Lithuania)
 - Change in stocks (Italy and UK)
 - Purchases of goods for resale (UK and Italy)

FULL TIME EQUIVALENT (FTE)

- 1 full time employee = 1 FTE
- Convert part time employees into FTE

FTE = Full time employees + α . Part time employees

- Conversion factor calculated separately in each 2 digit NACE industry

$$\alpha = \frac{\text{Hours of part time employees}}{\text{Hours of full time employees}}$$

PAYMENTS FOR AGENCY WORKERS

- This variable cannot be estimated from administrative data
- Tested method to estimate Payments for agency workers from providers rather than users – income of temporary employment agencies
- 2 proposed methods:
 - Estimate income from profit and loss accounts
 - Estimate income from annual services survey
 - Splits income into domestic / non-domestic

NEW ORDERS

- Estimate year-on-year growth rates in New Orders for small and medium sized enterprises, using:
 - growth rate of larger businesses
 - growth rate in VAT turnover
 - growth from qualitative business cycle survey
 - growth rate in VAT turnover (adjusted by the ratio of manufacturing turnover to total turnover)

CHANGE IN STOCKS OF GOODS AND SERVICES (CS)

Including Change in stocks of finished and semi-finished products (CSFP) and Change in stocks of raw materials and for resale (CSRM)

- $CS = CSFP - CSRM$
- Scenario 1 - total CS is available but components are not
- Scenario 2 - total CS and components are not available

CHANGE IN STOCKS OF GOODS AND SERVICES

- Under both scenarios, tested:
 - Imputation methods
 - Robust regression
- Scenario 1:
 - Impute missing components using Nearest Neighbour donor imputation, mean imputation and median imputation
 - Predict CSFP using robust linear regression modelling

CHANGE IN STOCKS OF GOODS AND SERVICES

- Scenario 2:
 - Impute all three variables from same donor using Nearest Neighbour donor imputation
 - Predict total Change in stocks using robust regression and apportion components

PURCHASES OF GOODS AND SERVICES FOR RESALE IN THE SAME CONDITION AS RECEIVED

- Scenario 1 - discontinuing the survey
- Scenario 2 - cut-off sampling
 - Estimate for units below the cut-off:
 - Ratio adjustment
 - Linear regression modelling

PURCHASES OF GOODS AND SERVICES FOR RESALE IN THE SAME CONDITION AS RECEIVED

- Assume units below employment cut-off no longer sampled
- Calculate ratio of estimate of total purchases to estimate of total VAT turnover for units above cut-off
- Multiply this ratio by total VAT turnover for units below cut-off

EVALUATION

- Comparison of current SBS-survey estimates with estimates from the proposed methods
 - Mean absolute difference and correlation coefficients (New Orders)
 - Relative percentage difference (FTE, Payments for agency workers, Purchases of goods and services for resale)
 - Monte Carlo simulation for relative estimation error (Change in stocks)

RESULTS

1. FTE:

Conversion factor based on hours paid leads to an average difference of around 1.5%

2. Payments for agency workers:

Survey based estimates exceed estimates based on income by approximately 30%

3. New Orders:

Using growth in modelled VAT turnover leads to a mean absolute difference $<0.4\%$ in most industries

RESULTS

4. Change in Stocks (CS available):

Median imputation works consistently well across 2 digit NACE industries (1-2% relative estimation error)

5. Purchases of goods and services for resale:

Applying ratio based on VAT turnover of larger businesses leads to difference that is typically small (<2%)

CONCLUSIONS

- Useful estimation techniques identified for all variables
- Important to understand the nature of the available data before using any estimation method
- In all cases WP3 recommends testing the effect of the estimation methods – WP3 results act as a guide
- May be possible to stop survey for only a subset of the population
- Consideration of applicability to other countries in WP3
- Reports on these variables available from Information Centre: <http://essnet.admindata.eu/>

FUTURE WORK

- WP3 continues as a collaboration between LT, NL & UK
- WP3 will explore further variables in the period 2011-2013
 - Gross investment in tangible goods
 - Gross investment in land
 - Gross investment in existing buildings and structures
 - Gross investment in construction and alteration of buildings
 - Gross investment in machinery and equipment
 - Sales of tangible investment goods

MORE INFORMATION

- Paper accompanying this presentation
- ria.sanderson@ons.gov.uk
- Work Package 3 leader Daniel Lewis:
daniel.lewis@ons.gov.uk
- ESSnet Admin data Information Centre:
<http://essnet.admindata.eu/>