Measuring public sector investment in intangible asset: main achievements and open issues

Massimiliano Iommi (LUISS and ISTAT)
Cecilia Jona Lasinio (LUISS and ISTAT)

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Outline

- Main pillars of Spintan estimation strategy
- Sources and methods for new intangible assets
- Sources and methods for national accounts intangible assets
- Deflation

Main pillars

- **Expenditure based approach**
- **Exhaustiveness**
- **Reproducibility**
- **“Updatability”**
- **Comparability across countries**
- **Consistency with National Accounts**

Main Pillars

- **Two different approaches for intangible assets not currently included in the SNA/ESA asset boundary and for assets already already included**
- **New Intangible Assets (NEWIA):**
  - Design
  - Market research and advertising
  - Training
  - Organisational Capital
- **National Accounts Intangible Assets (NAIA):**
  - Computer software and databases
  - Research and development
  - Mineral Explorations
  - Entertainment, literary and artistic originals

New Intangible Assets

- **Expenditures for NIA are currently considered expenditure to purchase intermediate inputs**
  - No output produced for own use is recorded (in NA only final output for own final use is included in the production boundary)
  - Both the production and the use of the purchased component of NI are registered in NA data
- **We have to produce our estimates of the own account component (unless we deem it to be negligible)**
- **We have no reasons to change national accounts estimates of total output and total expenditure**
- **We want to change the type of use (from intermediate consumption to gross fixed capital formation)**

New Intangible Assets

- **Use table main data source for expenditure to purchase intermediate inputs**
  - Both expenditure for domestically produced and imported services are included
  - They are the results of a reconciliation of information on resources (output and imports) and uses (domestic demand and exports)
  - The value of each single cell might not be highly reliable but it is the best we have
- **We need data on total expenditure for each product that relates to NIA for the industry/sector (provided by NSIs or SPINTAN estimates)**
- **Assumptions on how much of each expenditure might be considered gross fixed capital formation.**
- **Use tables usually available with delay (t-3)**

New Intangible Assets

- **Own account component**
- **Standard approach:**
  - to value it at the costs of production, i.e. the sum of compensation of employees, intermediate consumption and the cost of capital (consumption of fixed capital and, only for market producers, net operating surplus).
  - The crucial variable to estimate is compensation of employees.
  - The other variable can be estimated indirectly (e.g assuming a capitalisation factor of compensation of employees that implicitly takes into account also the other cost components).
  - Data on employment and compensation by occupational groups

New Intangible Assets

- **Own account production of organizational capital can be estimated using data from LFS-SES integrated with data from the OECD survey on compensation in the public sector for the O84 industry**
  - Managers are identified at the level of 1digit ISCO
  - Further refinements might be possible using more detailed data on LFS provided by NIESR
  - Unfortunately no data on employment cross-classified by industry and sector available from LFS released by Eurostat (need to ask on NSIs)
- **Open issue: need to think if cost-based approach is well suited to estimate output in the non-market sector:**
  - Manager compensation might reflects rent-seeking instead than marginal productivity (e.g., results of the OECD survey)

New Intangible Assets

- **We deem that own-account production of design, advertising and market research in the non-market sector is negligible**
- **Open issue: at the moment no data on own account production of training:**
  - There are no occupational groups that are directly involved in internally produced training activity.
  - Maybe country specific information on training activity in the Government sector and the NPISH sector?

National accounts intangible assets

- National accounts estimates include both purchased and own-account components
- Usually data are not available at the level of detail that we need (i.e. cross-classified by asset, industry and sector).
- Quite likely that there is no GFCF in Mineral explorations and Originals in the non-market component of the industries of interest to Spintan
- We need to produce estimates of GFCF in Computer software and databases and in Research and Development cross-classified by industry and by sector that are consistent with the available national accounts data on GFCF.

National accounts intangible assets

	Sectors			
Industries	**Market**	**Government**	**NPISH**	**Industry totals**
M72	$GFCF_{M72,MKT}$	$GFCF_{M72,GOV}$	$GFCF_{M72,NPISH}$	$\mathbf{GFCFI_{M72} = \sum_s GFCF_{M72,s}}$
O84	0	$GFCF_{O84,GOV}$	0	$\mathbf{GFCFI_{O84} = GFCF_{O84,GOV}}$
P85	$GFCF_{P85,MKT}$	$GFCF_{P85,GOV}$	$GFCF_{P85,NPISH}$	$\mathbf{GFCFI_{P85} = \sum_s GFCF_{P85,s}}$
Q86	$GFCF_{Q86,MKT}$	$GFCF_{Q86,GOV}$	$GFCF_{Q86,NPISH}$	$\mathbf{GFCFI_{Q86} = \sum_s GFCF_{Q86,s}}$
Q87-Q88	$GFCF_{Q87\text{-}88,MKT}$	$GFCF_{Q87\text{-}88,GOV}$	$GFCF_{Q87\text{-}88,NPISH}$	$\mathbf{GFCFI_{Q87\text{-}88} = \sum_s GFCF_{Q87\text{-}88,s}}$
R90-R92	$GFCF_{R90\text{-}92,MKT}$	$GFCF_{R90\text{-}92,GOV}$	$GFCF_{R90\text{-}92,NPISH}$	$\mathbf{GFCFI_{R90\text{-}92} = \sum_s GFCF_{R90\text{-}92,s}}$
Sector Totals	$\mathbf{GFCFIS_{MKT}}$	$\mathbf{GFCFIS_{GOV}}$	$\mathbf{GFCFIS_{NPISH}}$	$\mathbf{GFCF = \sum_j \sum_s GFCF_{j,s}}$
	$\mathbf{= \sum_j GFCF_{j,MKT}}$	$\mathbf{= \sum_j GFCF_{j,GOV}}$	$\mathbf{= \sum_j GFCF_{j,NPISH}}$	

National accounts intangible assets

- **Standard data availability from National Accounts (according to ESA2010 transmission program): GFCF by industry for Computer software and databases and for Total Intellectual Property Products.**
- **Very few countries provide also data on GFCF by institutional sector for IPP (and some components)**
- **We have developed two different methods:**
  1. when NSI provides GFCF by industry and by sector but not the cross classification
  2. when only GFCF by industry is available
- **We have implemented only approach 2:**
  - Better to apply the same method to all countries or to use all the data available for each country (but using different methods across countries)?

National accounts intangible assets

- **Estimation methods in a nutshell:**
  - Estimate the cells of the matrix using a mix of available data sources and assumptions
  - Rescale estimates to be consistent with the constraint from national accounts (row and/or columns totals)
- **A detailed description of the methods to be included in the deliverables is available… very detailed and boring but any comment is more than welcome**
- **Here only the intuition of method 1**
- **Open issue: what to do when no data at all are available**

National accounts intangible assets

- **Estimation method 1 in a nutshell:**
  - Industry totals (rows total in table 1) are available from NA.
  - first we estimate sector totals for the set of industries of interest (column totals in table 1)
  - second step is to estimate the industry distribution consistent with industry and (estimated) sector totals.
- **Assumption 1: for the industries of interest, Originals and Mineral Explorations are negligible, then in each industry SW+R&D=IPP**
  - R&D=IPP-SW
  - Probably not true for industry R90-92: need to make an adjustment.

National accounts intangible assets

- **For R&D, our approach is to produce the industry/ sector disaggregation using ANBERD data, data on R&D expenditure by source of funds and data on General Government expenditure (COFOG classification)**
- **Open issues:**
  - R&D surveys sectors and SNA/ESA sectors (assumptions)
  - Ownership vs founders: mapping based on assumptions
  - COFOG functions as a proxy for industries
- **For Computer software and databases we disaggregate total GFCF in each mixed industry into the market, government and NPISH component using output based indicators (to the best of our knowledge, no specific data sources are available).**

National accounts intangible assets

- **Mapping between R&D surveys sectors and SNA/ESA sectors**

	SNA/ESA sectors		
R&D survey sectors	**Market (S11+S12+S14)**	**Government (S13)**	**NPISH (S15)**
Business enterprises	1	0	0
Government	0	1	0
Non-profit institutions	0.5	0	0.5
Higher Education	0.1	0.45	0.45

- **Any country specific information available?**

National accounts intangible assets

- **Mapping between founding and ownership**

	Owner		
Founder	**Market (S11+S12+S14)**	**Government (S13)**	**NPISH (S15)**
Market (S11+S12+S14)	1	0	0
Government (S13)	0.25	0.75	0
NPISH (S15)	0.25	0	0.75

- **Any country specific information available?**

National accounts intangible assets

- **Mapping between COFOG and industries**

	Industries						
COFOG	M72	O84	P85	Q86	Q87-88	R90-92	Other ind.
Basic research(GF0104)	0.25	0.25	0.25	0.25	0	0	0
R&D General public services(GF0105)	0	1	0	0	0	0	0
R&D Defence(GF0204)	0	1	0	0	0	0	0
R&D Public order and safety(GF0305)	0	1	0	0	0	0	0
R&D Economic affairs(GF0408)	0	1	0	0	0	0	0
R&D Environmental protection(GF0505)	0	1	0	0	0	0	0
R&D Housing and community amenities(GF0605)	0	1	0	0	0	0	0
R&D Health(GF0705)	0	0	0	1	0	0	0
R&D Recreation, culture and religion(GF0805)	0	0	0	0	0	1	0
R&D Education(GF0907)	0	0	1	0	0	0	0
R&D Social protection(GF1008)	0	0.5	0	0	0.5	0	0

- **Any country specific information available?**

Deflation

- **Price-volume decomposition of GFCF in intangible assets is a particular challenge:**
  - units of knowledge cannot be readily defined
  - most intangibles are unique products (with the exception of copies, e.g. in the case of pre-packaged software).
- **OECD Manual on Capitalization of IPP**
- **IPPs can be decomposed into three broad types: copies for sale, originals for sale, and originals for own-use.**
- **The Handbook makes explicit recommendations for volume estimates in each case, recognizing the differences between each type, including, specifically, the availability of price data.**

Deflation

- **For copies, the Handbook recognizes the rapidly changing nature of IPPs and, so, strongly advocates hedonic methods.**
  - Software and Originals
- **For originals for sale, the Handbook refers to the Producer Price Index Manual, which describes the various 'model' based approaches that can be used.**
  - All new intangible assets (minority for NAIA according to Manual)
- **For originals for own-use, the Handbook encourages the use of methods that capture quality and productivity changes, but when these cannot be applied recognizes and accepts the necessity of input-based methods.**
  - All intangibles

Deflation

- **Copies: US deflator for pre-packaged software….any other country?**
- **Originals for sale: Service Producers Price Index are now available in many countries**
- **Originals for own-use:**
  - Input base methods also recommended by Eurostat Manual for R&D
  - Input based methods not so bad as long as:
    - Specific deflator for each cost component
    - Quality adjusted deflator for intermediate costs and cost of capital
    - Very detailed data on occupational groups to deflate labour cost component (to average wage method or wage rate method)

Deflation

- **Options for Spintan**
- **Producing our own hedonic price indexes, PPI and input-based deflators for all countries….it would be nice but a little bit too demanding ☺**
- **Using National Account GFCF deflators for NAIA and output/value added deflators for NIA:**
- **Producing harmonized deflators when possible:**
  - **Software (updating Intan-Invest deflator)**
  - **Based on SPPIs for Advertising, Market research and Organisational capital (originals of sale case according to the OECD IPP classification)**

Deflation

- **Unfortunately no updated information on sources and methods that are used by NSIs to produce national accounts data is available.**
  - Do they use SPPI for deflating output (if they are available)?
  - Do they use hedonic method to deflate purchased software? Or do they use an harmonized approach (f.i., using US deflator)?
  - Do they implement high quality input-based deflators?
  - It is likely that some improvements have been introduce in the last general revision of national accounts data (e.g, now Italian deflator for software is fully consistent with OECD Manual recommendations)
- **Current Spintan estimates:**
  - national accounts deflators
  - the same deflator for purchased and own account organizational capital

Thank you for your attention