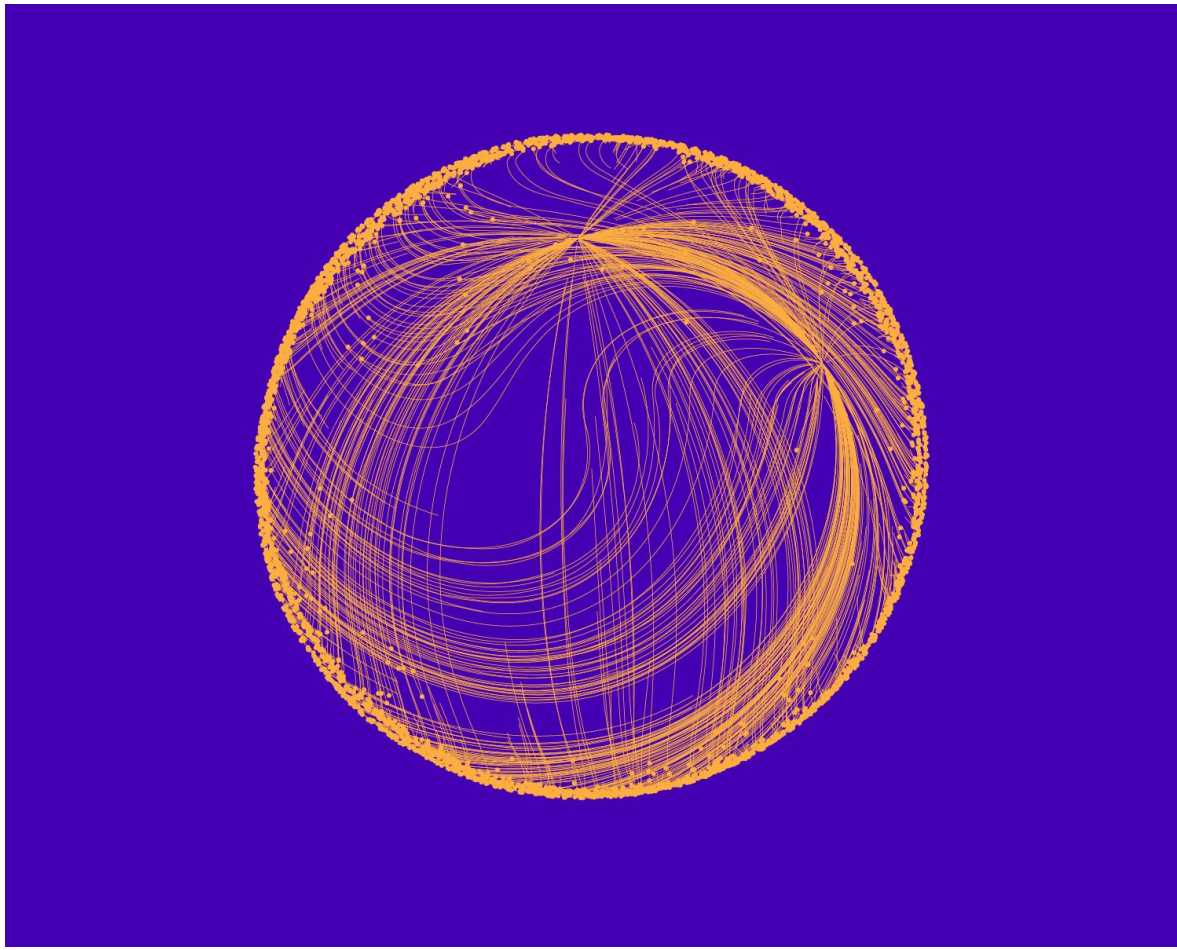
Helsinki GSE

Economics of Science Funding

September 25-26, 2025



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1. Why, by whom and how should science be funded?

Why?

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- In the long-run, all productivity growth rests on
  - new ideas
  - turned into new products, processes and services = inventions
  - and these diffusing widely

- In the end, a major fraction of inventions is based on ideas discovered by scientists.

- Many important science policy documents fail to motivate government's role in science funding (but only go on to describe what the government ought to do).

By whom?

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- Plan is to concentrate on public sector funding.

- At least two dimensions:
  - Tax-payers / government; NGOs; private sector
  - National / local governments; international coalitions (WHO, EU, …)

Key features

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- Outcomes: The basic arguments are well-known and understood, but worth repeating:
  - Highly uncertain outcomes
  - Outcome = knowledge is a global public good
  - But: it takes specialist knowledge to make use of the outcomes (= absorptive capacity)
  - It often takes (considerable) time to appreciate what is valuable and what is not
  - The process is ex-post wasteful and there is (substantial?) forgetting
- Production: The production technology sets demands on funding arrangements
  - Human capital and capital heavy
  - Long-term and slow
  - Takes specialist knowledge to evaluate the ex-ante prospects of a project, and almost by design, even then considerable uncertainty

Key features

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- ***Research = frontier knowledge production,*** to a large extent intimately tied to (the ability to be engaged in) ***frontier knowledge diffusion = teaching***.

Key institutions

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- Base funding & competitive funding
- Peer recognition and evaluation
  - Do scientists pay to be scientists?
  - Is “lower-than-market” pay a selection device?
- Tenure and competition for tenure-track positions (post-docs)
- Stable organizations needed
- These institutions interact: tenure necessitates base funding

Things to consider

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- Global public good
  - How to think of the base / competitive funding of any single jurisdiction?
  - Case Finland: < 1 pro mille of world population…
- Science funding as a selection and incentive device for knowledge diffusion
  - "you can only teach frontier knowledge if you strive to produce it yourself"
- Claim: Knowledge diffusion more local than knowledge production ➔ local incentives to provide local funding
- Let's not forget the distributional aspects, whether international (e.g. EU) or national (e.g. the US).

How?

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- Base funding
  - There is no competition for competitive funding without
  - institutions that enable the winners to conduct their work
  - potential applicants with the requisite skills and incentives to apply
  - ➔ need for base funding (in addition to teaching-related justifications)
- Competitive funding
  - since science unpredictable (who gets a good implementable idea and when), impossible to foresee even into the near future what a given researcher's funding needs are
  - provides incentives to remain research active (on and upon other institutionalized incentives)

A rough guess at a benevolent & capable social planner (OLG, multicountry-) equilibrium

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- (Almost) all countries provide base & competitive funding.
  - Absorptive capacity
  - Complementarity with teaching with strong local benefits
  - Ability to both train and to attract capable researchers
  - Role of base funding
    - Provide a basis for knowledge diffusion
    - Attracting and retaining talent
    - Providing a basis for there being sufficient competition for competitive funding
  - Role of competitive funding
    - Allow redirection of research effort
    - Incentives to researchers
    - Attracting and retaining talent
  - Constrained by
    - Cross-border knowledge spillovers from local research
    - Outflow propensity of locally trained talent

A rough guess at a benevolent & capable social planner (OLG, multicountry-) equilibrium

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- Local vs international: trade off local knowledge and priorities to better internalization of spillovers.

- In equilibrium

1. marginal local social benefits = opportunity cost of funding
2. marginal benefit of base funding = marginal benefit of competitive funding
3. marginal benefits to intl funding = marginal benefits to local funding

Things that I am (currently) ignoring

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- Time-horizon
- Political economy aspects
- Funding for teaching as a complement to science funding
- Private sector R&D and funding to universities
- Non-governmental sources of competitive funding (foundations)
- Strategic sectors / decoupling

- Important diversion: Universities vs (public) research institutes
  - knowledge diffusion vs mission orientation (government knowledge priorities)

2. Ways to facilitate studying the impact of individual policies

Sir John Kingman - Reflections on his time as Chair of UK Research and Innovation, 14 July 2021

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"If I look back on many years of involvement in political decision-making and

policy-making around science,

Innovation and R&D, I am struck by how much of it

tends to turn on gut feel

of the individuals involved,

[rather] than on hard evidence and analysis.

This is of course ironic, since good science is all about testing hypotheses against data, empirical results and facts."

Key insight

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- Even the best policy evaluation studies' results need to be put in the greater context.
- Without this, one is at great risk to draw wrong conclusions.
- For example, not finding causal output effects from NIH or ERC funding using (quasi-) natural experiments does not mean they would not be a good use of tax-payers' money.
- This risk is no reason not to facilitate such studies. Suggestions:
  - Explicit periodic evaluations by scientists
    - Data available also to 3rd parties (after a possible cooling period)
  - Systematic data collection and management (+ auxiliary data)
  - Randomization at the threshold
  - Randomization at the intensive margin
  - Randomization of committee compositions

3. What is known about the effects of science funding?

- The existing literature is not very large, but growing.

- Not sure it is worthwhile to include this.