

Science Performance: The Nordic Countries from an International Perspective

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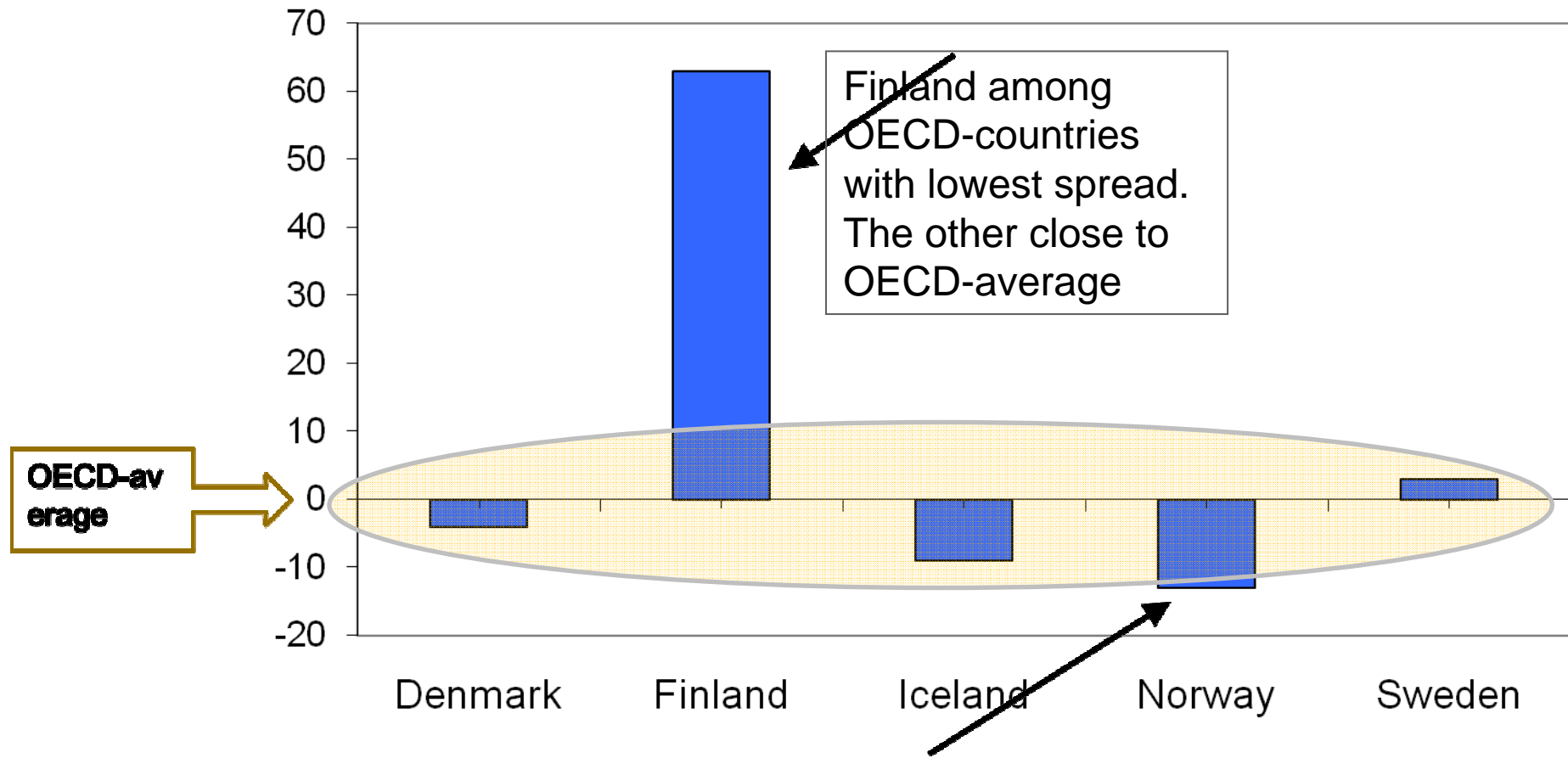
ILS, University of Oslo



Scientific literacy in PISA

- PISA 2006 framework:
 - Both cognitive and affective aspects
 - Science "literacy" – application of science knowledge, not simple reproduction of knowledge

Science performance of the Nordic countries compared to the OECD-average





Proficiency levels in science

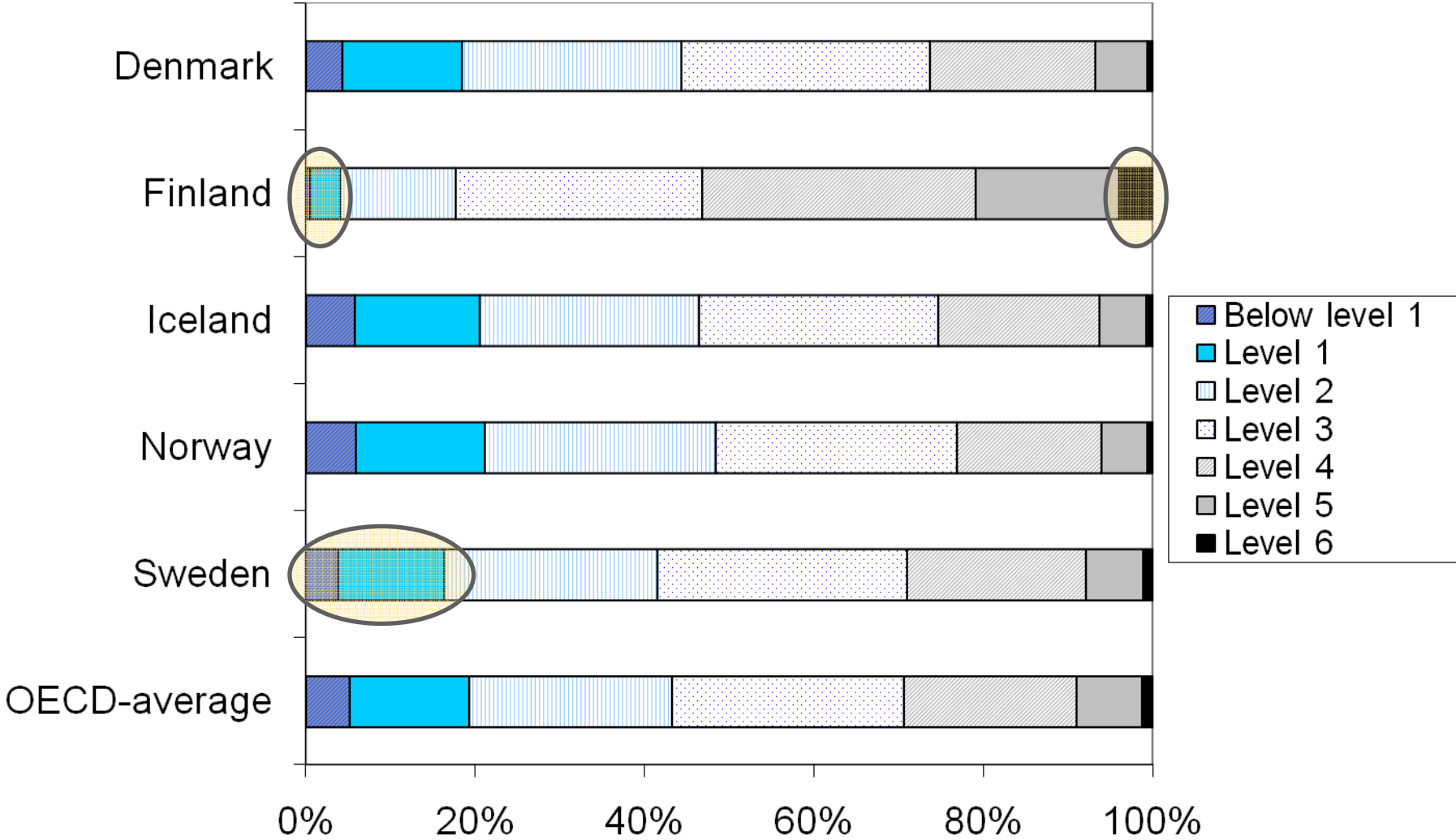
- Student scores in science are grouped into six proficiency levels
 - level 6 representing the highest score.
- Describe what kind of science competences students typically demonstrate at different points
 - Can't be applied to individual students, but it makes sense to describe proficiencies of *typical* students at certain levels



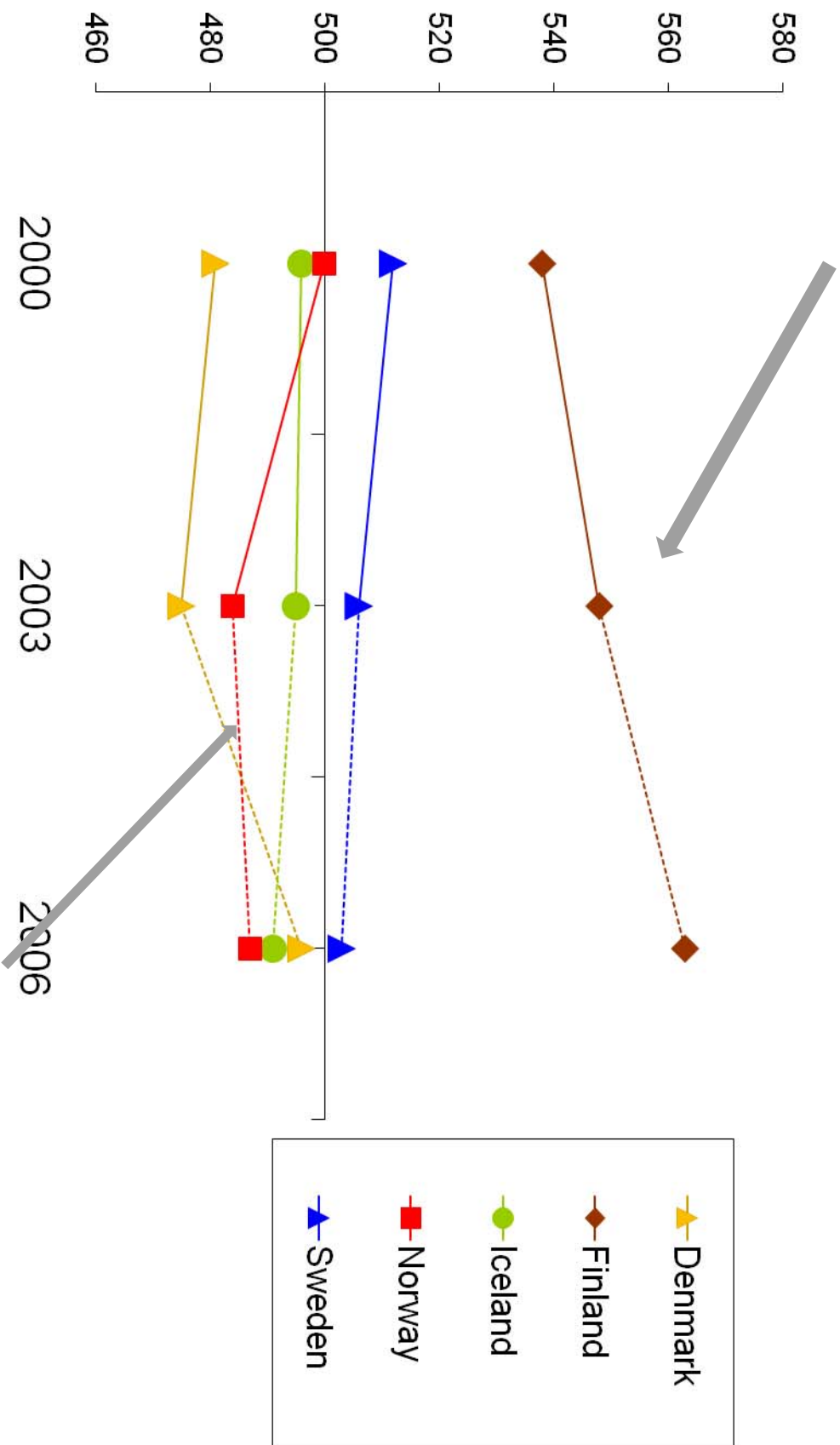
At level 1

- *Students have such a limited scientific knowledge that it can only be applied to a few, familiar situations. They can present scientific explanations that are obvious and that follow explicitly from given evidence.*

Percent of students at each proficiency level

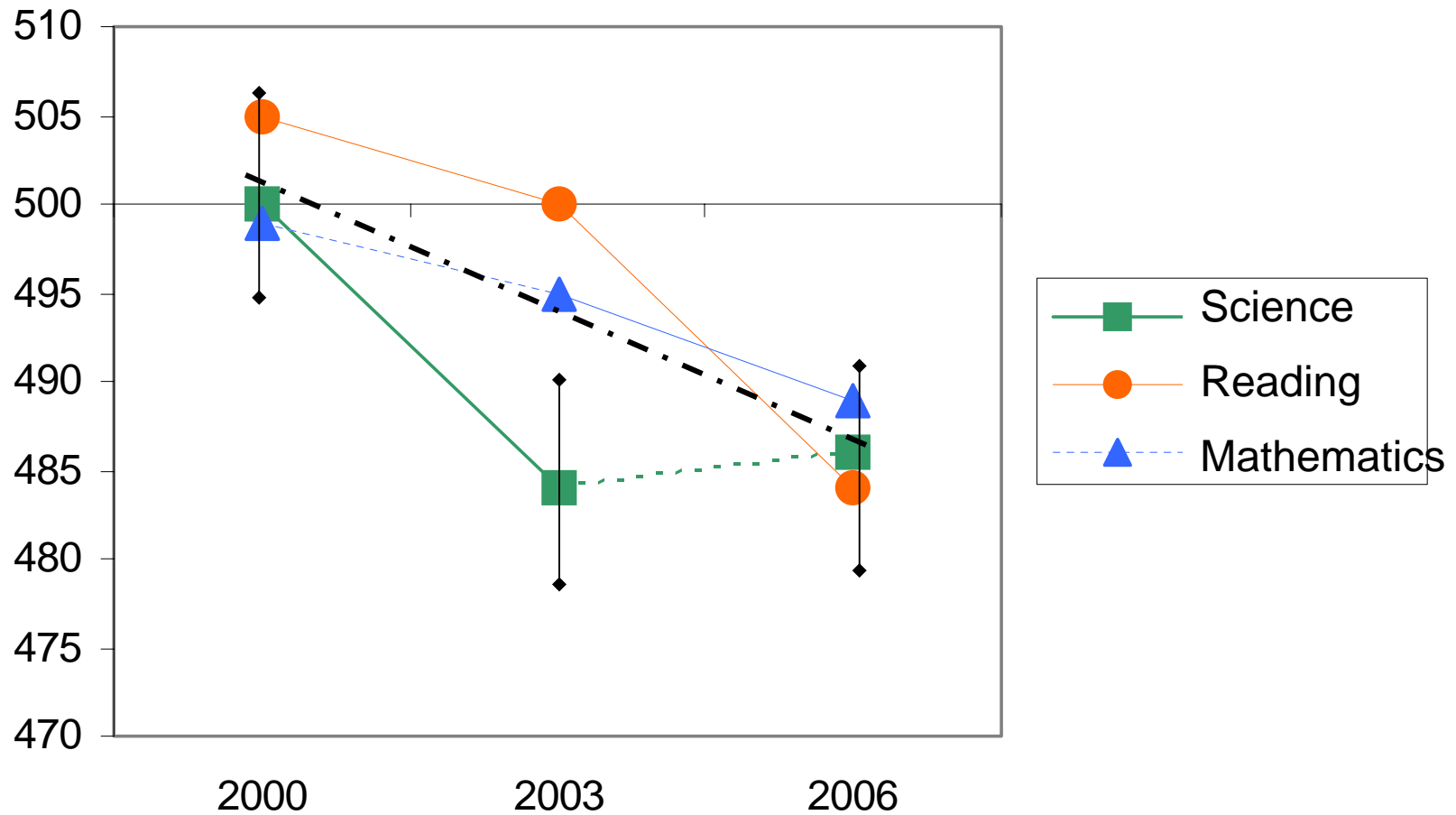


Trends in science in PISA 2000 - 2006



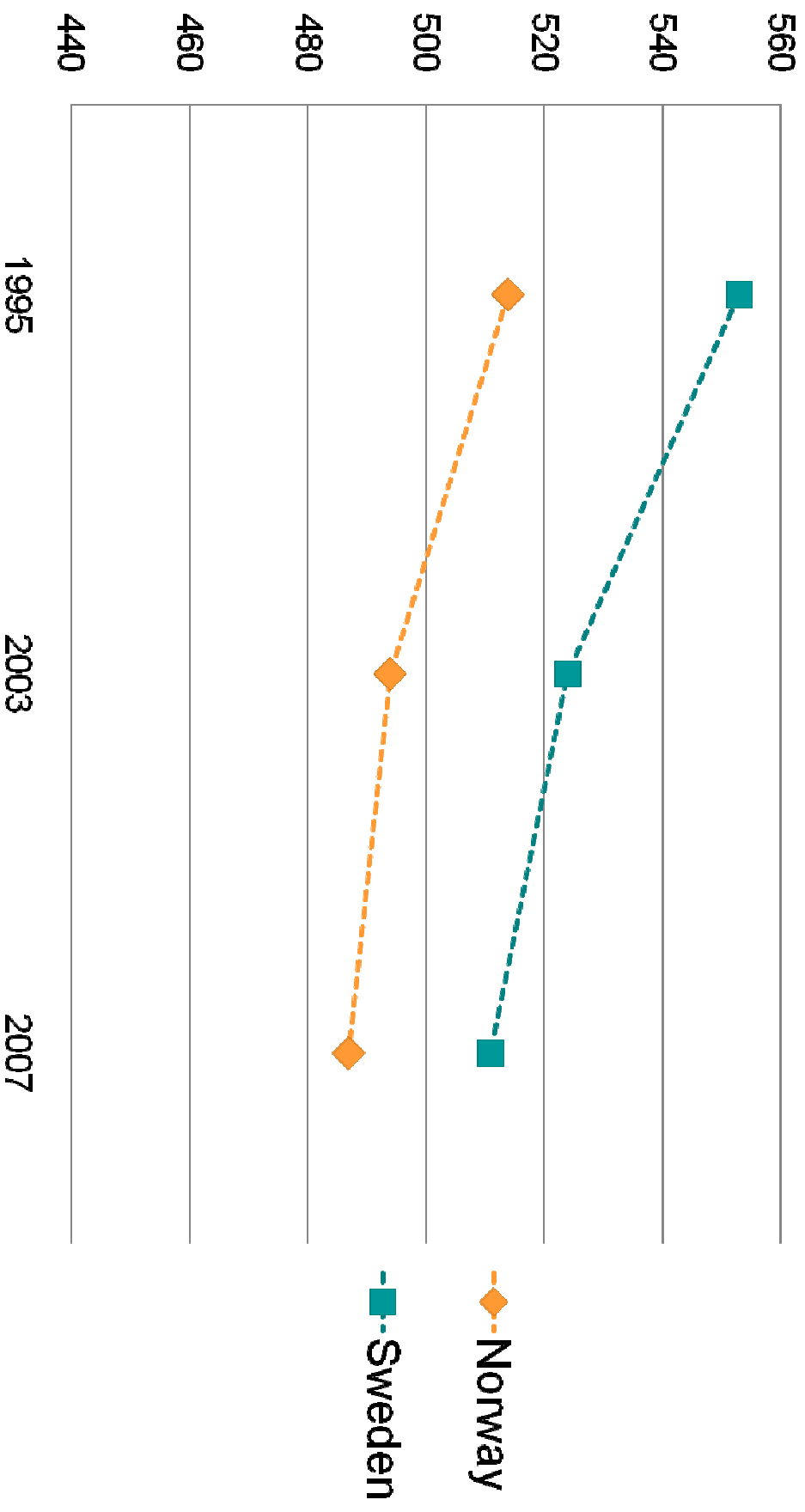


Trends in Norway PISA 2000 - 2006



Science

Trends in TIMSS





Three scientific competences

- 1. Identifying science issues**
- 2. Explaining phenomena scientifically**
- 3. Using scientific evidence**



Three scientific competences

1. Identifying science issues

- ❑ Recognising issues that is possible to investigate scientifically
- ❑ Identifying keywords to search for scientific information
- ❑ Recognising the key features of a scientific investigation



2. Explaining phenomena scientifically

- ❑ Applying knowledge of science in a given situation
- ❑ Describing or interpreting phenomena scientifically and predicting changes
- ❑ Identifying appropriate descriptions, explanations, and predictions

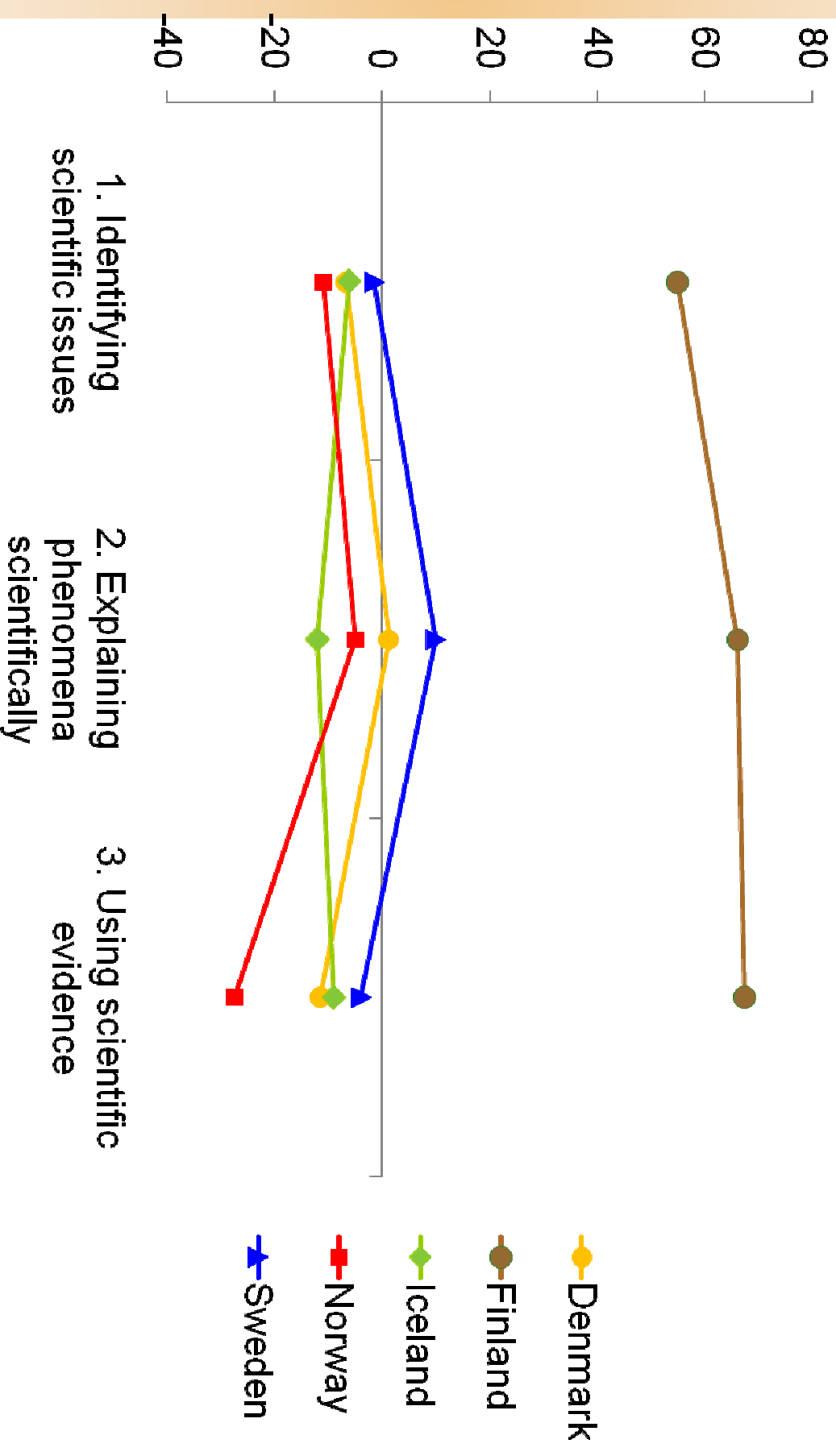


3. Using scientific evidence

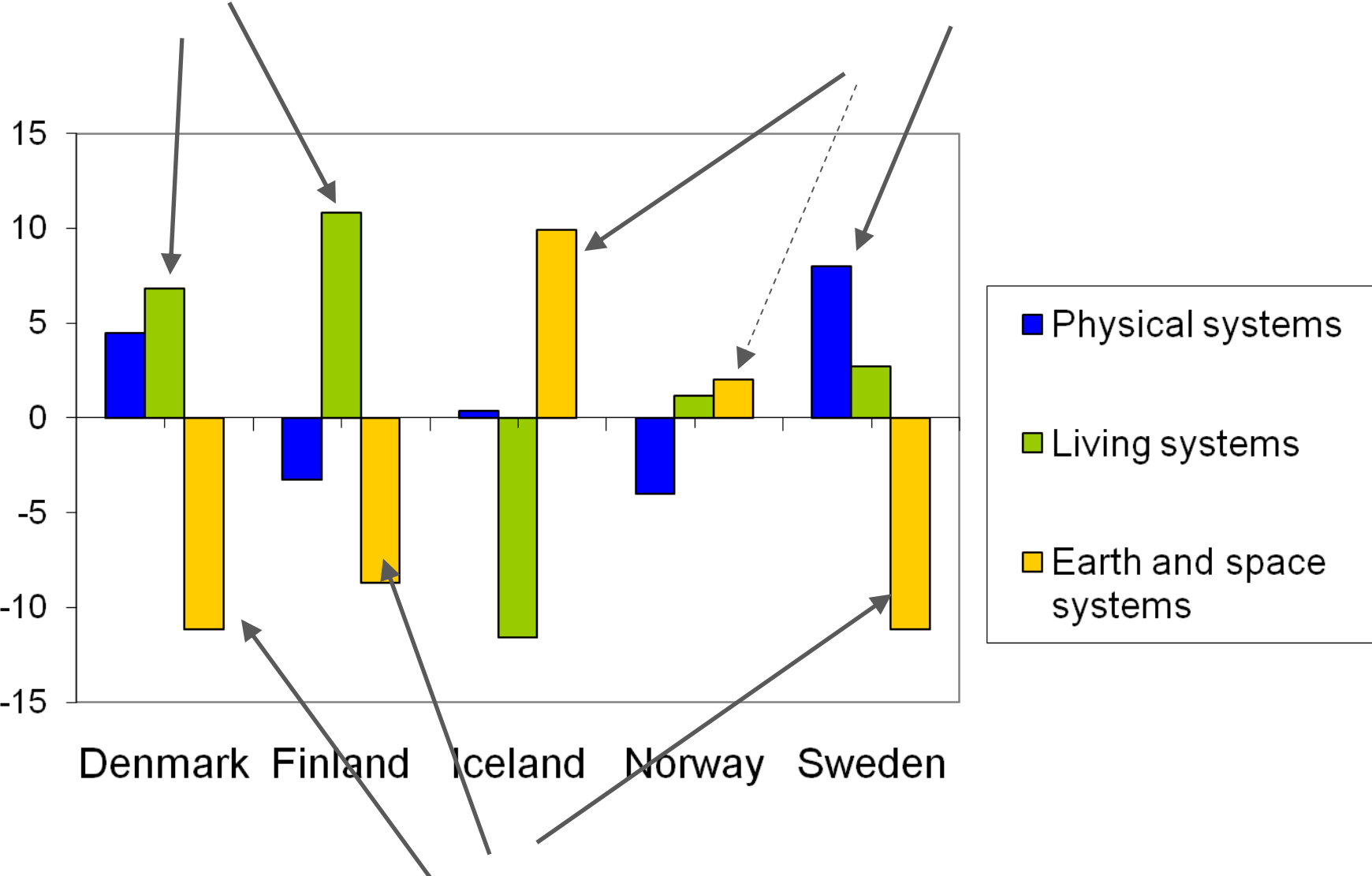
- ❑ Interpreting scientific evidence and making and communicating conclusions
- ❑ Identifying the assumptions, evidence and reasoning behind the conclusions
- ❑ Reflecting on the societal implications of science and technological developments



Scientific competences



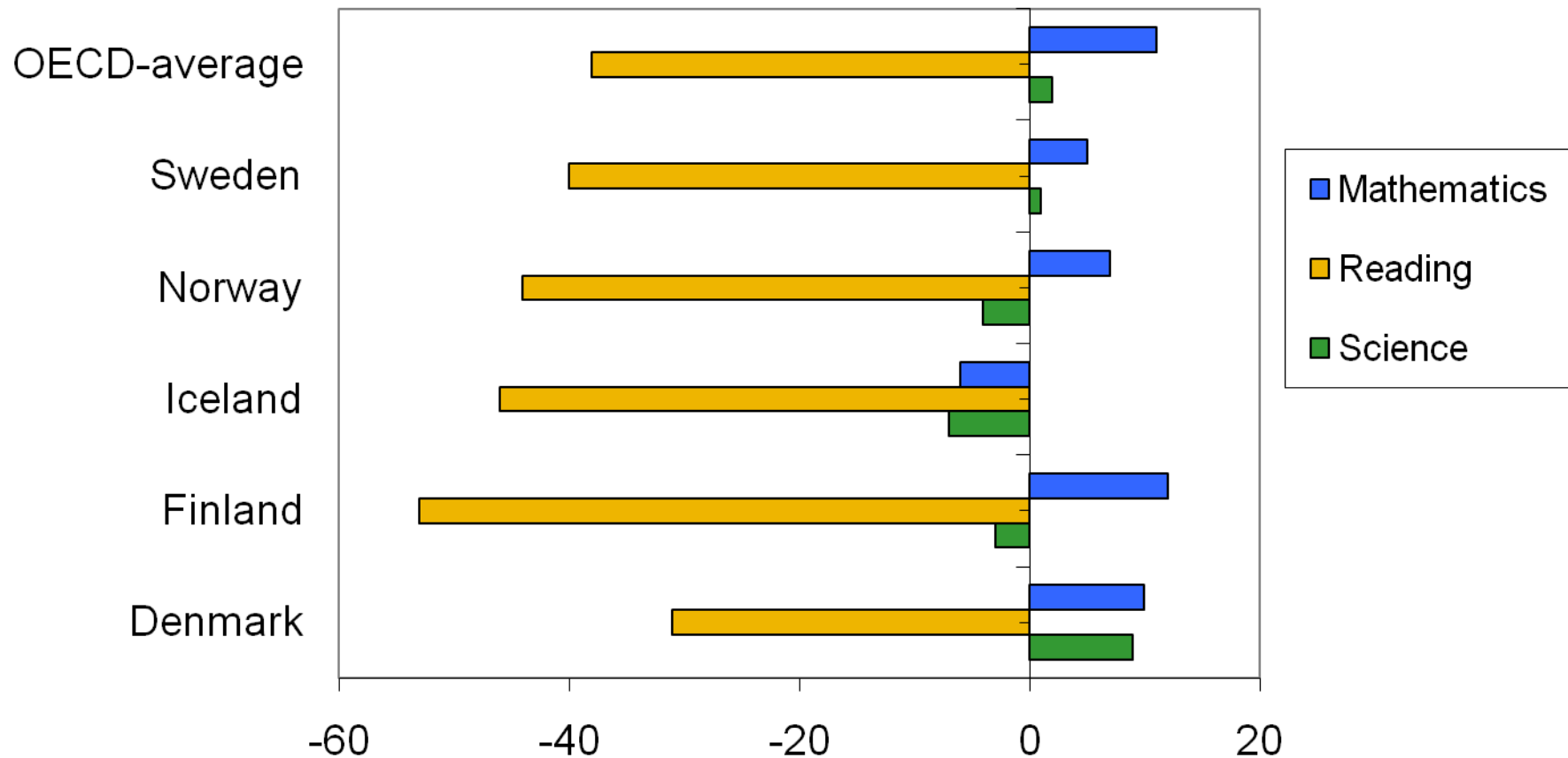
Performance in the three areas





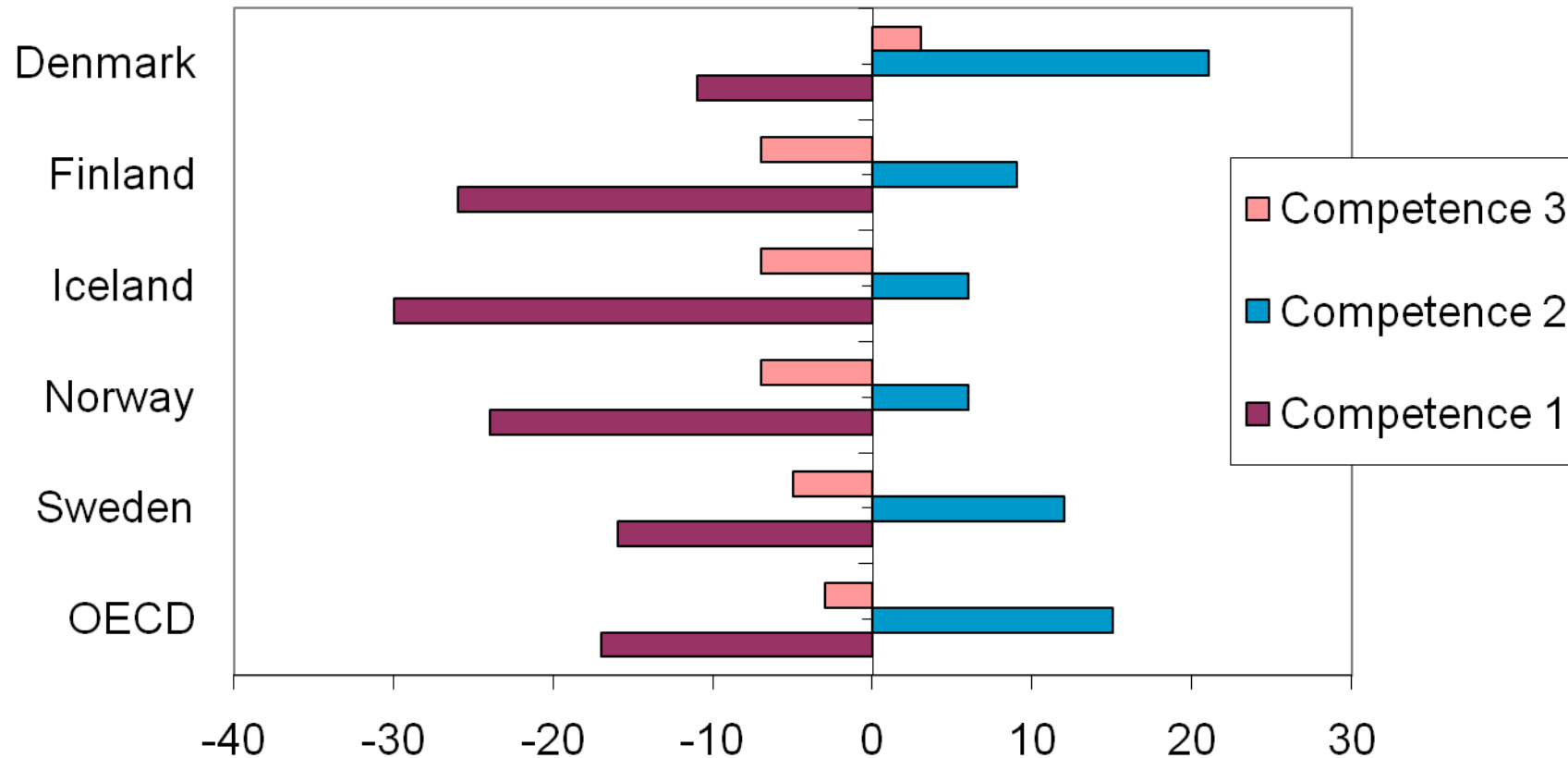
Gender differences in score points

Positive values in favour of boys





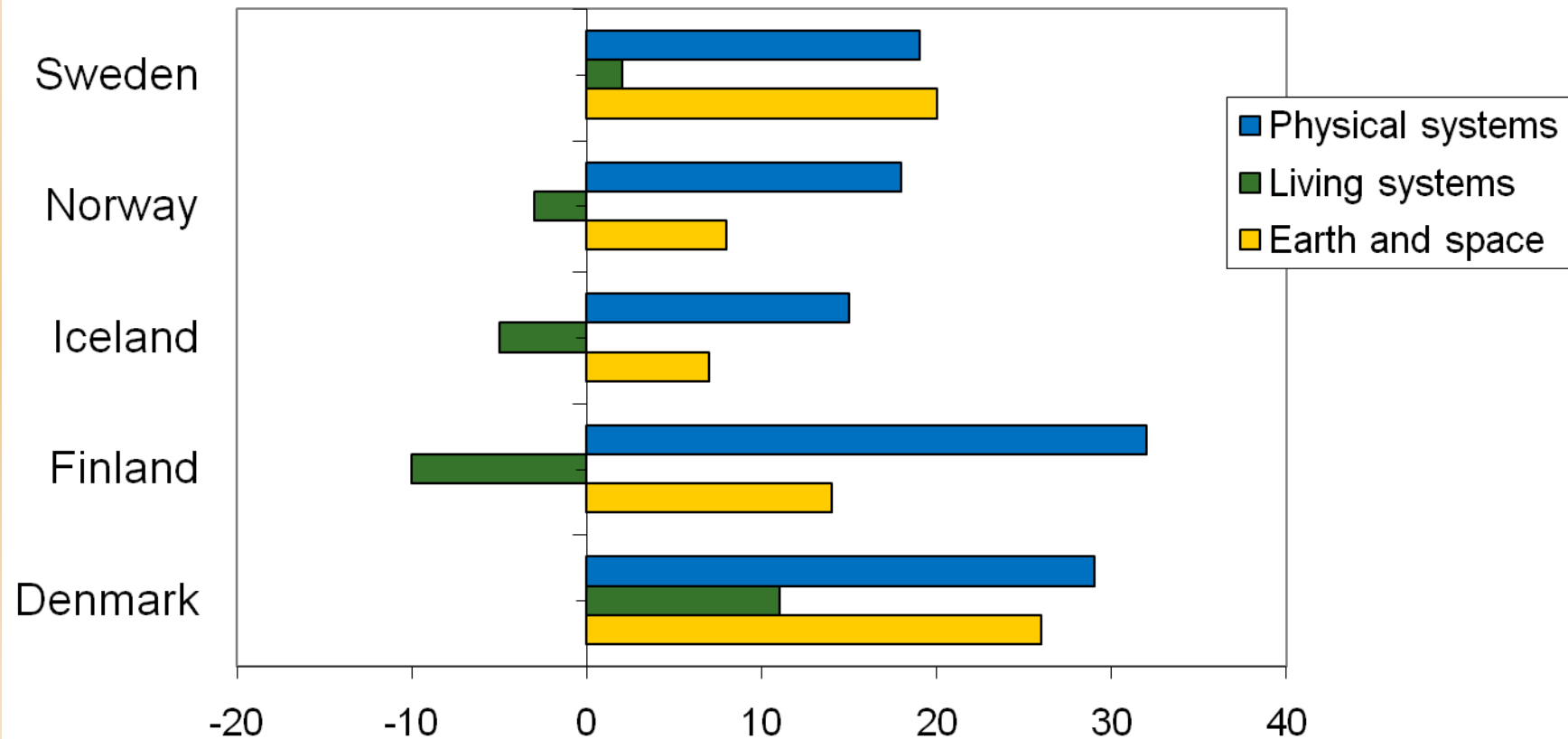
Gender differences for each competence in science (Positive values in favour of boys)





Gender differences in each area

Positive values in favour of boys





How different are we?

- To what extent are there similarities between the five Nordic countries concerning students' responses on individual items?
- How much better or worse do the students perform on a particular item compared to what is expected from the overall achievement of the country and overall difficulty of the item?



Cognitive similarities

Correlations between countries' residual p-values of items

	Denmark	Finland	Iceland	Norway
Finland	0,14			
Iceland	0,27	0,05		
Norway	0,57	0,20	0,31	
Sweden	0,50	0,24	0,24	0,56

Country	Corr.	Country	Corr.	Country	Corr.
Norway	0.77	New Zealand	0.05	Chinese Taipei	-0.15
Sweden	0.75	Lithuania	0.03	Azerbaijan	-0.16
Denmark	0.73	Italy	0.03	Uruguay	-0.18
Iceland	0.58	Estonia	0.02	Tunisia	-0.18
Finland	0.52	Belgium	0.02	Argentina	-0.19
Austria	0.41	Latvia	0.02	Greece	-0.20
Germany	0.38	United States	0.02	Serbia	-0.21
Switzerland	0.38	Macao-China	0.00	Israel	-0.22
Luxembourg	0.33	Portugal	0.00	Russia Fed.	-0.24
Liechtenstein	0.33	Croatia	-0.02	Qatar	-0.25
Czech Rep.	0.29	Slovenia	-0.03	Mexico	-0.26
Poland	0.17	Slovak Rep.	-0.03	Brazil	-0.27
Hungary	0.15	Hong Kong	-0.03	Colombia	-0.27
United Kingdom	0.15	Japan	-0.04	Bulgaria	-0.27
Australia	0.13	Chile	-0.06	Jordan	-0.29
Netherlands	0.10	Korea	-0.07	Indonesia	-0.30
Ireland	0.09	France	-0.10	Montenegro	-0.32
Canada	0.08	Turkey	-0.10	Kyrgyzstan	-0.32
Spain	0.05	Thailand	-0.14		



Actual type of science-related careers

"What kind of job do you expect to have when you are about 30 years old?"

- Occupation categories according ISCO
 - International codes for occupations
- Broad definition of science
- We have divided science into "hard" and "soft" science

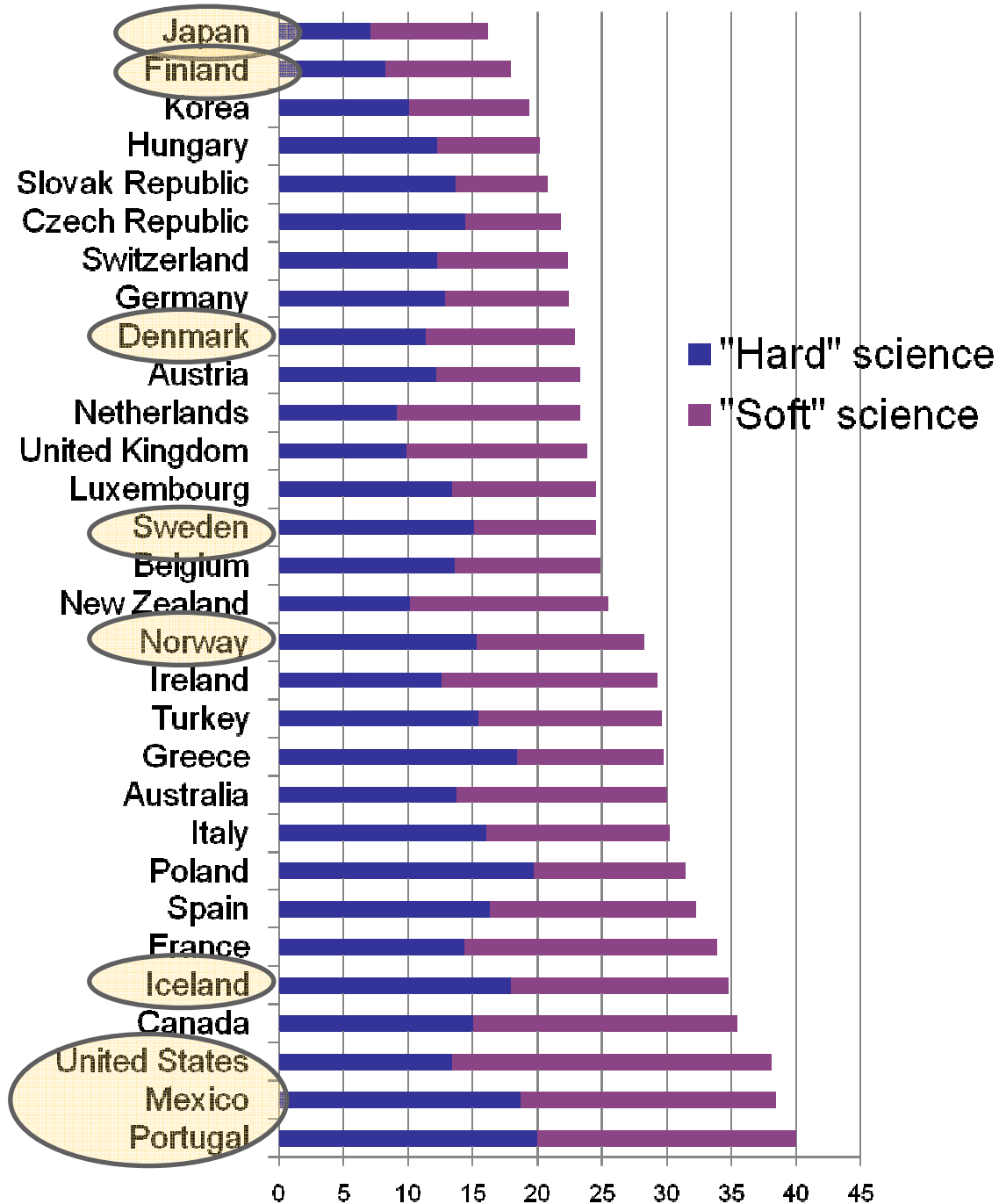


■ **“Hard” science:**

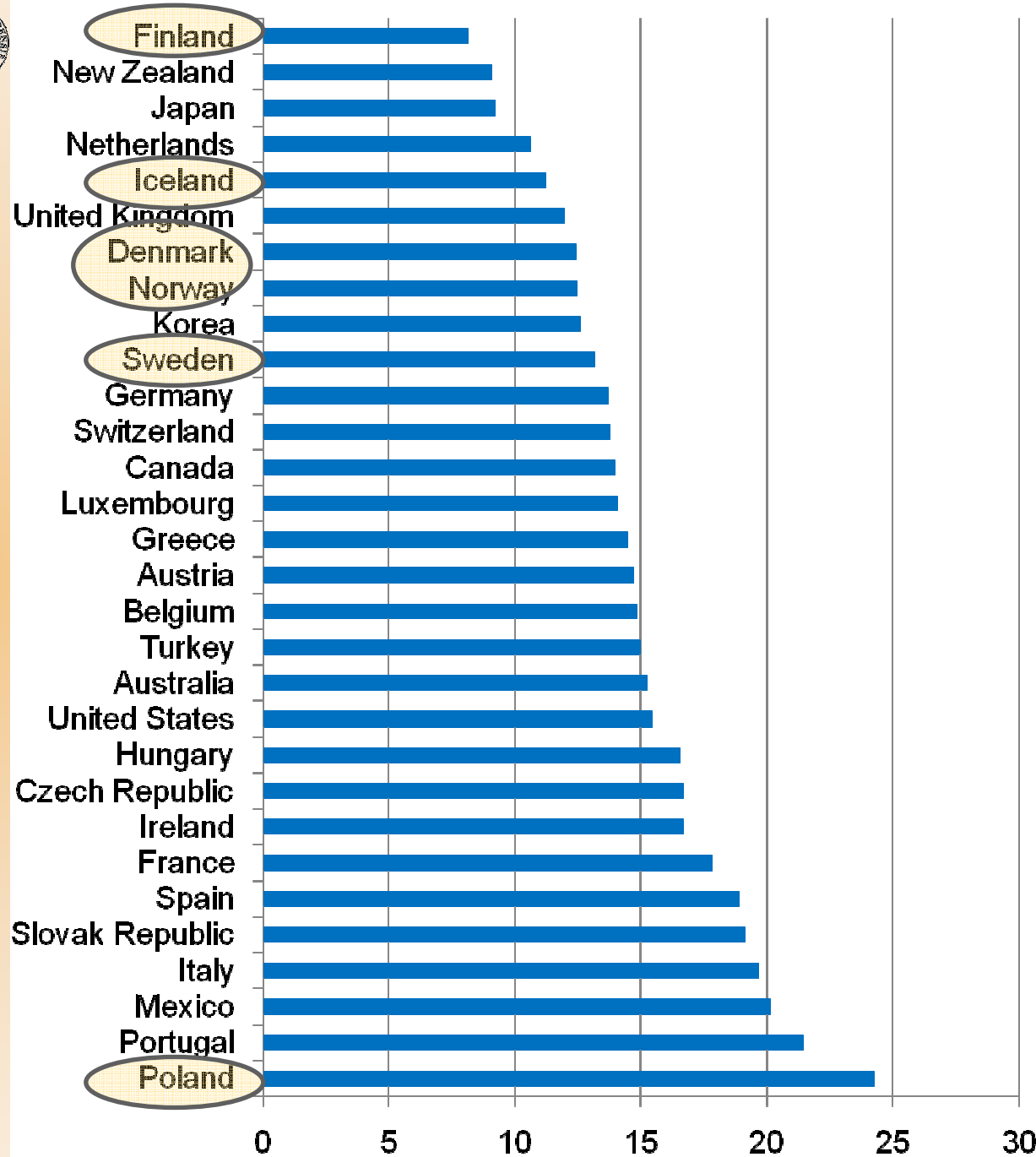
- ❑ Physical, mathematical & engineering science professionals
- ❑ Physical & engineering science associate professionals
- ❑ Medical and optical & electronically equipment operators

■ **“Soft” science:**

- ❑ Life science and health professionals
- ❑ Life science technicians etc associate professionals
- ❑ Physiotherapists etc associate professionals



Students
future job:
"hard" and
"soft"
science
Sorted by
increasing
percentage

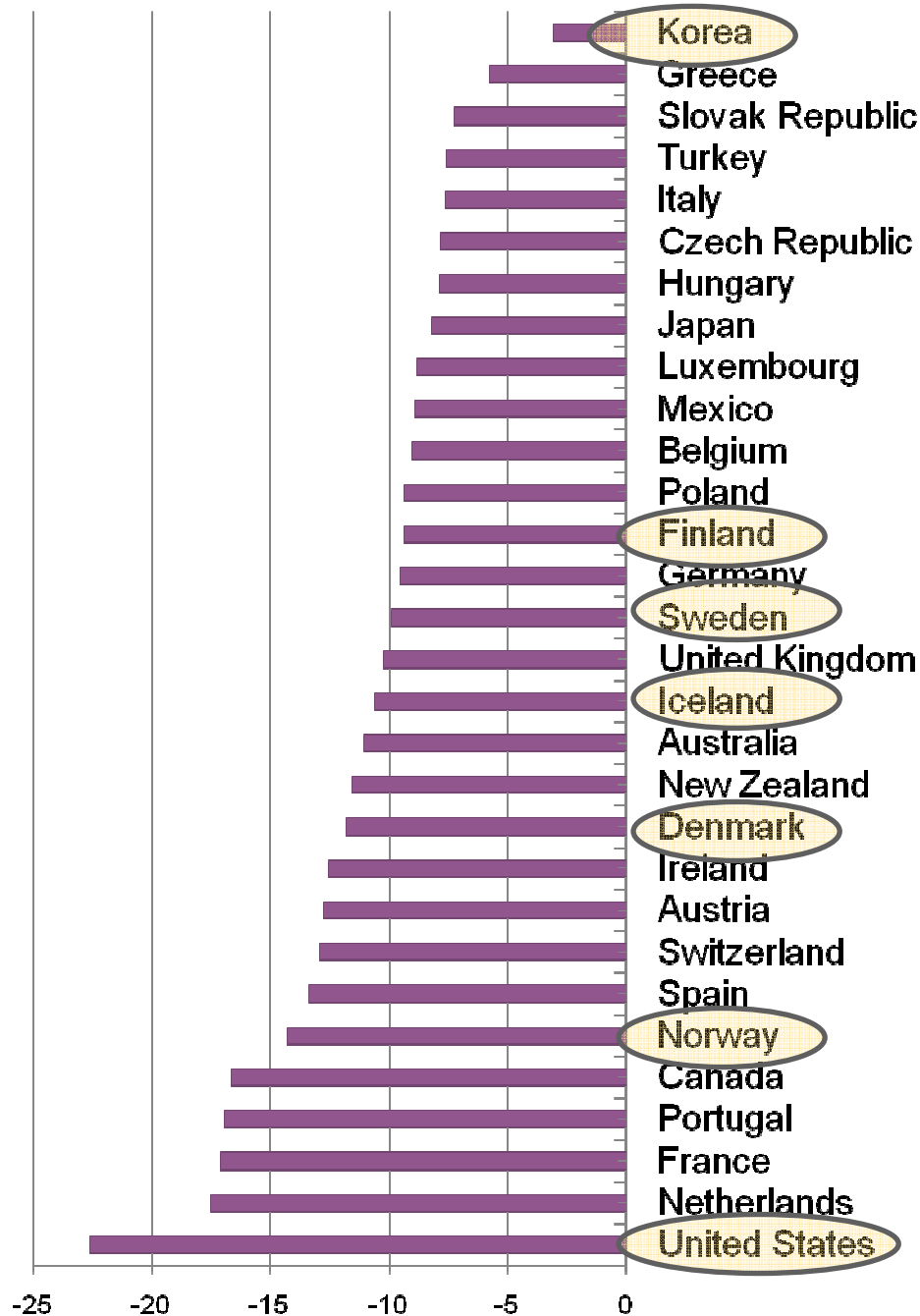


“Hard” science
Differences
between
male and female
OECD-countries

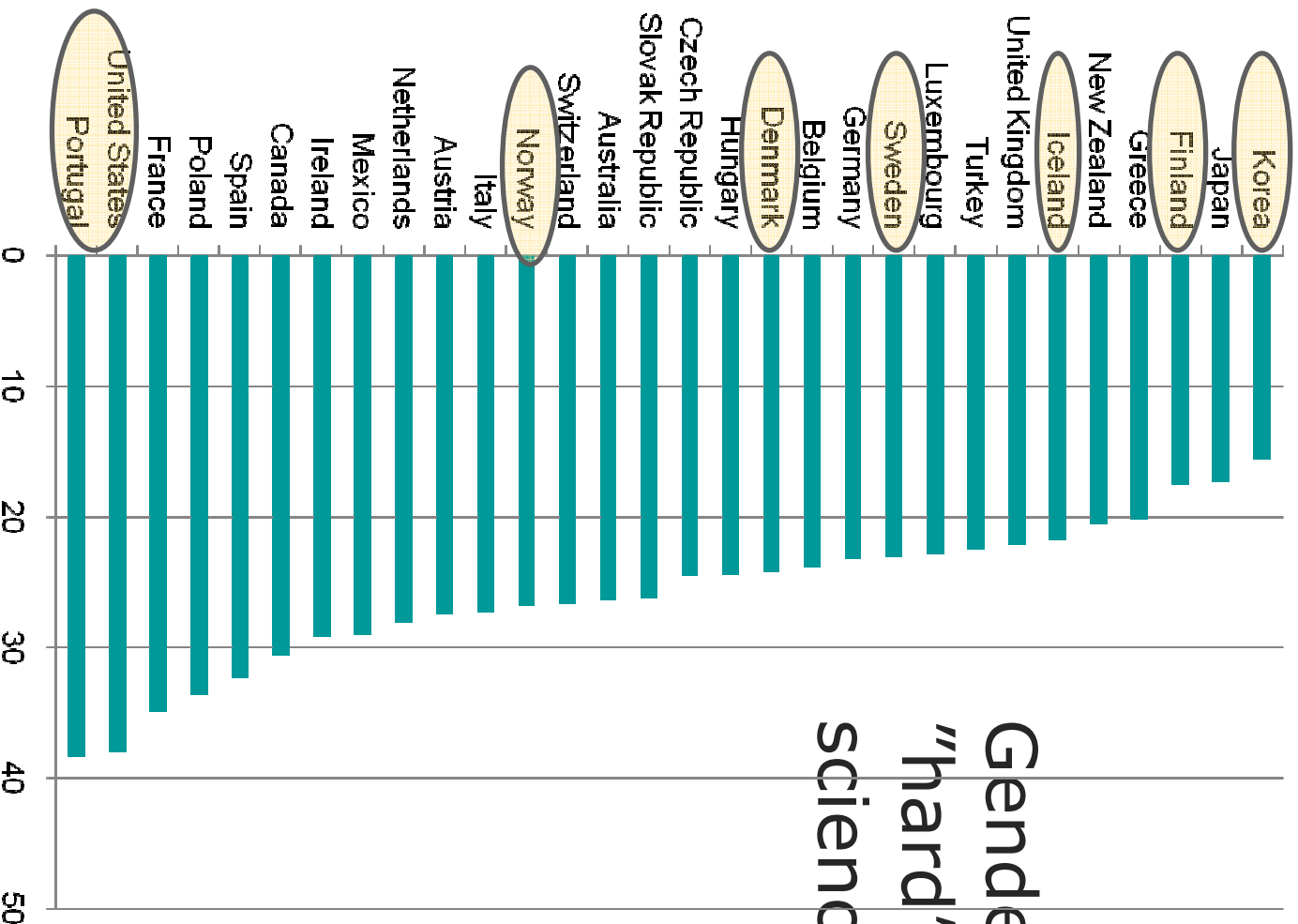


"Soft" science

Differences between male and female
OECD-countries



Gender stereotype "hard" and "soft" science





**Thanks
for your attention!**