GLOBALINTO

Measurement of intangibles and possibilities to implement them in national accounts

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New Intangibles for European Growth

https://globalinto.eu/

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Background

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- Intangible capital has been proven to contribute to economic performance and productivity growth; at aggregate and firm level
- However, measurement remains a challenge in firm-level which is the basic unit in national accounting
  - (Unified) widely accepted definition
  - Data availability
    - Coverage
    - Quality
    - Comparability
- Typically, two types of data sources are used to measure intangibles at firm level
  - Survey based data (from official statistics or one-off surveys)
  - Registry based data

One-off survey data

- Advantages and contribution
  - Offer a benchmark for estimates based on secondary data sources
  - Flexibility to collect data on aspects that are not covered by official statistics and test new hypothesized links
  - Can adapt the content to topics that are relevant in a specific period like pandemia or to explain hard facts on productivity development and technical change induced by intangibles
  - Important for development of methodological framework, as the measurement of intangibles is complex and the concept is still evolving.
  - Important to researchers and policy-makers, especially in view of increasing importance of intangible capital's contribution to economic performance
- Challenges
  - Lack international comparability or longitudinal perspective
  - European Investment Bank *Investment Survey* the only survey with wide (EU) international coverage besides recurring data collection on key variables from 2016 onwards
  - Sample size and structure are not necessarily optimal and often do not cover the entire economy or companies by size
  - Data collection represents a notable burden to the businesses
  - Costs of these surveys are high when attempting to achieve sufficiente survey quality, especially when conducted in several countries or at the EU level

Eurostat and National Statistical Institutes (NSI…)

- National statistical institutes (NSIs) in Europe regularly publish methodologically harmonised indicators across
  - A combination of input and output harmonisation approaches
  - Input harmonisation strives to standardise all steps of the survey life cycle, that is from questionnaire and sampling design, data collection and post-collection
  - Output harmonisation focuses on the required set of target variables respecting quality criteria
  - The concepts and definitions of variables and the classifications are subject to agreements/legislation in all statistical domains
- Data collection is continuously evaluated and revised as needed
- Expertise that NSIs have (sampling, questionnaire design, access to businesses, data collection, data processing and data management, …), builds trust that the collection of data at NSIs is of highest quality
- While at the moment Eurostat does not conduct a survey on intangible investment and intangible capital, there are several other surveys of Europe-wide character that gather relevant information on some component of intangibles:
  - R&D survey
  - Community Innovation Survey (CIS)
  - Survey on ICT usage and e-commerce in enterprises (ICT)
  - Continuous Vocational Training Survey (CVTS)

Goal

To investigate wheather GLOBALINTO's occupation based approach to measuring intangibles (D3.4) can be used in NA?

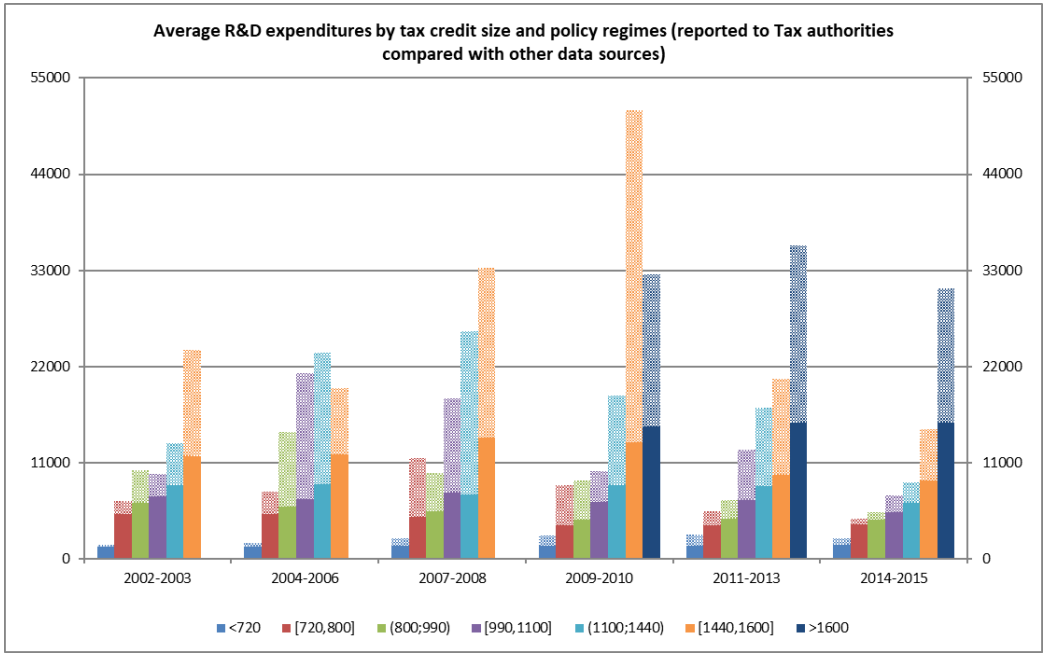
- Captures intangibles (R&D, ICT and OC) using register data available in most EU economies via existing harmonized Eurostat sources (based on ISCO08 Occupation classification)
  - Full coverage of firms versus survey data
  - Provide information for the smallest firms that are not represented in the surveys
- Important requirement! Availability of a link between individuals and the companies they are employed at.
  - Of the countries represented by GLOBALINTO, linked employer-employee data (LEED) are available in Denmark, Finland, Norway and Slovenia.
- Primary focus in this investigation is on R&D:
  - determination whether the company has performed any R&D activity
  - determination of the scope of R&D activity in the firm
  - Methodology: comparison of amounts based on official data used in NA with amounts obtained based on GLOBALINTO's measure

Data sources for intangibles used in Norwegian NA

- For R&D variables (both internal and external R&D):
  - R&D survey (Statistics Norway)
    - 4000-6000 firms per year
    - Covers industries: 03, 05-33, 35-39, 41-43, 46, 49-53, 58-66, 70-72, 74.9, 82.9
    - Full coverage of firms with 50+ employees, stratified sampling of firms with 10-49 employees
  - Applications for R&D tax credits, TC (Research Council of Norway)
  - Received R&D tax credits (Norwegian Tax authorities)
    - Full coverage of recipients
    - About 4000 firms per year
    - More that 50% are firms with <10 employees

From the recent evaluation of Norwegian tax credit scheme:

- Firms report to the Tax authorities only part of R&D expenditures that are eligible for the tax credit
- This problem is less important for the small firms with small projects
- 60-70 % of project costs are personal cost



Benedictow A., E. C. Bjøru, F. W. Eggen, M. Norberg-Schulz, M. Rybalka and R. Røtnes (2018): Evaluation of SkatteFUNN, Report 18-2018, Samfunnsøkonomisk Analyse, Oslo.

Data sources for intangibles used in Norwegian NA

GLOBALINTO

- For R&D variables (both internal and external R&D):
  - Annual R&D survey (Statistics Norway)
    - 4000-6000 firms per year
    - Covers industries: 03, 05-33, 35-39, 41-43, 46, 49-53, 58-66, 70-72, 74.9, 82.9
    - Full coverage of firms with 50+ employees, stratified sampling of firms with 10-49 employees
  - Applications for R&D tax credits (Research Council of Norway)
  - Received R&D tax credits (Norwegian Tax authorities)
    - Available since 2002
    - Full coverage of recipients
    - About 4000 firms per year
    - More that 50% are firms with <10 employees
- For ICT variables:
  - Structural statistics (Statistics Norway)
    - Almost full coverage of industries (A, D, K, P-R are not covered)
    - Purchased hardware
    - Purchased software
    - Own-account software
- Data used in GLOBALINTO:
  - Employer-employee data
    - Full coverage of industries
    - Both private and public sector are represented
    - Apply wage costs as proxy for investment in R&D (corrected for factor multipliers)
    - Harmonized occupational codes are available since 2008

GLOBALINTO definition of intangible labour (R&D, OC, ICT) (based on ISCO08 Occupation classification)

1 Managers

112 OC Managing Directors and Chief Executives

12 OC Administrative and Commercial Managers

121 OC Business Services and Administration Managers

122 Sales, Marketing and Development Managers

1221 OC Sales and Marketing Managers

1222 OC Advertising and Public Relations Managers

1223 R&D Research and Development Managers

13 Production and Specialized Services Managers

131 OC Production Managers in Agriculture, Forestry and Fisheries

132 OC Manufacturing, Mining, Construction and Distribution Managers

133 ICT Information and Communications Technology Services Managers

134 OC Professional Services Managers

14 Hospitality, Retail and Other Services Managers

2 Professionals

21 Science and Engineering Professionals

211 R&D Physical and Earth Science Professionals

212 R&D Mathematicians, Actuaries and Statisticians

213 R&D Life Science Professionals

214 R&D Engineering Professionals (excluding Electrotechnology)

215 R&D Electrotechnology Engineers

2151 Electrical Engineers

2152 R&D Electronics Engineers R&D

2153 ICT Telecommunications Engineers

216 R&D Architects, Planners, Surveyors and Designers

22 Health Professionals

221 R&D Medical Doctors

222 R&D Nursing and Midwifery Professionals

223 Trad. and Complementary Medicine Professionals

224 Paramedical Practitioners

226 R&D Other Health Professionals

23 Teaching Professionals

24 Business and Administration Professionals

241 OC Finance Professionals

242 OC Administration Professionals

243 Sales, Marketing and Public Relations Professionals

25 ICT Information and Communications Technology Professionals

26 Legal, Social and Cultural Professionals

3 Technicians and Associate Professionals

31 Science and Engineering Associate Professionals

311 R&D Physical and Engineering Science Technicians

312 Mining, Manufacturing and Construction Supervisors;

313 Process Control Technicians

314 R&D Life Science Technicians and Related Associate Professionals

315 Ship and Aircraft Controllers and Technicians

32 Health Associate Professionals

321 R&D Medical and Pharmaceutical Technicians

33 Business and Adm. Associate Professionals;

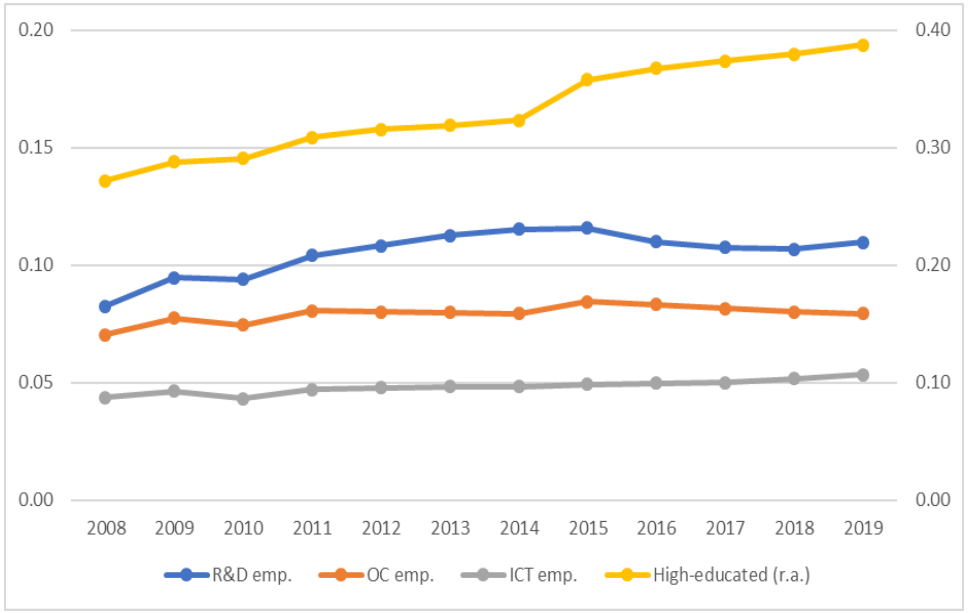
34 Legal, Social, Cultural Associate Professionals;

35 ICT Information and Communications Technicians

OECD CLASSIFICATON BY TECHNOLOGICAL LEVEL

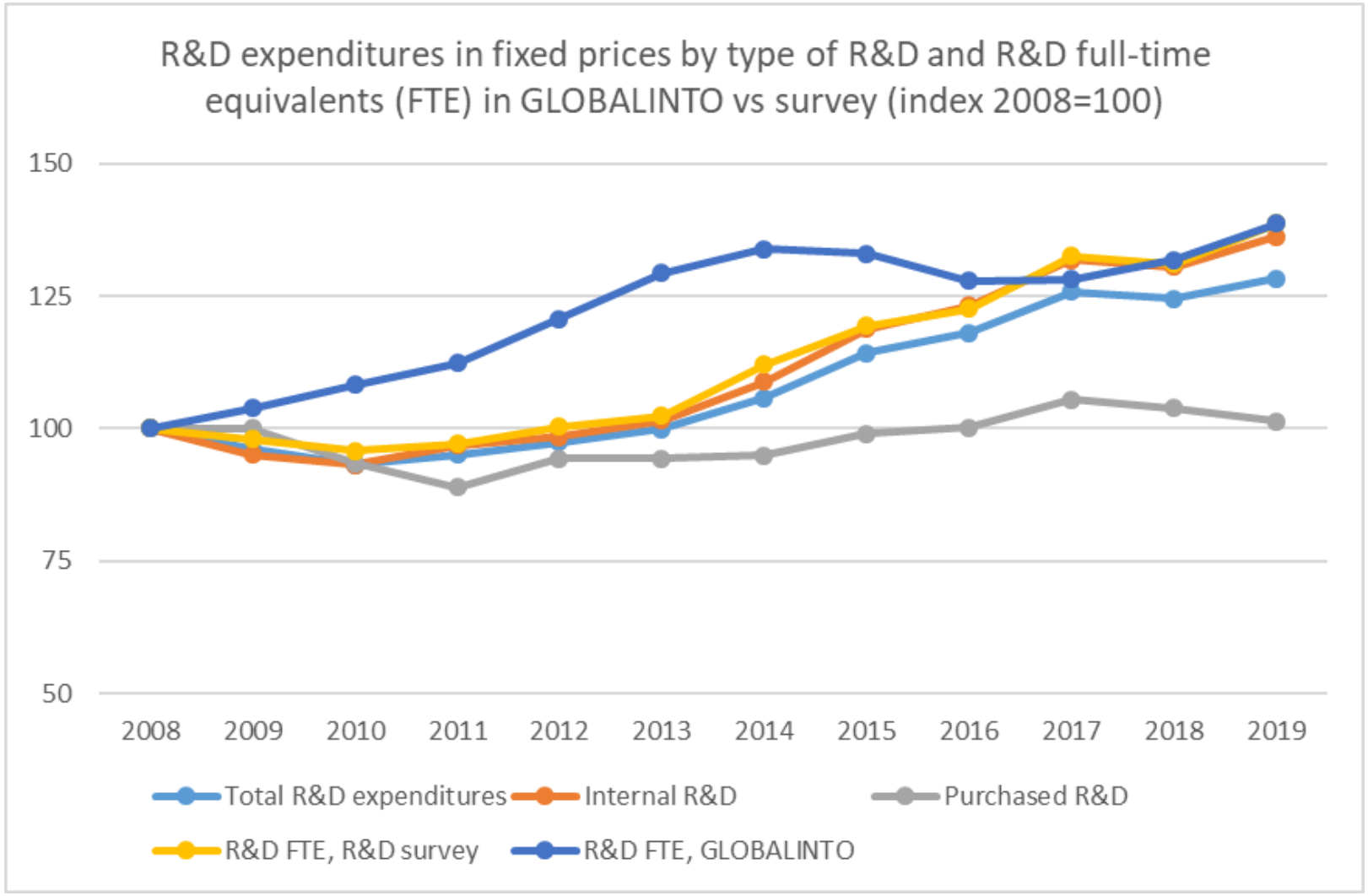
Technology type	Main industries	Other	Value added shares in 2019, %
Top High technology manufacturing	Electronics 21 and pharmacy 26		1.5
High-middle technology manufacturing	Chemical 20, electrical equipment 27, machinery and equipment 28	Motor vehicles 29, other transport 30	5.1
Low-middle technology manufacturing	Refined petroleum 19, rubber and plastic products 22, basic metals 24	Repair and installation of machinery and equipment 33-34, energy 35	**18.6**
Low technology manufacturing	Food 10, textile 13, paper 17	Beverages 11, tobacco 12, textiles 13, wearing apparel 14, leather 15, wood and wood product 16, printings 18, furniture. 31, other 32	5.4
KIS market (knowledge-intensive market services)	Transport 50-51 (not land) publishing 58, telecommunication 61, arts, entertainment and recreation R	Motion picture 59 programming, broadcasting 60, other professional activities 74, 75, 78 80	**14.1**
ICT services	Computer programming, consultancy 62 information service activities 63		4.6
R&D services	Architectural, engineering 71, R&D 72		5.6
OC services	Legal 69, head office 70, advertising, market research 73		4.3
Basic private services	Wholesale trade 45-47, land transport 49, warehouse 52, accommodation, food and beverage 56, real estate 68	Rental and leasing 77, travel agency 79	**40.8**

Intangible-worker occupation shares of total employment based on GLOBALINTO



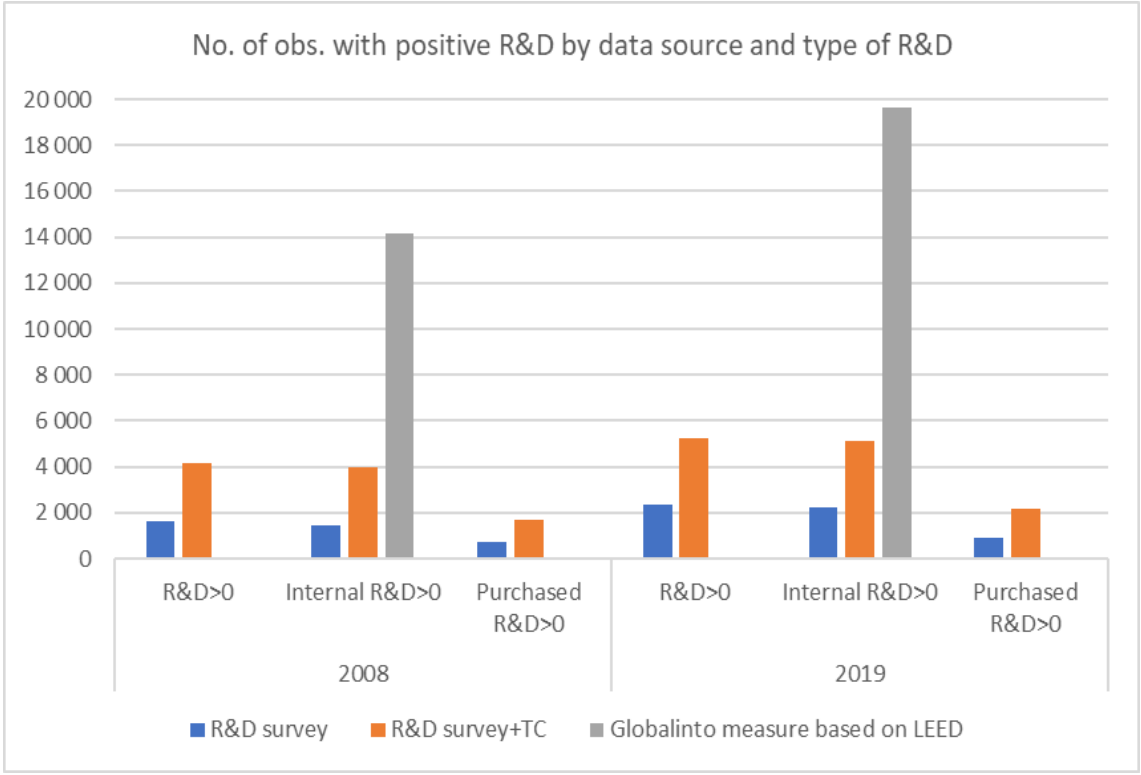
Industry group	R&D emp.	OC emp.	ICT emp.	Hihg-educated
High-tech	**0.390**	**0.114**	0.049	**0.550**
Medhightech	0.259	**0.112**	0.016	0.358
Medlowtech	0.117	0.084	0.011	0.231
Low-tech	0.050	0.082	0.013	0.205
KIS	0.071	0.069	**0.075**	0.399
R&D services	**0.642**	0.085	0.032	**0.743**
OC services	0.029	**0.254**	0.029	**0.693**
ICT services	0.082	0.092	**0.636**	**0.693**
Basic private services	0.026	0.057	0.012	0.230

Development of R&D measures based on statistical survey data and GLOBALINTO

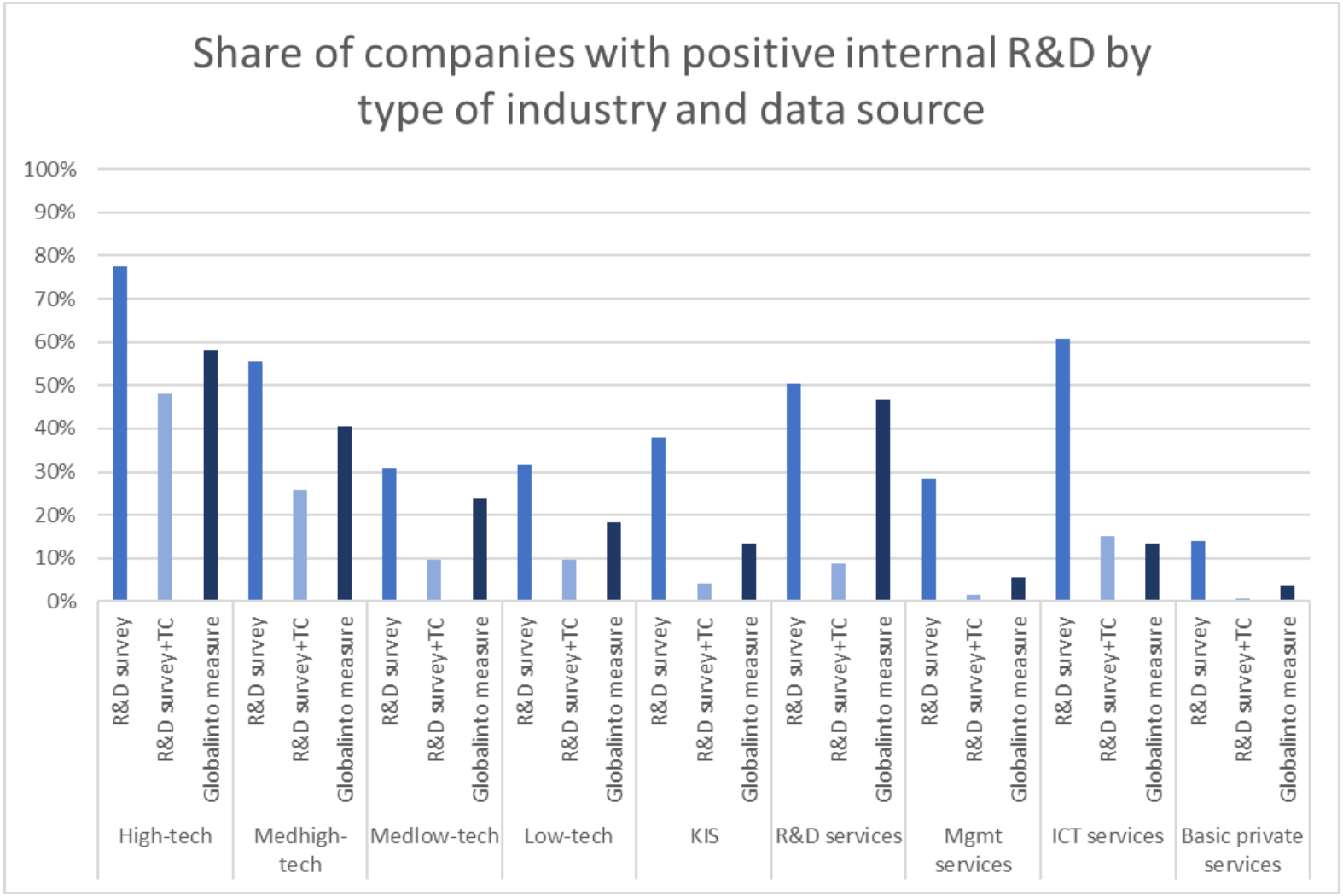


Norwegian sample description

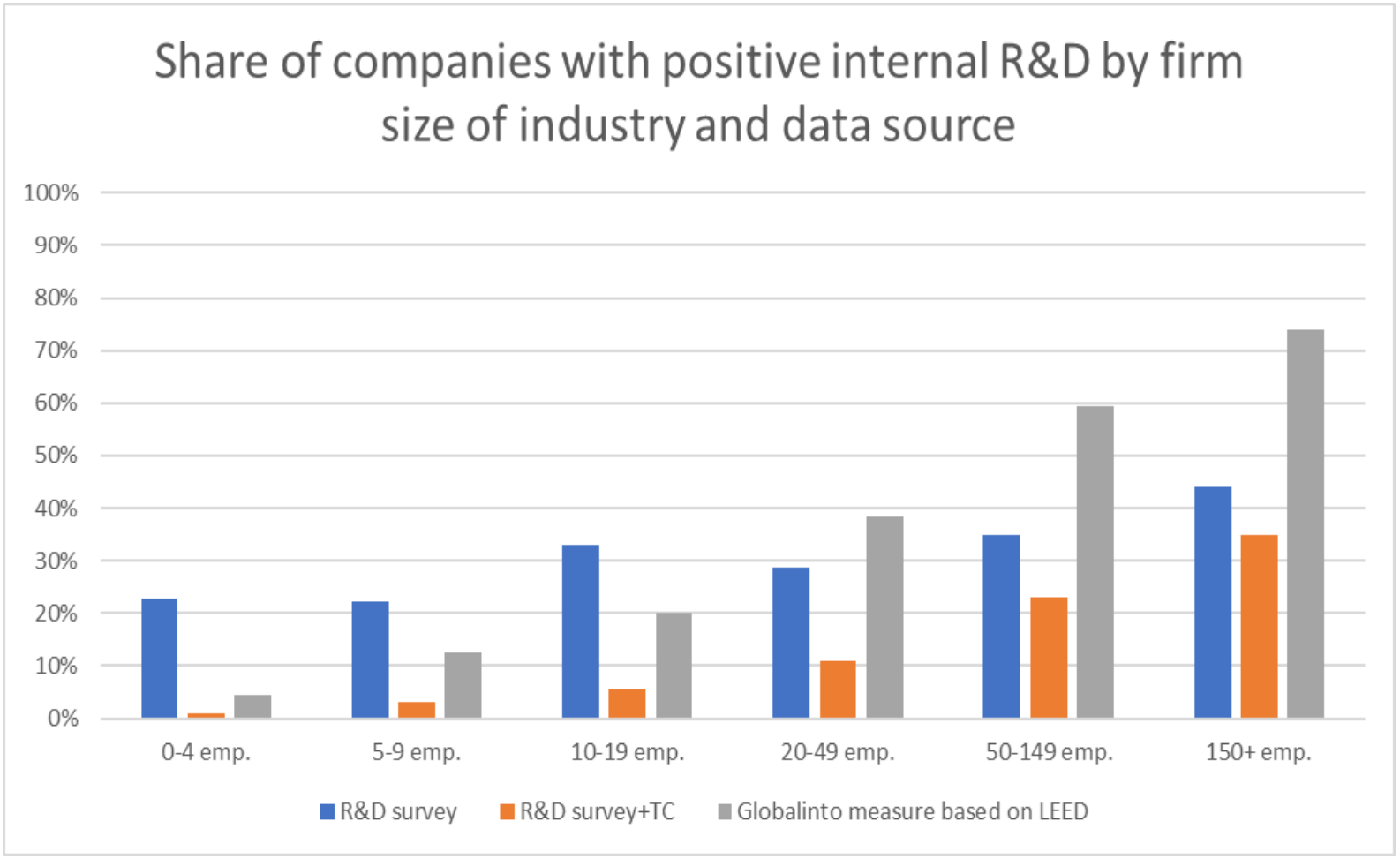
	Number of observations		
Year	R&D survey	R&D survey + TC	LEED data used in GLOBALINTO
2008	5568	8335	140791
2009	4392	7015	147621
2010	6118	8531	145696
2011	4566	7426	151622
2012	5853	8888	159801
2013	4415	7960	167237
2014	4443	8407	173728
2015	5089	9381	190045
2016	4535	8582	196853
2017	5527	8505	202722
2018	4940	8038	205073
2019	5773	8491	215394



Comparison between survey data and Globalinto data by type of industry

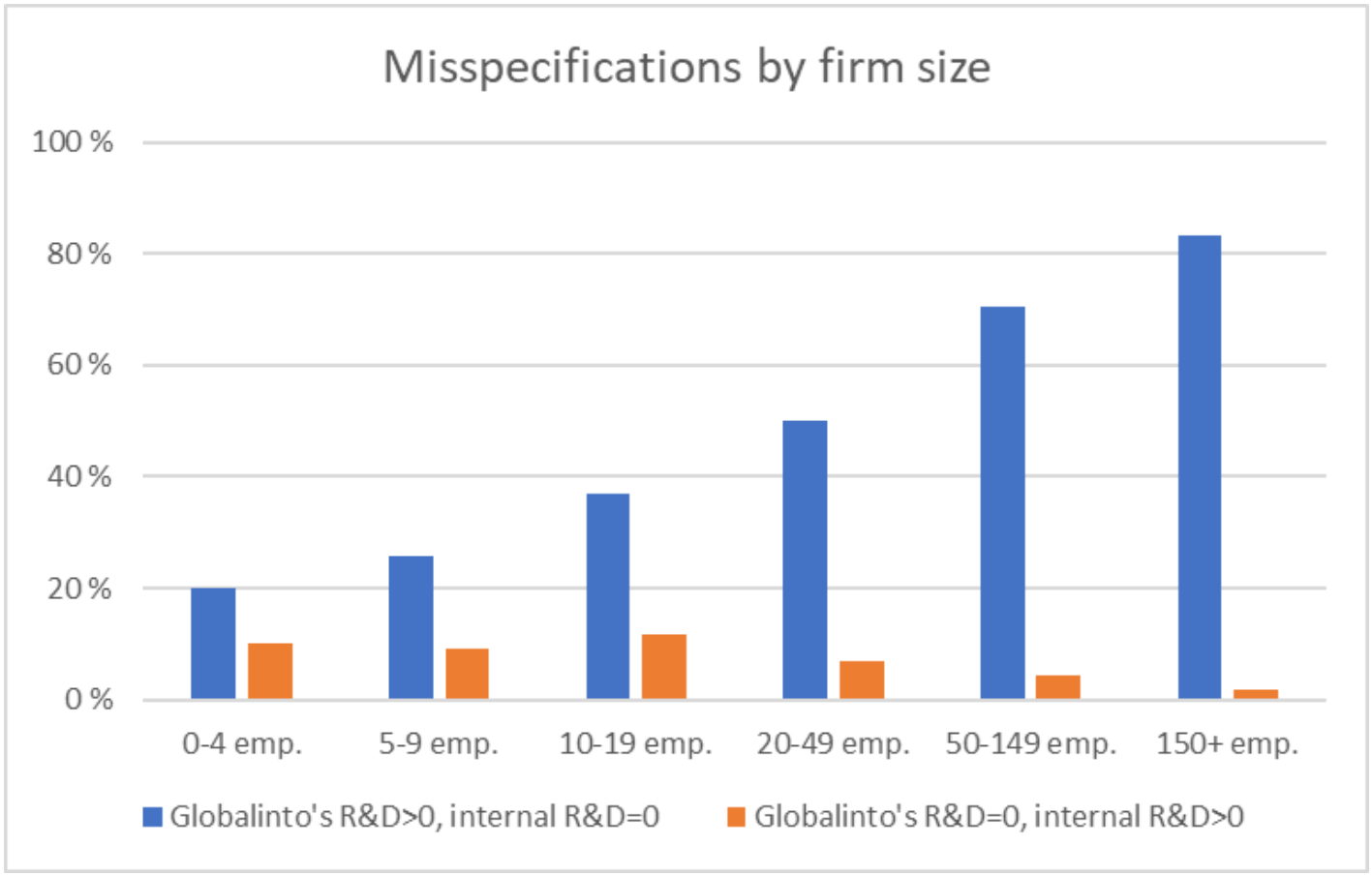


Comparison between survey data and Globalinto data by firm size



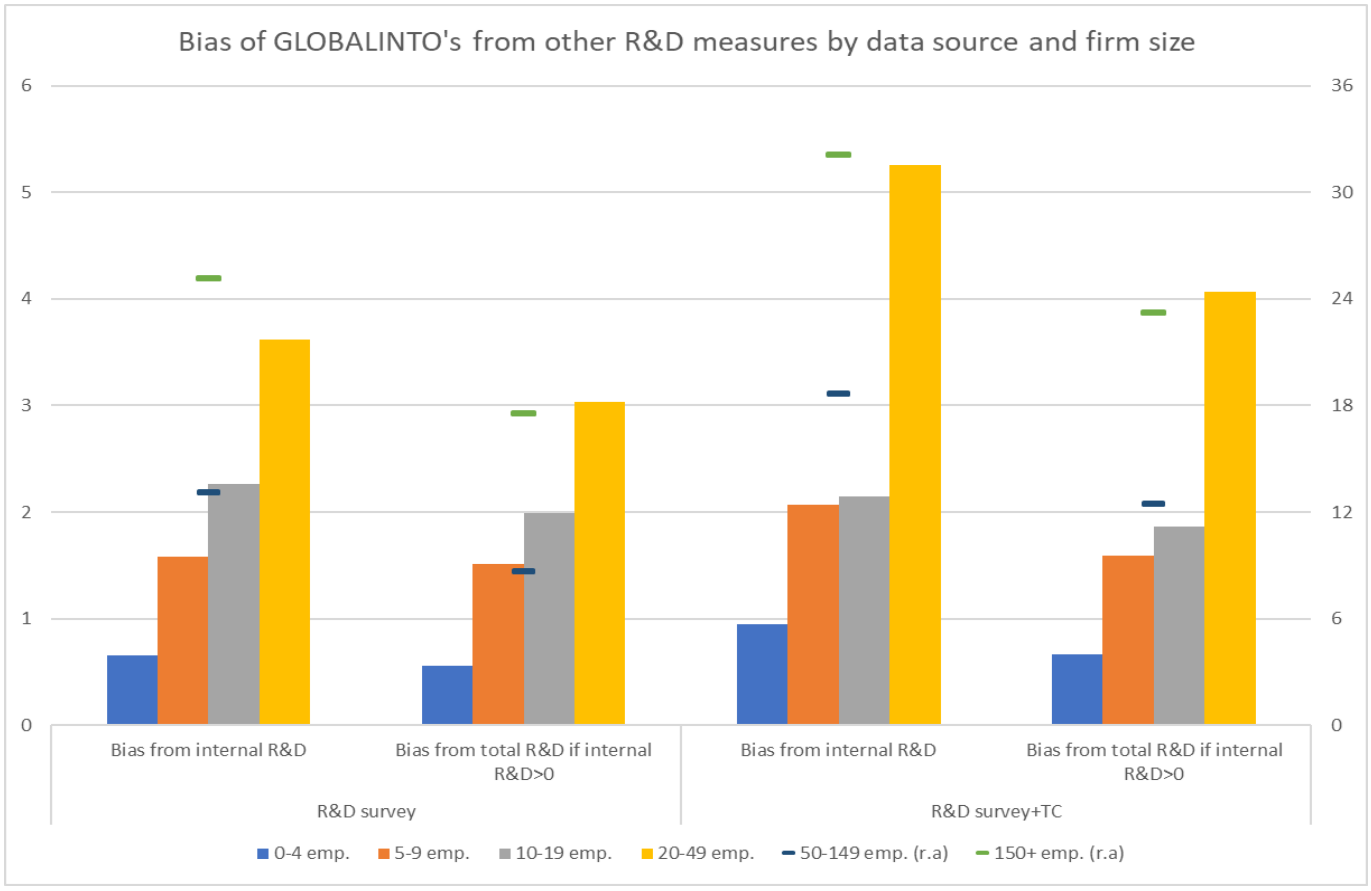
Comparison between survey data and Globalinto data by firm size-2

- GLOBALINTO's method is more generous in its R&D definition than R&D survey wrt. internal R&D
- This problem is less important for the small firms, but more serious the larger firms are
- The opposite misspecification in case of positive R&D in R&D survey is random



Comparison between survey data and Globalinto data by firm size-3

- GLOBALINTO's R&D measure based on labour costs (without applying factor multiplier of 0.7) is between 0.6-0.95 of observed internal R&D and between 0.6-0.7 of observed total R&D for the smallest firms (0-4 employees) and corresponds well with data reported in TC applications
- When applying factor multiplier of 0.7 for R&D labour costs, the GLOBALINTO's measure is close to observed R&D for firms with 5-9 and 10-19 employees
- The bias is serious for the larger firms



Discussion

- Goal was:
  - Investigate, whether it is possible to use constructed by GLOBALINTO measure of R&D investment (and potentially of other intangible assets) in NA
  - To compare definitions of R&D active firms based on GLOBALINTO with statistical data sources
  - To evaluate the scope of bias and applied factor multipliers

Methodological evaluation

- GLOBALINTO's method is restricted to identify the internal R&D activities only
- *Benchmarking the GLOBALINTO values to statistical R&D data*
  - GLOBALINTO's method is more "generous" in its R&D definition than R&D survey wrt. internal R&D
  - It works well for the smallest firms with 0-4 employees without correction for factor multiplier, and for the firms with 5-9 and 10-19 employees with correction for factor multiplier
  - The bias is more serios the large firms are
- Main conclusion:
  - GLOBALINTO's measure can be applied as a complementary source to official data on R&D for the analytical purposes
    - Provides full coverage of firms
    - However, the correction of factor multiplies should be considered to minimize the bias problem for the larger firms
  - and partly for statistical purposes
    - when it yields details for the small firms that are not covered by the R&D survey

Thank you for your attention!