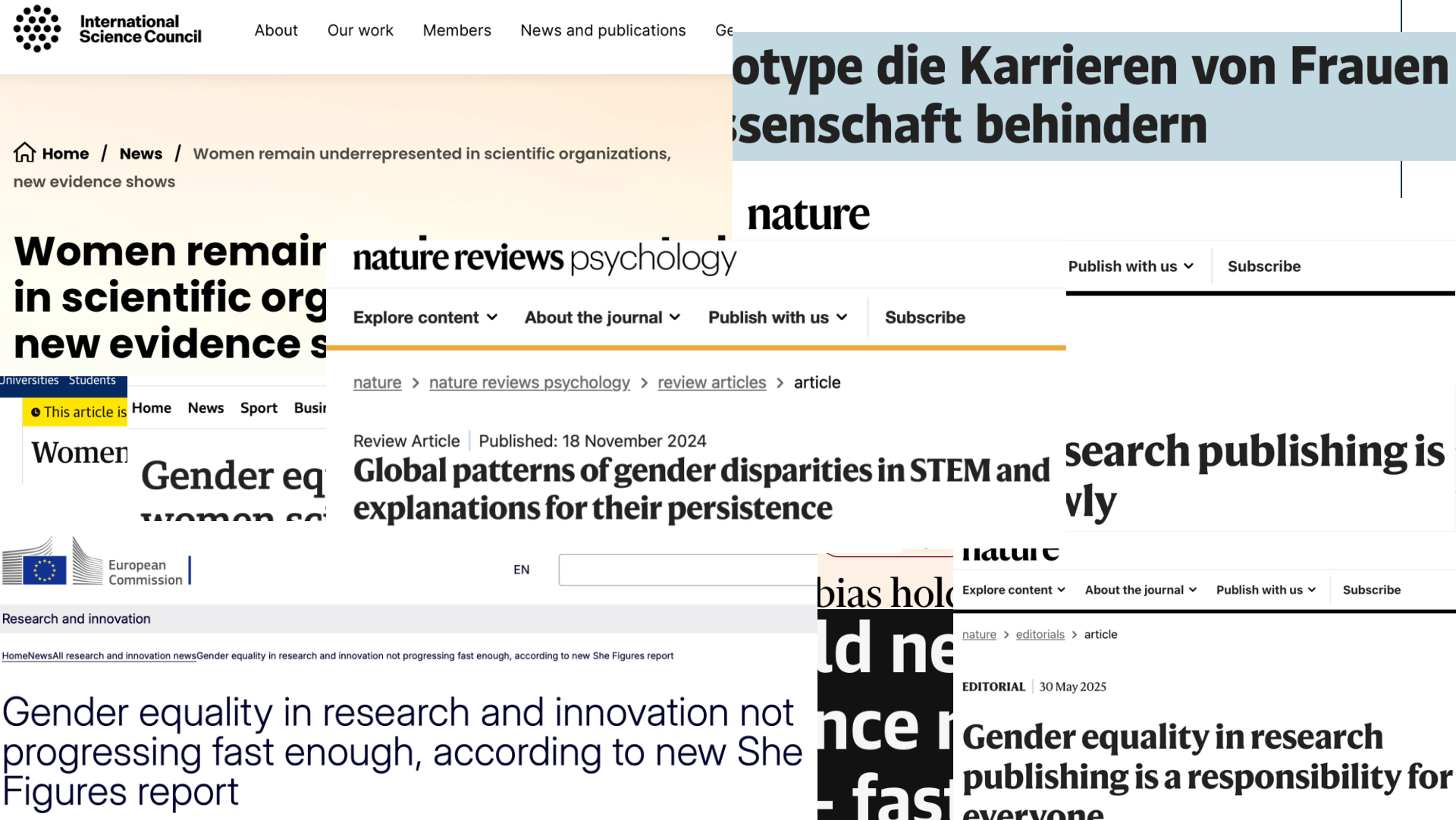
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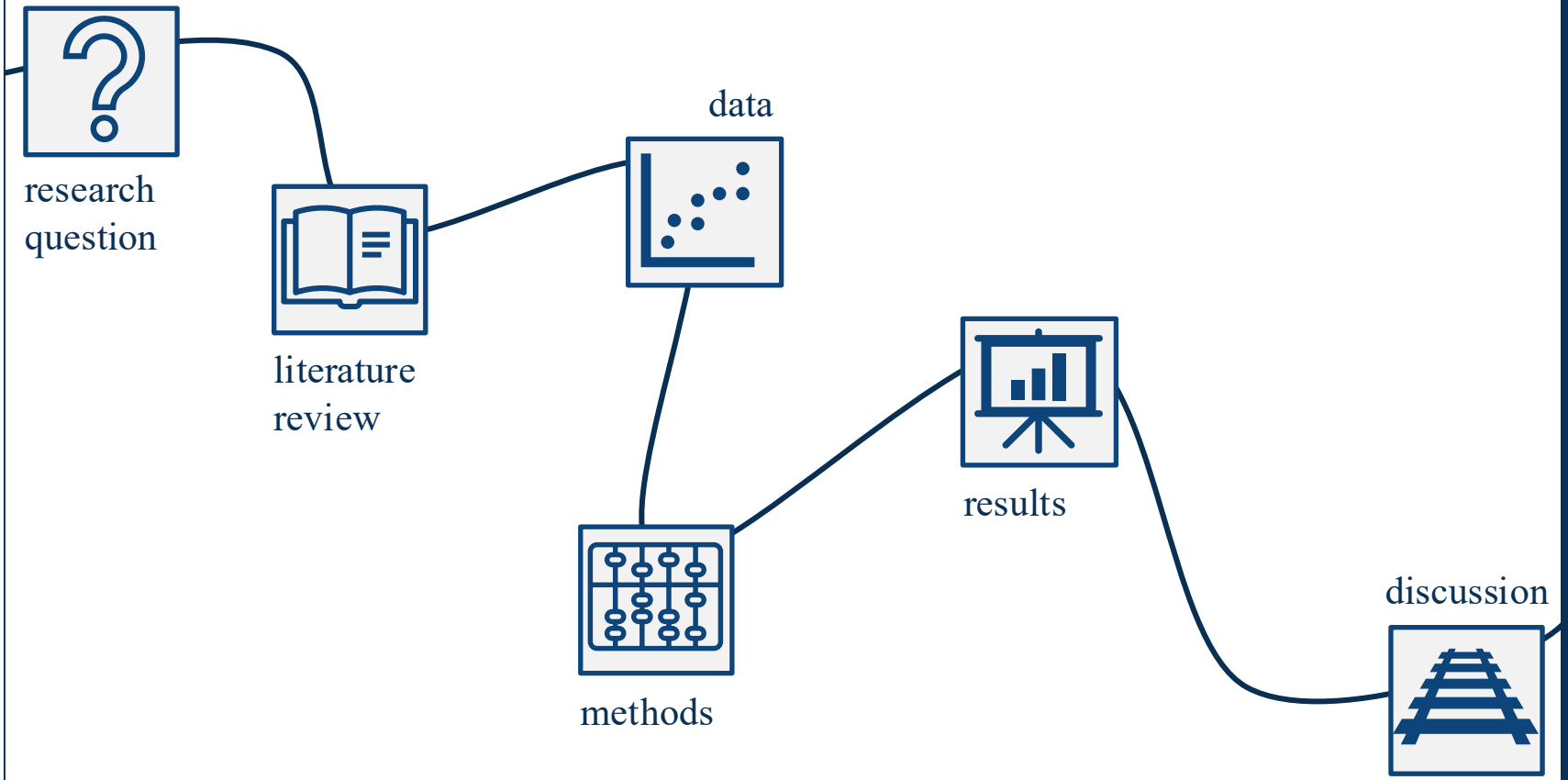
# BEYOND ACCESS: COMPUTATIONAL INSIGHTS INTO GENDERED CAREER DROPOUT ACROSS SCIENTIFIC FIELDS

Ari Jorah Timm
supervised by: Mark Wittek


research question
literature review
data
methods
results
discussion

# How does the gender composition of a research field moderate the relationship between gender and scientific career dropout?

Research on scientific dropout has shown that

- dropout is gendered and often a ‚leaky pipeline'[1, 2, 3, 4, 5, 6]
- dropout varies, for example by field [1, 5, 7, 8, 9, 10, 11, 12]

High shares of men in research communities

- establish and normalize male-coded norms [2, 3, 13, 14]
- result in less recognition and weaker career prospects for women [3, 4, 15]
- lead to lower sense of belonging as well as more experiences of bias and exclusion [16, 17]

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# Combining three datasources.

WIKIPEDIA
The Free Encyclopedia

OpenAlex

PubMed

**PubMed Knowledge Graph**
bibliometric, biomedical data
from 1781 to 2023 on
~ 36 million articles and
~ 26 million authors

+

**OpenAlex fields**
papers to topics
↓
topics to subfields
↓
subfields to **26 fields**
↓
fields to 4 domains

+

**Name-Gender**
inferred from
forenames with Wiki
Gendersort
→ male (M)
→ female (F)
→ unisex (UNI)
→ unknown (UNK)
→ initials (INI)

# Data sampling because of quality and resources.

**PubMed Knowledge Graph**
bibliometric, biomedical data
from 1781 to 2023 on
~ 36 million articles and
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+

**OpenAlex fields**
papers to topics
↓
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fields to 4 domains

+

**Name-Gender**
inferred from
forenames with Wiki
Gendersort
→ male (M)
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→ unisex (UNI)
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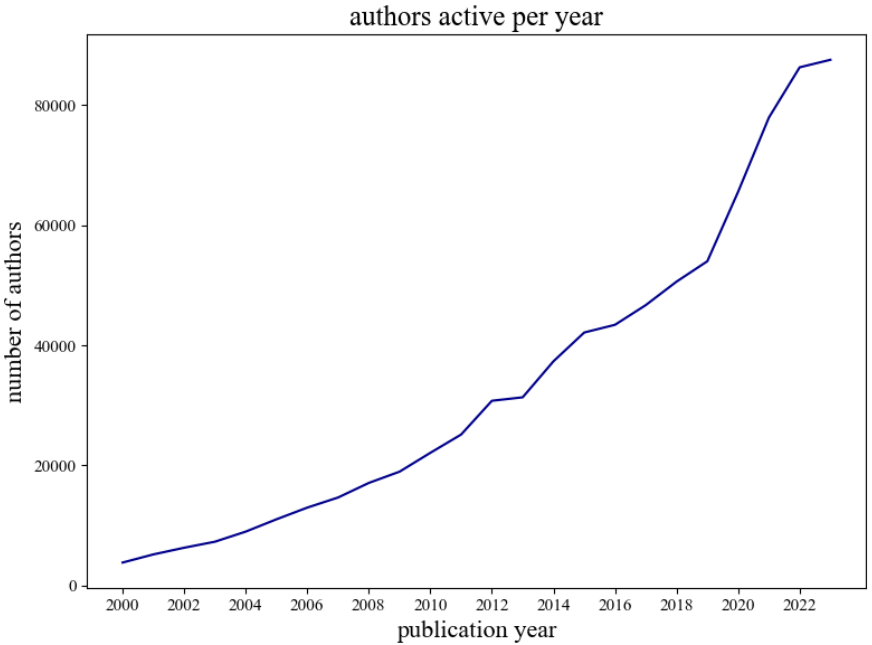
→ initials (INI)

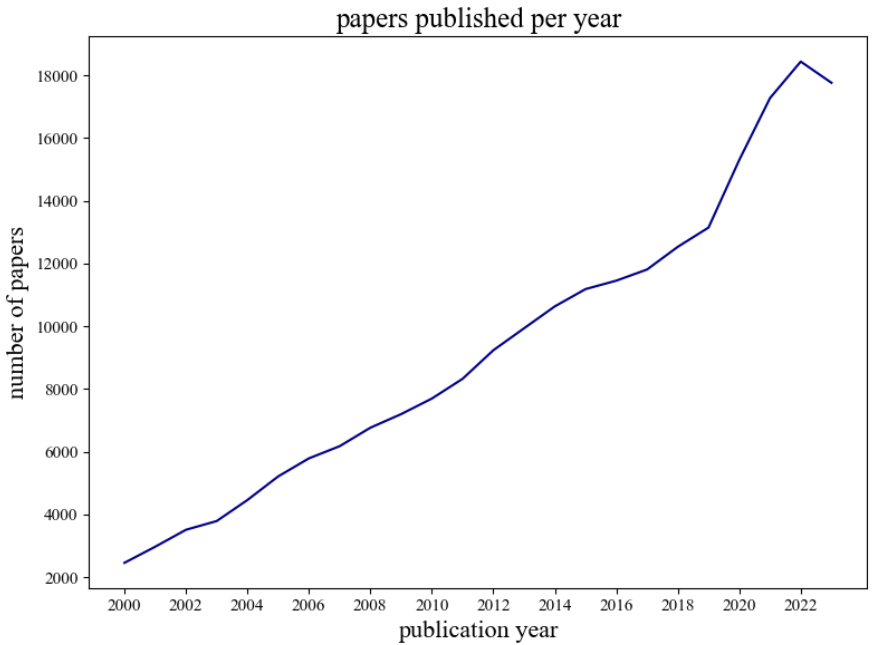
! limited resources
! reliable forenames only after 2000

select a random sample of 10.000 papers per field,
published between 2000 – 2023

# Research explodes in the last 20 years.

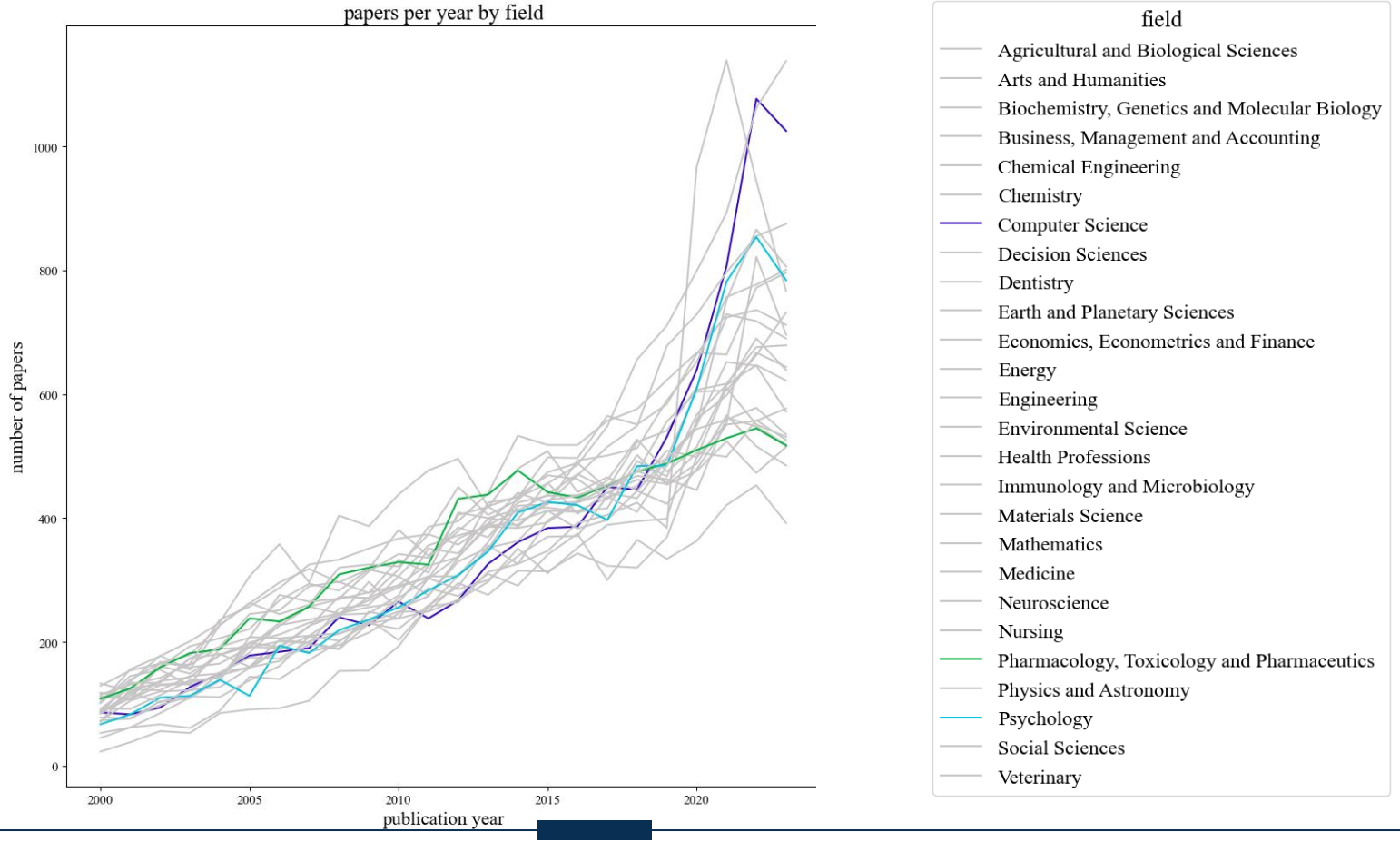



The number of authors increased 229-fold, ~33 times more than the number of papers.

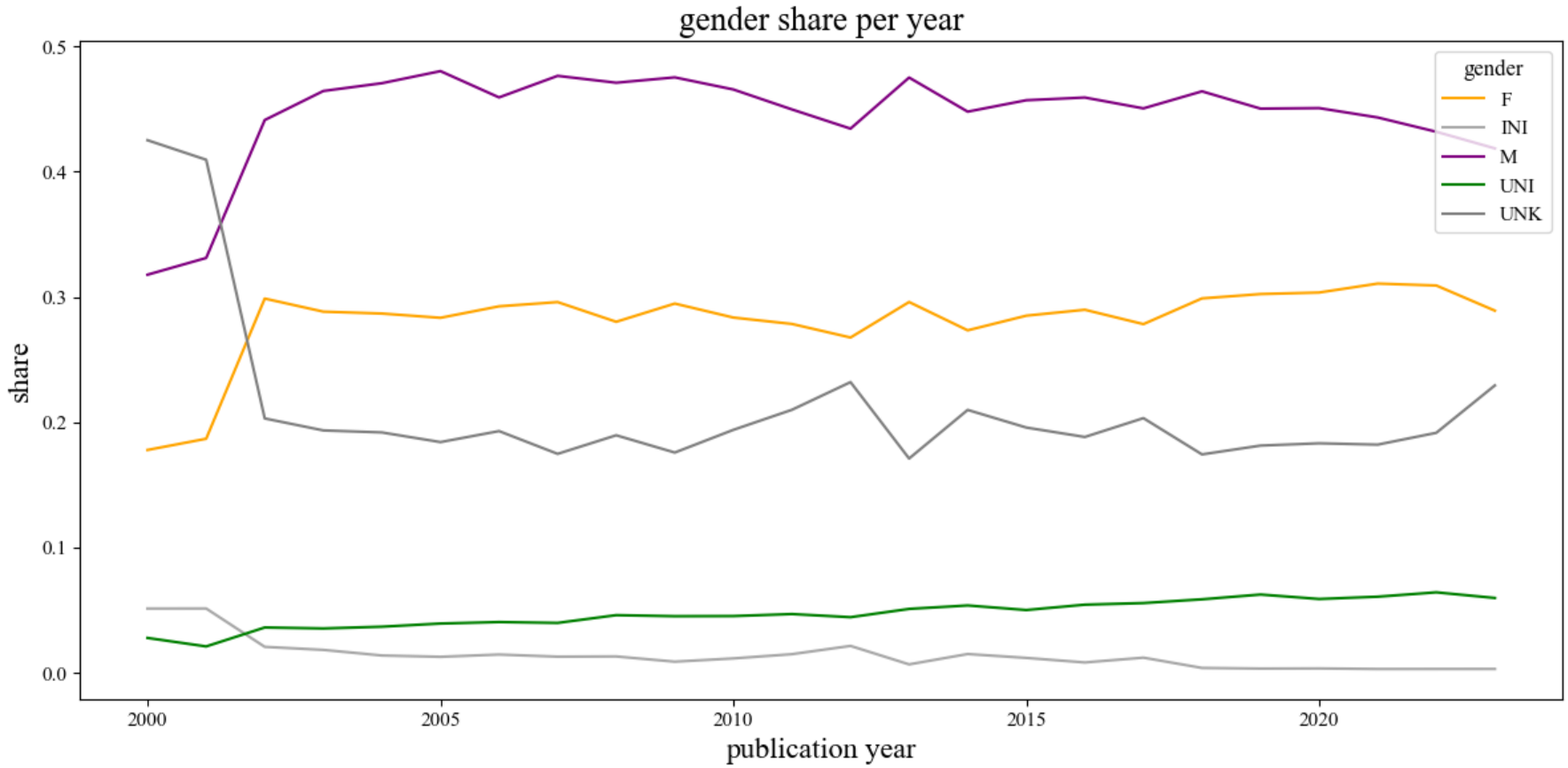



The number of papers published in 2023 was seven times higher than in 2000.

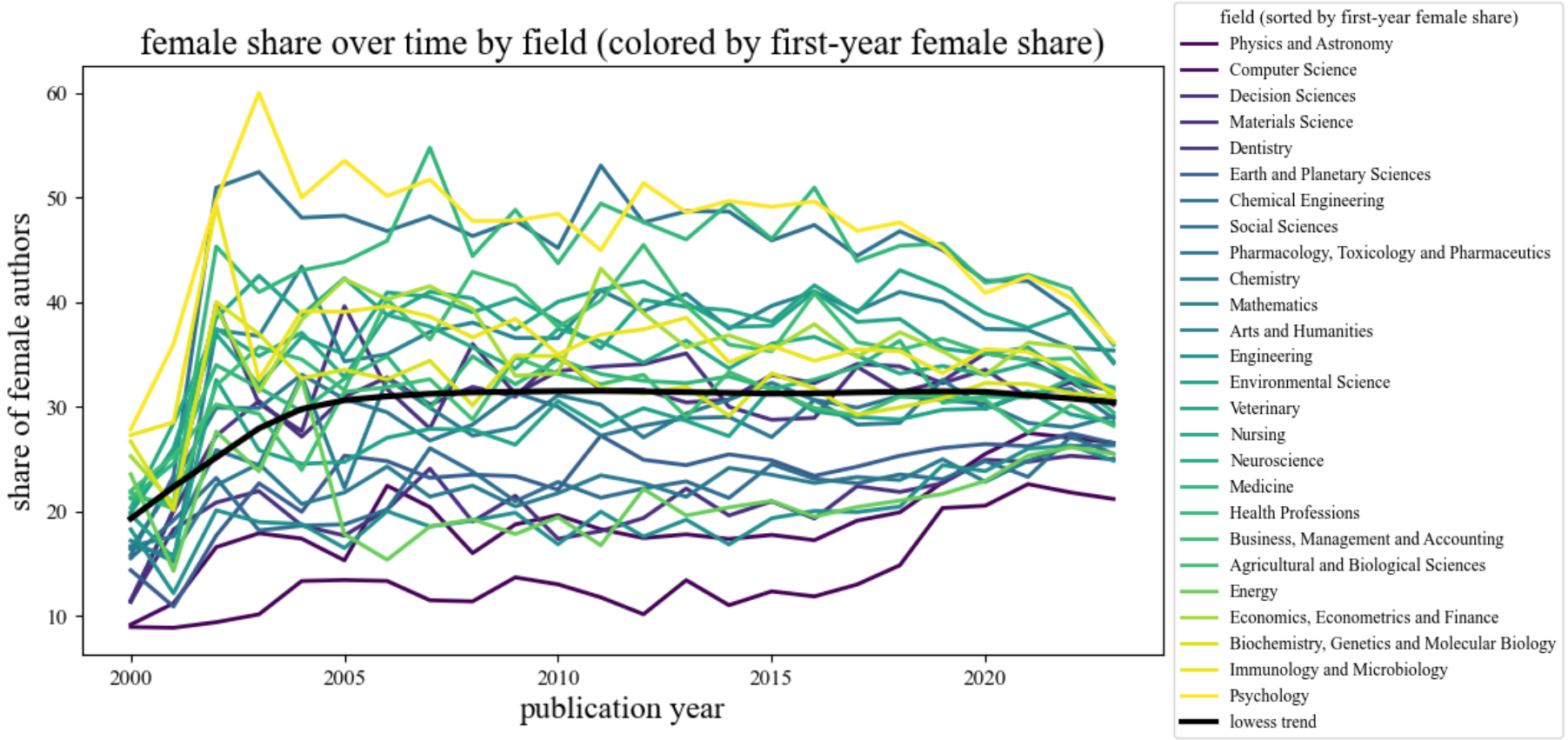
# Fields develop very differently over time.



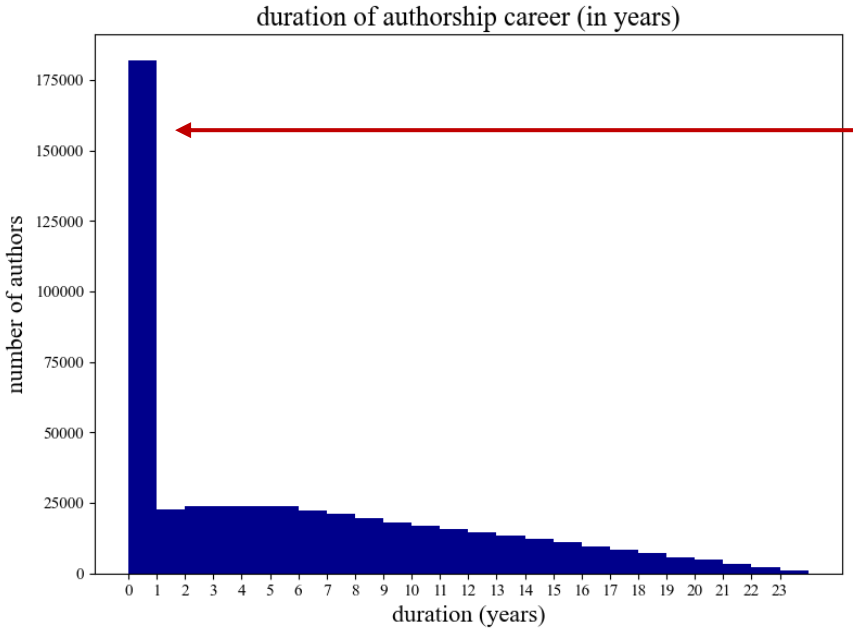
# Stable gender composition over time.



# Large field differences in gender composition.



# Operationalizing dropout is tough.




35% of authors last less than one year. Of those, 17% are censored as they publish for the first time in 2023.

! when does someone drop out?
! what about those who still publish after 2023?

# Cox proportional hazard regression models

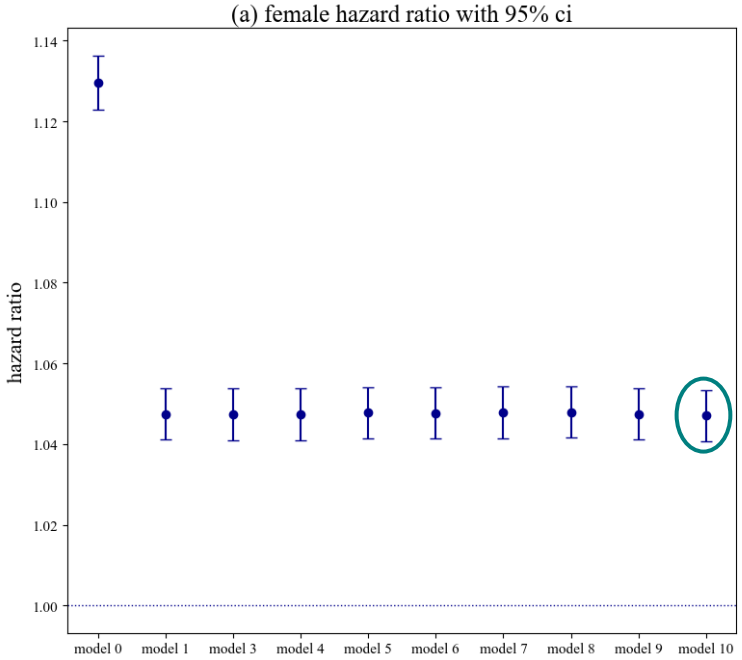
$$\lambda(t|X) = \lambda_0(t)\exp(X\beta)$$

**Dependent variable**
duration: first publication to last publication

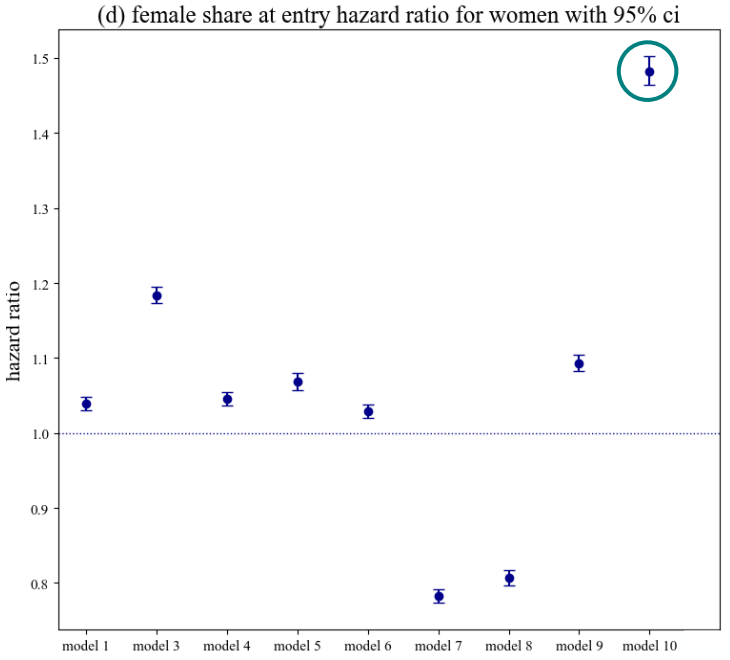
**Covariates**
**Independent variables**
- gender: female or male
- female share within the field at the time of entry
- entry time (year or period)
- field

**Interaction of gender and female share at entry**
- linear
- time-varying

# Women have a higher dropout risk than men, but the effect of female share remains unclear.




Women have a 5% higher dropout hazard in all model specifications.




The impact of female share at entry is highly dependent on the model specification.

# Findings and Implications

This thesis shows that

1. women have a consistently higher estimated dropout hazard than men that is robust across model specifications and dropout definitions
2. there is unclear evidence on whether a higher female share at entry reduces gendered dropout

This implys that

- the leaky pipeline still exists
- gender inequality needs to be understood as a retention issue, focusing on the conditions that allow researchers to remain active in the field over time

# Limitations and future work

- begin year and female share at entry are endogenous
- inferring gender from forenames is inherently problematic → compare different name-gender methods

**data quality and coverage**

- the data used might not fully cover the literature in each of the fields → use >2000 topics instead and test coverage
- name data is incomplete and unreliable until 2000 → use OpenAlex API to collect missing data

**models are limited**

- all cox models compared here estimate linear regression coefficients → test non-linear cox models
- many other factors besides gender influence the success of scientific careers → include more covariates

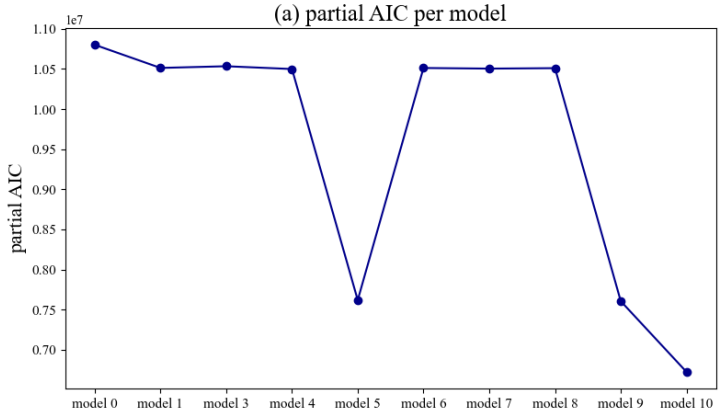
Thank you for listening

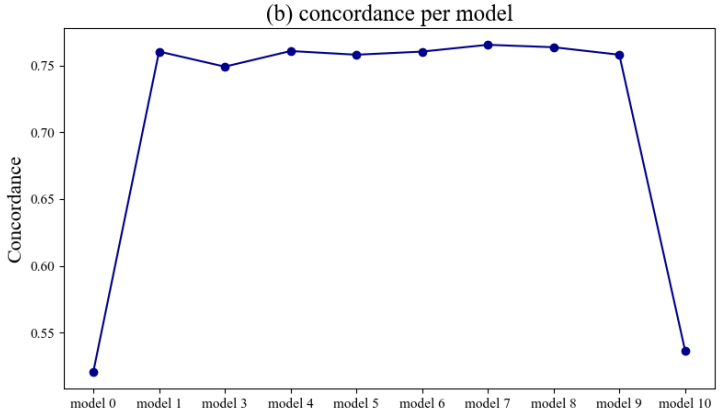
Questions?

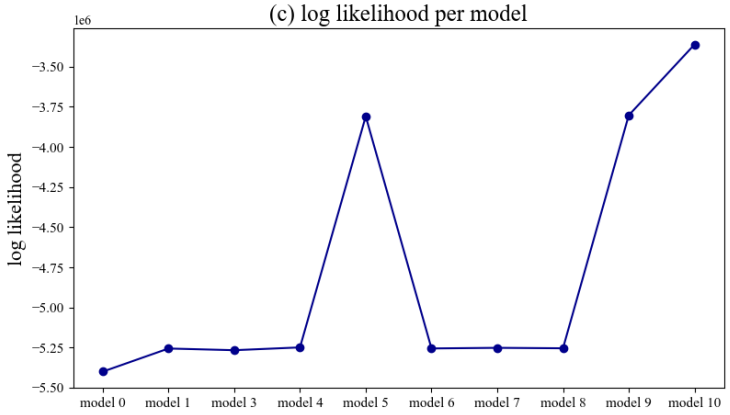
# Ten model specifications were tested.

| Model | Begin year or period | Field specification | Interaction |
|---|---|---|---|
| Model 0 | None | None | None |
| Model 1 | Linear begin year | Categorical field | Linear interaction |
| Model 3 | Categorical begin periods | Categorical field | Linear interaction |
| Model 4 | Spline begin year | Categorical field | Linear interaction |
| Model 5 | Linear begin year | Stratified by field | Linear interaction |
| Model 6 | Linear begin year | Categorical field | Quadratic female share term and linear interaction |
| Model 7 | Linear begin year | Categorical field | Time varying interaction with linear time |
| Model 8 | Linear begin year | Categorical field | Time varying interaction with log time |
| Model 9 | Spline begin year | Stratified by field | Linear interaction |
| Model 10 | Stratified by begin period | Stratified by field | Linear interaction |

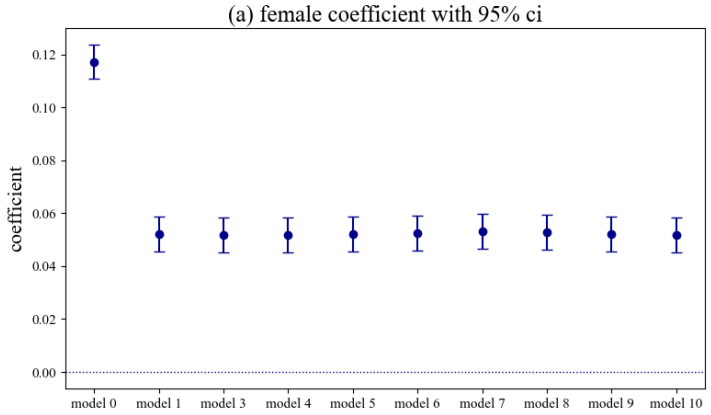
# 1-year-model goodness-of-fit measures

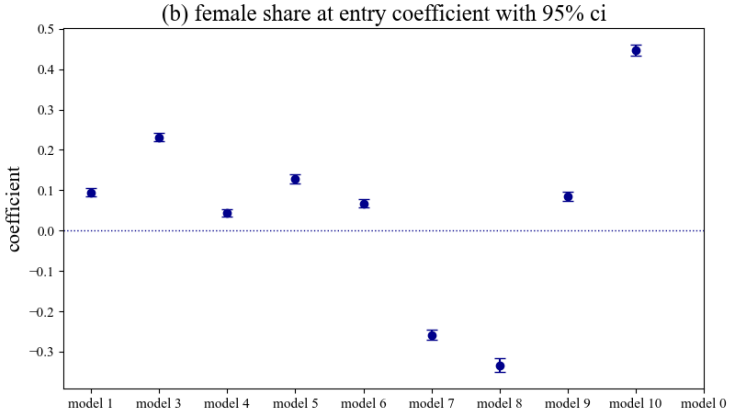


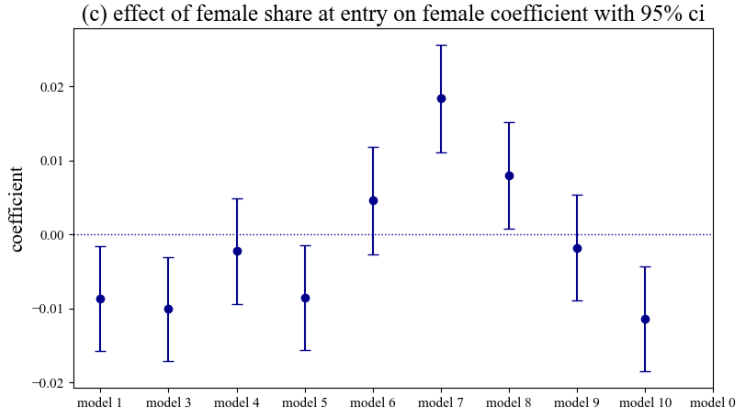



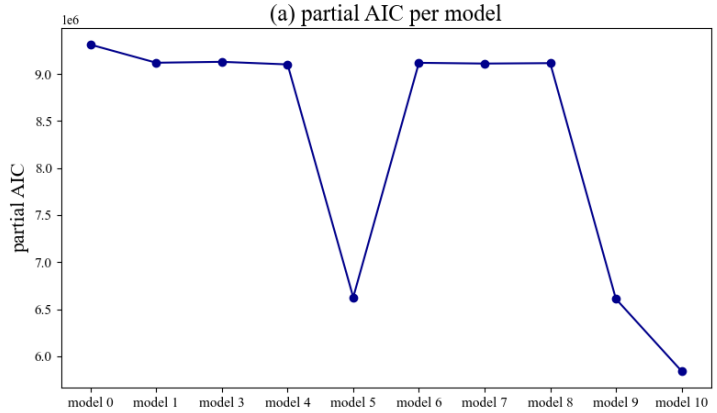
# 2-year-model values

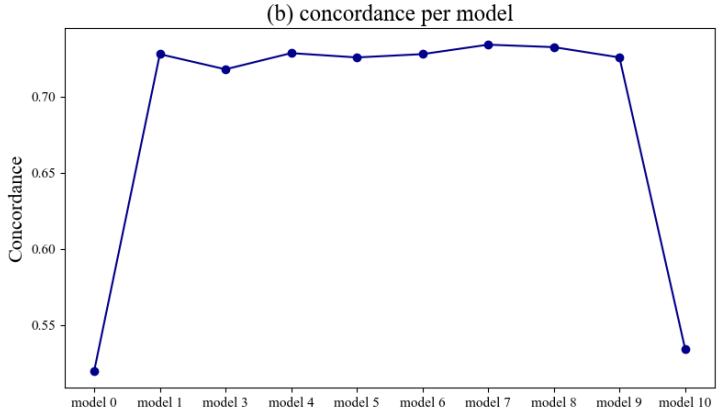


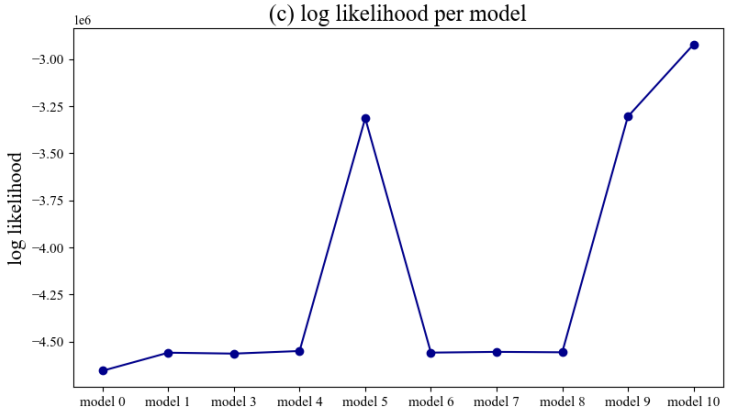



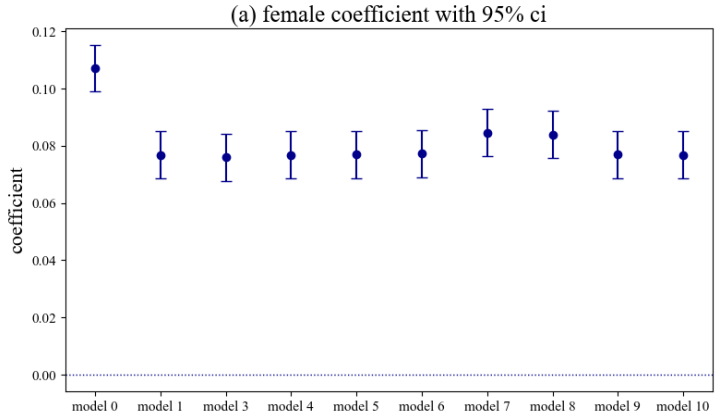
# 2-year-model goodness-of-fit measures

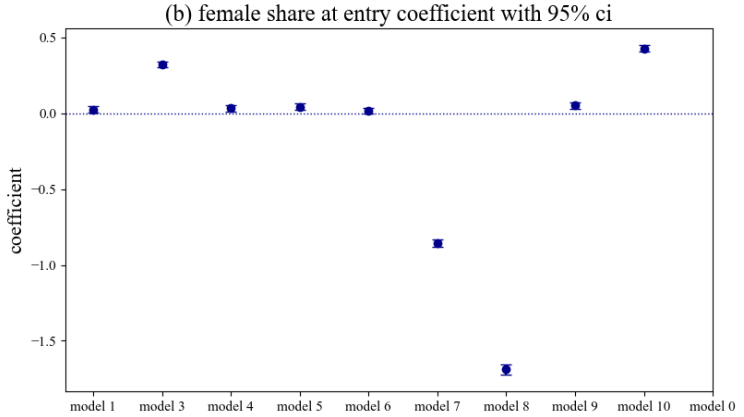


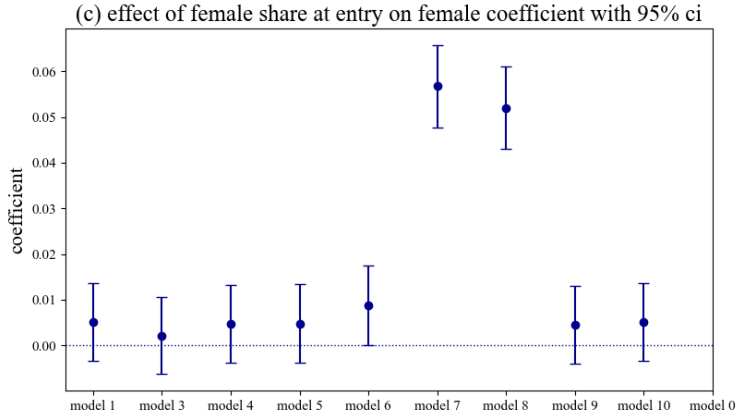



# 2-year-model values



# 5-year-model goodness-of-fit measures