

# Gross Fixed Capital Formation

Christian Gysting – February 2021



# Introduction

- Focus on largest components of GFCF:
  - Dwellings, Non-residential buildings, Other structures, Transport equipment, Machinery and equipment, R&D and Software
  - The largest components add up to 98 per cent of Danish GFCF
- Short presentation of most relevant sources: Structural Business Statistics (SBS) and Government accounts
- Minor sources omitted

# Major sources - SBS

- Structural Business Statistics (SBS):
  - Primary source of financial data for analytical studies of Danish business enterprises
  - SBS is essentially aggregations of items of the annual accounts of business enterprises
  - Cover large parts of the private sector
  - Cover information regarding business revenues, expenditures, value added, employment, wages and salaries, investment, etc.

# Major sources - SBS

- The different sources for SBS:
  - **Direct surveying**, covers approx. 73 per cent of turnover in 2015. Contain the most detailed information, regarded as highly reliable source
  - **The accounts data from the Danish tax authorities**, covers approx. 12 per cent. Less detailed. By stratified imputation the aggregates from Danish tax authorities are distributed among the more detailed items
  - **The rest**, mainly small firms. Small share of total, figures assumed less reliable. Stratified imputation based on employment size.

# Main sources: Government accounts

- (General) Government accounts:
  - Cover central and local government (S13)
  - Based on accounts from central government, municipalities, counties and social security funds
  - Data is coded by COFOG groups, ESA 2010 codes and industry codes
  - Contain information on GFCF by industries, but with little sub-division into types of investment

# Dwellings

- Gross Fixed Capital Formation on dwellings contains:
  - Construction of new dwellings
  - Capital repair of existing dwellings
  - Costs of ownership transfer regarding dwellings
- Estimation from the supply side based on turnover by products in the construction industry
- Adjustments for imports and exports
- Mark-up for VAT
- Supplement of costs of ownership transfer
  - payments regarding estate services by real estate agents, lawyers, stamp duties

# Dwellings, Main sources

- Turnover by products in construction industry
  - Products regarding dwellings: New dwellings (GFCF), capital repair of dwellings (GFCF) and ordinary repair of dwellings (mostly IC)
  - Annual figures are available
  - Measured “gross”, including subcontracted production within the construction industry
- Subcontracting within the construction industry
  - By type of products
- Household budget survey
  - Own account production
- Foreign trade statistics
  - Import and export by products
- Structural Business Statistics
  - Value added for the construction industry

# Dwellings

[illegible]



# Non-residential buildings

- Gross Fixed Capital Formation on non-residential buildings covers:
  - Construction of new non-residential buildings
  - Capital repair of existing non-residential buildings
  - Costs of ownership transfer regarding non-residential buildings
- Estimated by using expenditure side information
  - Main sources:
    - Structural Business Statistics (Private and public commercial buildings)
    - Accounts for selected companies
    - Government accounts (Government buildings)
- Split between construction of new buildings and capital repair compiled by using statistics on turnover by products in construction industry

# Non-residential buildings

[illegible]

# Other structures

- Gross fixed capital formation on other structures covers:
  - Construction of new other structures
  - Capital repair of existing new structures
- Estimated by using expenditure side information
  - Main sources:
    - Structural Business Statistics
    - Accounts for selected companies
    - Government accounts

## Other Structures

[illegible]

# Transport equipment

- Gross Fixed capital formation on transport equipment cover Vehicles, Ships, Airplanes and Trains
- Mainly estimated by using commodity flow method
  - Main sources:
    - Register of Motor Vehicles
    - Foreign trade statistics (by products)
    - Domestic production
- Breakdown on 53 different products

# Machinery and equipment

- Gross fixed capital formation in Machinery and equipment cover investment in computer hardware, telecommunication equipment and other machinery
  - Main sources:
    - Structural Business Statistics
    - Accounts for selected companies
    - Government accounts
- Breakdown on products (approx. 600)

- [illegible]

# Research and Development

- Research and Development (R&D) is a new item introduced as part of SNA-2008.
- Estimated from the supply side
- GFCF on R&D is mainly calculated as the sum of costs
  - Main sources:
    - Business Enterprise Research and Development statistics (Frascati Manual based statistics on R&D expenditure by private business)
    - Government Accounts
    - Foreign trade statistics



# Research and Development

- Main sources:
  - Business Enterprise Research and Development statistics
    - Annual survey
    - Cover in-house expenditure by cost component
      - Wages,
      - Other operating costs,
      - Investment costs
    - Based on Frascati Manual by the OECD
  - Government accounts
    - Own account production of R&D is identified by using the COFOG distribution
      - At the second level of the COFOG distribution, it is possible to separate out the R&D expenditure

# Research and Development

- **Transformation of sources data national account definitions for market R&D:**
- The starting point is the statistics on R&D expenditure by private business (Total expenses on own R&D based on the Frascati Manual)
  - Replacing investment figures with an estimate for gross operating surplus:
    - Investment figures can be directly identified in the Frascati figures
    - GOS estimated as an mark-up on wages and other operating costs
  - Overlap with software: It is assumed that part of R&D expenditure contains some level of costs already included in own account production of software. This part must be excluded from the R&D expenditure
    - Question from R&D survey on used for removing overlap with software. Respondents are asked about the share of costs directed towards development of software

# Research and Development

- Adjustment of Frascati figures – Marked R&D

<b>2017</b>	<b>Mill. DKK</b>
<b>R&amp;D expenditure by private business (Frascati Manual)</b>	<b>41.508</b>
Investment included in Frascati output	-2.434
Overlap with software	-9.127
Subsidies	0
Supplement for gross operating surplus	8.341
Other adjustments	49
<b>Adjusted Frascati output</b>	<b>38.336</b>

# Research and Development

- Adjustment of Frascati figures – Marked R&D

<b>2017</b>	<b>Mill. DKK</b>
Own account R&D	30.065
Purchased R&D	12.368
<b>Domestic output</b>	<b>42.432</b>
Import	12.209
<b>Total supply (basic price)</b>	<b>54.642</b>
Intermediate consumption	4.096
GFCF (basis price)	44.128
Export	6.418
<b>Total use</b>	<b>54.642</b>

# Software

- Gross fixed capital formation for software covers own-account software and purchased software

									<b>2017</b>
Total GFCF on software (tDKK)									42.987.516
Own-account								▲	22.715.375
Purchased software								▲	20.272.141

# Own account software

- Compilation of own-account software is a cost based estimation based on statistics on wages and salaries for employees by selected job categories
  - Register data for the relevant groups of employees are received with the following breakdown:
    - codes for enterprise (CVR)
    - industry (DB07),
    - classification of occupation (DISCO, the Danish version of ILO's ISCO),
    - number of employees,
    - full time equivalents
    - salaries

# Own account software

- Selection of DISCO / ISCO groups

Share of wages	Disco code	Title
50	2511	Systems Analysts
100	2512	Software Developers
100	5213	Web and Multimedia Developers
100	5214	Applications Programmers
20	2519	Software and Applications Developers and Analysts Not Elsewhere Classified
50	2521	Database Designers and Administrators
50	2522	Systems Administrators
50	2523	Computer Network Professionals
20	2529	Database and Network Professionals Not Elsewhere Classified

- A mark-up on wages on 135,6 per cent is added for other cost components (117,13 per cent for non-marked units)
  - Mark-up factor is based on accounting information from industry 62000 Information technology services
- Share of wages is assumed to be 25 per cent in industry 62000 Information technology services
  - Assumed to produce customized software sold to other units

# Purchased software

- GFCF for purchased software is calculated from the supply side using the commodity flow method
- The main sources is information from product statistics for the IT-industries and foreign trade statistics
  - Turnover from the different industries is broken down into different types of software
  - Significant part of the turnover is considered intermediate consumption



# Breakdown by sectors

- Gross fixed capital formation is compiled by type of asset and industries and subsequently split into institutional sectors
  - Government accounts is used to identify government GFCF (S.13)
  - NPISH source data is used to identify NPISH GFCF (S.15)
  - Breakdown by industries are used to identify financial sector (S.12)
    - Breakdown by industry initially determined on the basis of information obtained from the company records
  - Dwellings split into S.11 and S.14 by using information from the Register of Buildings and Dwellings (BBR)
    - All owner-occupied dwellings are allocated to households (S.14)
  - The remaining GFCF figures are broken down by sector (S.11 or S.14) by using information on depreciation by sectors based on SBS information