The diversification of individual research agendas

A comparison across disciplines and countries

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BEHAVE

My project

Overall goal

Investigating the factors affecting the choice of research topics.

0. Introductory chapter
1. Thirty Years of Climate Change Research. A fine-grained analysis of geographical specialization (under review)
2. *The diversification of individual research agendas: a comparison across disciplines and countries* (in progress)
3. Who's your peer? An ABM exploration of editors' strategy in reviewer selection (in progress)

(other projects: CIG funding, ERC topics, COST)

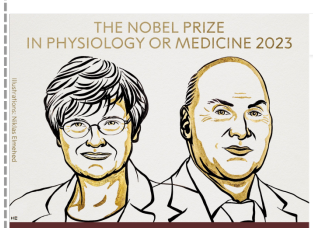
Cartoonish scientific pipeline

Most research focuses on filters

Sources of variation → **Publication & peer-review**
Career steps
Prestige & recognition → **(hopefully) knowledge**

Sources of variation → **Individual research agendas**

Recent examples



All about coffee...

Research agenda diversification

When choosing to pursue a new research line, scholars have to balance between *exploration* and *exploitation* (Kuhn 1977, March 1991).

Under what conditions can scholars (are incentivized to) have a broader (narrower) research agenda?

Relevant factors at different levels of description:

- Individual level (curiosity, seniority, gender, . . .)
- Disciplinary level (hierarchy and specialization, . . .)
- Institutional level (career systems, funding, mobility, . . .)

A promising theoretical framework is the one of *protected space* (Whitley 2000): social and/or technical dependence on others restricts protected space. Varies across disciplines and institutional contexts.

Design of the study

Comparative study across disciplines and countries (NB: observational).

Selection of fields (soft-hard, lab, paradigms):

- History and Philosophy of Science (HPS, 1207)*
- Sociology and Political Science (SPS, 3312)
- Economics and Econometrics (ECO, 2002)
- Immunology (IMM, 2403)
- Statistical and Nonlinear Physics (SNP, 3109)

Selection of countries with different models of career progression (internal vs external career, chair system or not):

- Italy
- Norway
- Germany
- Netherlands

Hypoteses

- H1: Disciplines with higher levels of dependence display lower levels of diversification (higher specialization).
- H1.1: In lab-based disciplines individuals display a delayed increase in diversification during the career (delayed independence).
- H2: Chair systems (and other institutional settings that increase dependence) display lower levels of diversification.
- H3: Mobility is associated with higher diversification (effect and/or selection).

Data collection

Iterative data collection via Scopus API

1. Publications in field and country
2. All publications by authors with at least 2 of those
3. Authors with modal field as target

Field	Authors	Observations
HPS	573	5,178
SPS	4,106	37,568
ECO	8,934	63,494
IMM	4,624	108,560
SNP	1,402	68,149
Total	**19,639**	**282,949**

Measurement of research agenda variety

Large Language Models allow to embed documents in a vector space (SentenceBERT, Reimers and Gurevych 2019). We can compute distances in this abstract space.

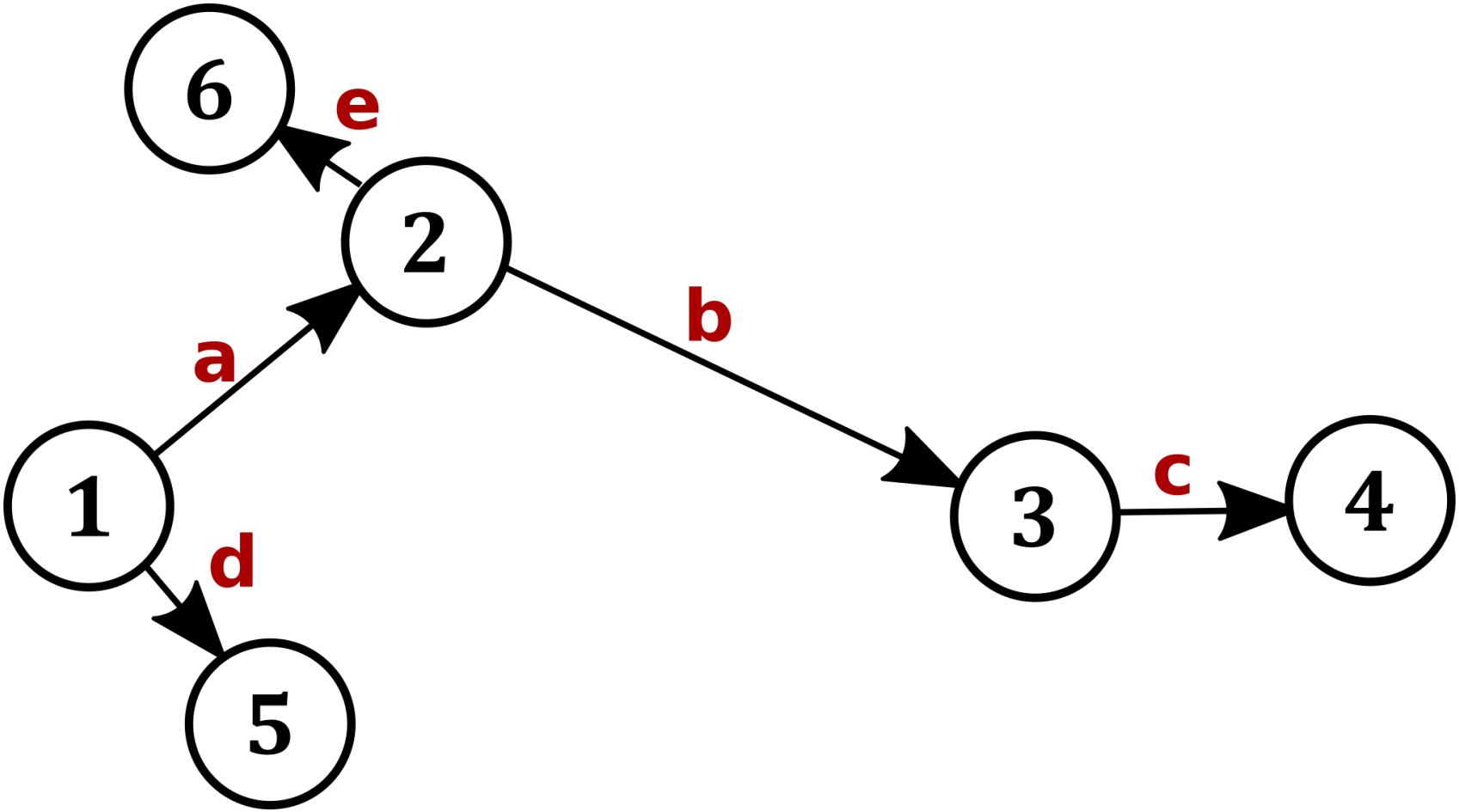
A continuous measure has advantages over a discrete one: no fixed and arbitrary level of description.

Outcome of interest

For the given publication, distance from the closest past publication by the focal author

Intuitive interpretation: how far is the given publication from the "comfort zone" of topics you have already published on?

Example



Predictors

- Focal author
- Seniority
- Gender
- Country
- Number of authors (scaled by 5)
- New coauthor
- Number of publications (scaled by 10)
- Publication year (scaled by 5)
- Affiliation change
- Country change

Model

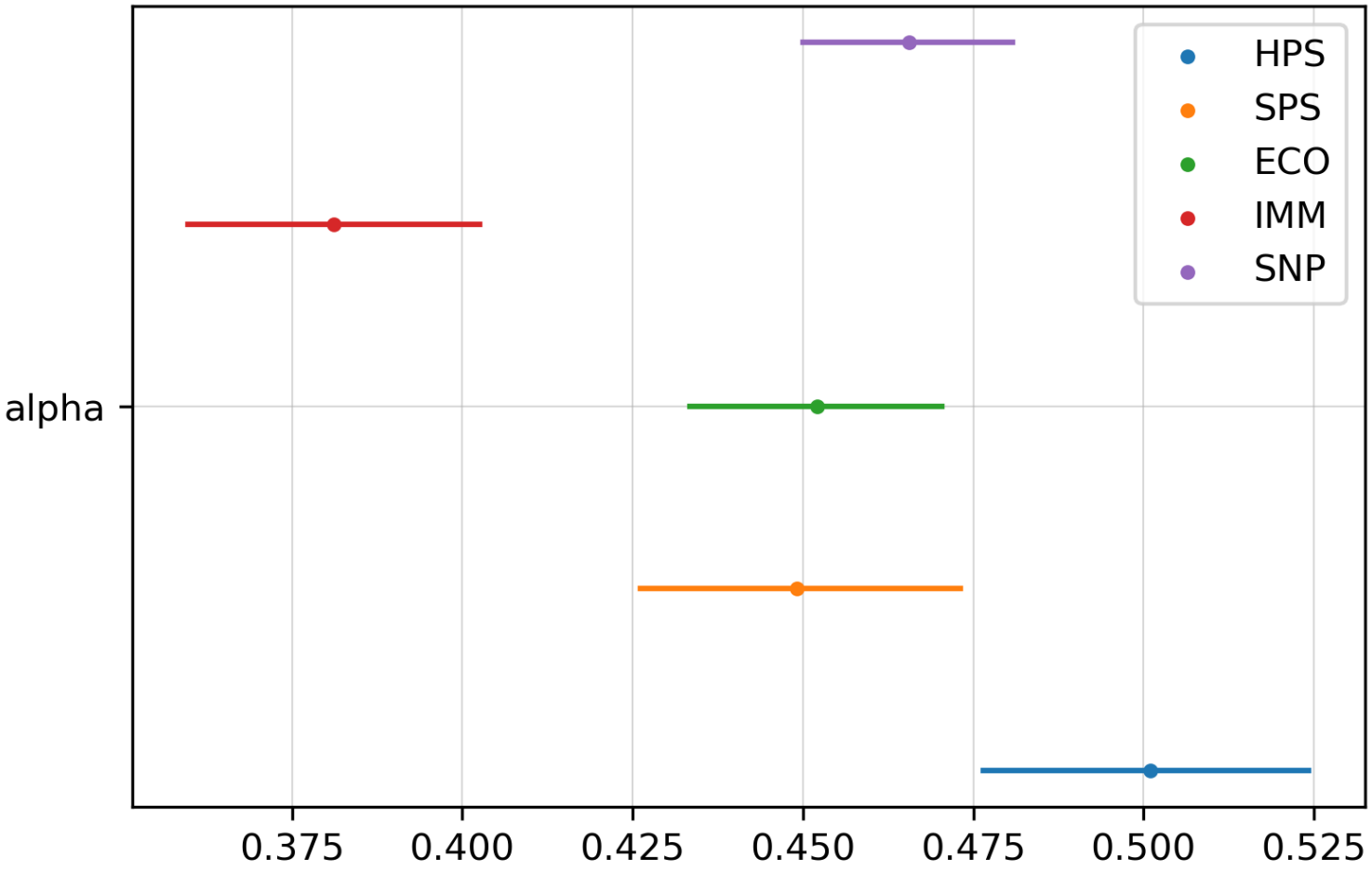
Bayesian multilevel model fitted separately for each field:

- smoothing prior on time variables (unknown functional form)
- linear model for baseline comparison (robustness check)

Stan - cmdstanpy implementation

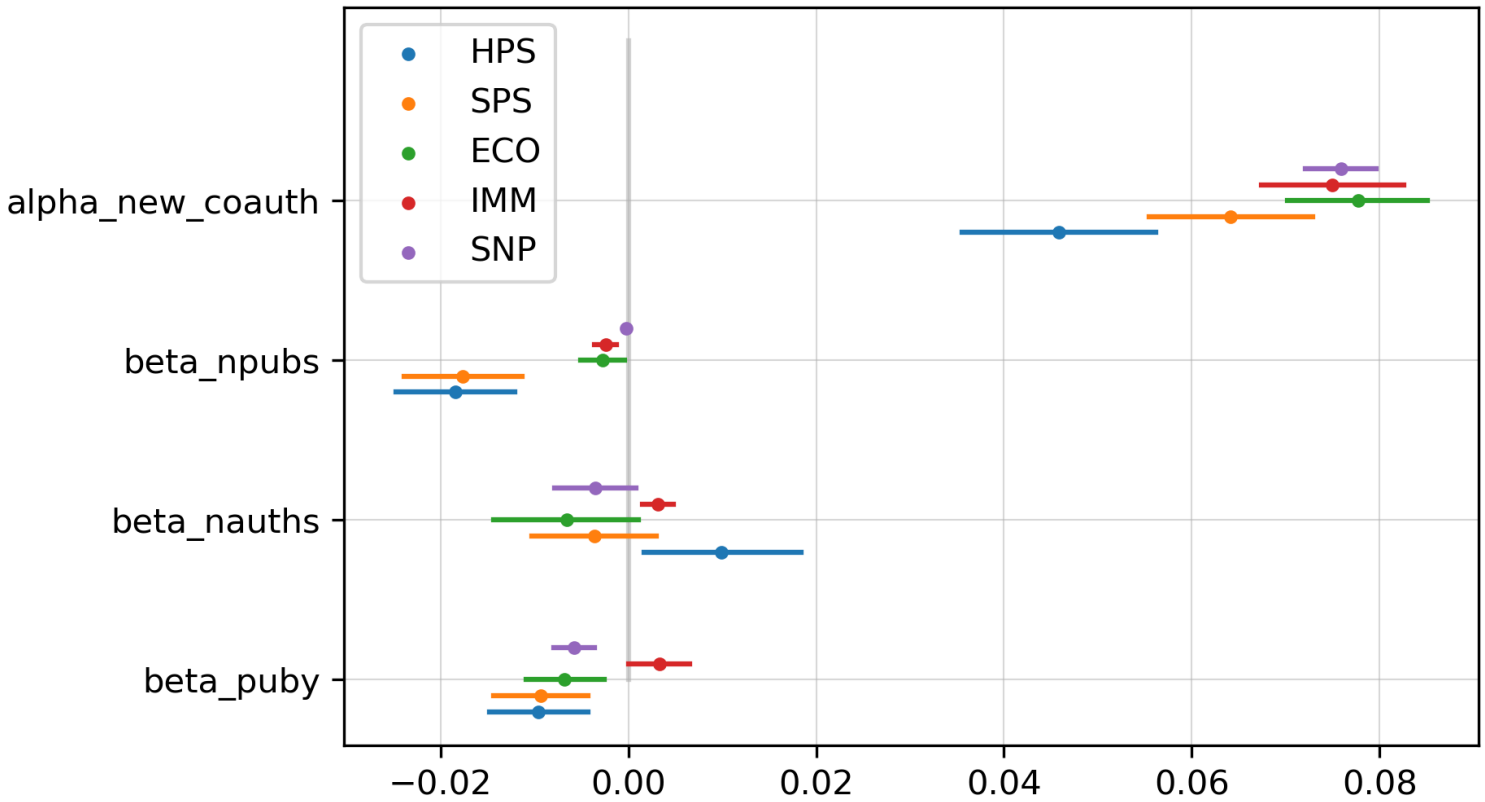
Preliminary results from random subsample of 300 authors per field

Results - Intercept



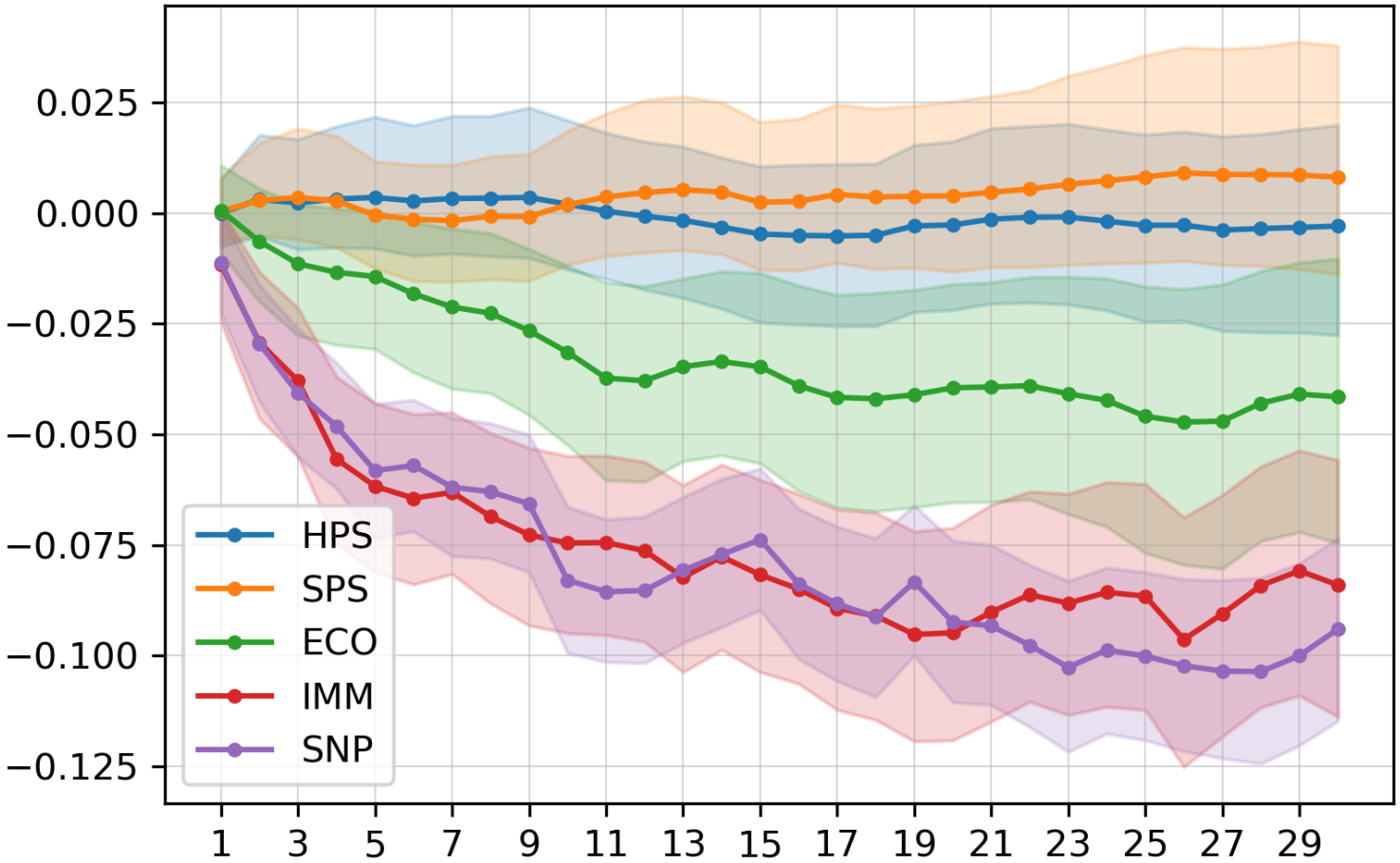
Average levels of diversification by field

Results - Linear effects



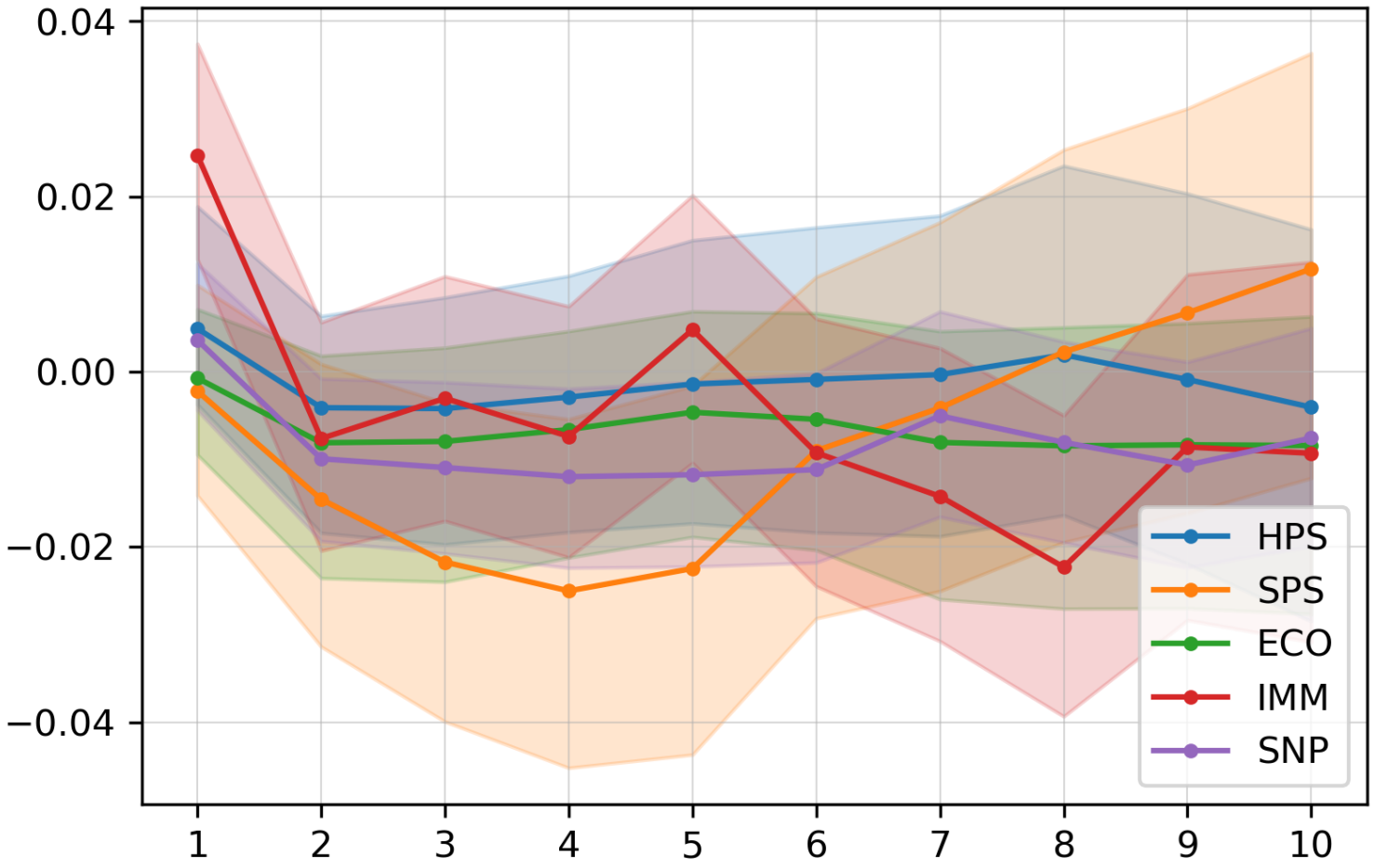
Effect of predictors by field

Results - Seniority



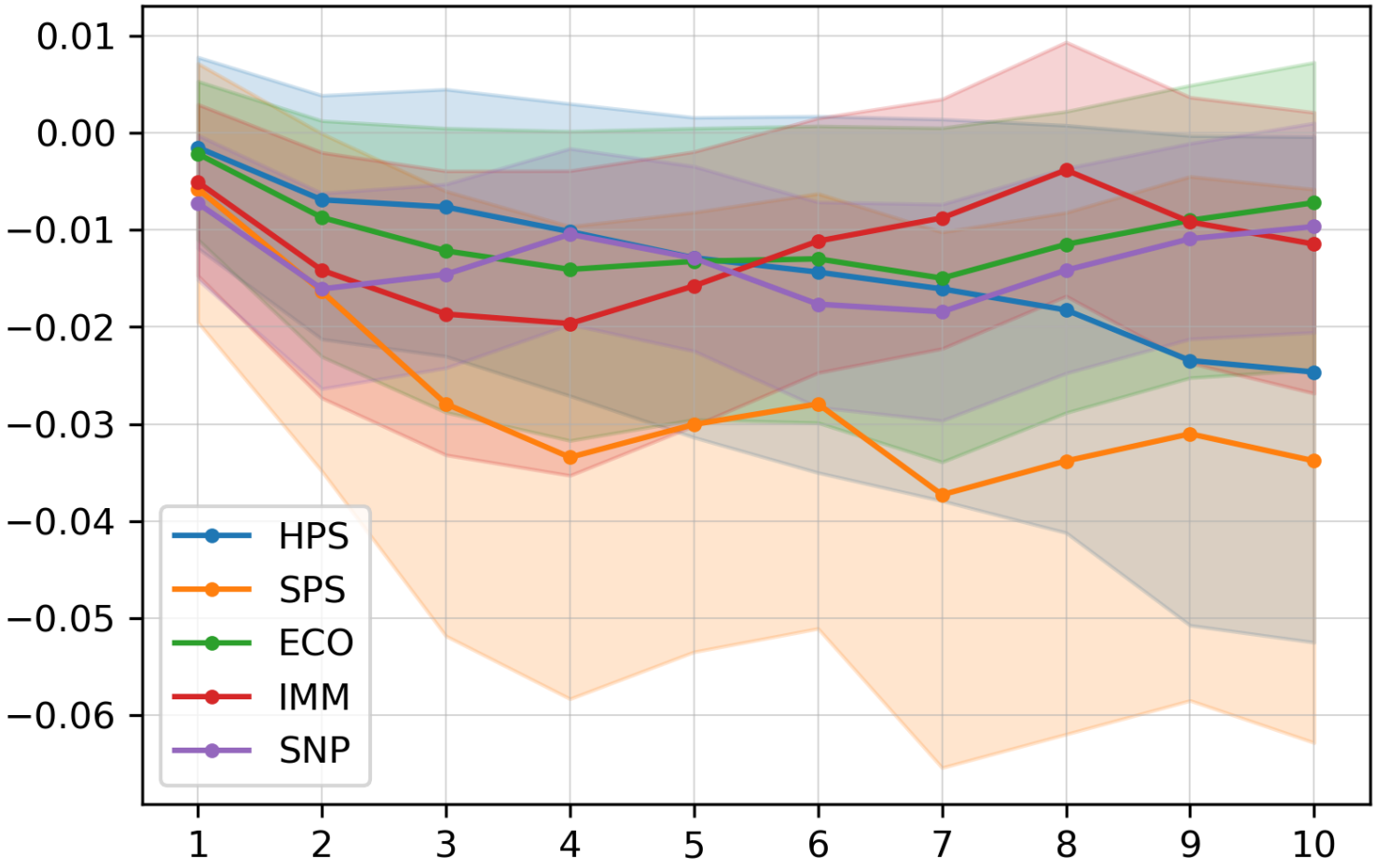
Evolution of variety over the career by field

Results - Affiliation change



Evolution of variety after mobility by field

Results - Country change



Evolution of variety after international mobility by field

Conclusions

- Disciplines are the main predictor of the average research agenda diversification
- Specialization is driven by path dependence along the career and mediated by discipline
- Mobility (esp. international) is associated with higher exploitation (cost of moving vs specialization-based mobility; hard to distinguish between effect and selection)
- No striking evidence of difference across institutional systems (low difference / mixing of academic market careers / small sample)

Thanks for your attention

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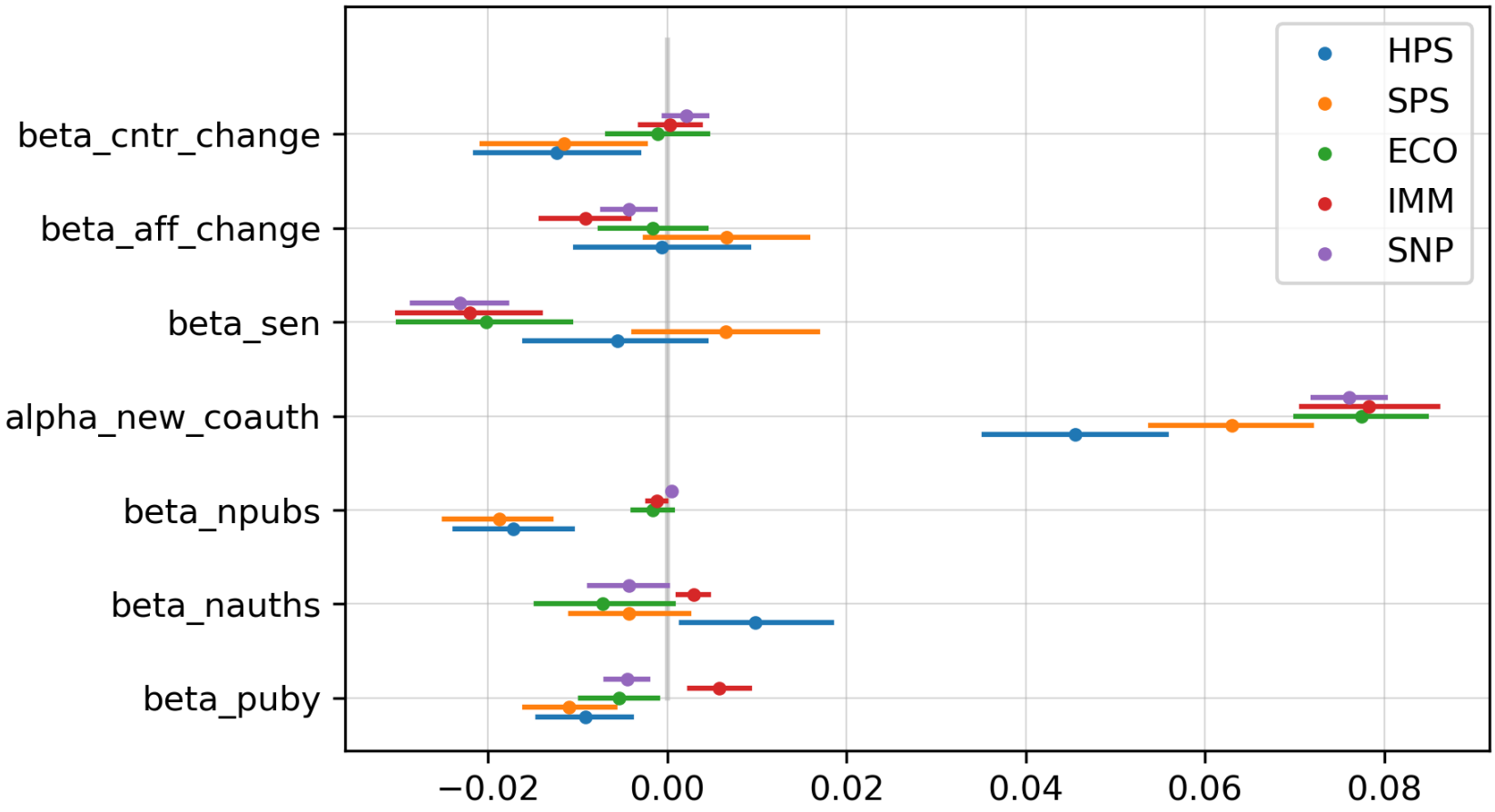
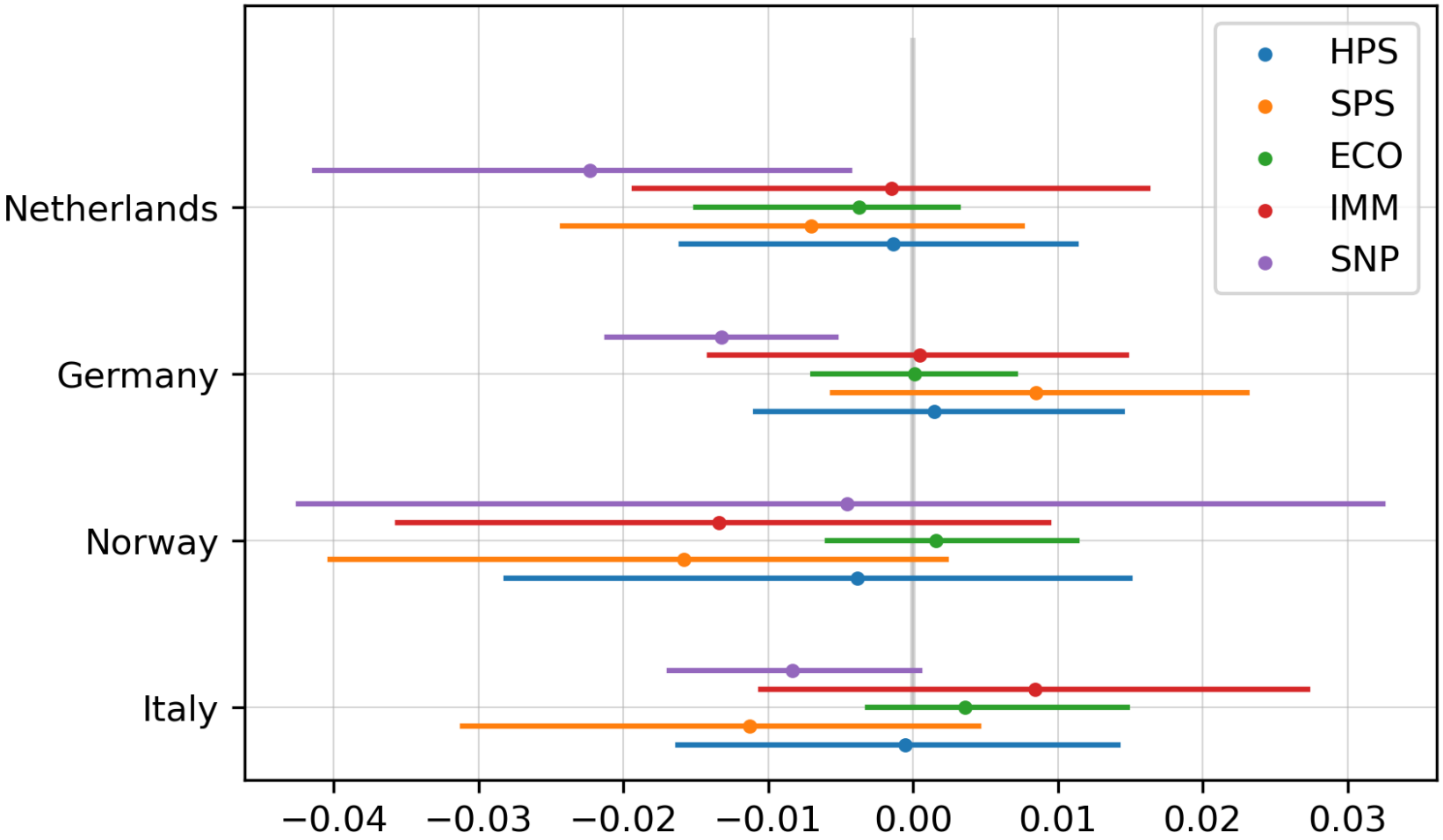
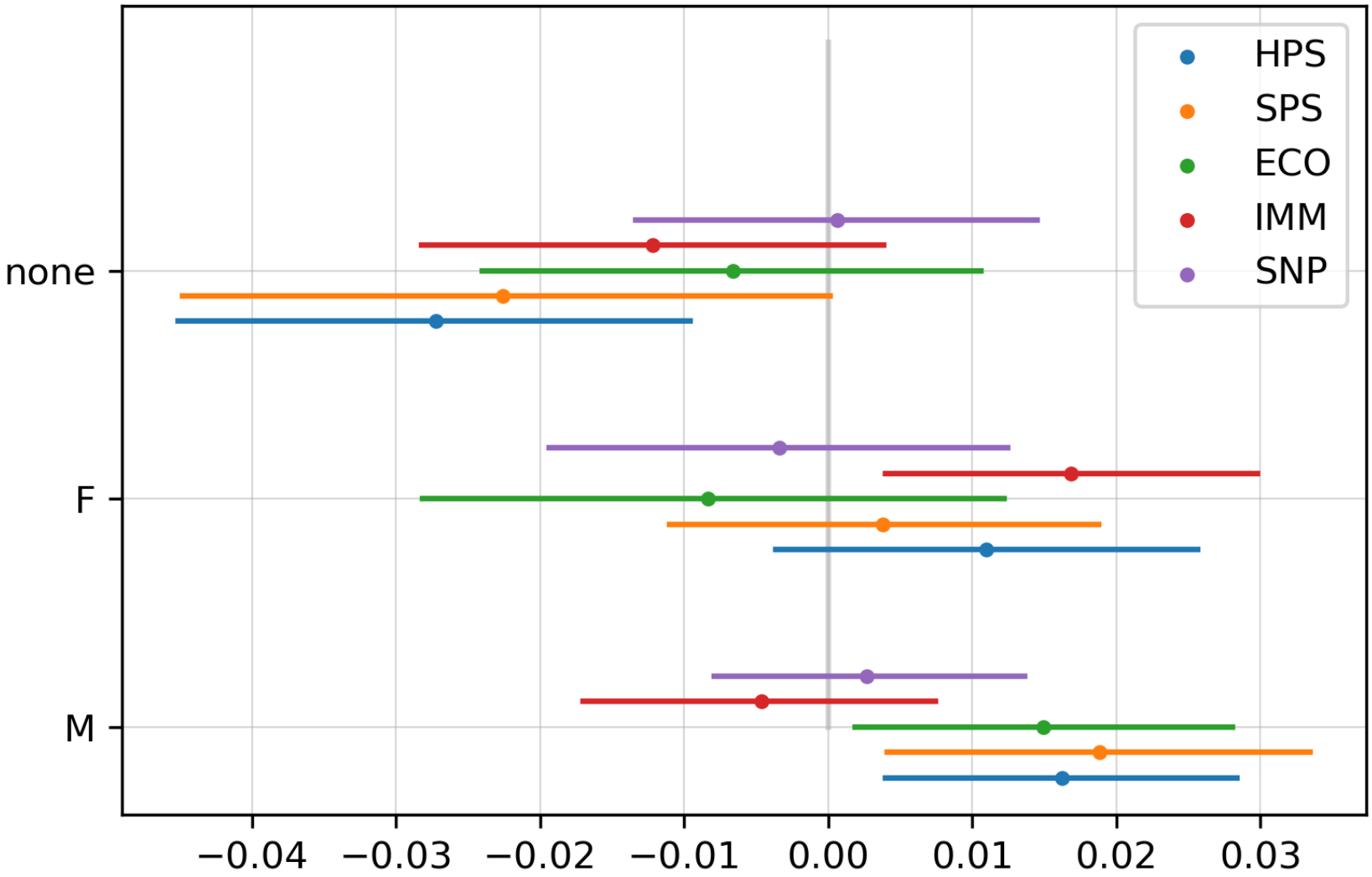
Linear model



Country effect



Gender



Random distances - field level