

GLOBALINTO



Globalinto

Biannual Zoom Meeting 25.5.2021

Coordinator Hannu Piekkola University of Vaasa

Globalinto 2019-2022

New Intangibles for European Growth

<https://globalinto.eu/>

Funded by EU Horizon 2020 Programme (3 million €)

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**

Table 1. Intangible-worker occupation shares (without assessing the share of time devoted to innovative work)

Finland	Other with				Norway	Other with		
	OC worker	R&D worker	ICT worker	tertiary		OC worker	R&D worker	ICT worker
1999	4.3 %	11.7 %	2.9 %	8.1 %				
2000	4.7 %	11.8 %	2.9 %	8.3 %				
2001	4.9 %	11.7 %	3.2 %	8.9 %				
2002	4.9 %	12.1 %	3.0 %	9.3 %				
2003	4.6 %	12.5 %	3.0 %	10.0 %				
2004	4.2 %	11.3 %	3.1 %	10.8 %				
2005	4.5 %	10.9 %	3.1 %	11.5 %				
2006	4.8 %	10.5 %	3.1 %	12.2 %				
2007	5.0 %	10.3 %	2.9 %	13.0 %	2008	6.9 %	8.7 %	4.1 %
2008	5.0 %	10.5 %	3.0 %	13.8 %	2009	7.7 %	10.2 %	4.5 %
2009	5.2 %	10.4 %	3.3 %	14.6 %	2010	7.3 %	10.0 %	4.0 %
2010	3.9 %	10.3 %	4.4 %	15.1 %	2011	8.1 %	11.3 %	4.4 %
2011	3.9 %	10.1 %	4.4 %	15.6 %	2012	8.1 %	11.6 %	4.5 %
2012	3.9 %	10.3 %	4.4 %	15.6 %	2013	8.1 %	12.2 %	4.6 %
2013	3.9 %	10.4 %	4.3 %	16.1 %	2014	8.0 %	12.5 %	4.5 %
2014	3.8 %	10.2 %	4.3 %	16.8 %	2015	8.7 %	13.0 %	4.7 %
2015	3.9 %	10.3 %	4.0 %	17.4 %	2016	8.6 %	12.5 %	4.7 %
2016	3.9 %	10.2 %	4.0 %	18.0 %	2017	8.5 %	12.2 %	4.7 %
2017	3.8 %	10.1 %	4.3 %	18.3 %	2018	8.3 %	12.0 %	4.8 %
Average	4.4 %	10.8 %	3.6 %	13.6 %	Average	8.0 %	11.5 %	4.5 %

Denmark	Other with			Slovenia	Organizational Technical		
	OC worker	R&D worker	ICT worker		ISCO	ISCO	ICT isco
1999	5.4 %	10.6 %	3.1 %	2000	2.6 %	8.6 %	1.4 %
2000	5.0 %	10.1 %	3.2 %	2001	2.6 %	8.5 %	1.5 %
2001	4.7 %	9.5 %	3.1 %	2002	2.4 %	7.9 %	1.5 %
2002	4.6 %	9.7 %	3.1 %	2003	2.7 %	7.8 %	1.6 %
2003	4.4 %	9.3 %	2.8 %	2004	2.8 %	7.5 %	1.8 %
2004	4.7 %	9.4 %	3.4 %	2005	3.0 %	7.7 %	2.0 %
2005	5.2 %	10.1 %	3.6 %	2006	3.2 %	7.7 %	2.1 %
2006	5.0 %	10.0 %	3.4 %	2007	3.2 %	7.8 %	2.2 %
2007	5.0 %	8.9 %	3.5 %	2008	3.4 %	8.0 %	2.3 %
2008	5.0 %	9.1 %	3.5 %	2009	4.0 %	8.4 %	2.5 %
2009	6.3 %	10.7 %	4.4 %	2010	4.2 %	8.5 %	2.5 %
2010	6.6 %	11.9 %	5.4 %	2011	4.2 %	8.6 %	2.6 %
2011	6.1 %	11.7 %	5.5 %	2012	4.4 %	8.9 %	2.6 %
2012	6.2 %	11.7 %	5.5 %	2013	4.5 %	9.2 %	2.7 %
2013	6.5 %	12.2 %	5.7 %	2014	4.4 %	9.2 %	2.7 %
2014	6.1 %	11.5 %	5.4 %	2015	4.4 %	9.4 %	2.7 %
2015	6.1 %	11.6 %	5.5 %	2016	4.4 %	9.5 %	2.6 %
2016	6.6 %	12.4 %	5.6 %	2017	4.3 %	9.5 %	2.6 %
Average	5.5 %	10.5 %	4.1 %	Average	3.6 %	8.4 %	2.2 %

Table 1. Factor multipliers for one unit of labor costs in micro data

EU region	OC	R&D (M72)	ICT
Firm data: intangible labor cost multipliers			
Factor multiplier	1.76	1.55	1.48
Labor share	0.4	0.7	0.6
Total multiplier	0.70	1.1	0.9
Innodrive			
Factor multiplier	1.65	2.46	2.00
Labor share	0.4	0.7	0.6
Total multiplier	0.70	1.1	0.7

Table 2. Intangibles per employee, Number of employees and firms with at least 10 employees

Norway	ocasset_l	oc2asset_l	rndasset_l	ictasset_l	machstoc_l	builfstock_l	emp	No. of firms
2008	36.0	15.8	119.5	46.0	62.8	1249.9	865429	17774
2009	37.0	16.2	123.7	47.8	64.7	1069.3	833814	18038
2010	37.0	16.0	136.8	48.7	73.1	1107.8	971513	18364
2011	39.4	17.1	139.4	51.3	62.5	1699.1	883198	18307
2013	39.0	17.2	132.7	52.1	59.7	1549.2	939011	18186
2014	39.8	17.7	130.8	53.0	58.3	1676.5	953446	17986
2015	38.6	17.2	133.2	52.6	56.7	1198.2	896011	17760
2016	40.4	17.8	138.0	53.9	55.2	1198.6	875346	17528
2017	39.0	17.2	132.6	51.6	49.4	1100.2	881682	16889
2018	39.8	17.3	133.2	51.7	49.5	987.4	881333	16270
Average	38.7	17.0	132.2	50.9	59.5	1331.1	899651	17761
Finland	ocasset_l	oc2asset_l	rndasset_l	ictasset_l	machstoc_l	builfstock_l	emp	No. of firms
1999	15.2	6.1	41.8	4.0	82.2	81.2	727894	13009
2004	17.2	6.6	44.5	5.2	124.6	130.3	827847	14041
2008	17.9	6.8	44.9	5.5	95.7	104.4	977099	15800
2009	18.1	6.7	45.9	5.8	91.9	106.5	949850	15900
2010	16.8	5.9	46.1	6.9	86.6	105.3	968429	16000
2011	15.9	5.5	46.1	7.5	82.9	103.0	996028	16200
2013	15.4	5.4	47.2	8.0	103.6	120.5	973205	16400
2014	15.4	5.3	47.6	8.1	119.8	128.5	980394	16400
2015	15.0	5.3	47.4	7.9	131.9	132.1	989236	16400
2016	14.5	5.1	46.5	7.8	142.6	135.2	1007799	16400
2017	13.5	4.8	45.8	7.7	146.1	123.4	1005398	16350
Average	16.4	6.1	45.0	6.2	107.8	113.3	911545	15473
Denmark	ocasset_l	oc2asset_l	rndasset_l	ictasset_l	machstoc_l	builfstock_l	emp	
1999	7.3	3.4	46.6	2.1	82.0	80.2	728332	
2004	9.6	4.5	51.1	2.4	124.1	128.6	827614	
2008	11.3	5.2	54.1	2.2	95.1	102.0	977429	
2009	11.6	5.2	55.6	2.5	91.5	104.2	949460	
2010	11.1	4.8	52.4	5.0	86.1	102.9	968228	
2011	10.8	4.7	49.8	6.4	82.5	100.7	994445	
2013	10.9	4.7	47.5	8.0	103.1	118.1	970014	
2014	10.5	4.4	46.7	8.3	118.9	125.0	980095	
2015	10.2	4.3	45.2	8.4	130.5	125.3	988126	
2016	9.7	4.1	43.4	8.3	139.6	123.2	1002736	
Average	10.0	4.5	49.8	4.3	105.0	109.9	905582	

OECD CLASSIFICATION BY TECHNOLOGICAL LEVEL + IA PRODUCING SERVICES (Carter)

1 HIGH-TECHNOLOGY MANUFACTURING

Hightech=Manufacture pharmacy 21, computer, electronic and optical products 26)

Medhtech=Manufacture chemical 20, electrical equipment 27, machinery and equipment 28 motor vehicles 29 other transport 30

2 LOW-TECHNOLOGY MANUFACTURING

Medltech=Manufacture coke and refined petroleum products 19, rubber and plastic products 22 other non-metallic mineral 23 basic metals 24 fabricated metal products repair and installation of machinery and equipment 33-35 energy

Lowtech=Manufacture food 10 beverages 11 tobacco 12 textiles 13 wearing apparel 14 leather 15 wood and wood product 16 paper, paper products 17 printings 18, furniture 31 & other manufacturing 32

*Knowledge intensive sectors

3 KNOWLEDGE INTENSIVE SERVICES (KIS)

Other KIS=water transport 50 air transport 51 publishing 58 motion picture 59 programming, broadcasting 60, telecommunication 61 finance 64-66 other professional activities 74, veterinary activities 75, employment 78 security and investigation 80 public administration O, education P human health Q arts, entertainment and recreation R

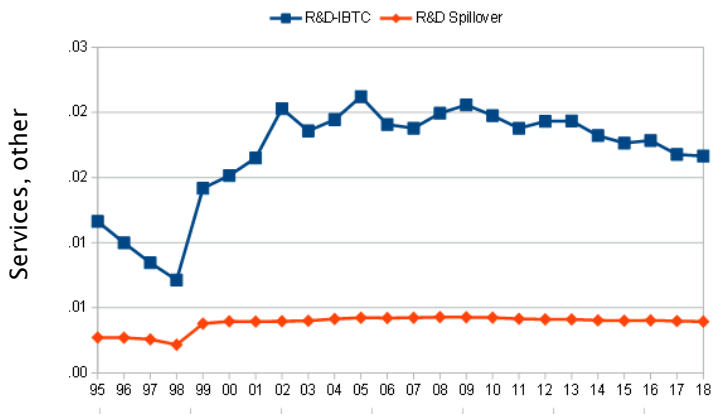
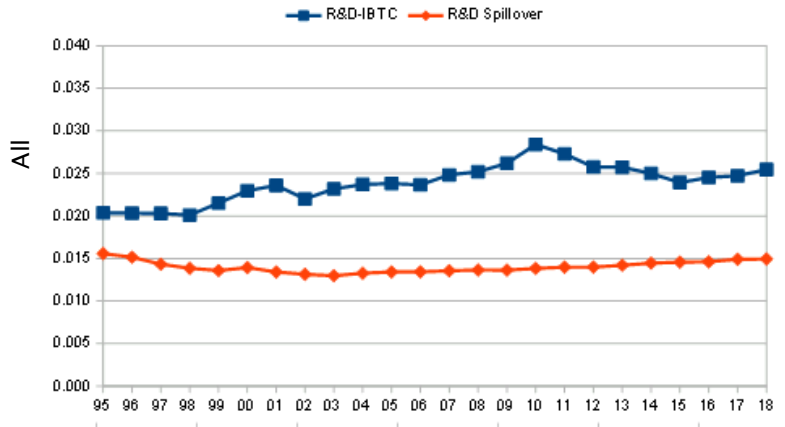
ICT service= computer programming, consultancy 62 information service activities 63

R&D and Engineering service= architectural, engineering 71, R&D 72

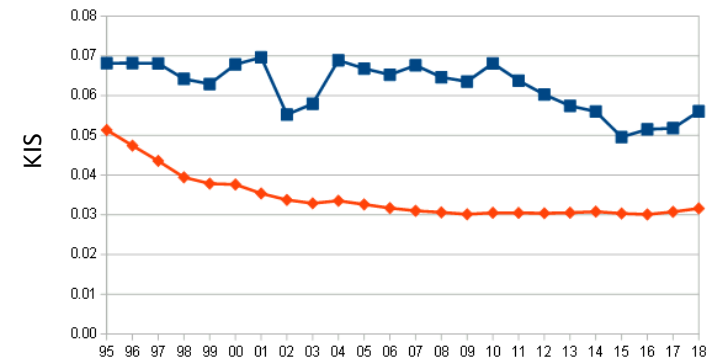
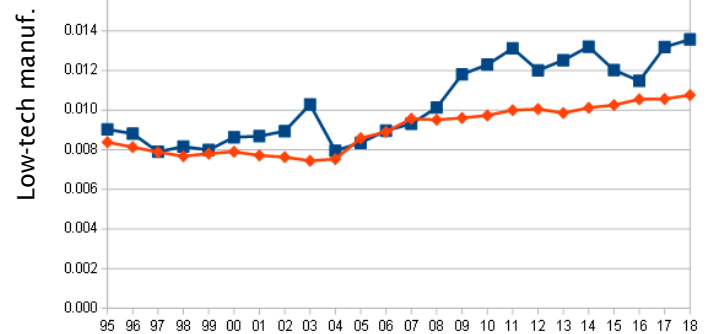
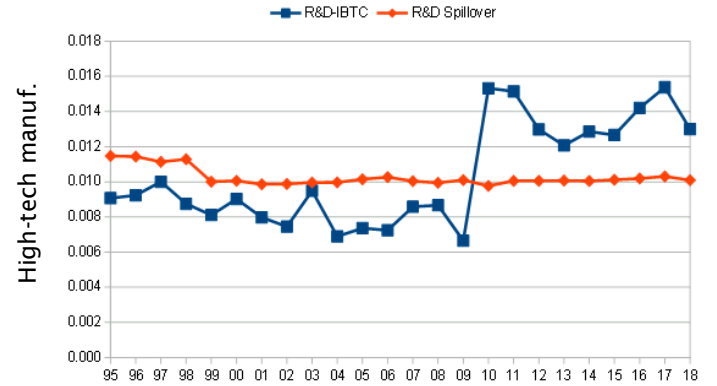
Management service= legal 69 head office 70 advertising and market research 73

4 SERVICES OTHER wholesale trade 45-47, land transport 49, warehouse and support activities 52, postal 53 accommodation 55 food and beverage 56 real estate 68 rental and leasing 77, travel agency 79 services to buildings, landscape 81 office administrative support 82, other service activities S

R&D-IBTC Finland

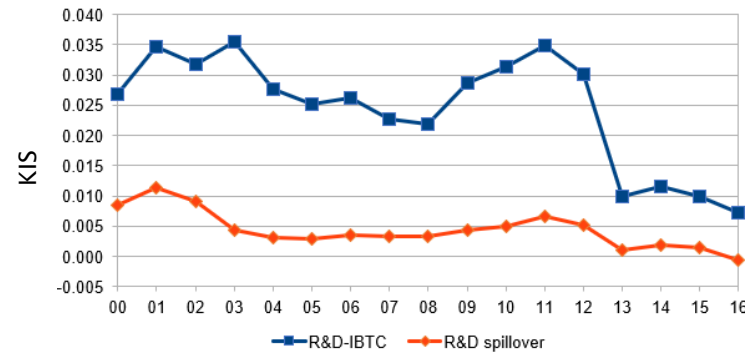
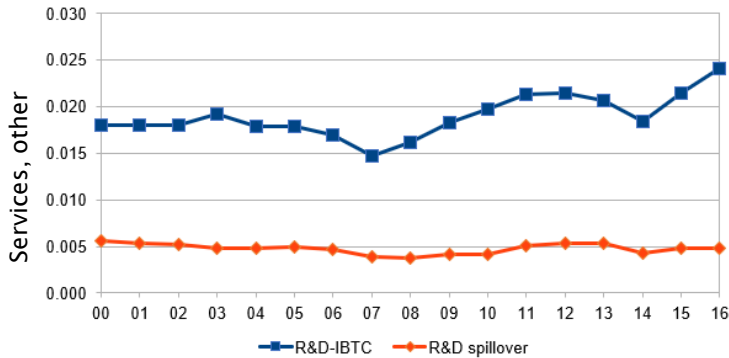
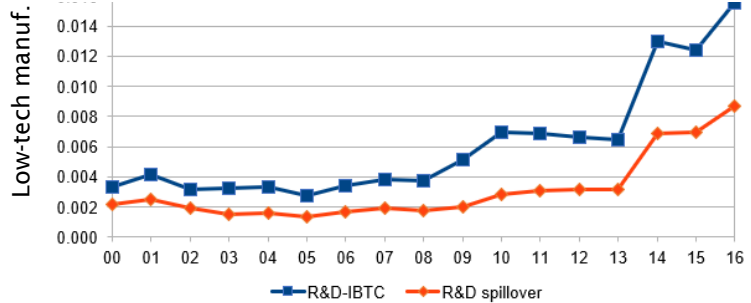
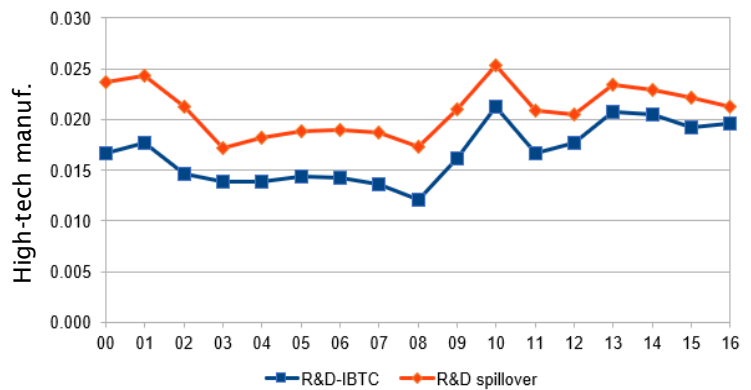
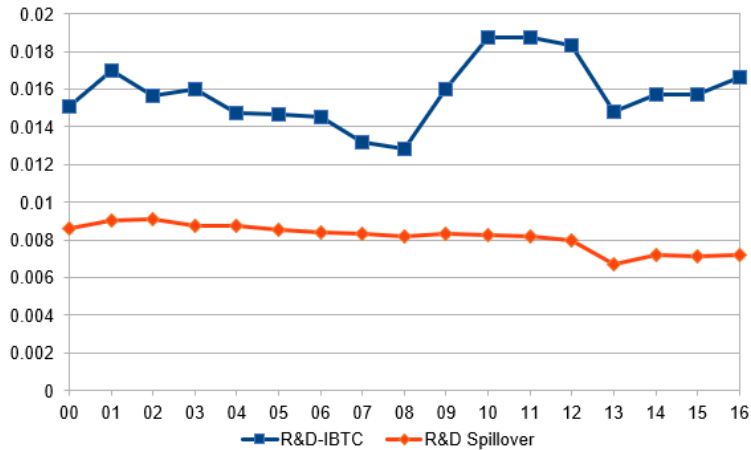


Overall increase, KIS down, other increase



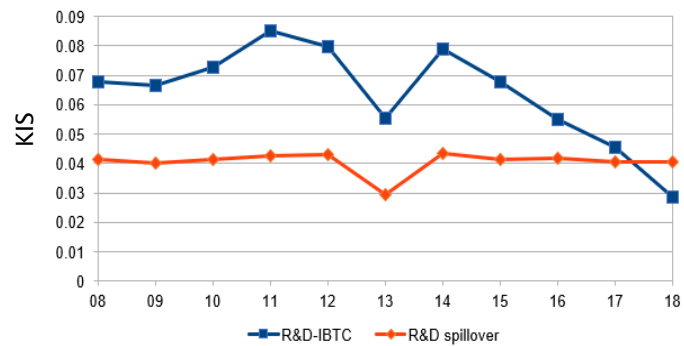
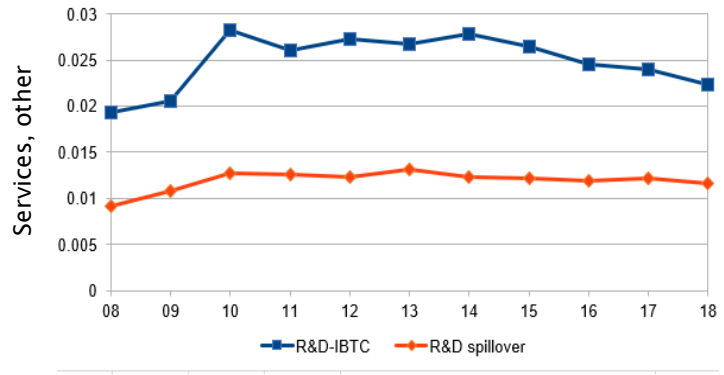
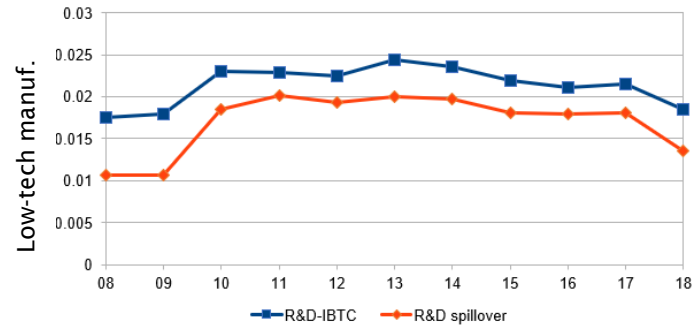
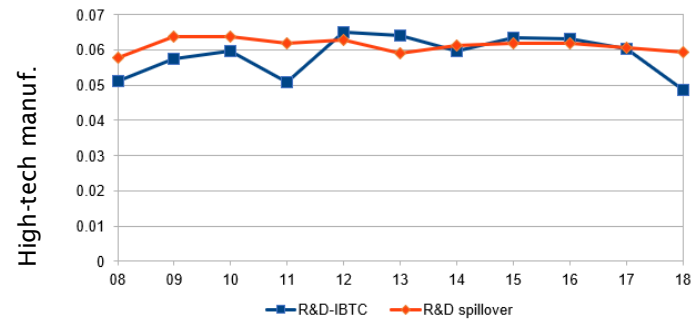
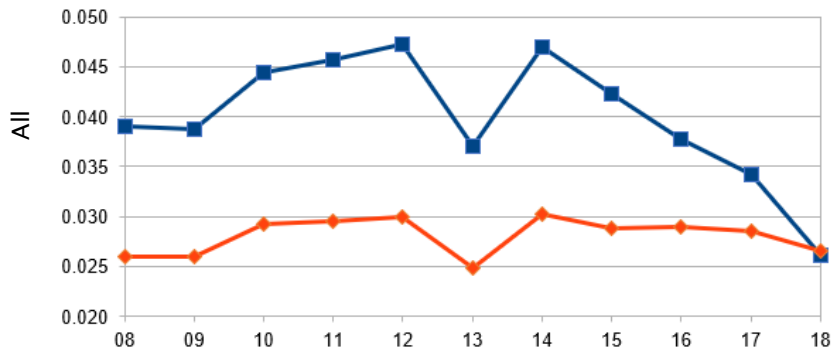
R&D-IBTC Denmark

All



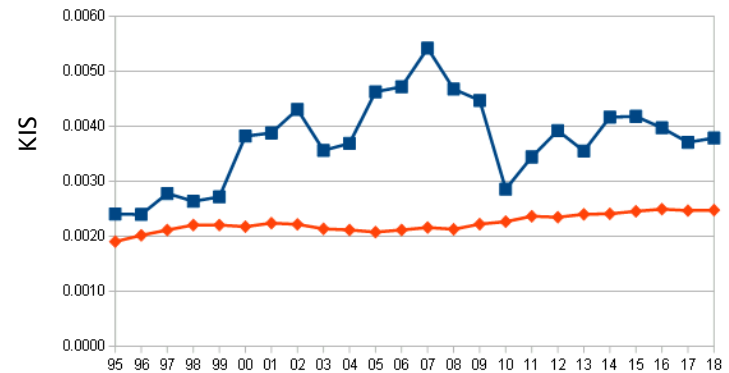
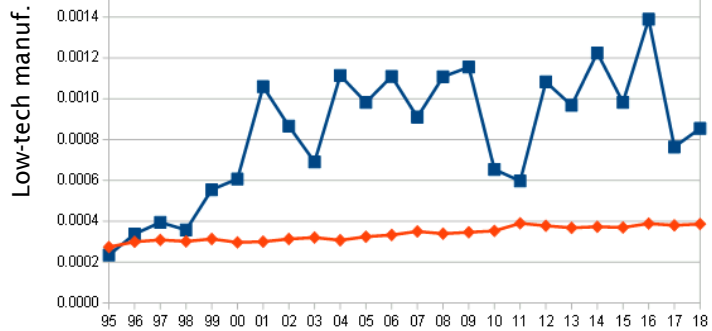
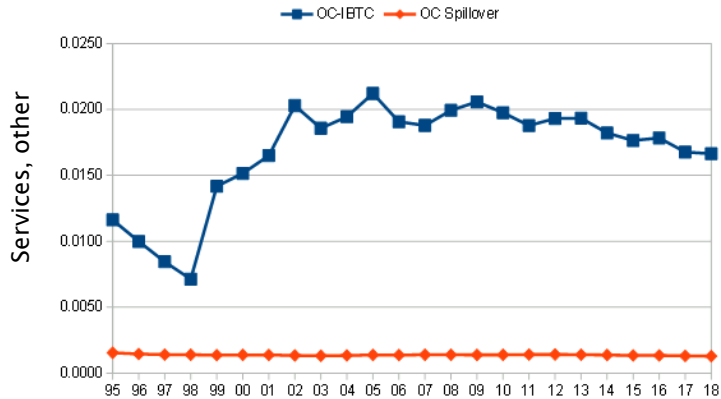
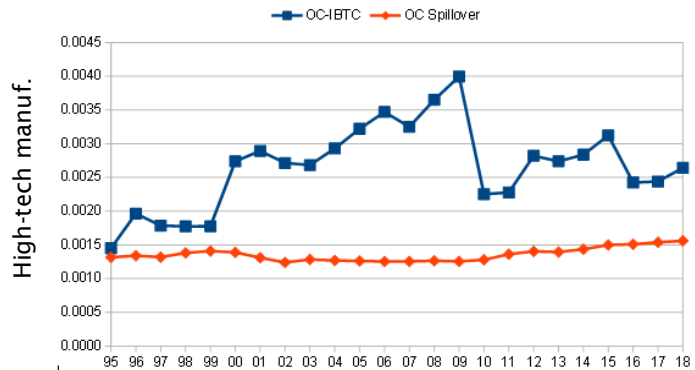
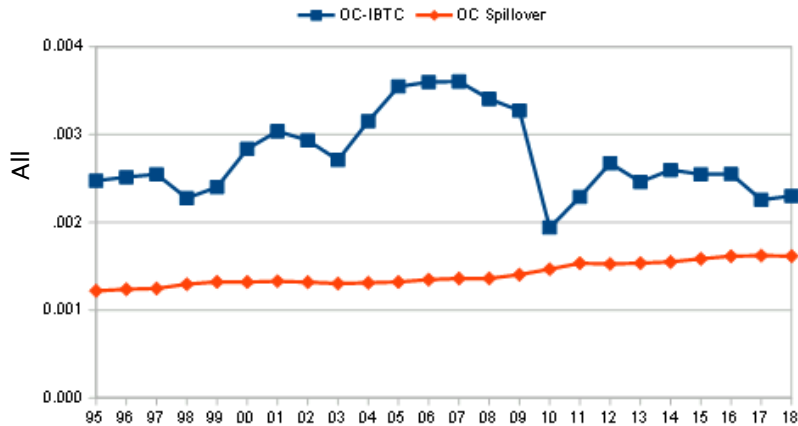
Overall slight increase, KIS down, other increase

R&D-IBTC Norway (fewer obs)



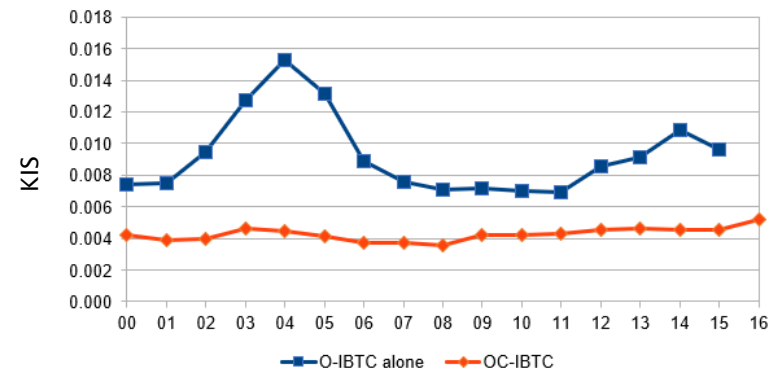
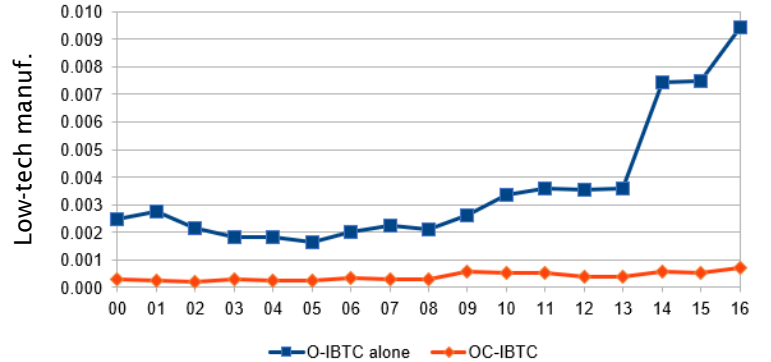
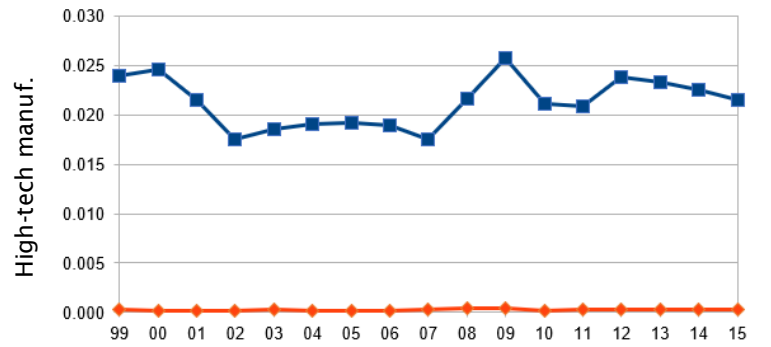
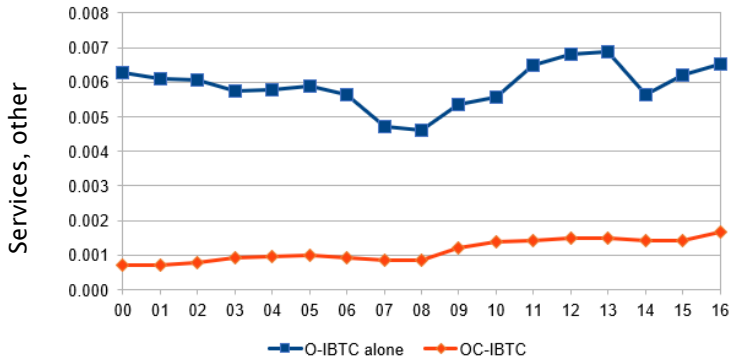
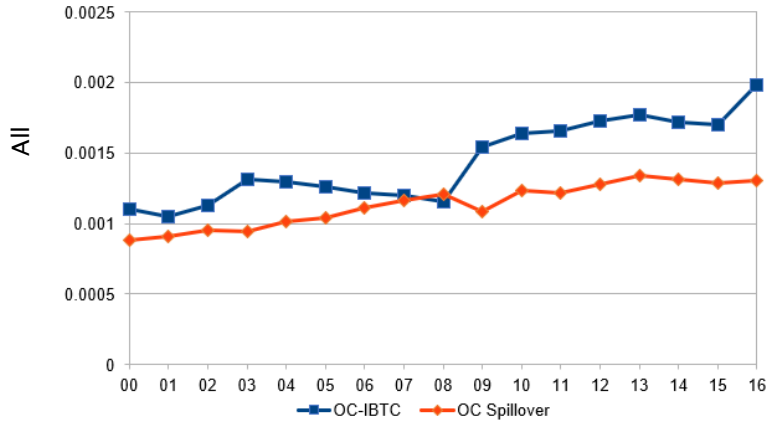
Overall stable, KIS down, other stable

OC-IBTC Finland



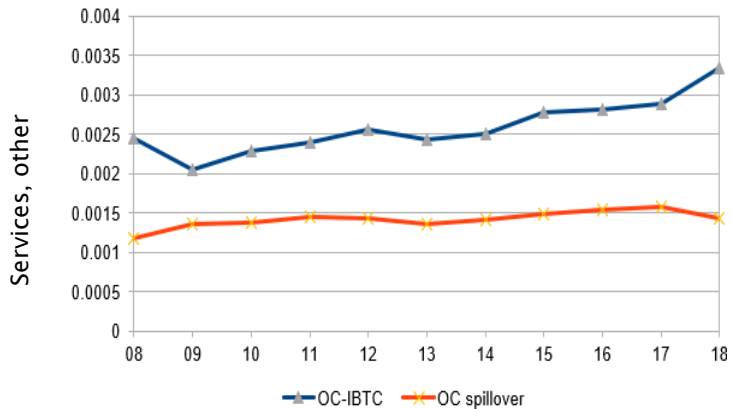
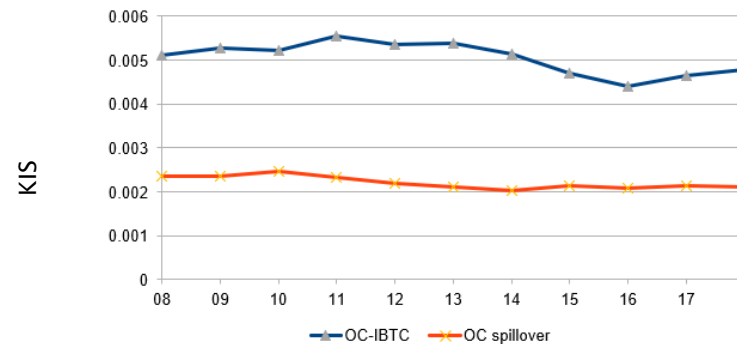
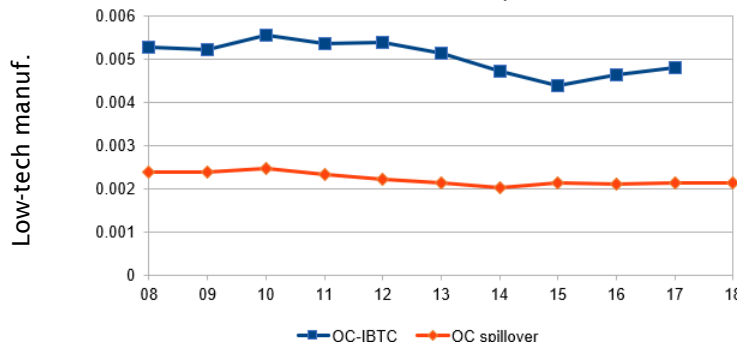
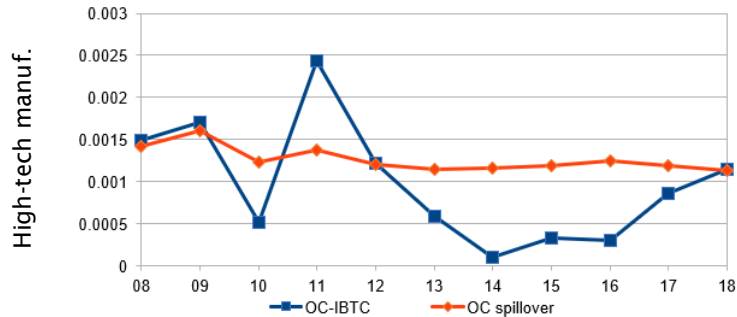
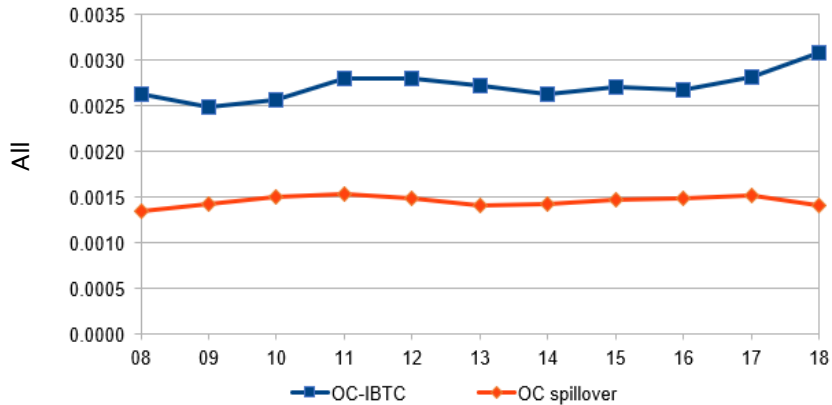
Overall peak 2005-09, volatile increase

OC-IBTC Denmark



Overall increase, low-tech manu increase

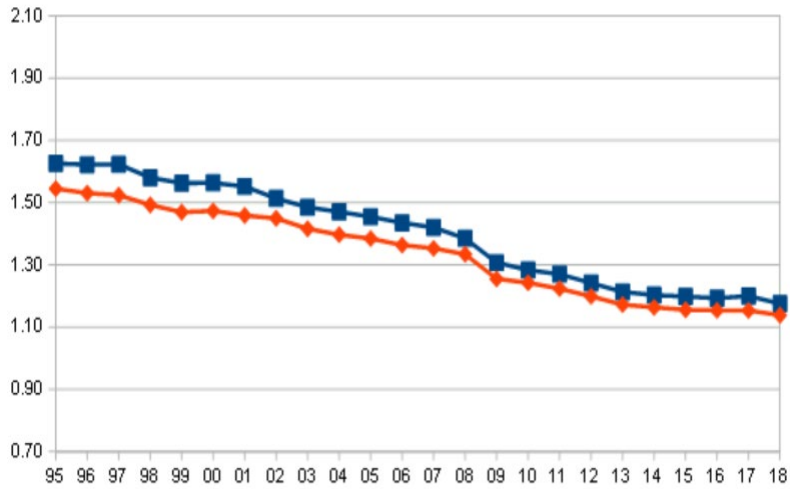
OC-IBTC Norway



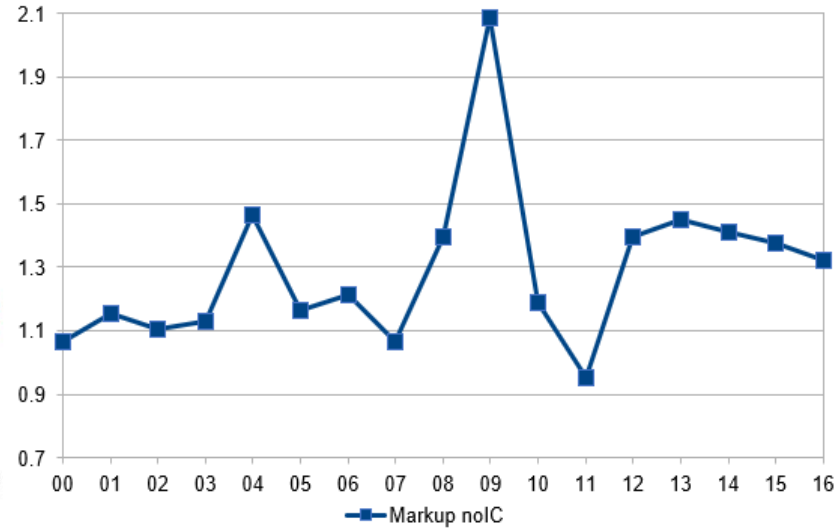
2.6.2 Overall increase, high-tech manuf, KIS decrease

Markup Finland

■ Markup no IC ◆ Markup IC



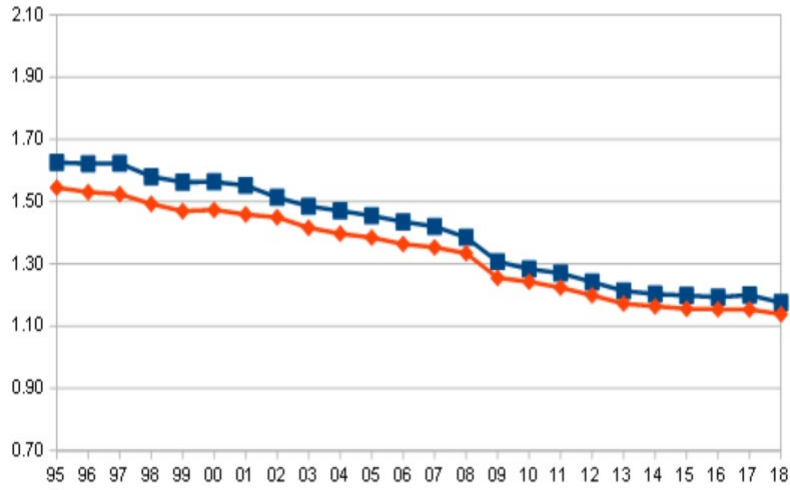
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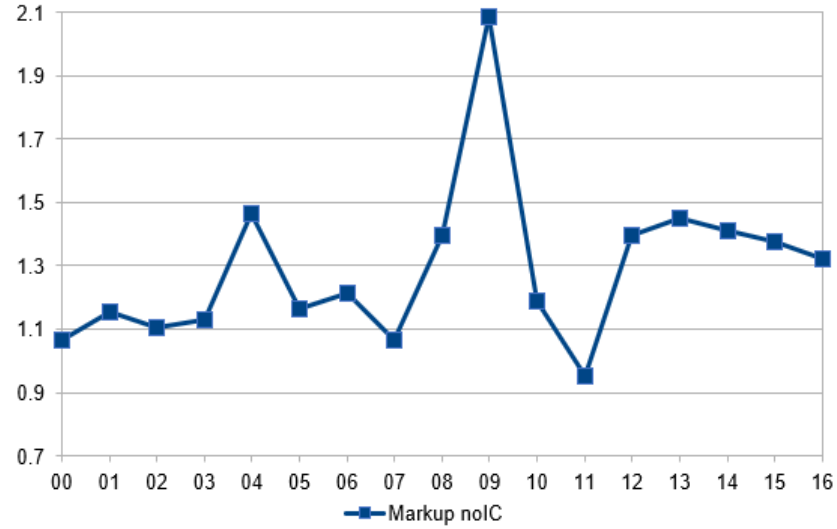
KIS

Markup Finland

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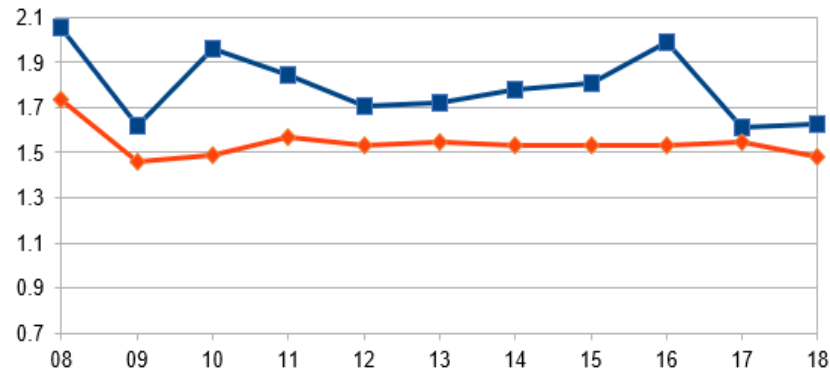


Markup Denmark



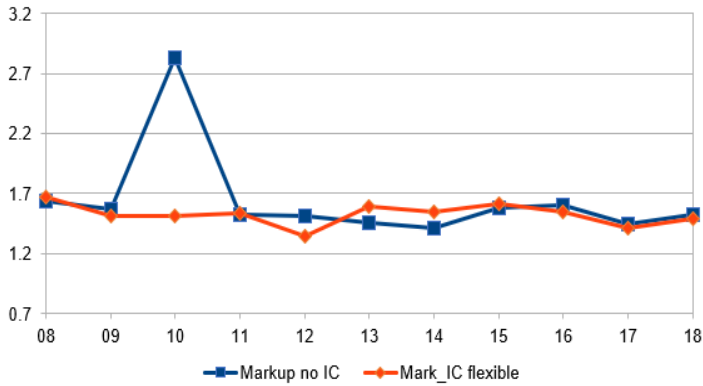
Markup Norway

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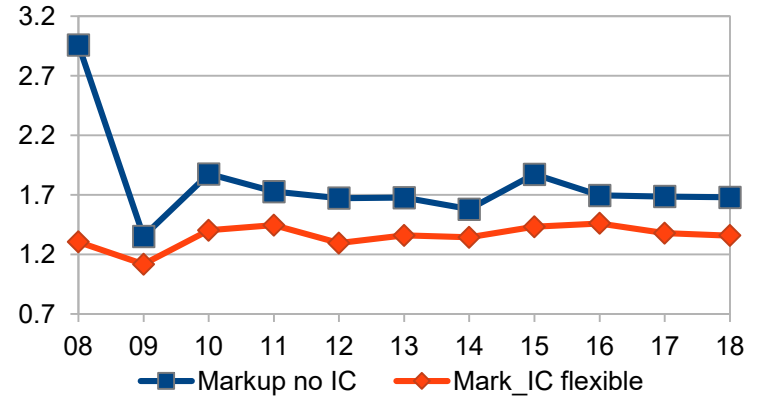
Higher decreasing trend in Finland than in Denmark and Norway (Norway excludes soci.sec. expenses by now)

High-technology manufacturing

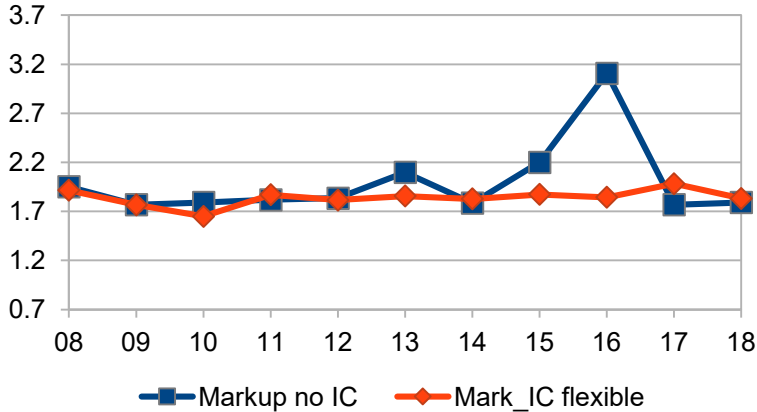


Norway Markups

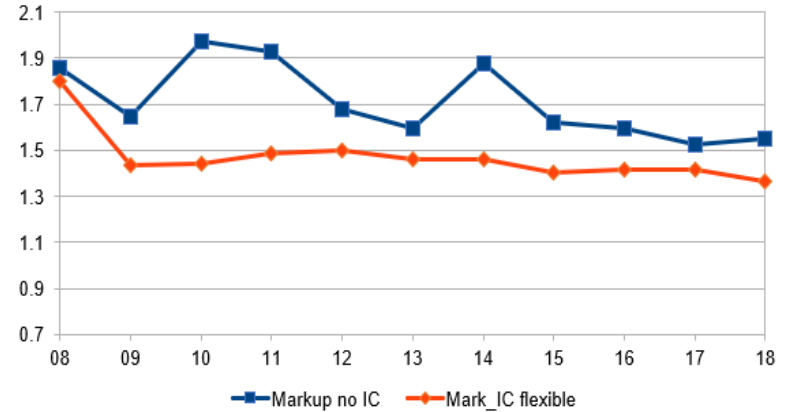
Low-technology manufacturing



KIS



Services other



Inclusion of IC: markups highest in High-tech manu and KIS

Finland

Denmark

Variable	Mean	Median	Std	N	Mean	Median	Std	N
Value added/L	2576.0	60.9	23478.0	225012	119.0	80.2	4727.0	149892
OC/L	18.0	9.6	51.3	123880	18.9	12.4	59.7	91267
R&D/L	42.8	18.7	262.0	157541	130.0	59.6	455.0	71644
ICT/L	15.9	4.3	68.8	57392	44.5	8.6	155.0	31576
K/L	229	66	1773	225012	0	0	0	0
Export/Sales	0.16	0.01	1.84	94978	0.88	0.89	0.11	149892
Output elasticity of employment (excl. IA work)	0.60	0.61	0.22	225012	0.02	0.02	0.16	149892
Output elasticity of R&D asset	0.03	0.03	0.08	225012	-1.64	-1.46	2.63	149892
Output elasticity of relative quality of R&D work	0.09	0.31	2.80	225012	0.01	0.01	0.04	149892
Output elasticity of OC asset	0.09	0.08	0.13	225012	-1.47	-1.43	3.97	149892
Output elasticity of relative quality of OC work	1.07	0.86	4.27	225012	0.08	0.07	0.08	149892
Output elasticity of capital	0.05	0.04	0.07	225012	0.99	0.89	0.62	69490
Initial relative quality (wages) of R&D work	2.80	2.00	2.80	57681	1.08	1.04	0.53	88735
Initial relative quality (wages) of OC work	4.28	2.69	5.11	50279	0.97	0.99	0.10	26094
Relative quality of R&D work	1.20	1.03	5.05	49043	0.982	0.993	0.113	47602
Relative quality of OC work	1.160	1.030	2.200	46050	-0.005	0.000	0.017	26094
R&D-IBTC	0.013	0.001	0.048	49043	-0.001	0.000	0.002	47602
OC-IBTC	0.003	0.000	0.020	46050	-0.001	0.000	0.008	149892
R&D-IBTC+R&D spillover	0.006	0.000	0.029	225012	0.000	0.000	0.001	149892
OC-IBTC+OC spillover	0.001	0.000	0.010	225012				

Variable	Mean	Median	Std	N
Value added/L	174.0	113.0	481.0	14379
OC/L	47.3	34.0	60.4	14379
R&D/L	158.0	65.3	293.0	14379
ICT/L	35.5	8.9	65.4	14379
Output elasticity of employment (excl. IA work)	0.89	0.90	0.24	14379
Output elasticity of R&D asset	0.02	0.02	0.10	14379
Output elasticity of relative quality of R&D work	0.58	0.78	2.59	14379
Output elasticity of OC asset	0.05	0.02	0.28	14379
Output elasticity of relative quality of OC work	0.22	0.60	5.48	14379
Output elasticity of capital	0.03	0.02	0.05	14379
Initial relative quality (wages) of R&D work	1.91	2.10	0.49	14379
Initial relative quality (wages) of OC work	1.65	1.45	0.49	14379
Relative quality of R&D work	1.09	1.03	0.63	14379
Relative quality of OC work	0.954	1.010	1.570	14379
R&D-IBTC	0.036	0.002	0.101	14379
OC-IBTC	0.001	0.000	0.012	14379
R&D-IBTC+R&D spillover	0.064	0.026	0.116	14379
OC-IBTC+OC spillover	0.003	0.002	0.014	14379

Relative R&D wages to avg wage median
FIN 2 . Demark 0.89, Norway 1.03

Policy considerations



Broad set of intangibles

- Productivity puzzle of labor productivity:
Micro: division to IBTC and markups
 - Finland markup goes down while R&D-IBTC goes up
R&D-IBTC very high in KIS but decreasing
 - Denmark markup and IBTC flatter
R&D-IBTC not different in KIS and decreasing
 - Norway R&D-IBTC relative flat, in KIS decreasing
 - OC-IBTC generally increasing
- Growth accounting
- International competition and the role of structural capital such as R&D and in OC and their relation
- Role of general knowledge such as ICT and how Covid has changed the role of digitalization

Policy considerations

Increasing role of knowledge intensive services (KIS)

- The way how KIS is linked to intangibles of manufacturing and other industries.
- Expansion of KIS in Nordic countries and elsewhere, but decreasing R&D-IBTC

Investment in intangible commons, see following present.

- Infrastructural investment in connecting people
- Smart specializatoion
- Regions specialize in certain industries in exports.
- Balanced growth across regions



Policy considerations

Policies to foster growth of SMEs.

- SMEs rely on their growth to IBTC and are especially dependent on knowledge spillover in their industry

Tangible investment and growth

- too little or misallocation across sectors

Regulation and innovative growth – Porter hypothesis.

- Well-designed environmental regulation leads to both environmental and private economic gains
- Sustainability

