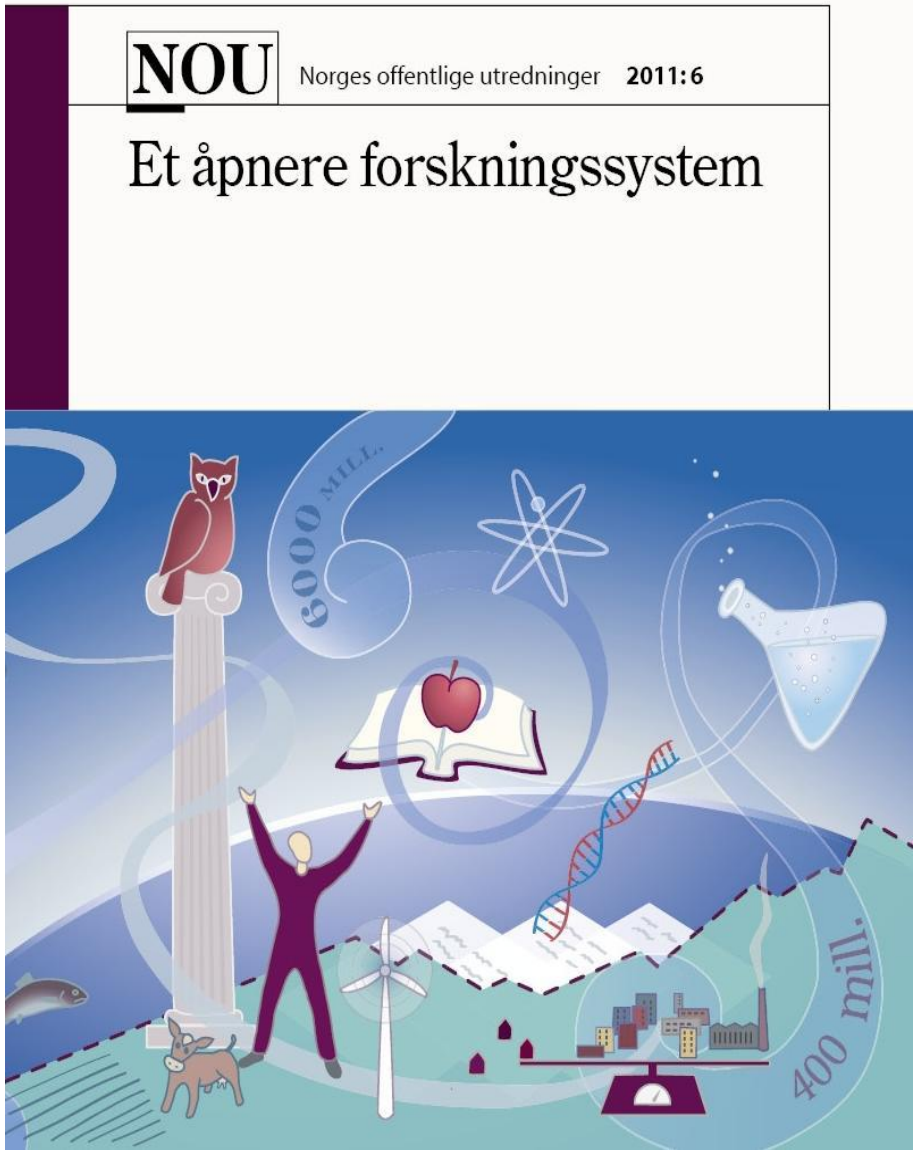
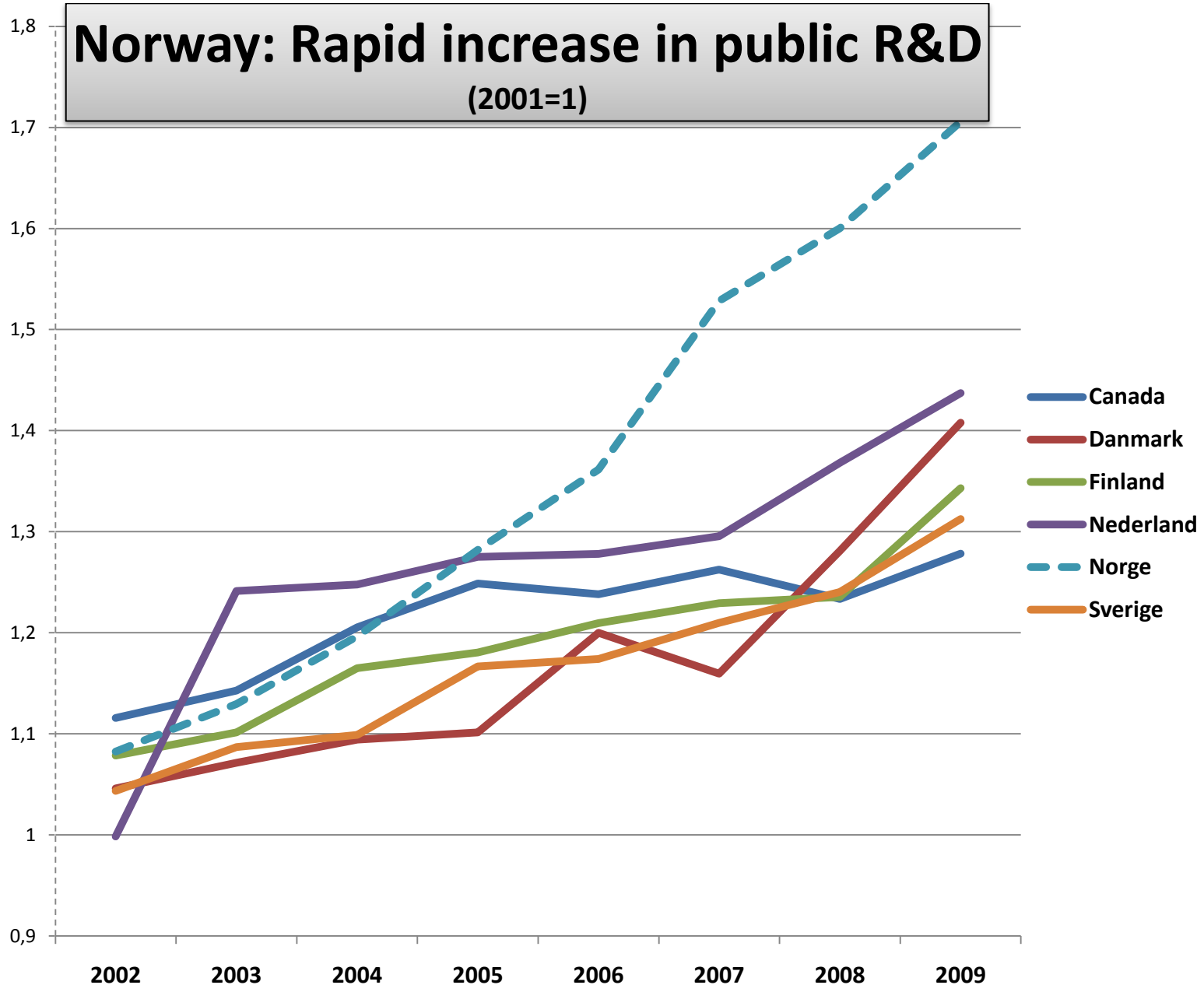
"A more open research system"
NOU 2011: 6 , delivered May 2, 2011



Results versus resources

An analysis of publicly funded research in Norway

Jan Fagerberg,
TIK (University of Oslo), CIRCLE (University of Lund) and SPRU (University of Sussex)
Helsinki, 10.6.2011


Norway: Rapid increase in public R&D
(2001=1)
1,8
1,7
1,6
1,5
1,4
1,3
1,2
1,1
1
0,9
2002
2003
2004
2005
2006
2007
2008
2009
Canada
Danmark
Finland
Nederland
Norge
Sverige

”Expert committee” asked to:

The minister: Tora Aasland

- *Establish **indicators** for **”results”***
- *Relate these to use of **resources***
- *Focus on the **efficiency**/productivity of publicly funded research*
- *Suggest **changes** in the distribution of resources that might ”benefit society economically”*
- *Place special emphasis on **basic research** and **doctoral education** (higher education sector)*
- *Limit the analysis to **publicly financed research**, the overwhelming part of which are carried out in universities, hospitals and institutes. e.g., not analyse the efficiency of the entire **innovation system***

Measuring the efficiency of public sector research

What to measure

- Quantity?
- Quality? Use by the research community (citations)?
- Use in society at large? (social returns) – important but difficult to measure in (sufficiently) precise way
- New PhDs
- Internationalisation ?
- Efficiency – relate results to resources (R&D as defined by the OECD) – with a lag!

How (pilot-project)

- Quantity: Publications
- Quality (citations): ISI Web of science (articles)
- Two databases, the Norwegian "Cristin" (everything) and ISI Web of Science (journal articles)
- How to adjust for differences between different academic fields**?**
- PhD production (rel to labour force)
- Involvement in EU research, cross-country co-authorship in research
- Compare with "similar" countries

Result: A "barometer" for the efficiency of public sector research – A tool for everybody, not just an instrument for control …

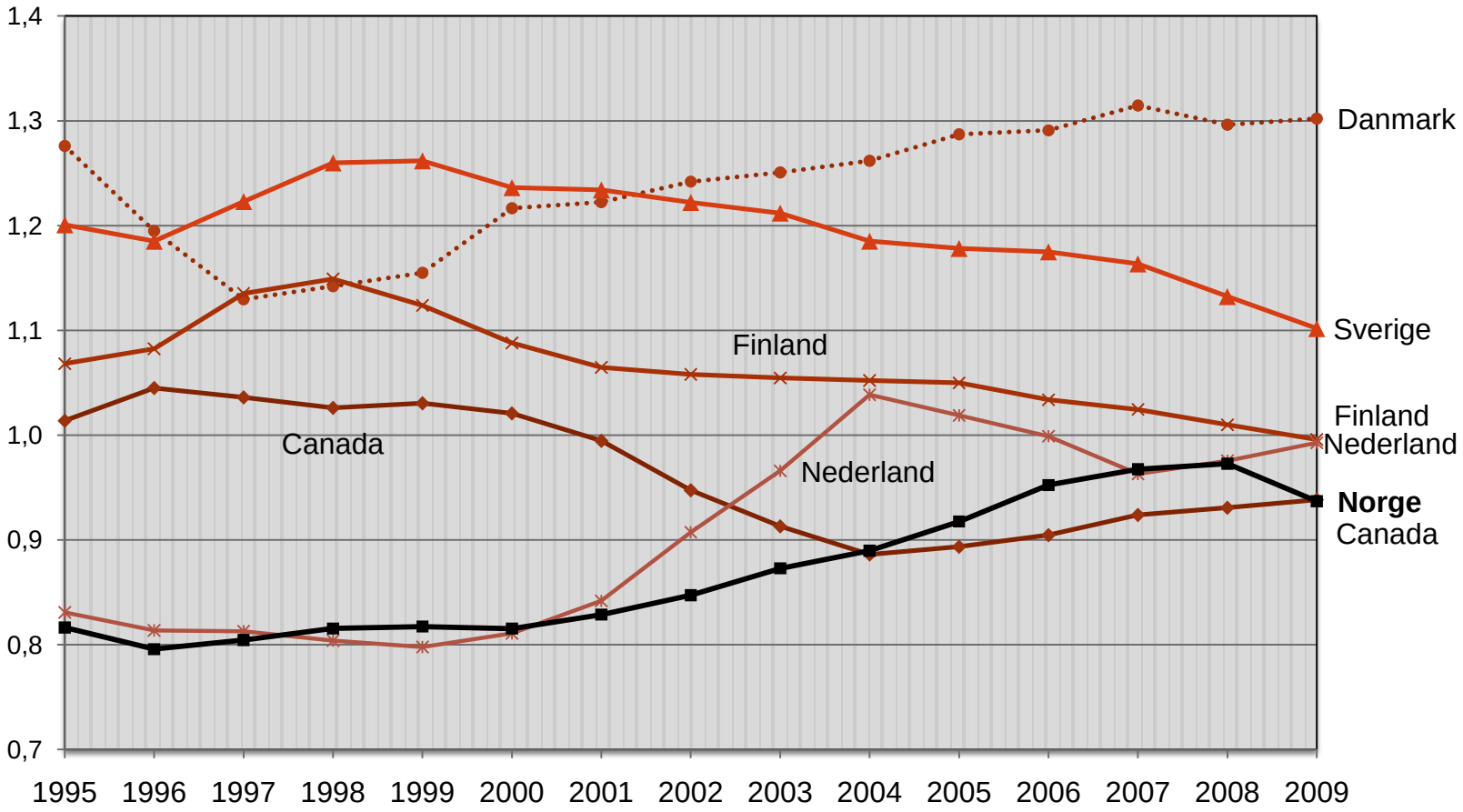
Differences across fields

Publications in ”Cristin” that are also in ISI Web of Science, 2005-2009

	Composition: Norwegian Data Base "Cristin", %	Composition: ISI Web of Science, %	Share of “Cristin” publications in ISI Web of Science, %
Natural science	21,4	33,3	**87,8**
Medicine and health	23,4	33,7	**81,4**
Technology	12,3	16,1	**73,7**
Social science	22,7	10,6	**26,4**
Humanities	20,2	6,3	**17,7**

Source: NIFU/DBH/Thomson Reuters(ISI Web of Knowledge)

Research production (articles) relative to public R&D expenses, selected countries

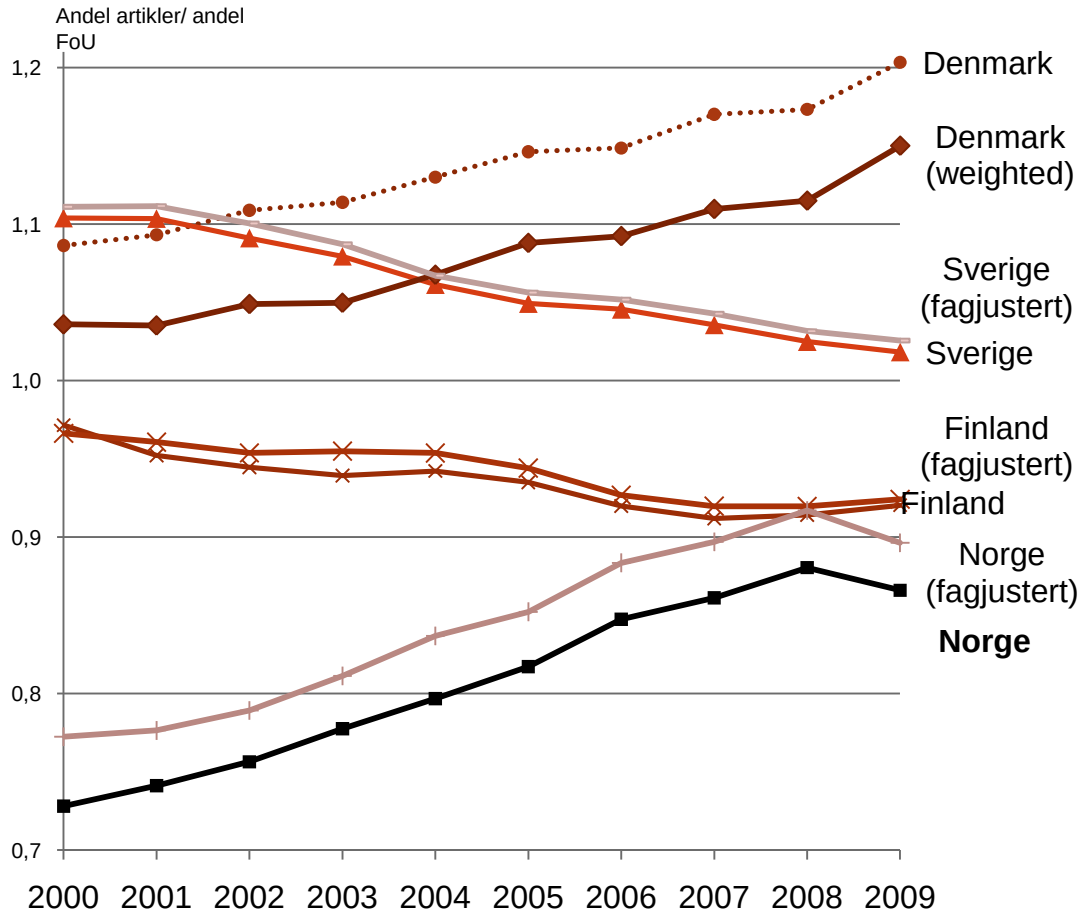


Source: Calculations based on data from ISI Web of Science and the OECD

How to test for differences in specialization of countries/institutions?

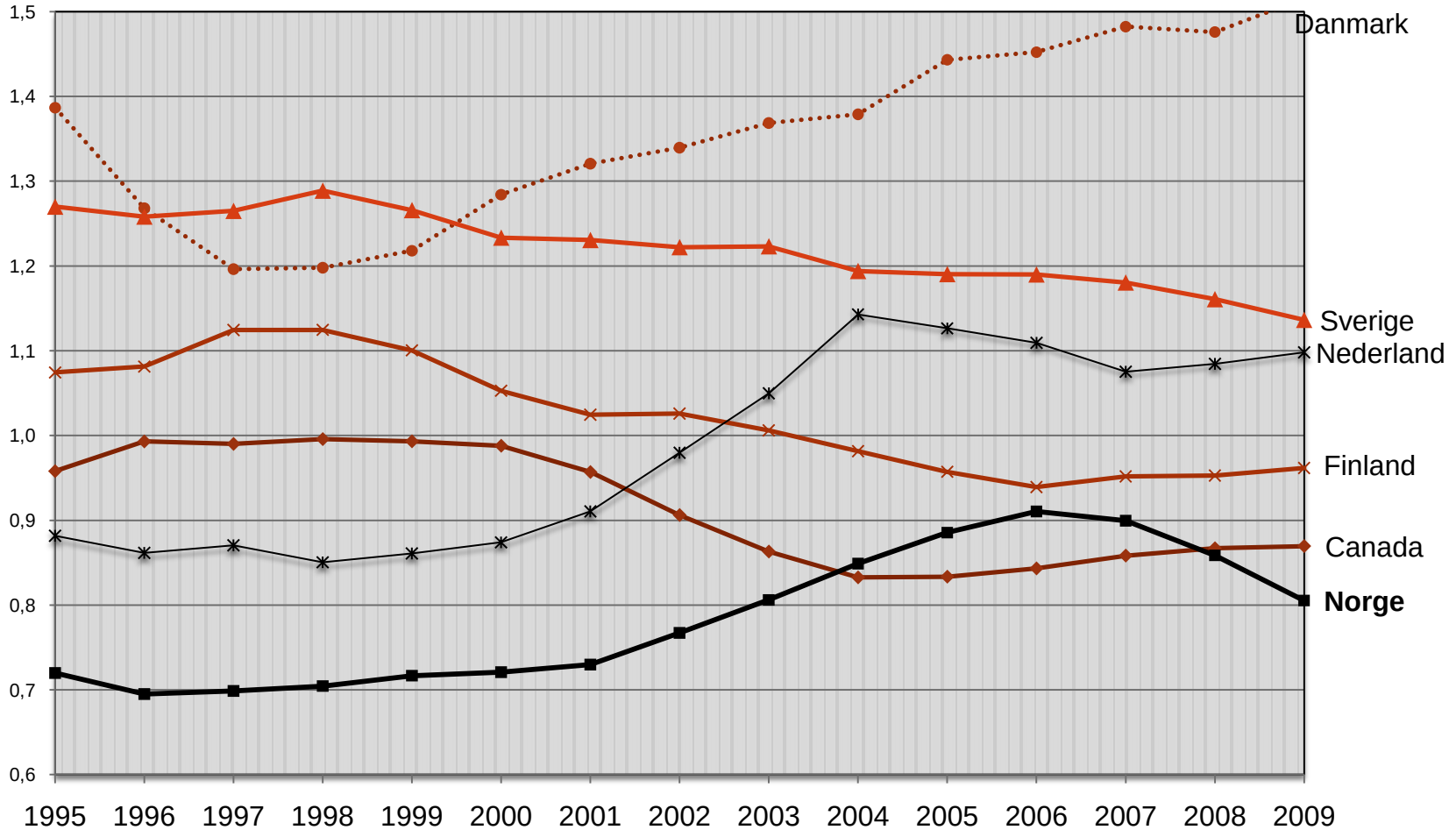
- (a) Calculate **shares of publications/citations** for each country or institution for each area (natural science, health, technology, social science, humanities)
- (b) Calculate similar **shares for R&D expenditure**
- **Divide (a) on (b)** – this gives the productivity per field – with an average of 1
- **Weigh together** the field specific productivity-figures with shares in R&D expenditure, this gives overall productivity
- Requires that R&D expenditure can be **decomposed** according to area: Only Nordic countries?

Differences in composition of expenses do not explain a lot



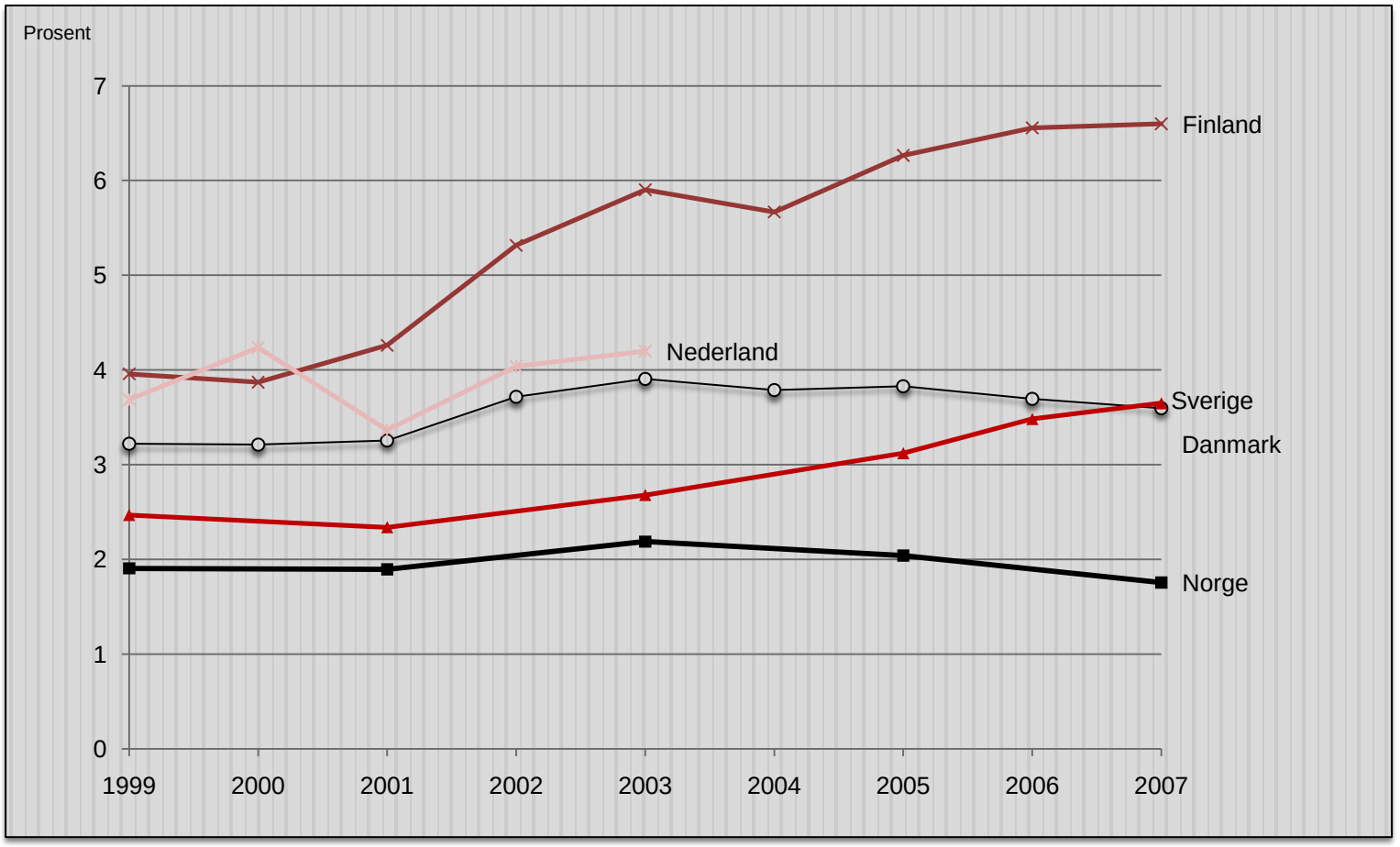
Source: Calculations based on data from ISI Web of Science and the OECD

Citations relative to public R&D expenses, selected countries



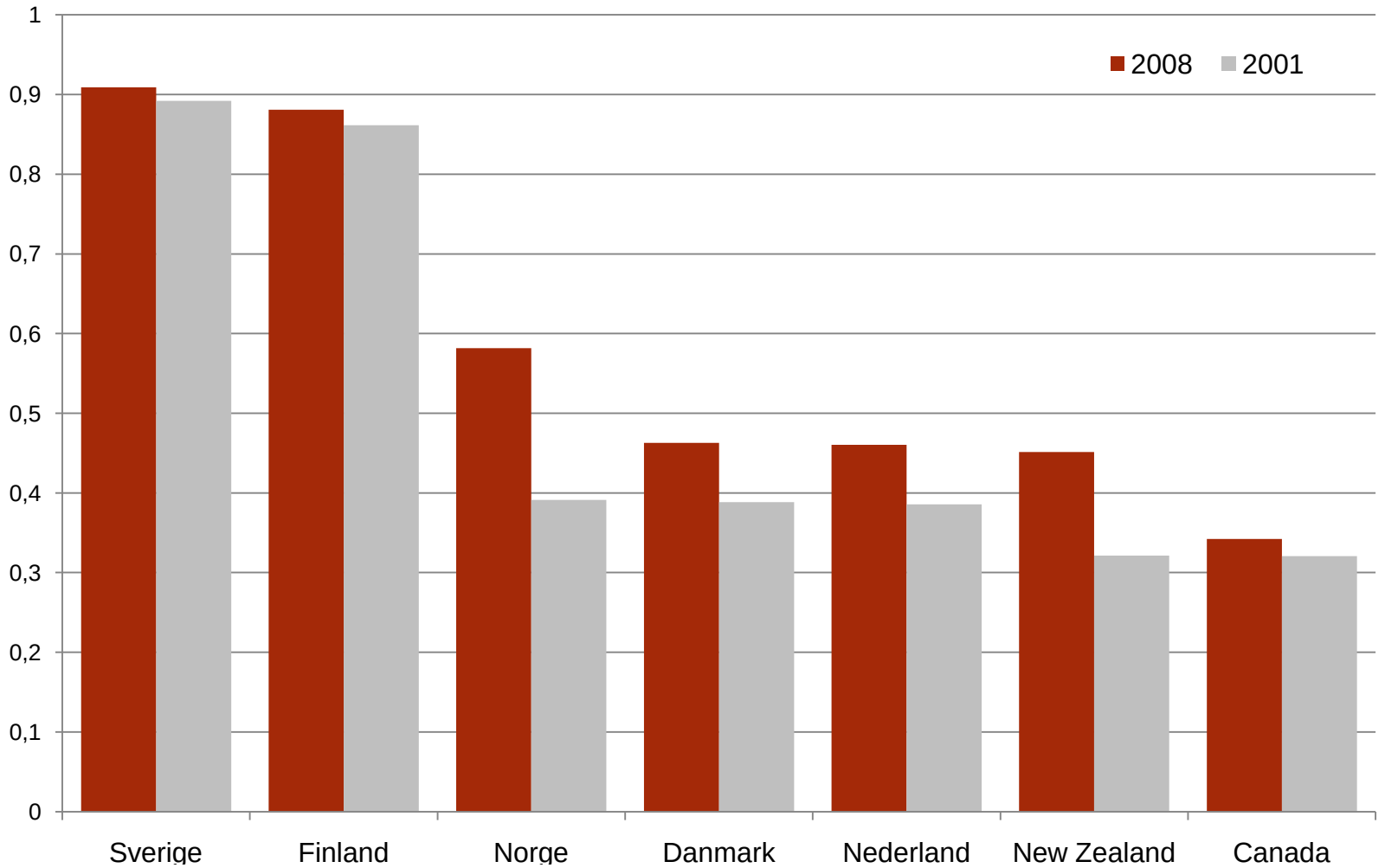
Source: Calculations based on data from ISI Web of Science and the OECD

Internationalisation: R&D support from the EU as a percentage of public R&D



Source: Calculations based on data from NIFU and the OECD

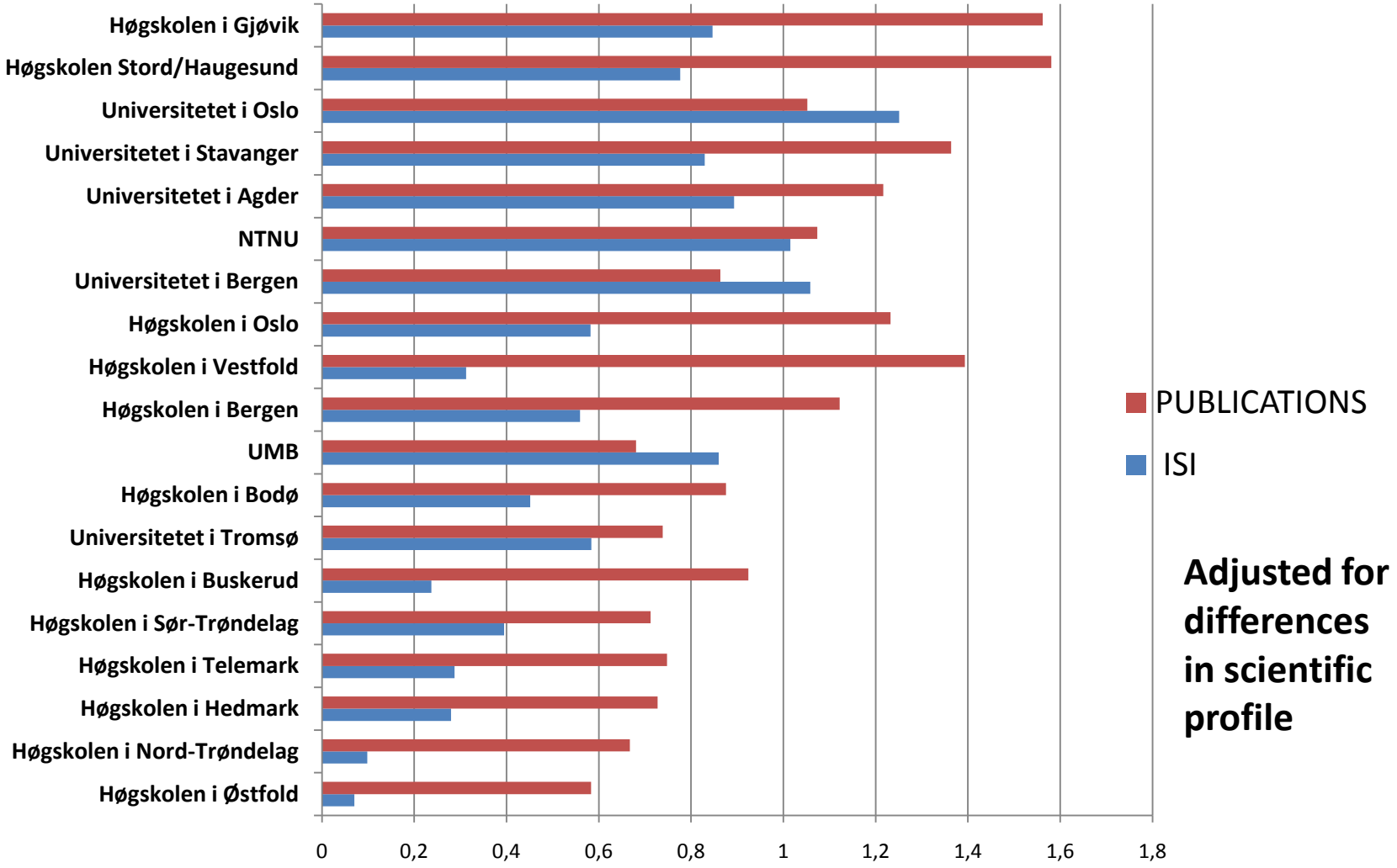
New PhDs per thousand employed , 2008 og 2001



Source: Calculations based on OECD(ISCED 6)

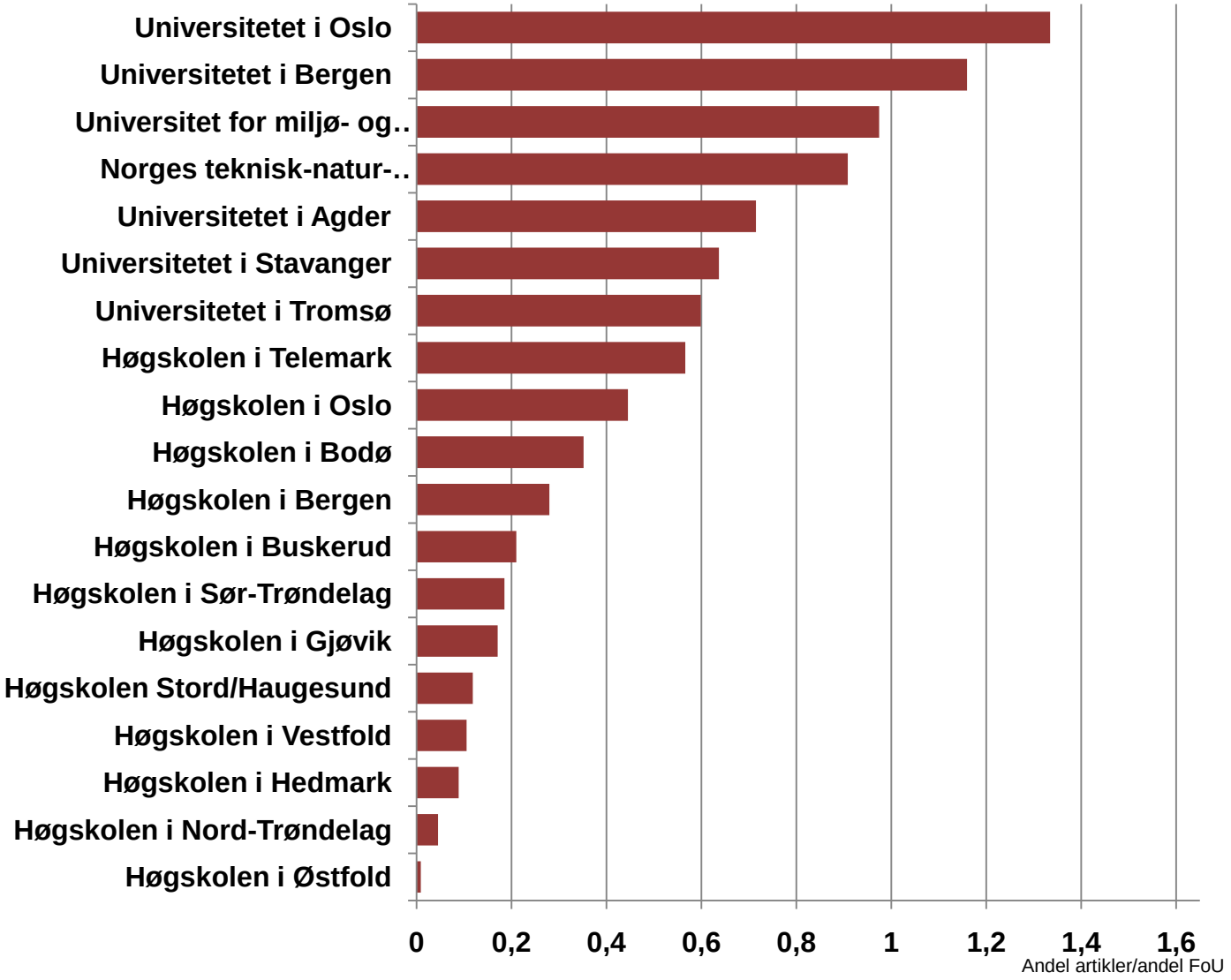
Within Norway: Big differences in research productivity

(publications and articles (ISI) relative to R&D expenses)



Source: ISI Web of Science, Statistics Norway and DBH (Cristin)

Even bigger differences in citations (relative to R&D expenses, adjusted)



Some lessons from the "barometer"

Much of what we wish to measure is **difficult** to measure (with **precision**): Need for **more research and better indicators of social and economic effects** of publicly financed research

- The Norwegian public research system has become **more efficient** in recent years
- But still **far behind the frontier** (Denmark/Sweden)
- **Low competitiveness in EU** (look to Finland!)
- Fewer **new PhDs** than Sweden and Finland, and probably **too few satisfy future demand** (especially in technology)
- **Big differences in efficiency/productivity** across Norwegian institutions
- Need – and scope – for **improvements**

Why isn't productivity higher

- The **time allocated to research** in higher education may not be sufficiently well exploited (productivity very skew, many produce little or nothing)
- Universities may not **support good researchers** sufficiently well (pay salary but not much more ….)
- Too little **competition** for resources in the system - lack of open competition arenas for good research (only supporting a few centers of excellence not good use of available resources)
- The **closed door** problem: Only one research council & its resources increasingly go to **a limited set of thematic fields** (defined by politicians in cooperation with well established interests)
- The governement's **incentives** to higher productivity may not work as intended (do not affect those that make the actual decisions?)

Main recommendations

Open up!

- **Research barometer**
- **Research program** on social & economic effects of publicly funded research
- O**pen research arena:** A new arena in the research council open to all areas of research – modeled after ERC (broad, cross-disciplinary panels) - special emphasis on novel & cross-disciplinary research
- **More PhDs** (narrowing the gap vis-à-vis Sweden/Finland) & more competitive allocation of stipends
- More **competitive allocation** of resources in all sectors (example health)
- A new (temporary) system for **automatic support to researchers** producing above a certain threshold level to help institutions developing better routines
- Total cost 2 bill NOK (well within the goal of 1% of GDP), of which 1 bill to PhDs