

Sources of productivity growth II: industry and firm-level

Hannu Piekkola University of Vaasa

Aggelos Tsakanikas National Technical University of Athens NTUA

Carter Bloch Aarhus University

Arvid Raknerud Statistics Norway, Research department

Globalinto 2019-2022

New Intangibles for European Growth

<https://globalinto.eu/>

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Firm-level analysis

R&D, OC-IBTC *

- IBTC depends on quality A:
$$A(L_{OC}, L_{RD})L_{noIC} = \left(\left(\frac{a_{RD}L_{RD}}{\bar{a}_L L_{noIC}} + \frac{a_{OC}L_{OC}}{\bar{a}_L L_{noIC}} \right) + 1 \right) L_{noIC}$$
- Relative quality $\frac{a_{RD}}{\bar{a}_L}, \frac{a_{OC}}{\bar{a}_L}$ first proxied by R&D, OC (management, marketing) wages relative to non-intangible wages *noIC* in a production function of Nace-III digit industries

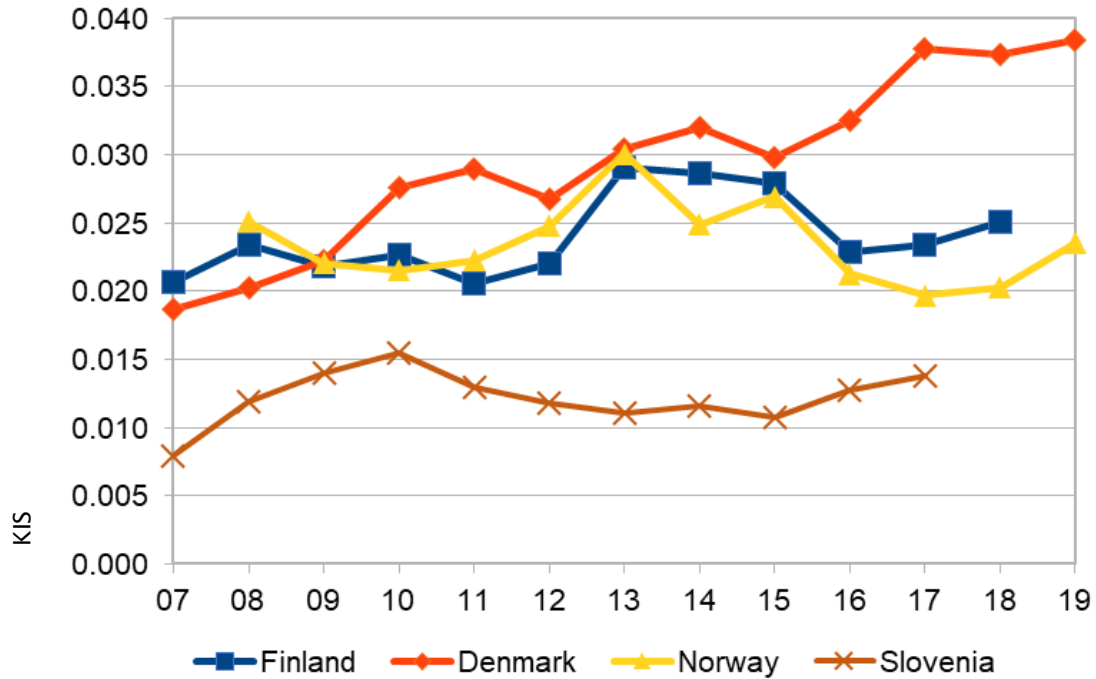
*PIEKKOLA 2020. Intangibles and Innovation-labor-biased technological change (IBTC) Journal of Intellectual Capital, PIEKKOLA, BLOCH, DEREK & RYBALKA 2021. Intangibles from innovative work – their valuation and technological change. IARIW-ESCoE Conference November 11-12. London, submitted to Review of Income and Wealth

Markup **

- Production: flexible (non-IC) workers are paid according to their marginal return
- Output elasticity of flexible labor / flexible labor costs per VA a

**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.

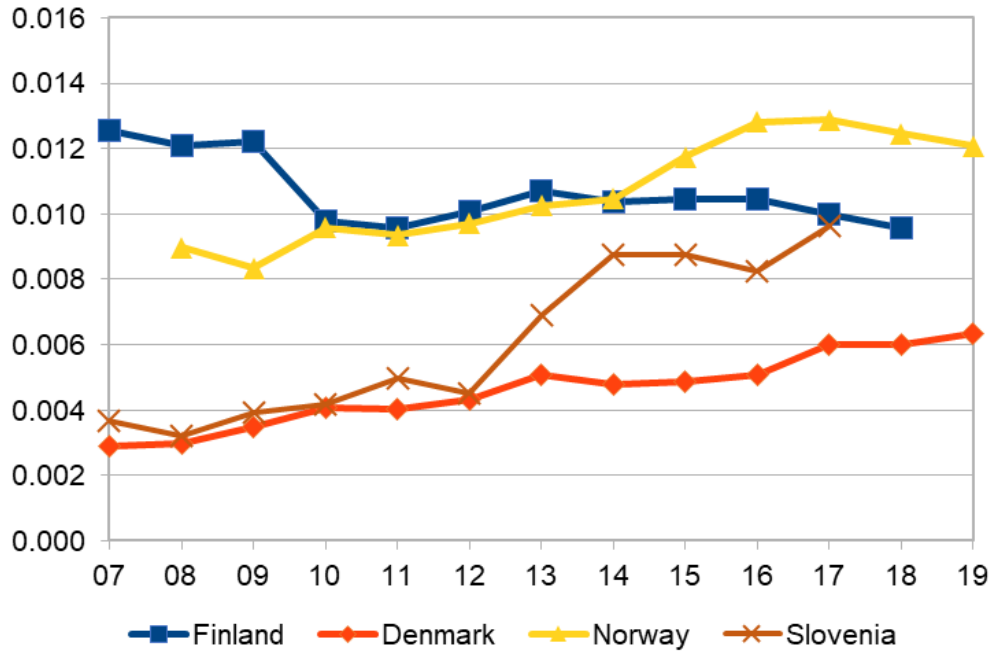
Figure 1. R&D-IBTC



R&D-IBTC

FIN, DEN, NOR, around
2.0-2.5% per year
DEN increasing
SLO around 1.3%

Figure 2. OC-IBTC



FIN, NOR around 1% per year;
DEN, SLO around 1% per year
SLO, DEN, NOR increasing
FIN decreasing (a shift to ICT)

IBTC results

Broad intangibles contribution to IBTC

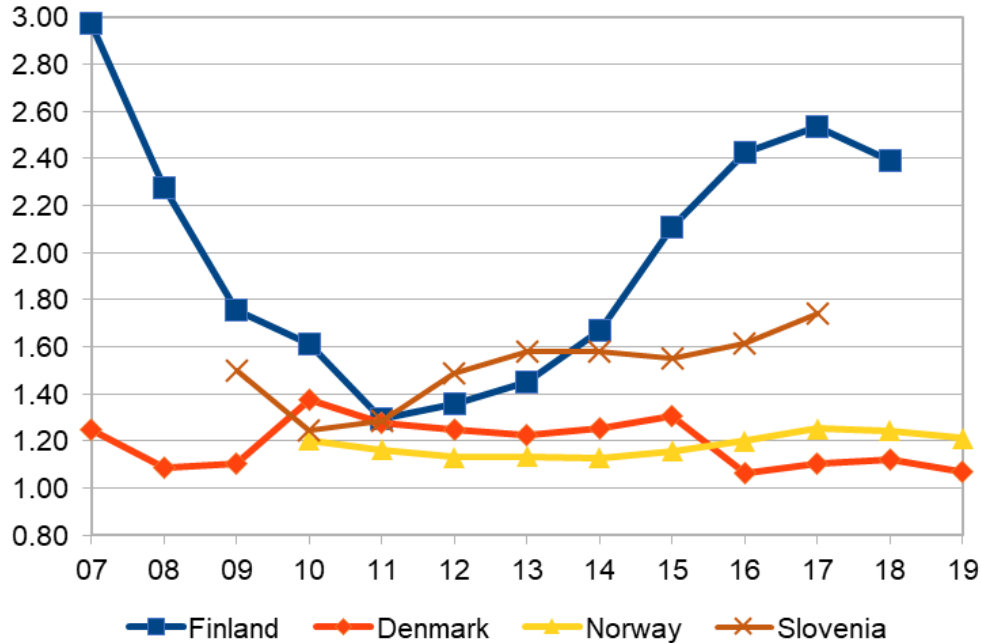
- Nordic countries are in equal foot in R&D-IBTC around 2-2.5% per year
 - Norway is also rich in intangibles
 - Finland and Denmark: an increase over time to highest levels
- Slovenia has clearly lower R&D-IBTC 1.3% per year
 - Especially low values in KIS

Increasing role of knowledge intensive services (KIS)

- Technological change 3-4.5% per year
- KIS is linked to intangibles of manufacturing and other industries.



Figure 2. Markup



FIN around 100% (2 in figure) with a dip in slow growth period 2009-2014
SLO around 60% increasing
DEN, NOR around 20% flat

Markup results

Markups vary across countries and follow business cycle

- Finland around 100%, dip in slow growth period 2011-2015
 - Since 2008 supported by KIS and high-tech manufacturing especially before 2009
- Slovenia around 90% increasing over time
 - Equal development across techtypes
- Norway around 60%
 - High-tech decrease, Low-tech, KIS increase
- Denmark around 13%
 - High wage costs, expansion of basic services



VA explained by ICs and IBTC

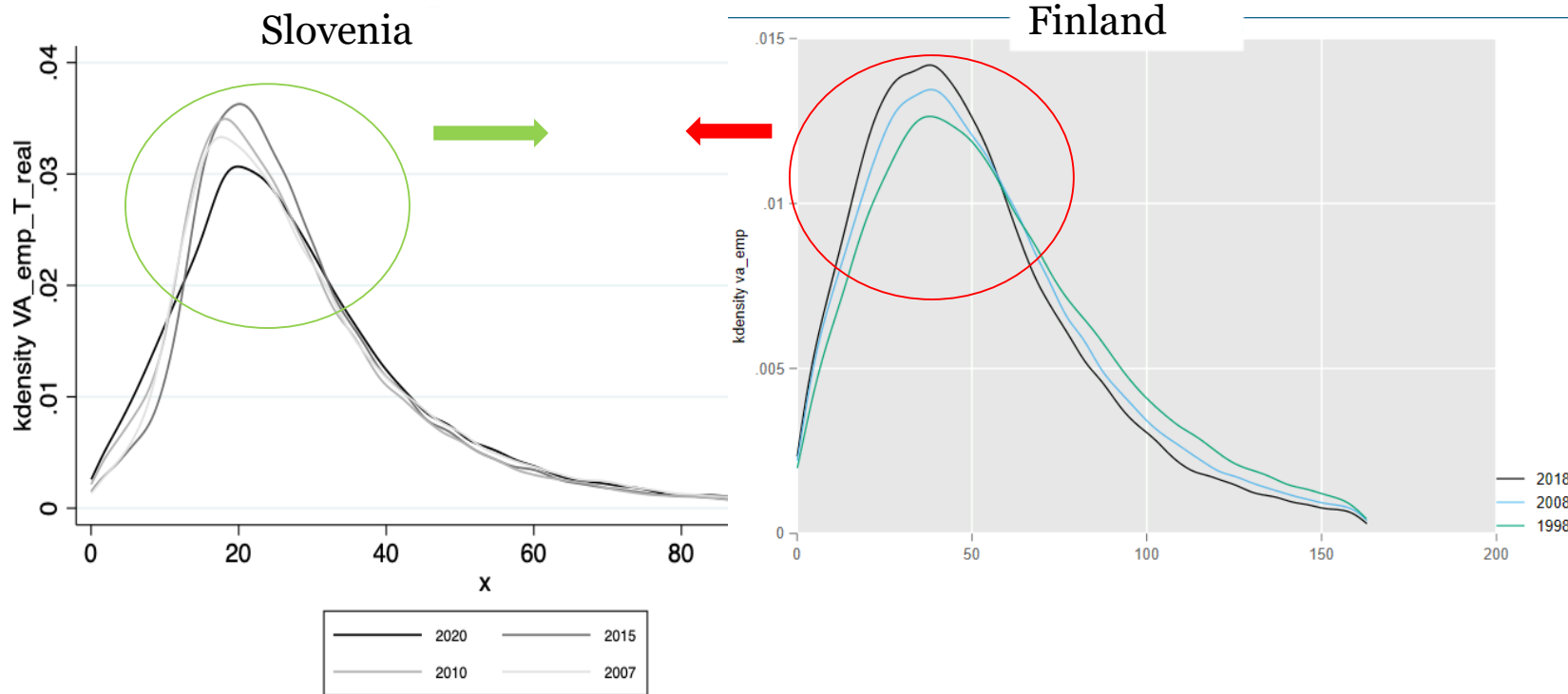
	Finland	Norway
OC	0.104*** (0.006)	0.034* (0.014)
R&D	0.132*** (0.005)	0.084*** (0.010)
ICT	0.010*** (0.001)	0.010*** (0.003)
Tangibles	0.035*** (0.002)	0.042*** (0.006)
R&D-IBTC	-0.403 (0.209)	1.741*** (0.195)
OC-IBTC	5.431*** (0.584)	2.279** (0.696)
Markup	0.007* (0.003)	-0.036 (0.028)
Obs	44991	8325
R ² within	0.427	0.279
Scalability	1.05	1.05
IA total	0.25	0.13

	Denmark	Slovenia
OC	0.021*** (0.006)	0.084*** (0.006)
R&D	0.021*** (0.005)	0.077*** (0.005)
ICT	0.021*** (0.005)	0.012*** (0.001)
Tangibles	0.011*** (0.003)	0.076*** (0.003)
R&D-IBTC	1.615*** (0.184)	0.014 (0.009)
OC-IBTC	4.254*** (1.26)	1.419*** (0.149)
Markup	0.002 (0.007)	4.528*** (0.462)
Obs	4897	20480
R ² within	0.354	0.275
Scalability	0.95	0.98

ICs and IBTCs improving VA

- Intangibles (IC)
- Markup FIN, SLO
- R&D IBTC NOR, DEN
- OC-IBTC
 - Inseparable from OC
- Tangible (evaluated from balance sheets in SLO)

Firms excluding top 5% ($VA/L > 96$ in SLO and > 163 in Finland)



Typical productivity VA/L improves over time in Slovenia
decrease in Finland (in 1000 2015€)

Dispersion increases overtime in Slovenia and decrease in
Finland: closer to each other

Thoughts for policy

Decrease in total factor productivity?

- Lower markups in slow-growth periods like 2011-2015
- Broad intangibles cause fixed costs
- Technological change ongoing
 - Increasing among large firm (Finland and Denmark) with variation
 - Quality through RD,OC-IBTC: 3.5% per year and 1/3 driven by OC
 - Internal R&D together with high share of innovative labor, same for internal OC
 - Top 5% firms: global players with “winner takes all”

