

# Explaining the national differences in the level of scientific research – a review of literature

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# Introduction

- This presentation is part of a research project “Why is Finland not successful in international science comparisons?”
- A more general question: what are the factors explaining the level of a country’s scientific research?
  - level at first hand refers to the quality of research (citations/publication)
  - the subject has been studied for decades
  - no convincing solution
- I will present something of the related literature
- the structure of the presentation
  - a few words about literature and its structure (appendix)
  - highlights of some of the most important factors
  - summary and preliminary conclusions

# Literature

- selected literature in the Annex
- The structure of the literature
  - General explanations
  - Excellent researchers
  - Recruitment/endogamy
  - Research time
  - Competition
  - Autonomy/management
  - Economies of scale, concentration
  - International collaboration
  - Resources

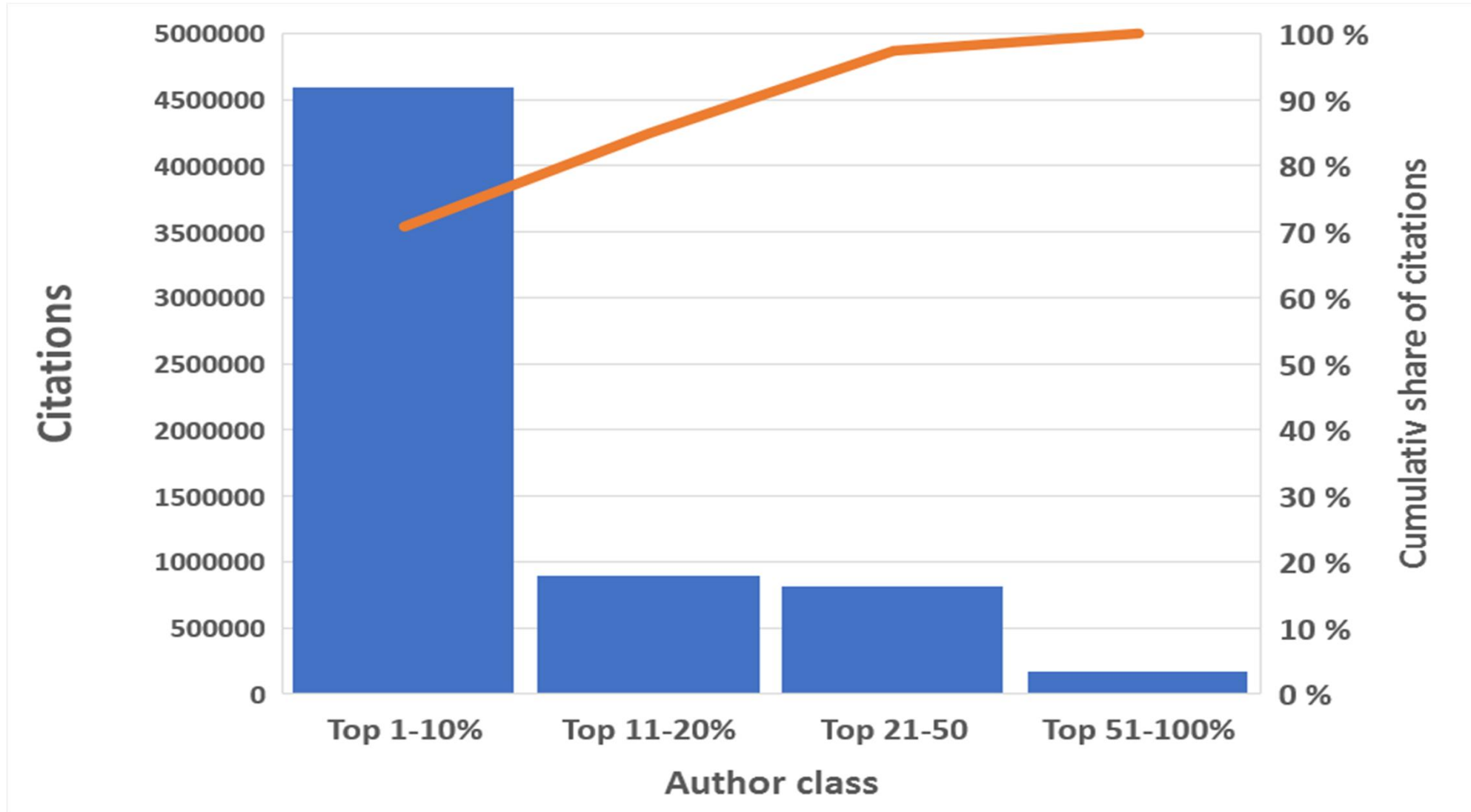
# Narrow explanations

- Size of research units; economies of scale
  - empirical results are contradictory
- International collaboration
  - A possibility for small countries
  - the citations are usually calculated per publication, not per researcher
- Resources
  - essential, but only when you know how to use them

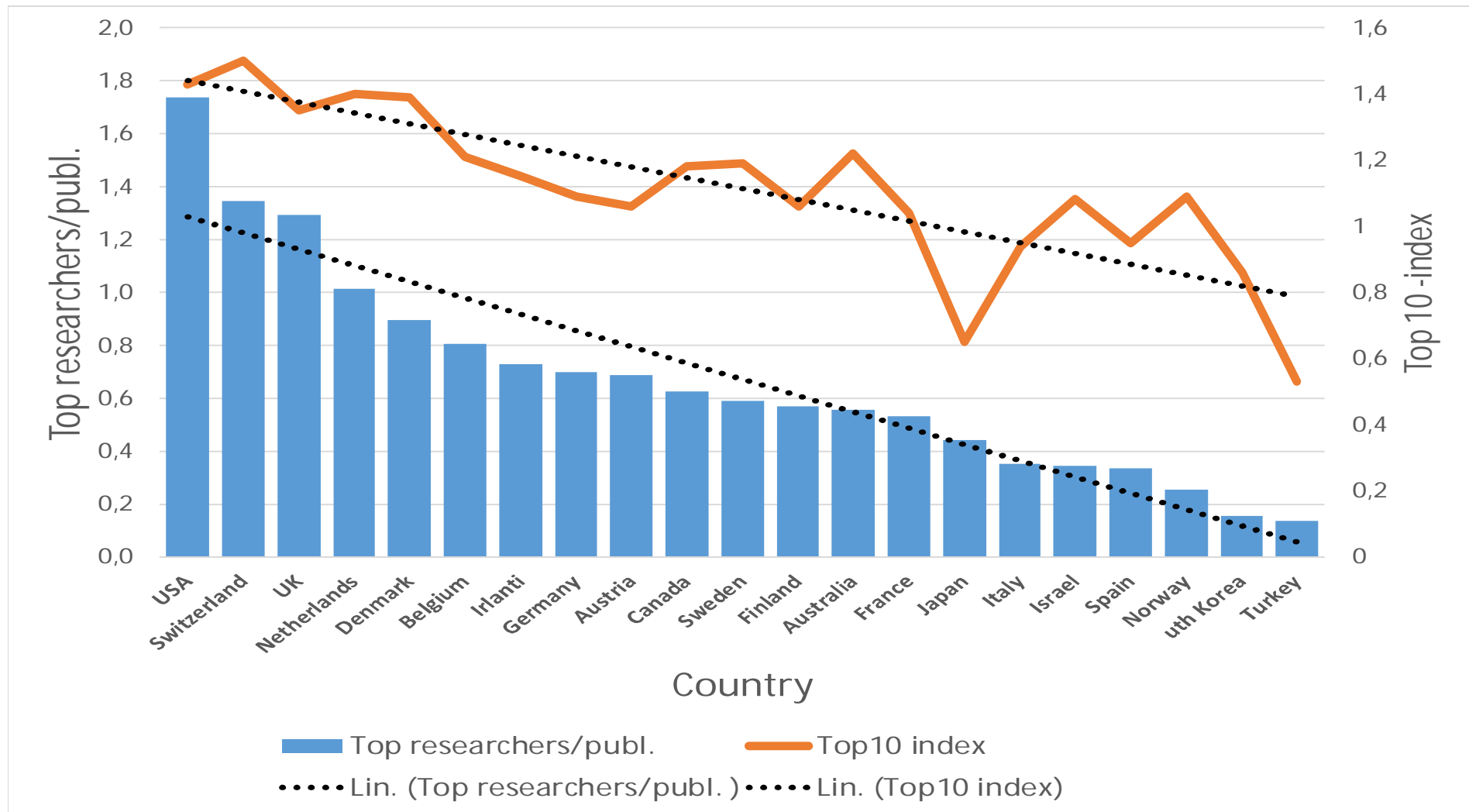
# Excellent researchers

- Old line of explanation (e.g. Lotka 1926; Ben-David 1960, Price 1965; Cole & Cole 1972)
- Not popular (Hicks 2011)
  - excellence versus equality, - the allocation of research resources
- The productivity and quality differences between researchers are really great

# World citations/cited author class 1990-2013 (Gazni & Ghaseminik 2015)



# Top researchers and Top 10 –citation index (Highly cited researchers 2014; Academy of Finland 2016)



# Recruitment

- Successful countries in science comparisons: successful in recruiting outstanding scientists
  - domestic young talents
  - foreign scientists
- Factors affecting the recruitment of researchers
  - remuneration, permanent jobs, research funding, colleagues, reputation, etc.
- Nationally: competitive conditions for researchers in relation to other sectors
- Internationally: conditions in absolute terms better than in the comparative countries
- Open, merit-based and transparent recruitment
  - endogamy



# Research time

- The productivity and quality of research depends on the time available for research
- When a country adds time for research and wants to keep the teacher-student relationship unchanged
  - you have to increase the number of researchers - more money, or
  - to reduce the number of students or the amount of teaching
- More assisting staff
  - research assistants
  - technical staff

# Competition - funding

- Competition is usually presented in connection with research funding
- Centralized funding: the core funding of universities according to inputs
- Competitive
  - external project funding through research funding institutions
  - the core funding of universities according to the results
- If there are quality differences between universities, a shift from centralized to competitive funding raises the quality of research in the country
  - however produces only a level shift, not a continuous rise; cf.. British RAE
- The problem of funding competition is short-term contracts for researchers; uncertainty of jobs
  - weakens the attractiveness of science to young people

# Competition - excellent scientists

- Only increasing the share of outstanding researchers will lead to a continuous rise in the country's scientific level
  - attention from funding competition to competition from excellent researchers (Ben-David 1960)
  - Conditional on the autonomy of universities
- Cf.. USA and Switzerland are very well located in science comparisons, albeit with quite different funding models
  - universities from both countries can compete freely from researchers

# Summary and preliminary conclusions

- There is a lot of literature concerning the factors explaining the national differences in the level of scientific research
- It seems that the most important explaining factor is the number and share of excellent researchers
- It is not enough; you need a whole complex:
  - excellent researchers-recruitment-research time-competition-autonomy-money