



Intangibles, Global Value Chains and Productivity Growth – New evidence and perspectives Workshop 23.11.2021

Globalinto 2019-2022

New Intangibles for European Growth

<https://globalinto.eu/>

Funded by EU Horizon 2020 Programme (3 million €)

Continuation of FP7th Framework Innodrive, Coinvest 2008-2011



Workshop Program: Micro, Macro, Meso levels

14:00-14:20 Welcome and introduction. Hannu Piekkola, Professor, University of Vaasa, GLOBALINTO Coordinator

14:20-14:55 Intangible Capital and Labor Productivity Growth: Revisiting the Evidence. Felix Roth, Senior Research Fellow, Chair for International Economics, University of Hamburg

14:55-15:30 Business intangibles in global value chains: In search of export competitive advantage. Aggelos Tsakanikas, Associate Professor, Director of the Laboratory of Industrial and Energy Economics, National Technical University of Athens

15:30-16:00 Intangibles and agility in the COVID crisis, analysis and policy implications. Ahmed Bounfour, Professor, European Chair on Intangibles, University of Paris-Saclay

Nova Spectrum Immateriale Capitale



- (1) Knowledge deficiency on economic competencies hampers efficient innovation policies.**
 - (1) Intangibles such as organizational capital 1/3 of R&D in Nordic countries**
 - (2) The research based on the new GLOBALINTO – data to understand reasons for TFP slowdown.**
 - (2) Digitalization as the critical driving force especially for SMEs’ cooperative and knowledge sourcing strategies**
General purpose ICT
 - (3) Intangibles replacing non-sustainable inputs: a first-mover advantage by becoming “green” in many industries**
 - (4) High depreciation of intangibles**
 - **Becoming obsolete or intangible commons?**
 - **Show a rate at which valuable intangibles translate into public or general knowledge losing its private value**

(1) Broad measures of intangibles (IAs) using full register-based occupational data approach that originates from Innodrive (EU FP 7th framework project 2008-2011)

(2) Structural capital Organizational capital (OC) such as management and marketing 1/3 of R&D (Globalinto, Innodrive)

(3) Quality of innovative work *

(1) Innovation-labor biased technical change IBTC, an extension to Hellerstein et al. (1999) and Ilmakunnas and Piekkola (2014 J Prod Growth)

(2) Markups = output elasticity – labor cost share of valued added, for flexible workers (other than IA workers with high fixed costs)

*Piekkola (2020) Intangibles and Innovation-labor-biased technological change Journal of Intellectual Capital, Piekkola, Bloch, Derek, Rybalka (2020) Intangibles from innovative work – their valuation and technological change, Paper presented at IARIW-ESCoE Conference London 11.11.2021 and Globalinto Delivery 5.3

Box 1 GLOBALINTO Intangibles Assets occupations (based on ISCO08 Occupation classification)

1 Managers	216 R&D Architects, Planners, Surveyors and Designers
112 OC Managing Directors and Chief Executives	22 Health Professionals
12 OC Administrative and Commercial Managers	221 R&D Medical Doctors
121 OC Business Services and Administration Managers	222 R&D Nursing and Midwifery Professionals
122 Sales, Marketing and Development Managers	223 Trad. and Complementary Medicine Professionals; 224 Paramedical Practitioners
1221 OC Sales and Marketing Managers	226 R&D Other Health Professionals
1222 OC Advertising and Public Relations Managers	23 Teaching Professionals
1223 R&D Research and Development Managers	24 Business and Administration Professionals
13 Production and Specialized Services Managers	241 OC Finance Professionals
131 OC Production Managers in Agriculture, Forestry and Fisheries	242 OC Administration Professionals
132 OC Manufacturing, Mining, Construction and Distribution Managers	243 Sales, Marketing and Public Relations Professionals
133 ICT Information and Communications Technology Services Managers	25 ICT Information and Communications Technology Professionals
134 OC Professional Services Managers	26 Legal, Social and Cultural Professionals
14 Hospitality, Retail and Other Services Managers	3 Technicians and Associate Professionals
2 Professionals	31 Science and Engineering Associate Professionals
21 Science and Engineering Professionals	311 R&D Physical and Engineering Science Technicians
211 R&D Physical and Earth Science Professionals	312 Mining, Manufacturing and Construction Supervisors;
212 R&D Mathematicians, Actuaries and Statisticians	313 Process Control Technicians
213 R&D Life Science Professionals	314 R&D Life Science Technicians and Related Associate Professionals
214 R&D Engineering Professionals (excluding Electrotechnology)	315 Ship and Aircraft Controllers and Technicians
215 R&D Electrotechnology Engineers	32 Health Associate Professionals
2151 Electrical Engineers	321 R&D Medical and Pharmaceutical Technicians
2152 R&D Electronics Engineers R&D	33 Business and Adm. Associate Professionals;
2153 ICT Telecommunications Engineers	34 Legal, Social, Cultural Associate Professionals;
	35 ICT Information and Communications Technicians

Table 2. Intangible stocks per employee, thousand 2015€

Year	OC/L	R&D/L	ICT/L	All	OC/L	R&D/L	ICT/L	All
	Finland				Denmark			
2000	16.6	43.8	5.1	65.6	8.0	50.1	2.1	60.2
2002	16.4	42.6	5.0	63.9	9.1	48.6	2.2	60.0
2004	16.1	44.3	5.4	65.8	9.6	51.1	2.4	63.1
2006	16.0	43.9	5.6	65.5	10.5	52.7	2.3	65.6
2008	16.0	45.5	5.3	66.8	11.3	54.1	2.2	67.6
2010	14.8	47.0	6.8	68.6	11.1	52.4	5.0	68.5
2012	13.4	47.0	7.6	67.9	10.6	47.8	7.2	65.7
2014	13.0	48.3	7.9	69.2	10.5	46.7	8.3	65.5
2016	12.1	47.4	7.9	67.4	9.7	43.4	8.3	61.5
2018	10.8	45.9	7.7	64.3				
	Norway				Slovenia			
2000					7.3	46.6	2.1	56.1
2002					8.7	46.9	1.9	57.5
2004					8.6	50.6	2.4	61.7
2006					9.7	53.0	2.4	65.1
2008	20.2	54.2	10.9	85.2	11.3	54.8	2.2	68.4
2010	22.3	64.5	10.5	97.3	11.6	55.6	2.5	69.7
2012	25.3	71.2	11.7	108.2	10.8	49.8	6.4	66.9
2014	27.1	74.8	12.2	114.0	10.9	47.5	8.0	66.4
2016	28.1	77.4	12.8	118.3	10.2	45.2	8.4	63.8

R&D per employee highest 76.2 thousand € in Norway 2018. Other countries around 43-45 thousand € in 2016-18, covers about 80% of firms

Finland has higher OC intensity than Denmark or Slovenia despite lower share of OC workers, but in Norway OC per employee are highest around 27 thousand € in 2018.

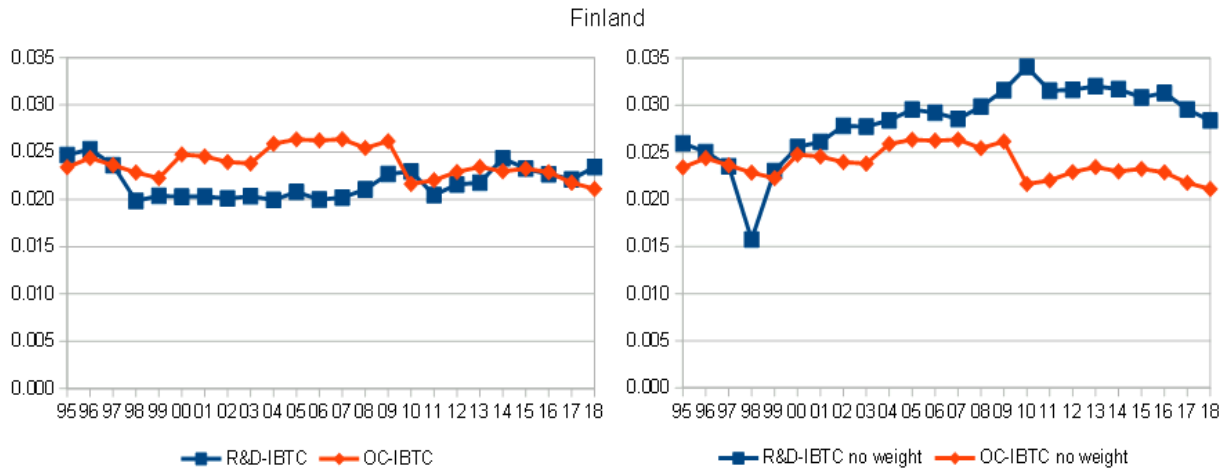
Economic competences (incl. OC here) would be the largest subcategory of intangible investment in many other studies (Bloom and Van Reenen, 2010, Piekkola, 2016), here narrow definition

Note: Variation higher in Knowledge Intensive Services

Quality and types of intangibles matter

- Innovation work causes “innovation-labor biased technical change”
- OC-IBTC organizational change, marketing innovations
- R&D-IBTC new product and process innovations
 - Finland, Norway, Slovenia and Denmark: robust development of technical improvement over time that did not slow down during financial crises or after
- Intangibles increase markups
- Knowledge business services major source of intangibles

Figure 4. R&D-IBTC and OC-IBTC: RHS with no turnover weight reflect SMEs (all firms with at least 5 workers are included)

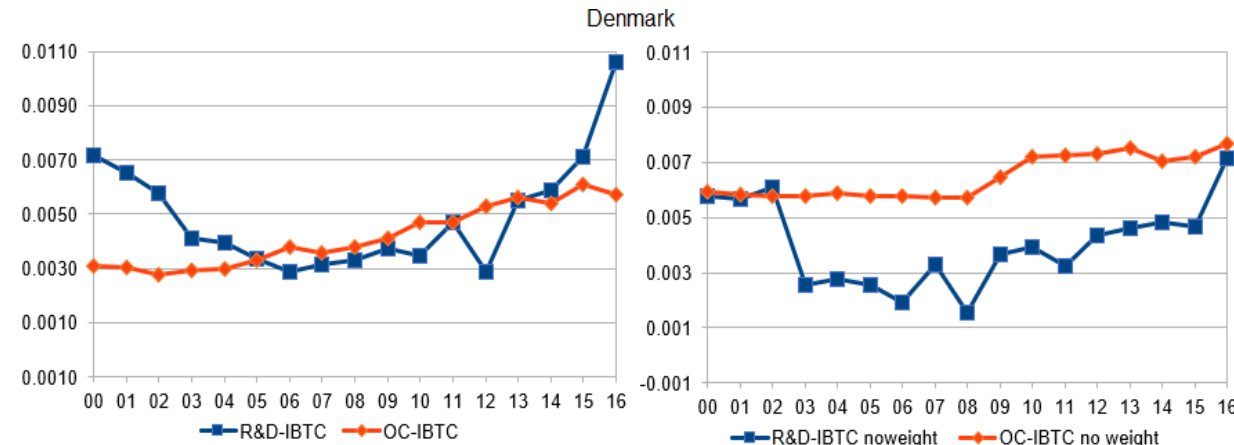


R&D-IBTC

FIN, NOR, SLO at around 1.5-2.5% per year
 NOR from high 2.5% to 1.5% since 2015
 DEN low 0.6% 2007-2015 (low w_{RD}/w_{avg} ratio 1.2) but higher 1.1 in 2016

OC-IBTC

FIN and DEN highest and about the same level than R&D-IBTC;
 SLO and NOR at least double lower than R&D-IBTC

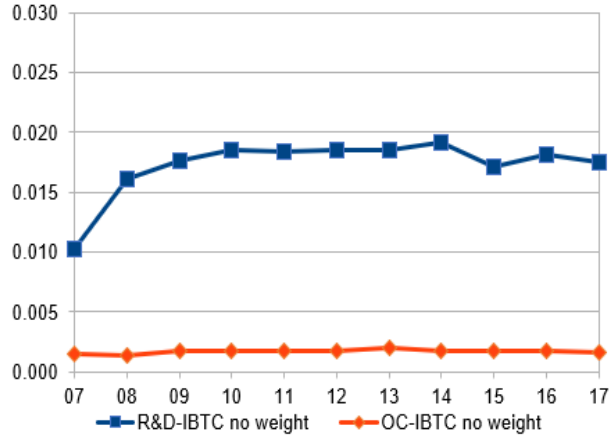
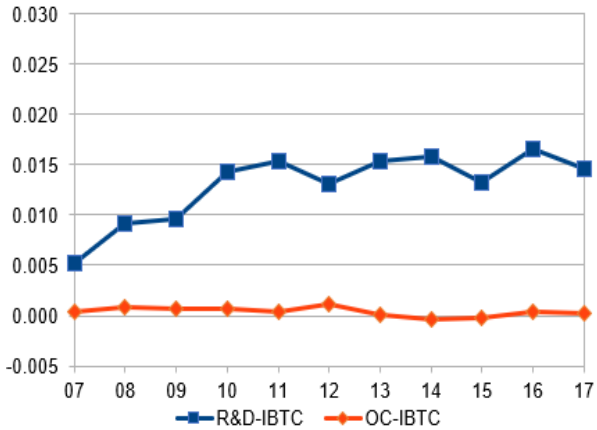


SMEs (RHS figures)

R&D-IBTC
 FIN increasing
 DEN, SLO follow general trend
 OC-IBTC
 DEN leading role

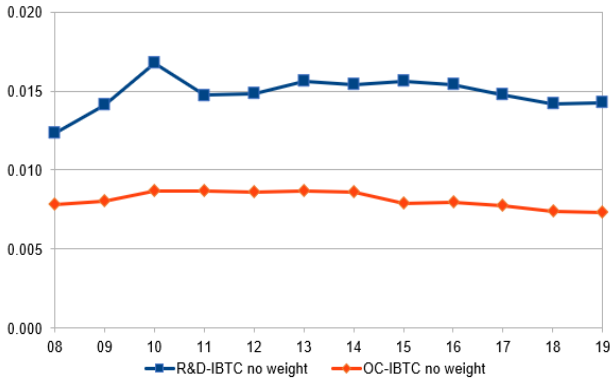
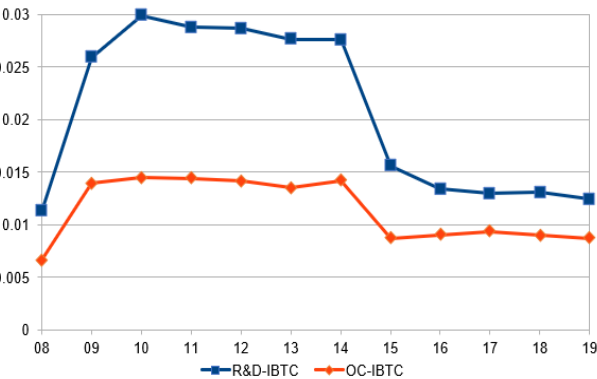
Figure 4. R&D-IBTC and OC-IBTC

Slovenia



Financial crises:
no downward shifts, NOR
and SLO rather increase
until flattening in 2011

Norway



Markups*

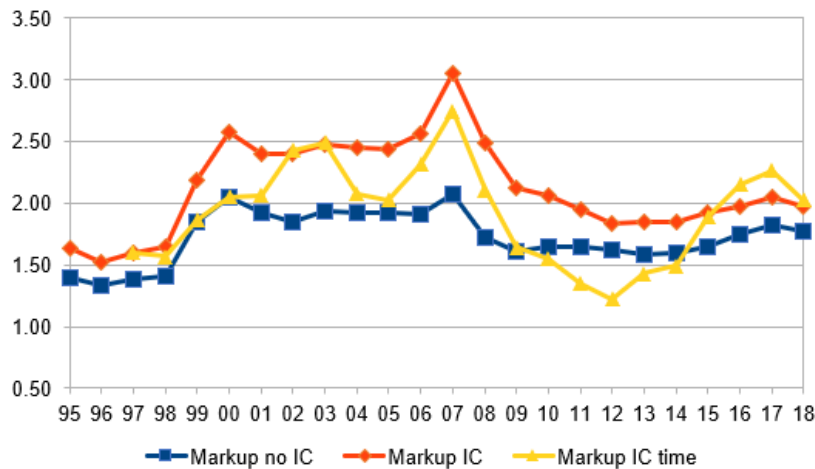
- Markup: output elasticity of flexible labor / flexible labor costs share of value added
- Markups (with firm revenue weights) vary over time using the preferred time-varying output elasticity
 - Finland 1.8 2007- (lower 1.5 in 2010-14)
 - Slovenia 1.6 2009-
 - Denmark 1.3 2007-
 - Norway 1.04 2010-
- KIS: markups FIN 3.1, SLO 1.5, DEN 1.5, NOR 0.8, increase over time
- High-tech manufacturing: markups lower in later years, but in SLO improving
- Low-tech production: markups low but increasing
- Services other than KIS: markup low 1-1.3

*DE LOECKER, J., EECKHOUT, J. & UNGER, G. 2020. The rise of market power and the macroeconomic implications. *The Quarterly Journal of Economics*, 135, 561-644.

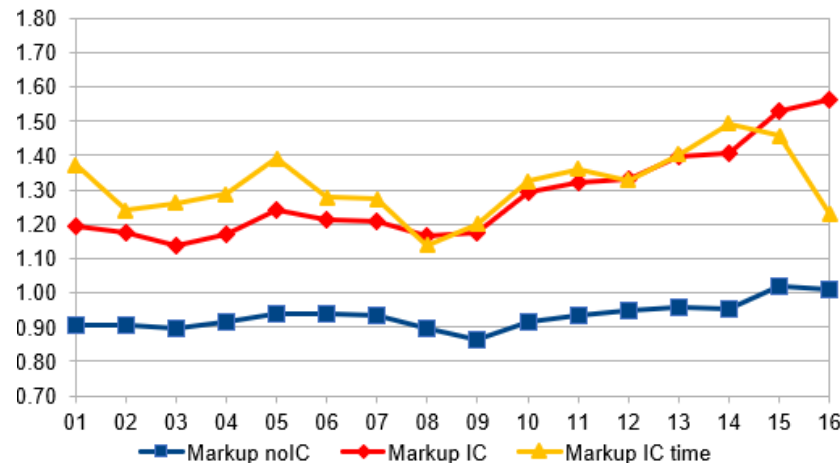
DE LOECKER, J. & WARZYNSKI, F. 2012. Markups and firm-level export status. *American economic review*, 102, 2437-71.

Markup: output elasticity of flexible labor / flexible labor costs per value added

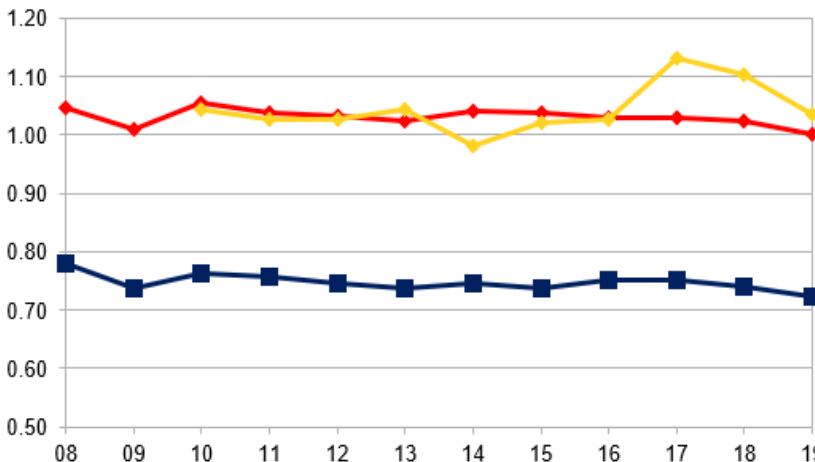
Finland



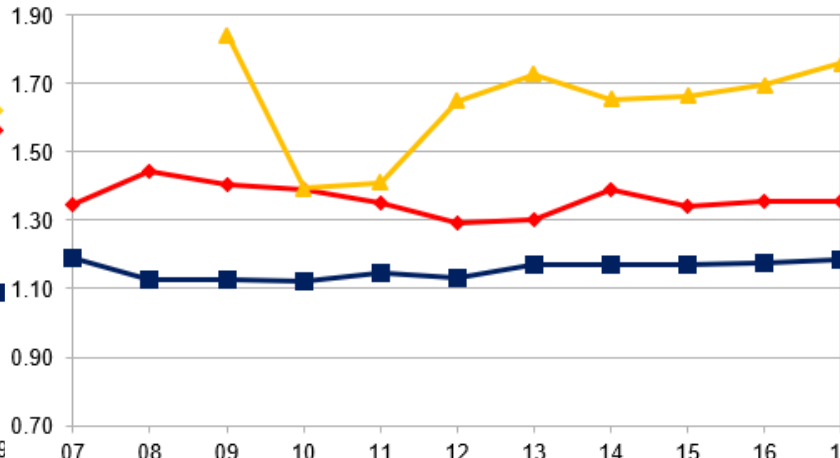
Denmark



Norway



Slovenia



Yellow lines preferred having time varying output elasticity

	Technology type production							Services						
	All	High-High Middle	Low-Middle	Low	KIS	R&D	Other services	All	High-High Middle	Low-Middle	Low	KIS	R&D	Other services
	Finland							Norway						
Education	0.054*** (0.005)	0.033** (0.012)	0.040** (0.012)	0.048** (0.015)	0.109*** (0.011)	0.052*** (0.013)	0.058*** (0.010)	0.152*** (0.011)	0.173*** (0.034)	0.157** (0.049)	0.148* (0.059)	0.117*** (0.019)	0.101*** (0.029)	0.117*** (0.018)
Employee	0.772*** (0.006)	0.820*** (0.018)	0.830*** (0.015)	0.772*** (0.017)	0.717*** (0.014)	0.686*** (0.020)	0.766*** (0.011)	0.896*** (0.015)	0.842*** (0.057)	1.121*** (0.044)	0.802*** (0.048)	0.770*** (0.026)	1.115*** (0.050)	0.737*** (0.021)
OC	0.110*** (0.006)	0.093*** (0.016)	0.109*** (0.014)	0.049** (0.016)	0.203*** (0.016)	0.052* (0.021)	0.115*** (0.012)	0.016 (0.014)	0.056 (0.047)	-0.029 (0.040)	0.179*** (0.041)	0.04 (0.028)	-0.151** (0.047)	0.071** (0.023)
R&D	0.123*** (0.005)	0.103*** (0.016)	0.092*** (0.013)	0.161*** (0.015)	0.119*** (0.013)	0.252*** (0.017)	0.096*** (0.009)	0.088*** (0.010)	0.143*** (0.042)	0.049 (0.030)	0.015 (0.031)	0.110*** (0.018)	0.138*** (0.052)	0.080*** (0.016)
ICT	0.010*** (0.001)	0.009** (0.003)	0.004 (0.003)	0.008* (0.003)	0.025*** (0.004)	0.012** (0.004)	0.006* (0.003)	0.010*** (0.003)	0.005 (0.009)	-0.004 (0.008)	0.004 (0.009)	0.048*** (0.008)	0.007 (0.011)	0.018*** (0.004)
Tangibles	0.036*** (0.002)	0.015 (0.008)	0.033*** (0.007)	0.034*** (0.007)	0.032*** (0.005)	0.043*** (0.009)	0.033*** (0.005)	0.041*** (0.006)	0.056** (0.019)	0.009 (0.017)	0.068*** (0.020)	0.042*** (0.011)	0.007 (0.023)	0.063*** (0.010)
R&D-IBTC	1.131*** (0.095)	1.336*** (0.258)	1.903*** (0.155)	0.635 (0.398)	1.350*** (0.198)	0.415 (0.289)	0.941*** (0.246)	3.139*** (0.465)	0.388 (1.093)	4.403*** (1.261)	0.234 (2.632)	0.423 (1.155)	5.551** (1.911)	3.353*** (0.730)
OC-IBTC	0.787*** (0.142)	2.028*** (0.476)	-0.138 (0.444)	2.189*** (0.406)	0.083 (0.293)	-2.034** (0.673)	0.426 (0.231)	3.906*** (0.985)	-1.021 (2.841)	2.019 (3.481)	-2.319 (2.867)	4.766** (1.791)	1.986 (6.607)	4.410** (1.414)
Markup	0.014*** (0.003)	-0.062*** (0.005)	-0.004 (0.010)	-0.045*** (0.013)	0.023*** (0.006)	0.063* (0.026)	0.052*** (0.012)	-0.01 (0.025)	-0.111 (0.074)	-0.016 (0.068)	-0.065 (0.066)	0.048 (0.060)	0.01 (0.114)	0.028 (0.036)
Observations	44853	8424	7664	6767	7004	2866	12128	8083	1170	1189	981	1239	562	2942
R ² within	0.43	0.349	0.483	0.39	0.447	0.501	0.442	0.275	0.159	0.388	0.274	0.352	0.433	0.273
Rho	0.65	0.548	0.621	0.617	0.734	0.55	0.719	0.526	0.416	0.461	0.453	0.564	0.565	0.748
Scalability	1.05	1.04	1.07	1.02	1.10	1.05	1.02	1.05	1.10	1.16	1.07	1.01	1.12	0.97
IA total	0.24	0.21	0.21	0.22	0.35	0.32	0.22	0.11	0.20	0.03	0.20	0.20	0.00	0.17
	Denmark							Slovenia						
Education	0.096*** (0.004)	0.111*** (0.012)	0.082*** (0.018)	0.181*** (0.019)	0.034 (0.017)	0.029* (0.013)	0.113*** (0.015)	0.116*** (0.01)	0.138*** (0.019)	0.168*** (0.017)	0.120*** (0.021)	0.113*** (0.024)	-0.131 (0.087)	0.102*** (0.024)
Employee	0.887*** (0.005)	0.883*** (0.012)	0.934*** (0.014)	0.964*** (0.021)	0.907*** (0.023)	0.798*** (0.023)	0.878*** (0.024)	0.712*** (0.014)	0.798*** (0.028)	0.711*** (0.025)	0.784*** (0.032)	0.727*** (0.032)	-0.044 (0.208)	0.616*** (0.034)
OC	0.022*** (0.002)	0.020*** (0.004)	0.009 (0.005)	0.016** (0.006)	0.008 (0.001)	0.022** (0.007)	0.01 (0.01)	0.109*** (0.012)	0.115*** (0.021)	0.100*** (0.02)	0.104*** (0.024)	0.082* (0.035)	0.244 (0.164)	0.121*** (0.028)
R&D	-0.002 (0.027)**	-0.004 (0.042)**	-0.005 (0.008)	-0.006 (0.025)**	-0.006 (0.025)**	-0.01 (0.147)**	-0.007 (0.019)**	0.064*** (0.008)	0.078*** (0.021)	0.043** (0.015)	0.060** (0.021)	0.085*** (0.024)	0.375*** (0.109)	0.061*** (0.017)
ICT	0.021*** (0.002)	0.014*** (0.004)	0.013** (0.005)	0.004 (0.005)	0.023** (0.007)	0.025** (0.009)	0.041*** (0.007)	0.006** (0.002)	-0.003 (0.003)	0.004 (0.003)	0.009* (0.004)	0.027*** (0.007)	-0.014 (0.021)	0.008 (0.004)
Tangibles	0.007*** (0.001)	0.009*** (0.003)	0.021*** (0.003)	0.029*** (0.004)	0.016*** (0.004)	-0.003 (0.004)	0.003 (0.005)	0.076*** (0.004)	0.085*** (0.01)	0.102*** (0.006)	0.081*** (0.013)	0.048*** (0.03)	0.012 (0.03)	0.092*** (0.012)
R&D-IBTC	1.853*** (0.136)	0.721* (0.284)	5.309*** (0.455)	2.883*** (0.53)	1.673* (0.68)	-1.895*** (0.447)	-3.089* (1.249)	0.060*** (0.013)	0.03 (0.017)	0.087*** (0.022)	0.099* (0.038)	0.082*** (0.025)	0.892 (0.488)	0.169*** (0.026)
OC-IBTC	1.793*** (0.342)	2.494** (0.92)	4.471*** (1.062)	4.859** (1.641)	6.582*** (1.26)	0.728 (1.069)	3.963*** (1.2)	2.254*** (0.286)	1.413** (0.46)	2.065*** (0.519)	1.650* (0.647)	1.713* (0.779)	-2.064 (2.277)	2.452*** (0.672)
Markup	0.050*** (0.007)	0.123*** (0.015)	0.102*** (0.014)	0.039** (0.013)	-0.029** (0.015)	0.049* (0.024)	0.591*** (0.091)	3.618** (1.144)	-0.245 (2.256)	-0.892 (1.963)	3.085 (2.095)	6.476** (2.248)	-10.333 (18.594)	8.909** (2.894)
Constant	3.471*** (0.068)	3.229*** (0.129)	3.581*** (0.177)	2.330*** (0.201)	4.336*** (0.228)	3.917*** (0.201)	2.643*** (0.225)	6.872*** (0.172)	5.861*** (0.315)	6.304*** (0.272)	6.284*** (0.344)	7.107*** (0.422)	5.613** (2.118)	6.965*** (0.365)
Observations	32999	8172	5347	4028	1821	2266	1000	7969	1659	2269	1529	533	56	1923
R ² within	0.367	0.331	0.367	0.363	0.352	0.374	0.347	0.288	0.451	0.37	0.417	0.676	0.534	0.294
Rho	0.557	0.57	0.628	0.571	0.636	0.568	0.538	0.668	0.705	0.726	0.675	0.887	0.744	0.639
Scalability	0.96	0.97	0.99	1.04	0.98	0.99	0.95	0.97	1.08	0.96	1.04	0.97	0.58	0.90
IA total	0.07	0.08	0.03	0.05	0.06	0.19	0.07	0.18	0.19	0.15	0.17	0.19	0.61	0.19

Production function estimates of value added (VA), random effects

R&D and OC increase VA FIN, SLO especially in KIS One year more education: VA up 9-14%, or FIN 5%

Markup: DEN, in other countries more through IAs

R&D-IBTC Significant, least in SLO

OC-IBTC Significant, in NOR positive for all services while markups were low

Note. Firms with at least 20 employees. R Squared all is about 0.8-0.89. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

Measurement at firm-level in National Accounts

- Statistical institutes' future surveys on intangibles should benefit more from existing structural business statistics and register-based data on management and marketing occupations, among others (see also OECD, 2020).
- Many statistical institutes already evaluate software and database from related personnel costs (like with 30% share in Finland)
- Avoids double accounting
- Also valuation, i.e. a more to performance-based measure of intangibles

