Procuring innovation: evidence from the SBIR program

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From Dept. of Defense to private houses

Research Questions

1. Does demand from the public sector **direct innovation**?

2. How does **public procurement** - on top of **R&D grants** - affect firms?

This paper

- Focus on the **SBIR** program, at the **DoD**
  - **R&D grants** (SBIR) are directed by the DoD according to their needs
  - On top of R&D grants, the DoD can buy the product
- Compare grant recipients to procurement winners
  - No difference in **patenting** (both number and quality)
  - Procurement winners get $1M more per year in **non-SBIR** DoD contracts

Contribution to the Literature

1. Research grants (and SBIR) on **innovation**:
   - Sabrina T. Howell (2017), Myers and Lanahan (2022), S. Howell et al. (2021), and Bhattacharya (2021)
   - **Procurement** contracts do not increase patenting activity
2. **Public procurement** and firm performance:
   - Belenzon and Cioaca (2022), Hvide and Meling (2022), Cappelletti and Giuffrida (2021), Sabrina T Howell and Brown (2022), and Lanahan, Joshi, and Johnson (2021)
   - Focus on **military** procurement: firms strengthen their ties to the public sector

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Data sources

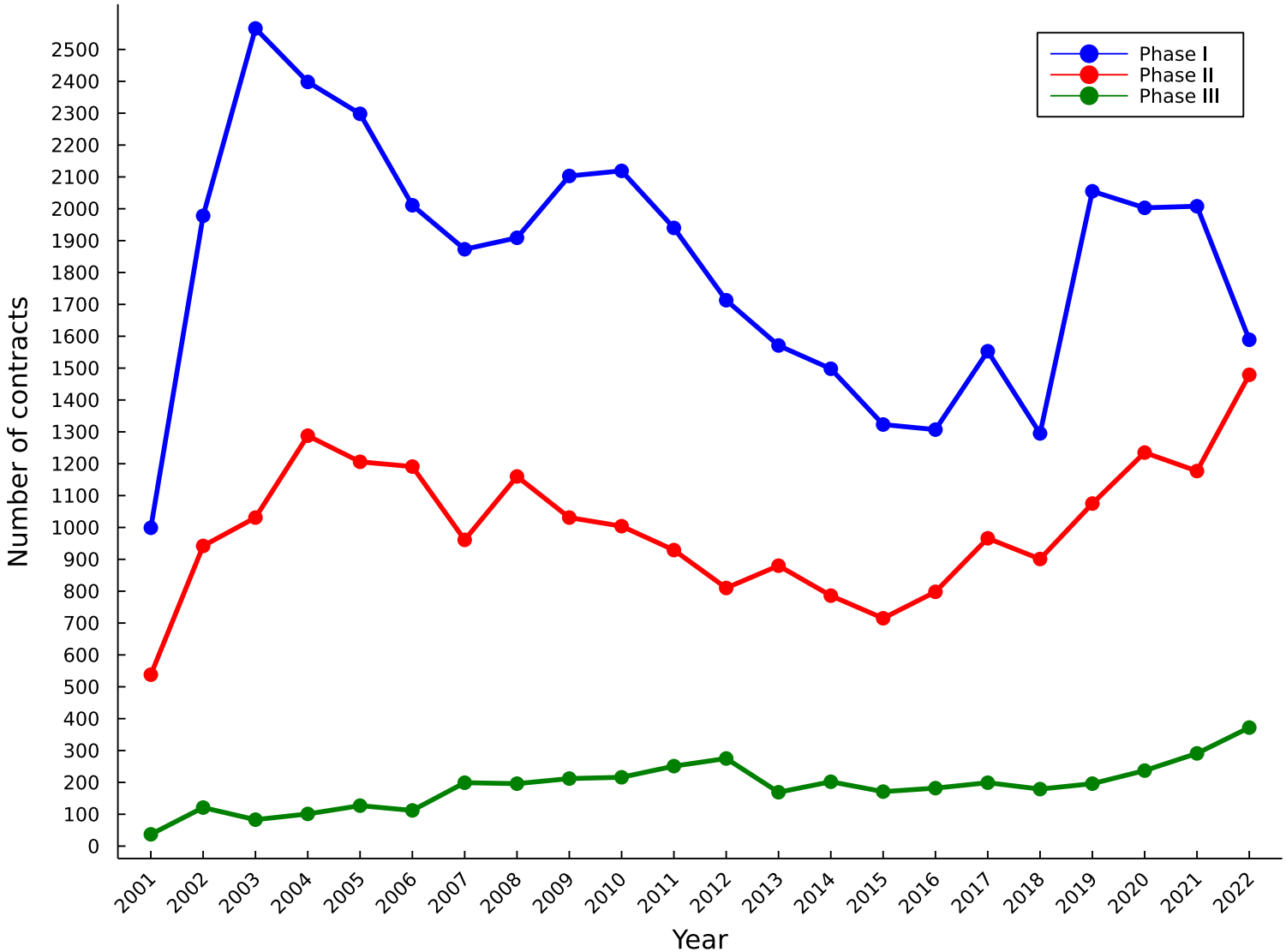
- **SBIR** on government research grants:
  - title
  - abstract
  - awarded firm
  - agency (i.e. DoD) and branch (i.e. Army)
  - year
  - phase (I or II)
  - money awarded
  - type of grant (SBIR or STTR, competitive...)
- **USAspending.gov** on government contracts:
  - All SBIR contracts awarded by the DoD
  - SBIR-related procurement
  - Follow-on procurement contracts (non-SBIR related)
- **PATSTAT** on patents:
  - number and quality (i.e. forward citations) of patents

▸ Data Cleaning

SBIR-STTR and the DoD

- Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs
- Department of Defense (DoD) is the largest agency in the program, with subbranches (e.g. Army, Navy, Air Force)
- In the DoD the program is divided in three phases. The first two are grants, the third is a procurement contract

Department of Defense, number of contracts



▸ Contracts by branch

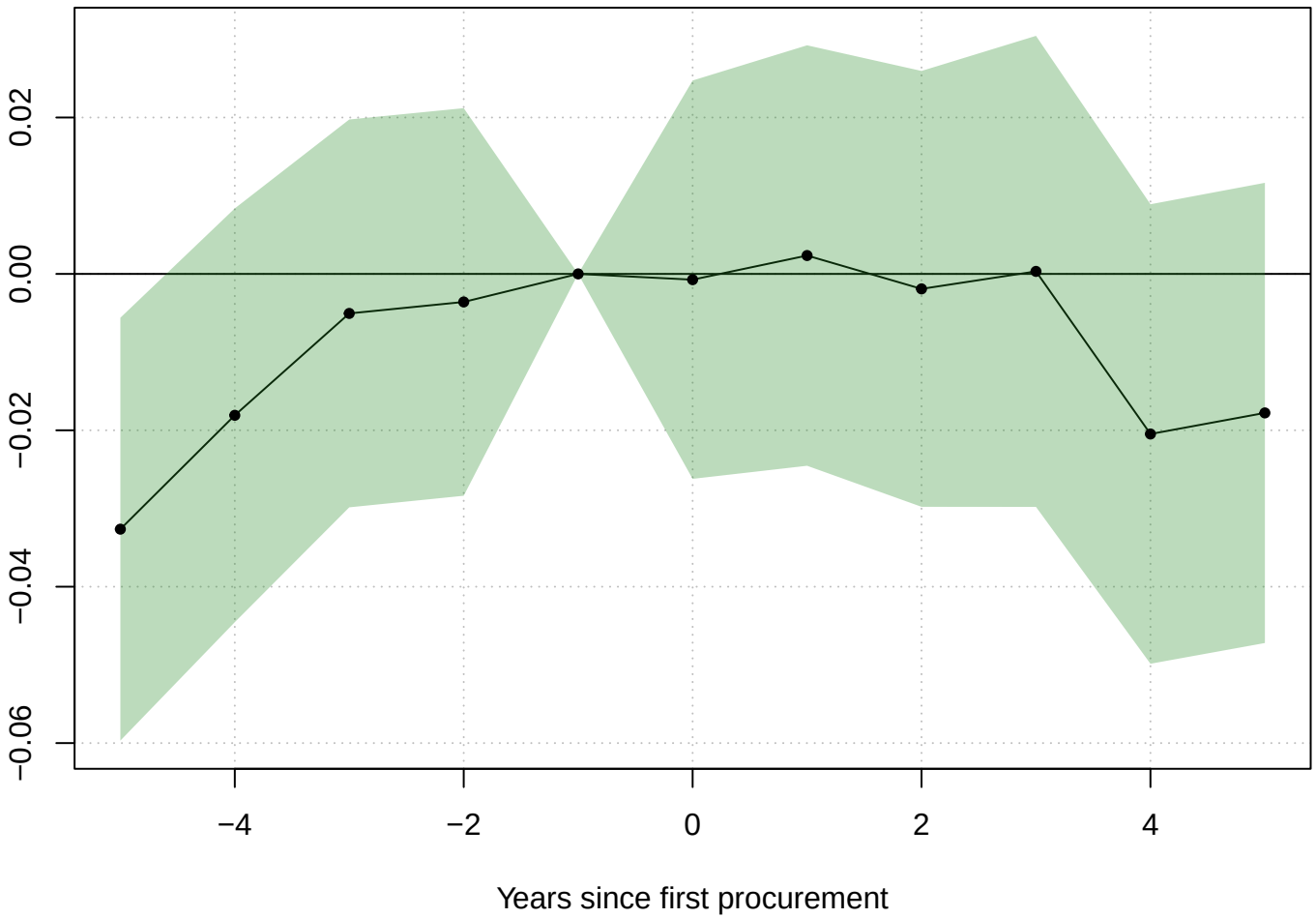
▸ Conditional probabilities

Comparing SBIR and Phase III winners

$$y_{i,t} = \sum_{\tau=-5}^{5} \beta_\tau \text{YearsSinceProcurement}_{i,t+\tau} + \gamma_i + \delta_t + \epsilon_{i,t}$$

- $y_{i,t}$: patents/contracts granted to firm i in year t
- $\text{YearsSinceProcurement}_{i,t}$: years since the first Phase III contract
- γ_i: firm fixed effects
- δ_t: year fixed effects

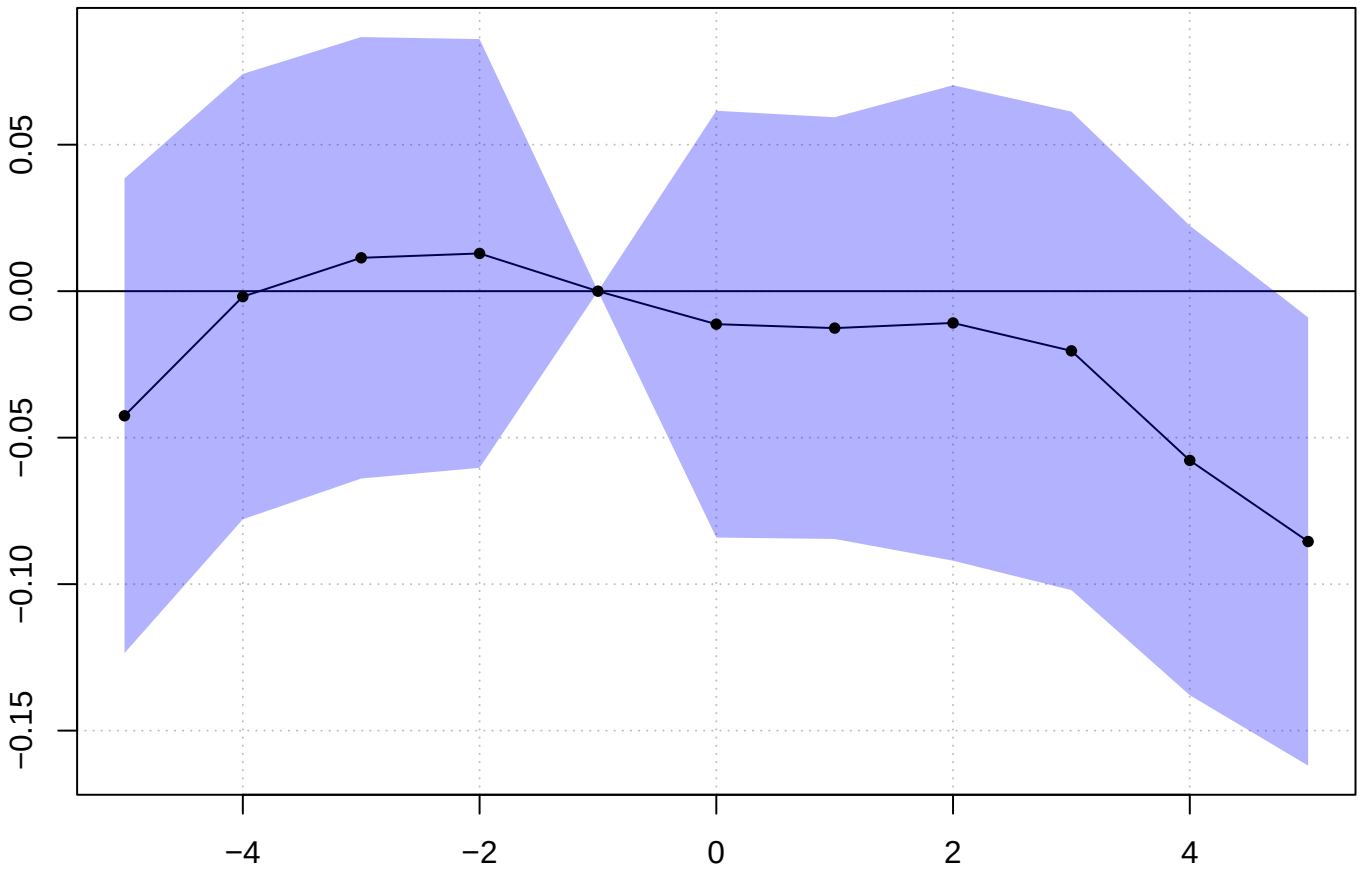
Landing a Phase III contract does not increase patenting



▸ Cumulative patents

▸ Sun and Abraham (2021) estimator

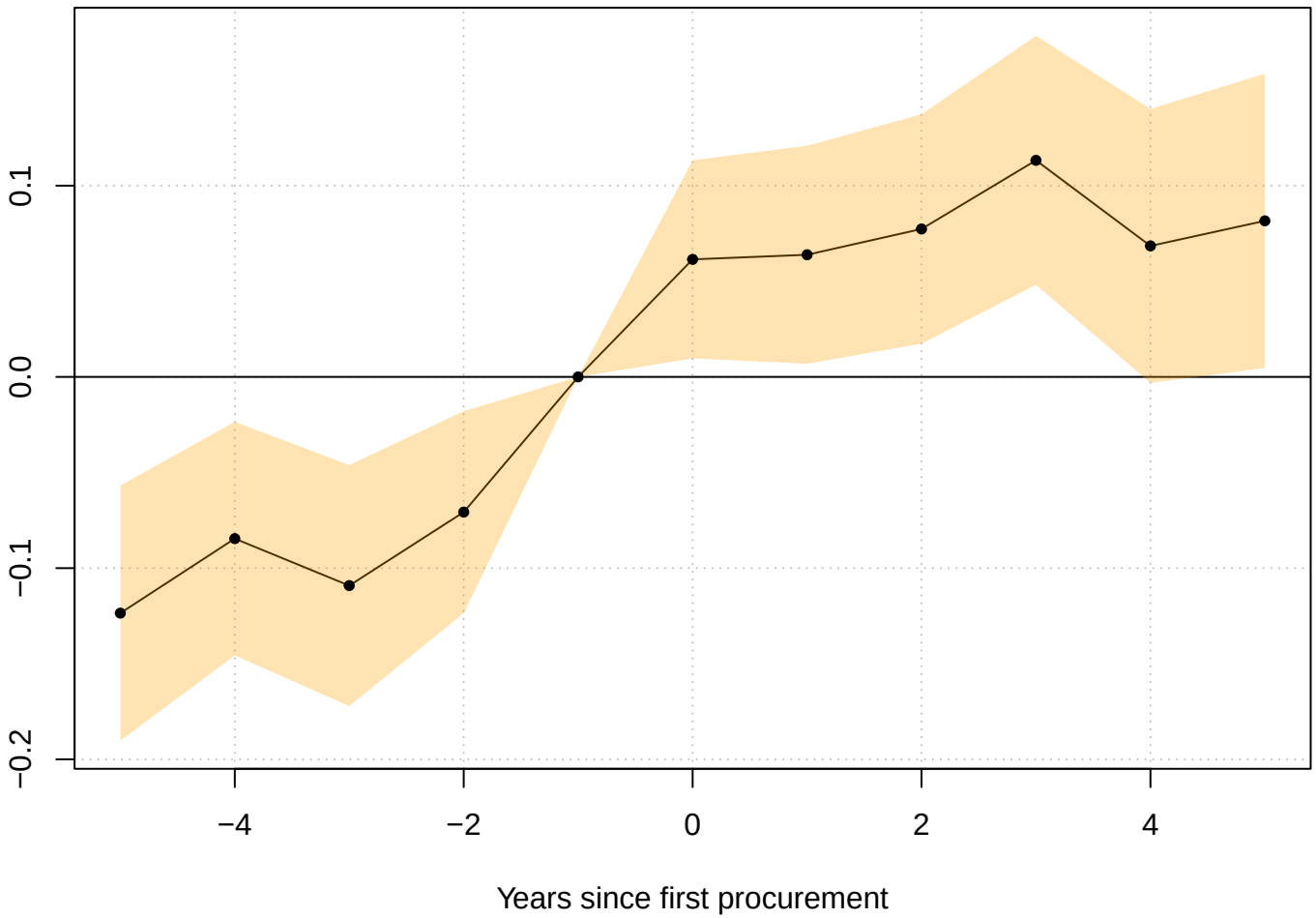
Landing a Phase III contract does not increase patent quality



▸ Cumulative citation-weighted patents

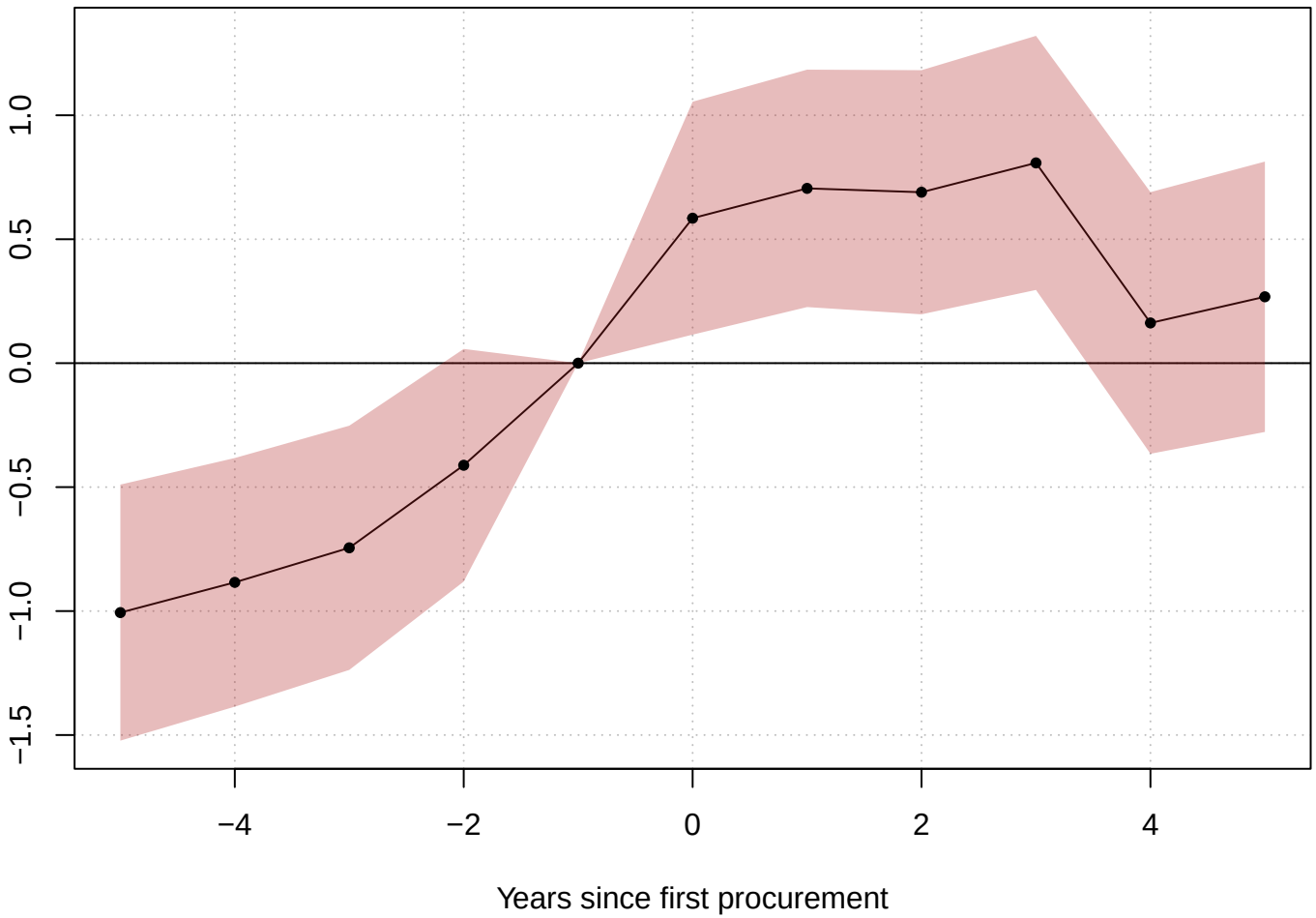
▸ Sun and Abraham (2021) estimator

Phase III leads to more procurement contracts



▸ Non-SBIR contracts indicator ▸ Sun and Abraham (2021) estimator

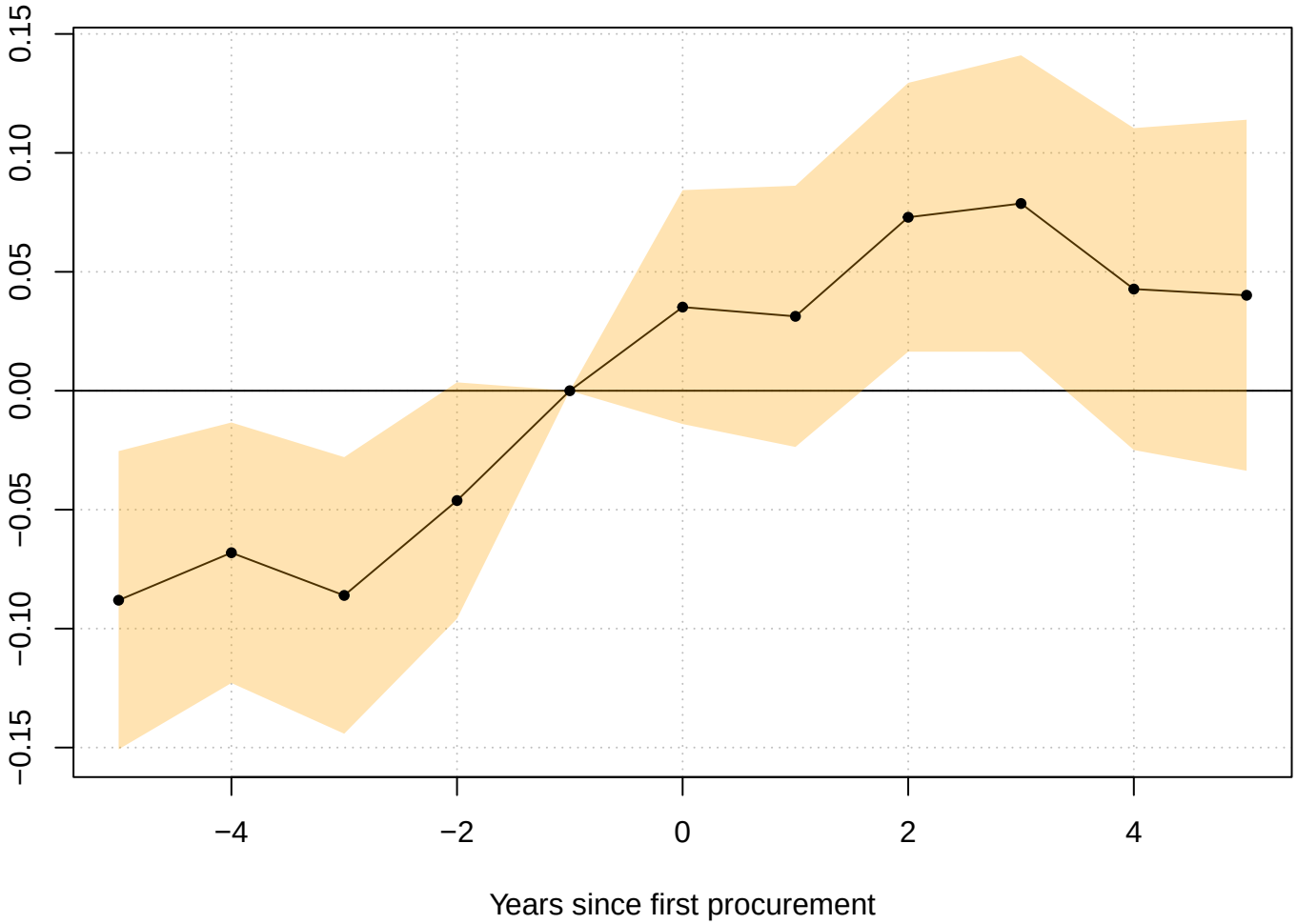
Phase III leads to more money in procurement contracts



▸ Other SBIR outcomes

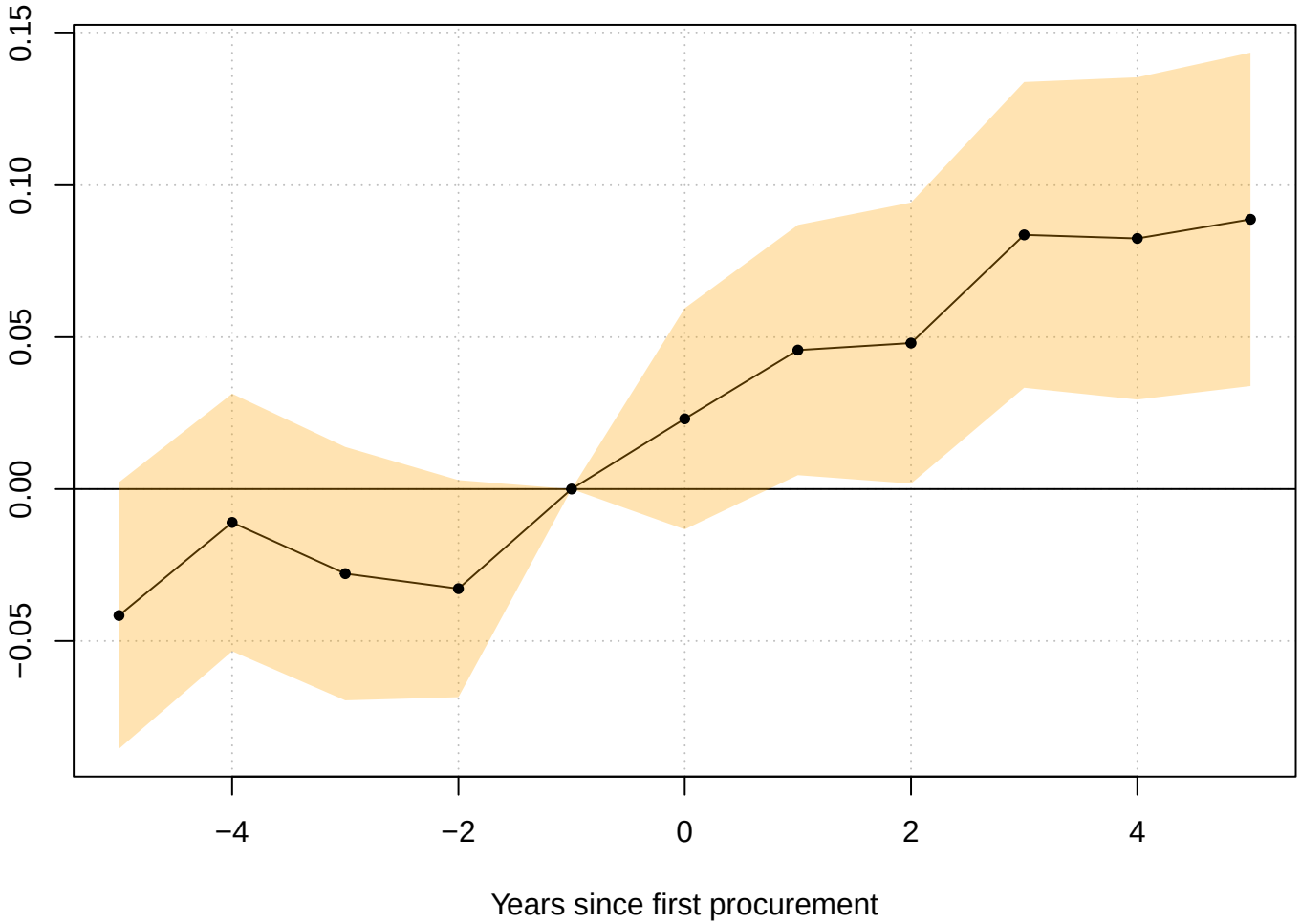
▸ Sun and Abraham (2021) estimator

Competed contracts increase slightly



▸ Competed contracts value ▸ Sun and Abraham (2021) estimator

Non-competed contracts increase more



▸ Non-competed contracts value

▸ Sun and Abraham (2021) estimator

Results and next steps

1. Does demand from the public sector **direct innovation**?
   - No difference in patenting activity between SBIR and Phase III winners

2. How does **public procurement** - on top of **R&D grants** - affect firms?
   - Phase III winners are more likely to get further non-SBIR DoD contracts
   - Most of the increase is driven by non-competed contracts

3. **Next steps**:
   - Add other dimensions of firm performance, such as *M&A* activity
   - Explore new identification strategies

Thank you for your attention!

Any questions?

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Dataset from SBIR, post 2000

- Unique contracts: **66609** (**45232** Phase I and **23441** Phase II)
- Plus, **17** contracts with no identifier. Those will be discarded
- Unique firms: **9298**, identified by Duns
- **2747** contracts (4.12%) in which the Duns identifier is 0
- **4658** firms (52.27%) only one Phase I contract
- **2925** firms (52.84%) only one Phase II contract

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Dataset from USA Spending

- Unique contracts: **66340** (**40206** Ph. I, **22401** Ph. II and **4219** Ph. III)
- Unique firms: **9819** (Duns) and **10555** (UEI)
- **4374** firms (55.13%) only one Phase I contract
- **2738** firms (53.67%) only one Phase II contract
- **1367** firms (70.98%) only one Phase III contract

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Dataset from USA Spending, without missing Duns

- Unique contracts: **60773** (**36794** Ph. I, **20709** Ph. II and **3742** Ph. III)
- Unique firms: **9818** (Duns) and **9818** (UEI)
- **4398** firms (54.84%) only one Phase I contract
- **2782** firms (53.51%) only one Phase II contract
- **1390** firms (70.49%) only one Phase III contract

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Merged dataset: SBIR and USA Spending

- Unique contracts: **48266** (**31791** Ph. I and **16885** Ph. II)
- Unique firms: **7271** (Duns)
- **3607** firms (53.53%) only one Phase I contract
- **2283** firms (52.41%) only one Phase II contract

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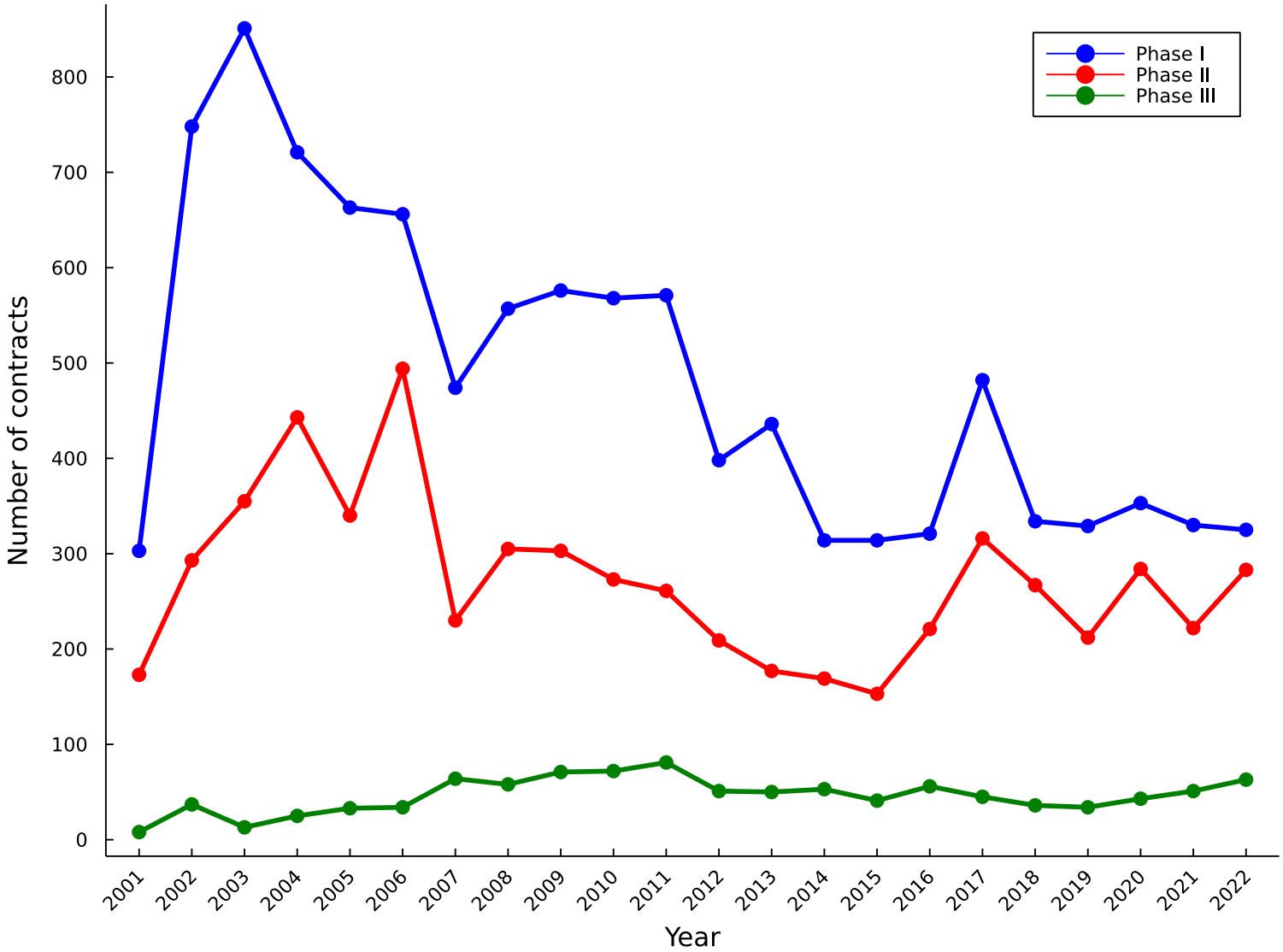
Department of the Army, contracts



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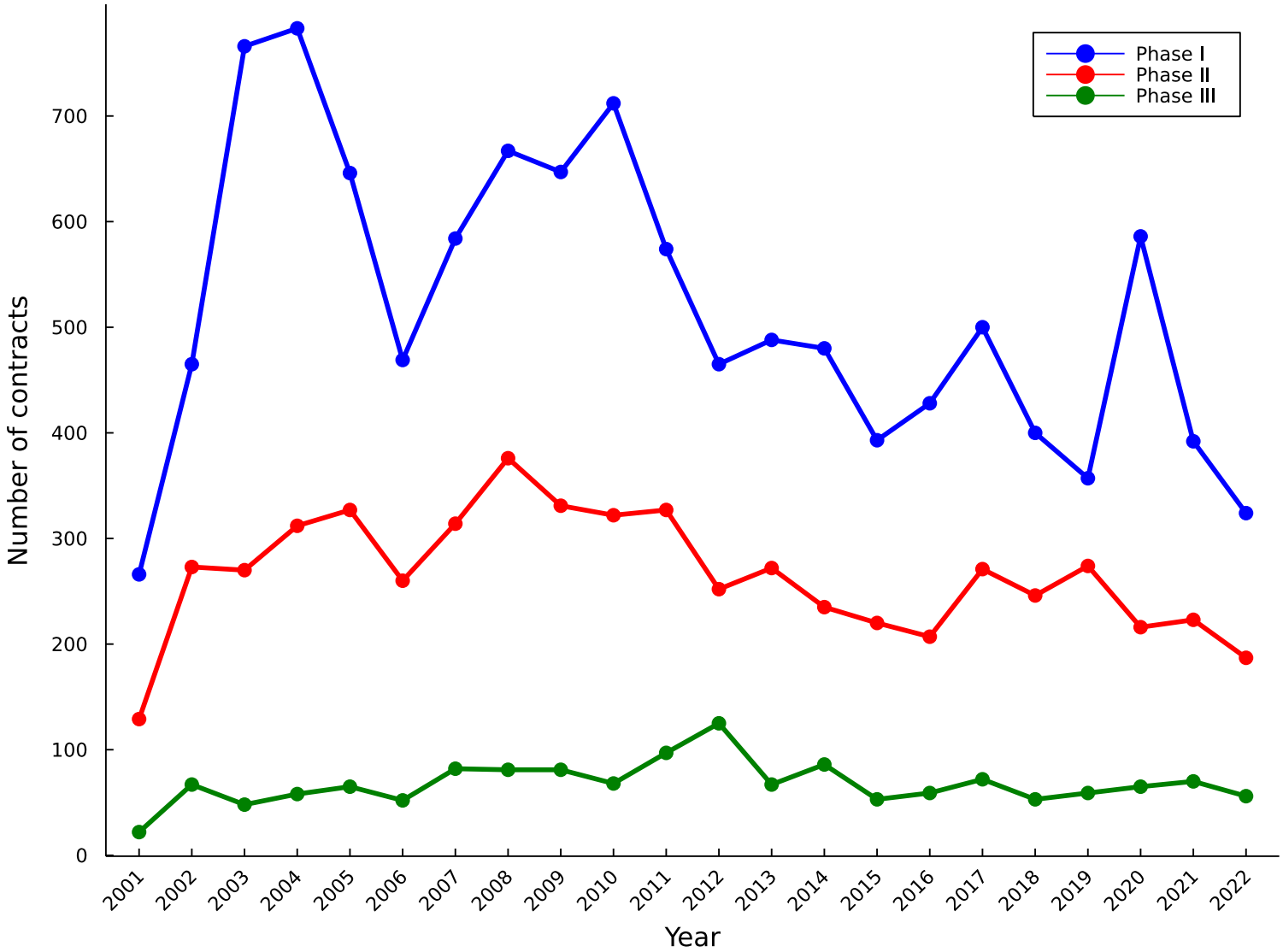
Department of the Navy, contracts



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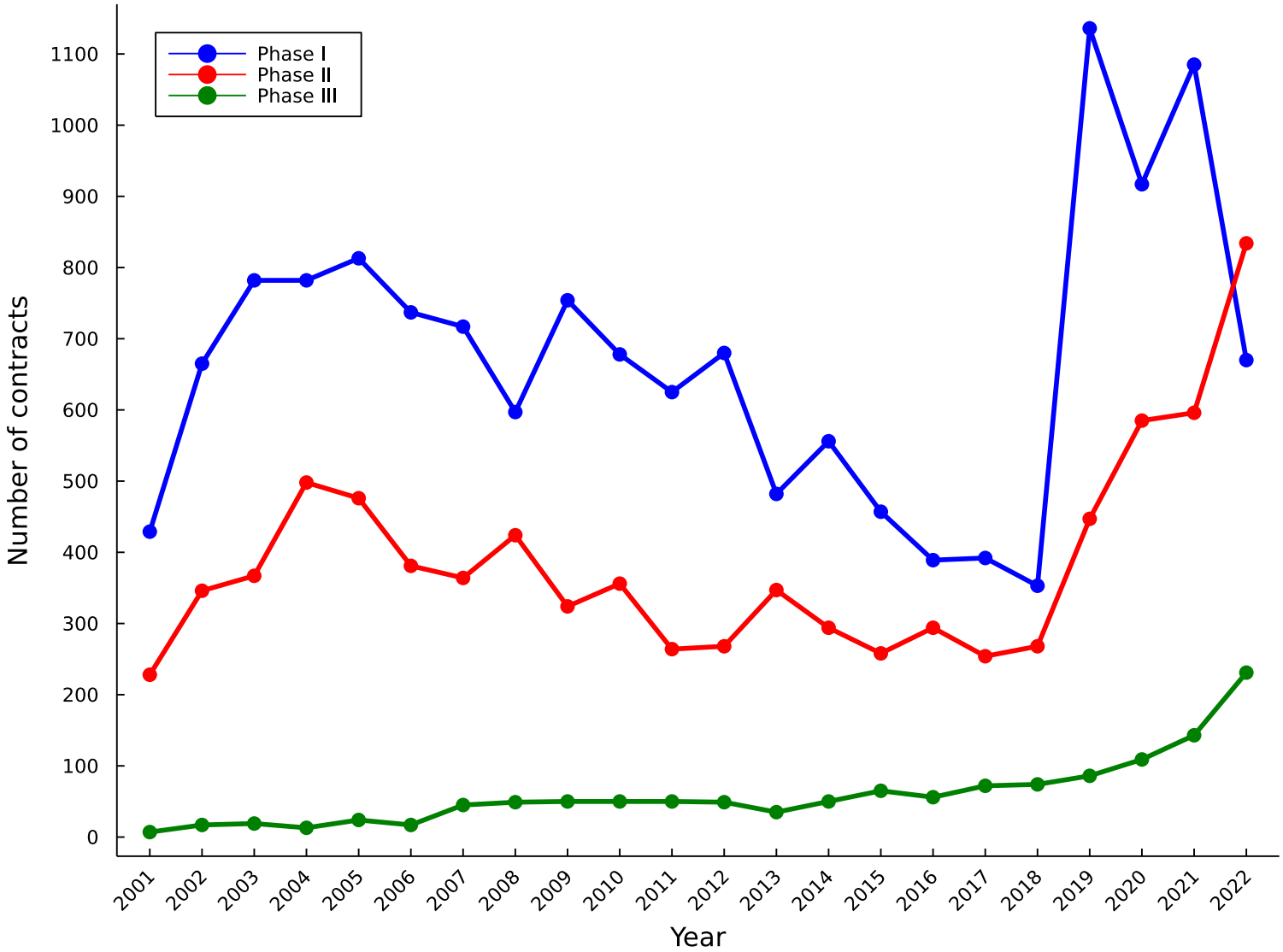
Department of the Air Force, contracts



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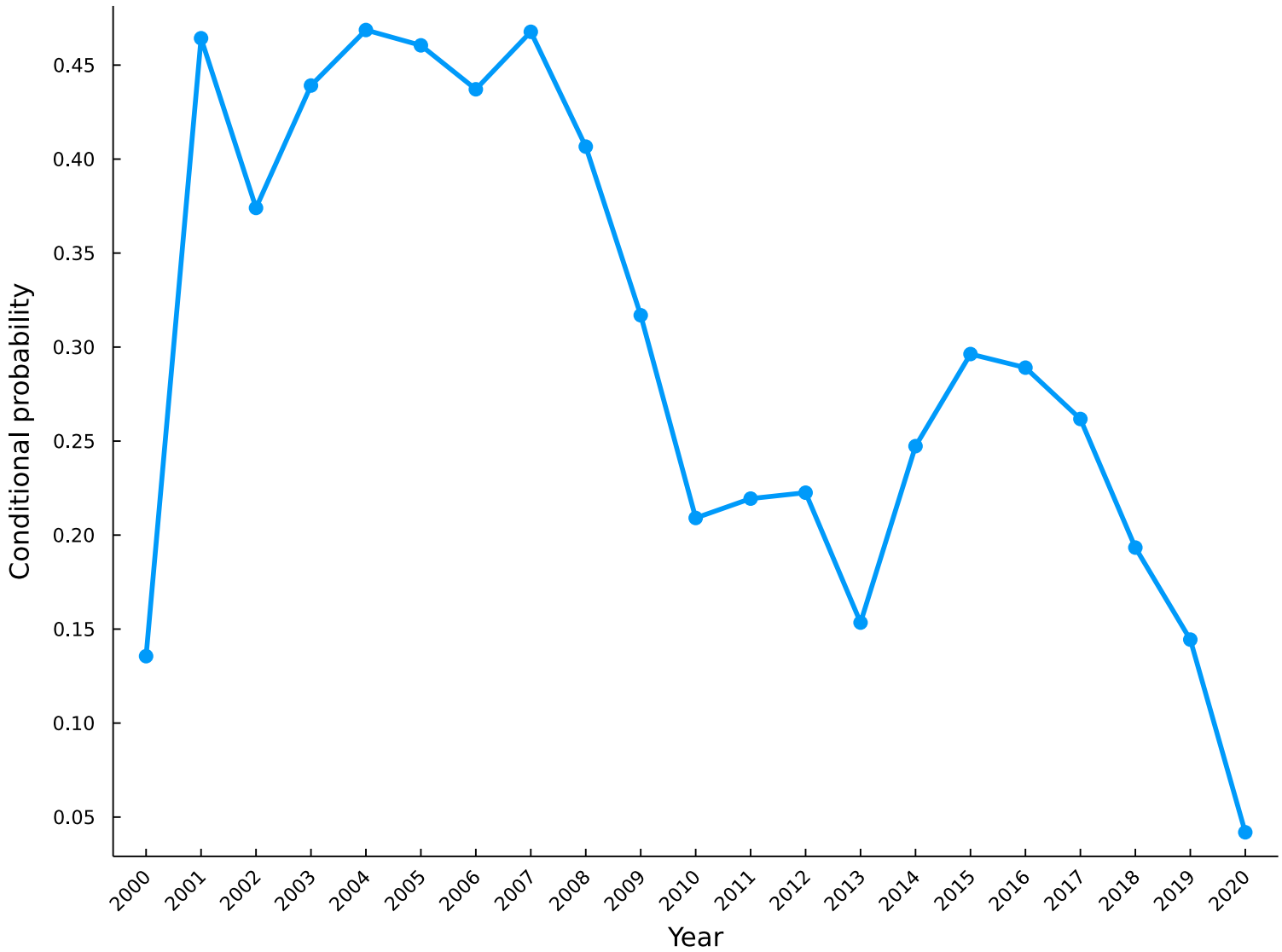
Probability of getting to Phase II decreases over time



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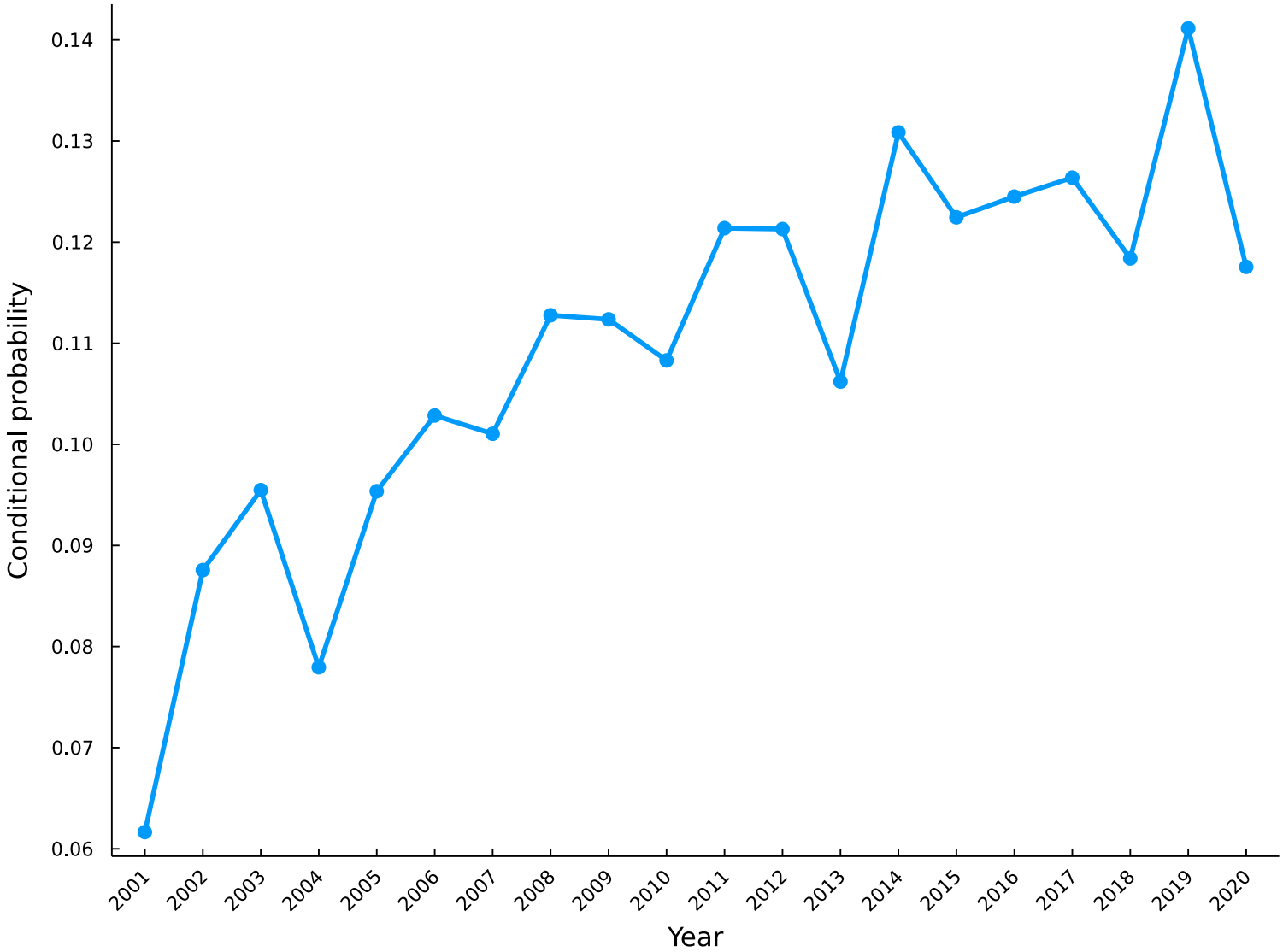
Probability of getting to Phase III increases over time



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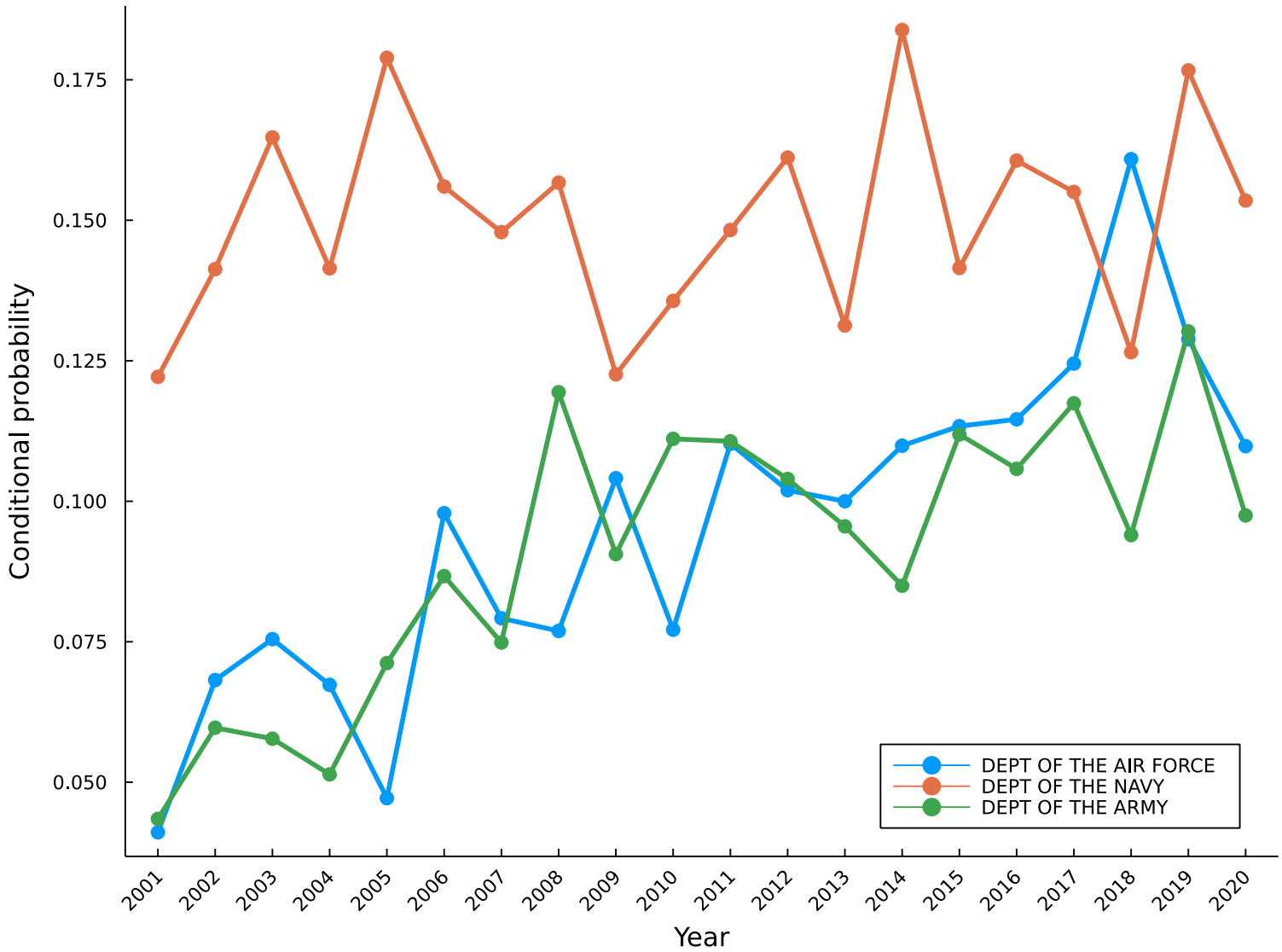
Navy lands more procurement contracts



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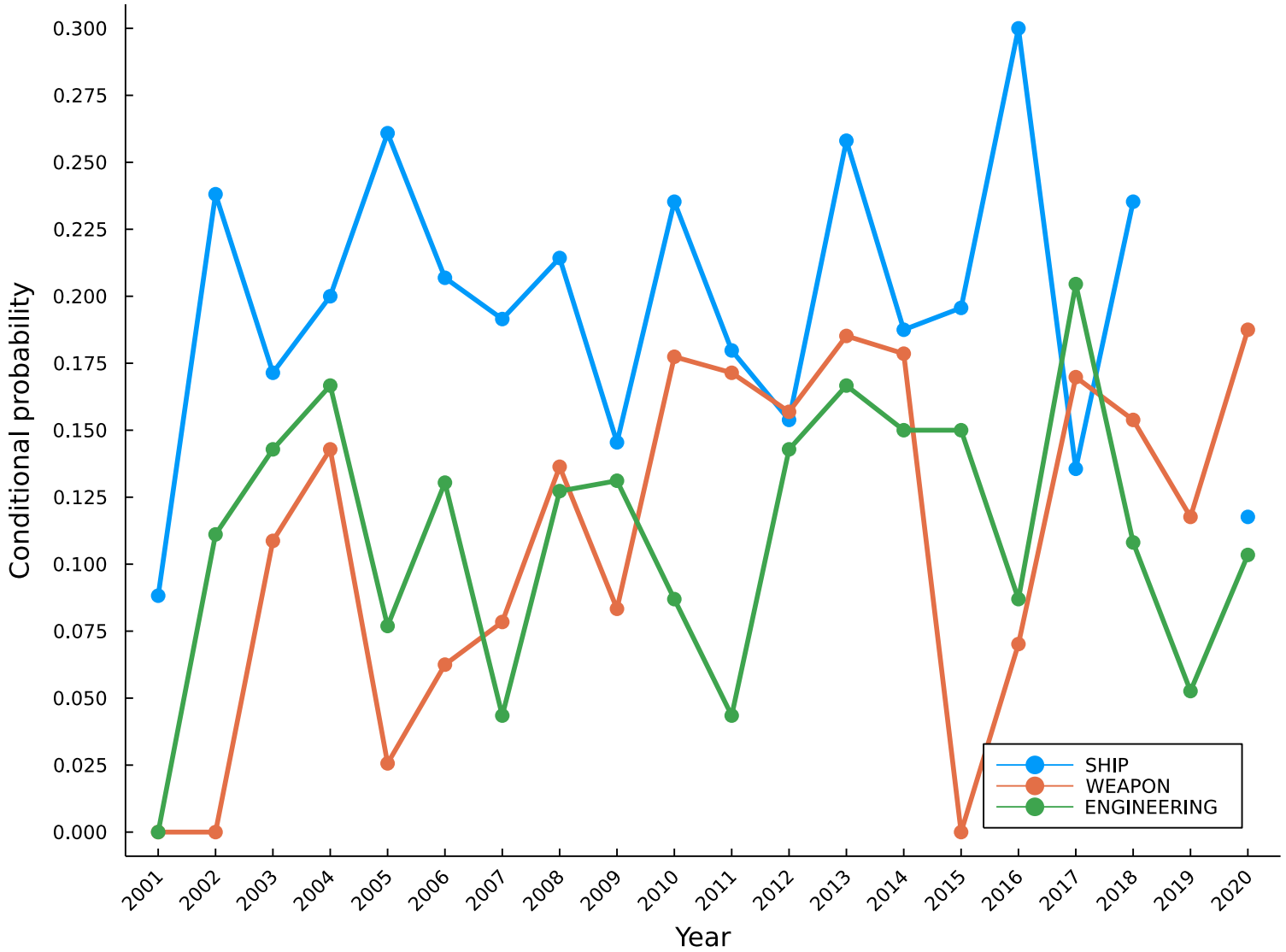
Ship-related products more likely to get procured



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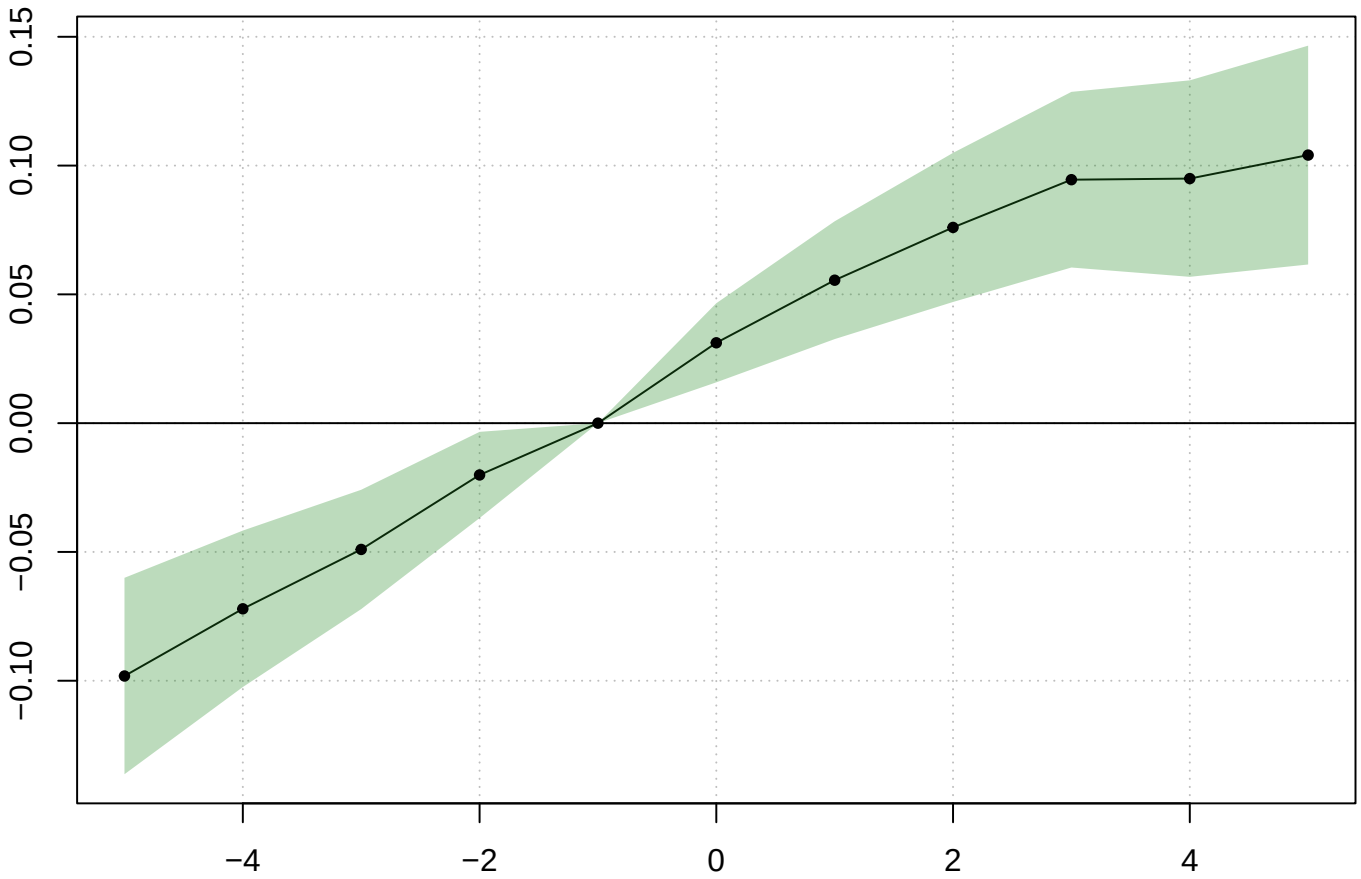
Cumulative patenting



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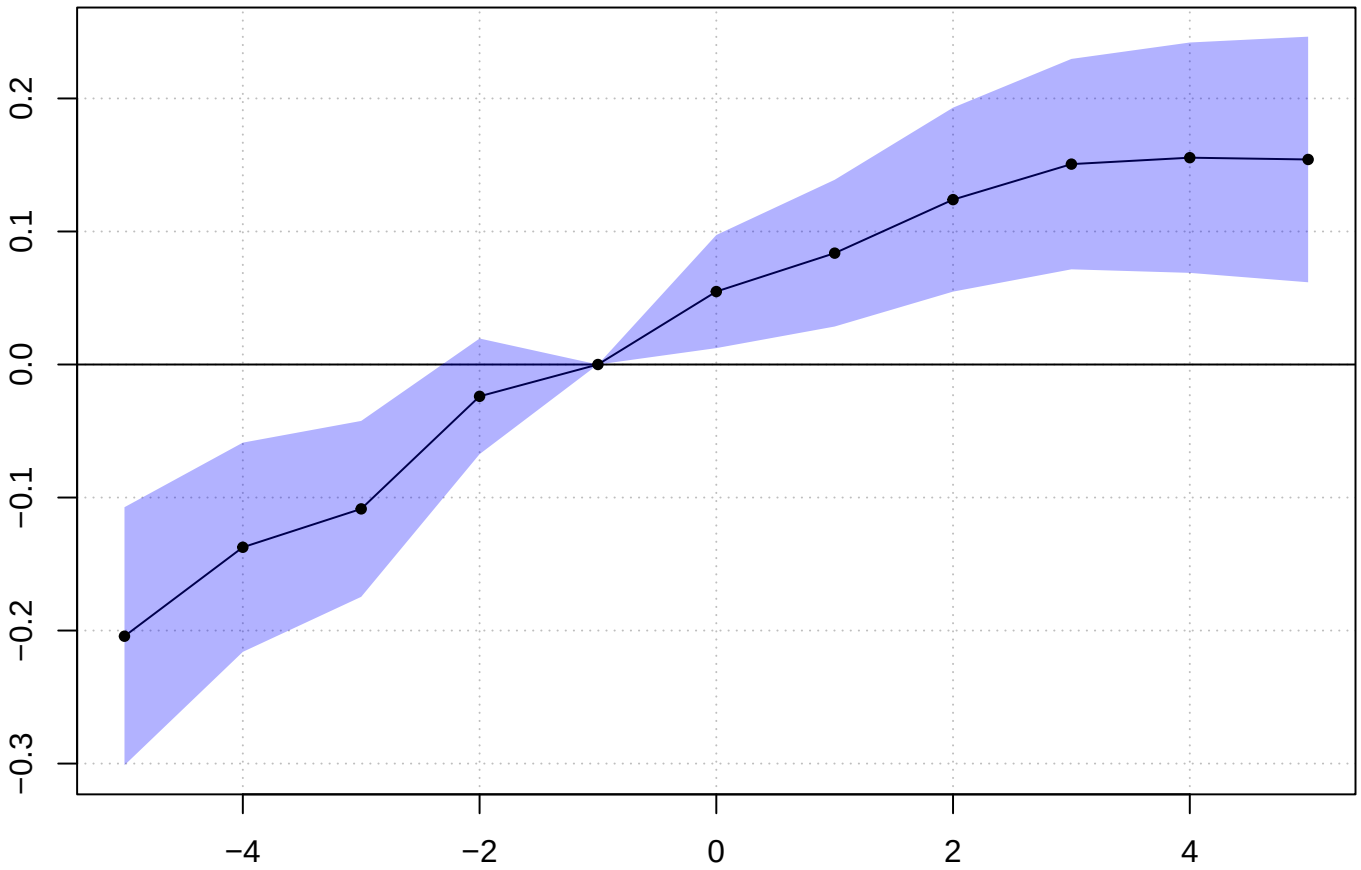
Cumulative patent quality



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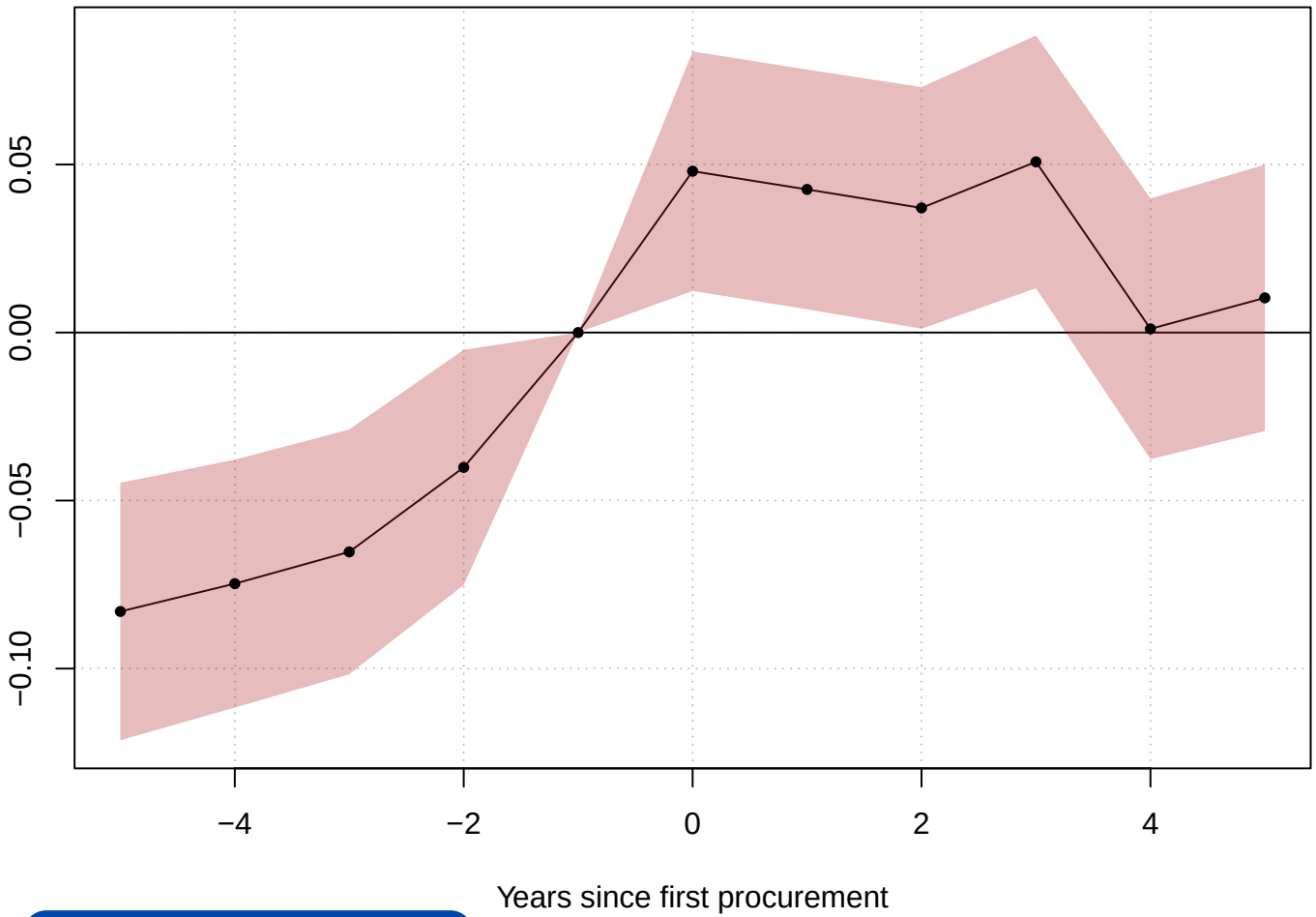
Non-SBIR contracts indicator



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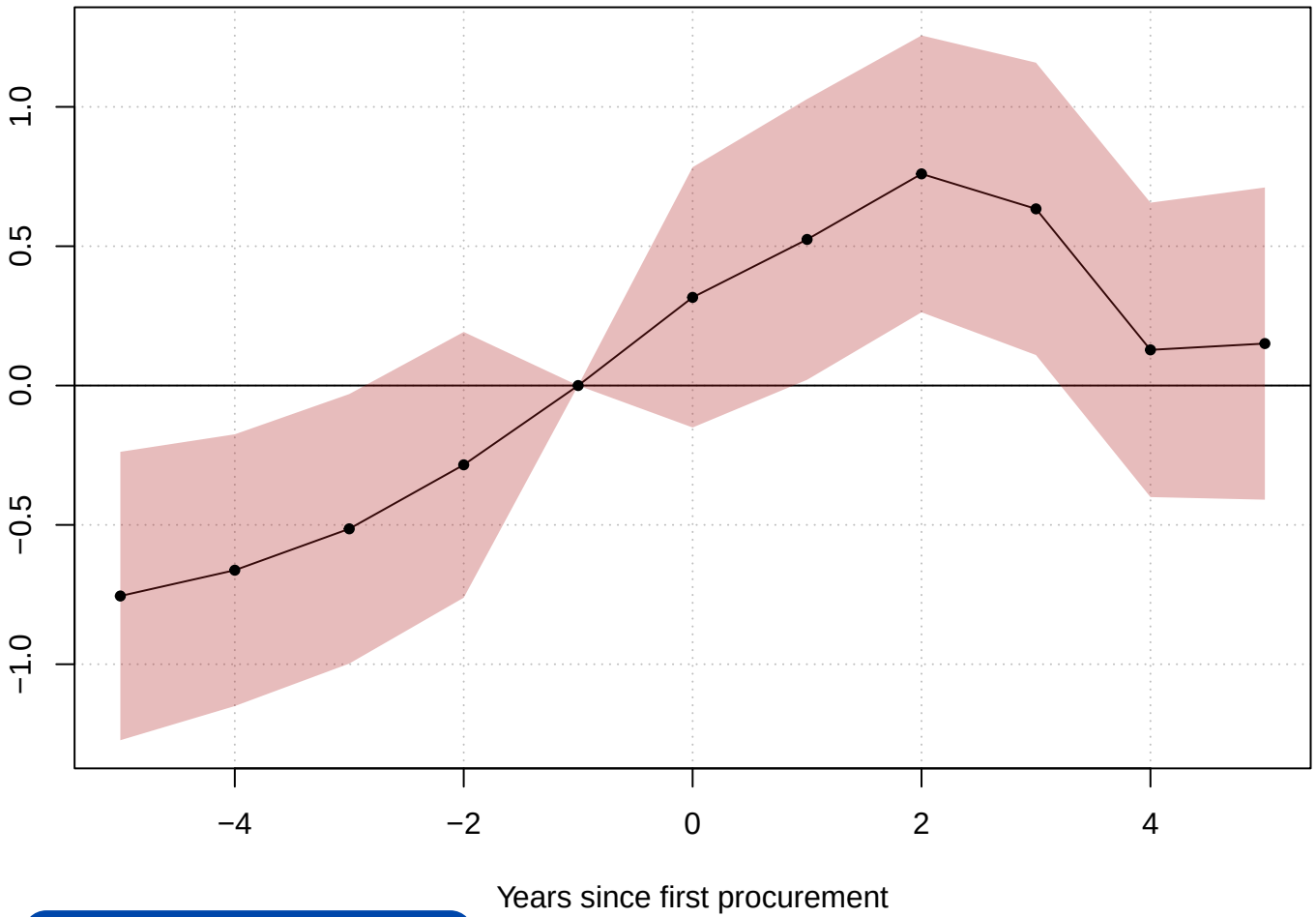
Competed non-SBIR contracts indicator



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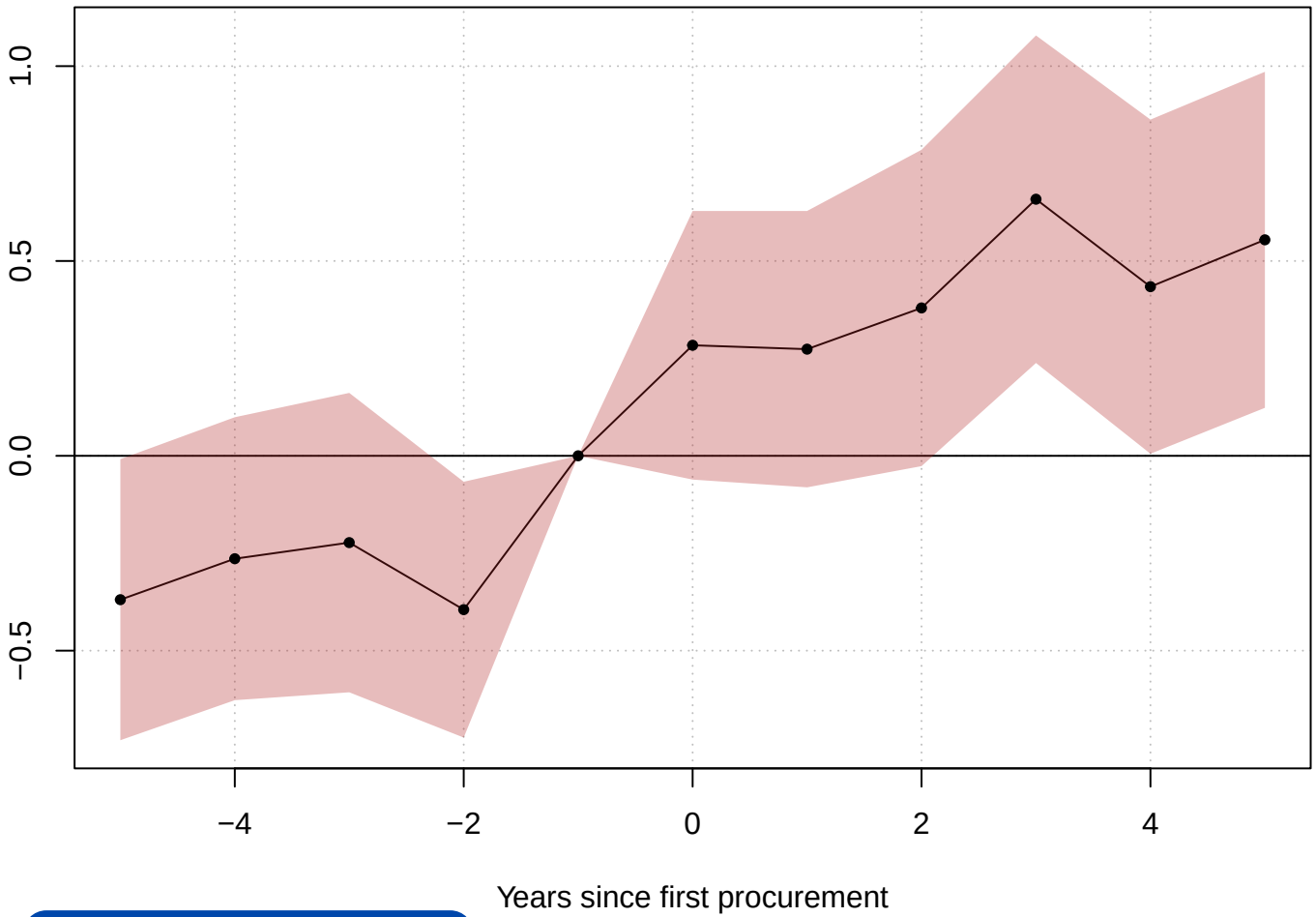
Non-competed non-SBIR contracts indicator



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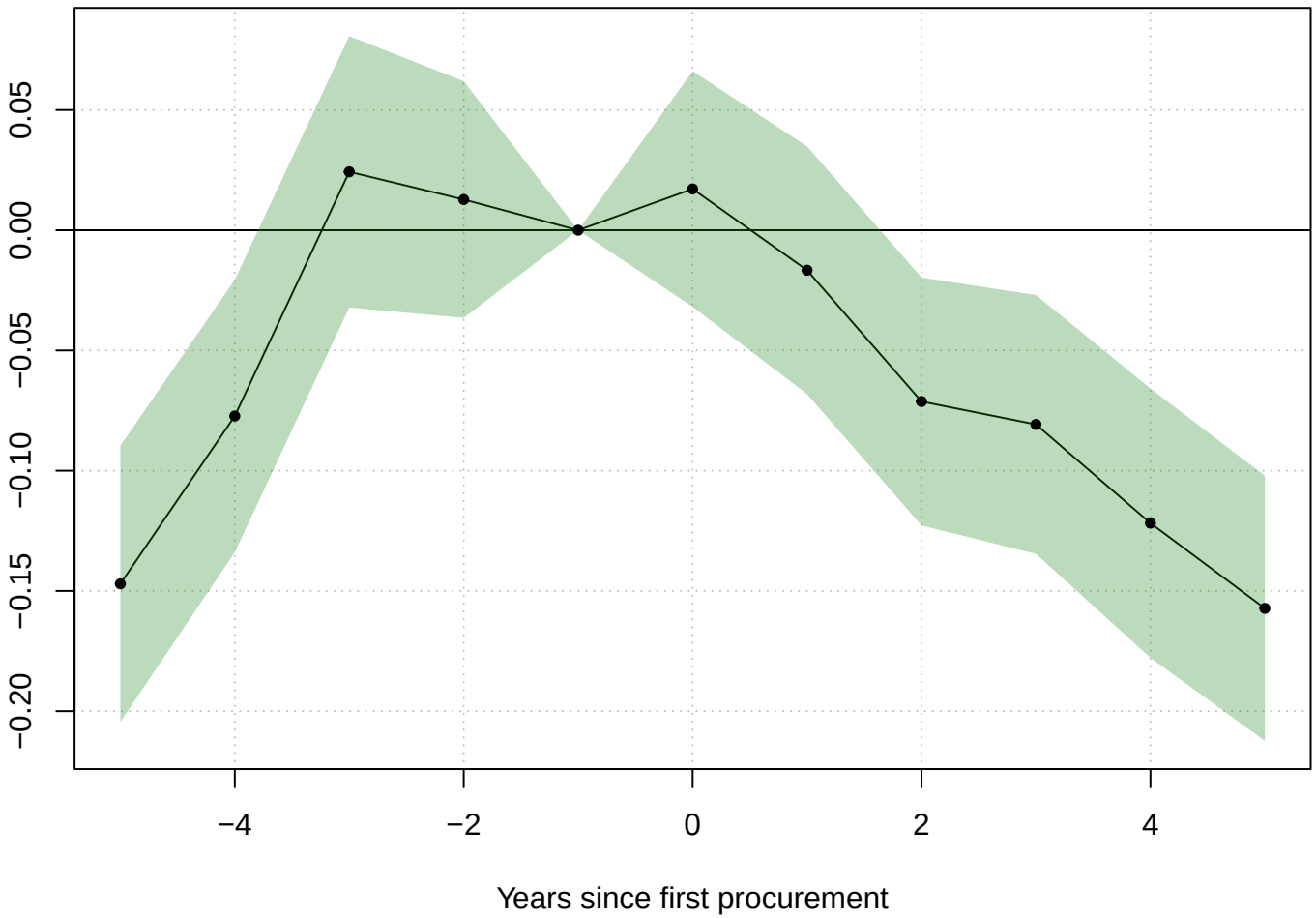
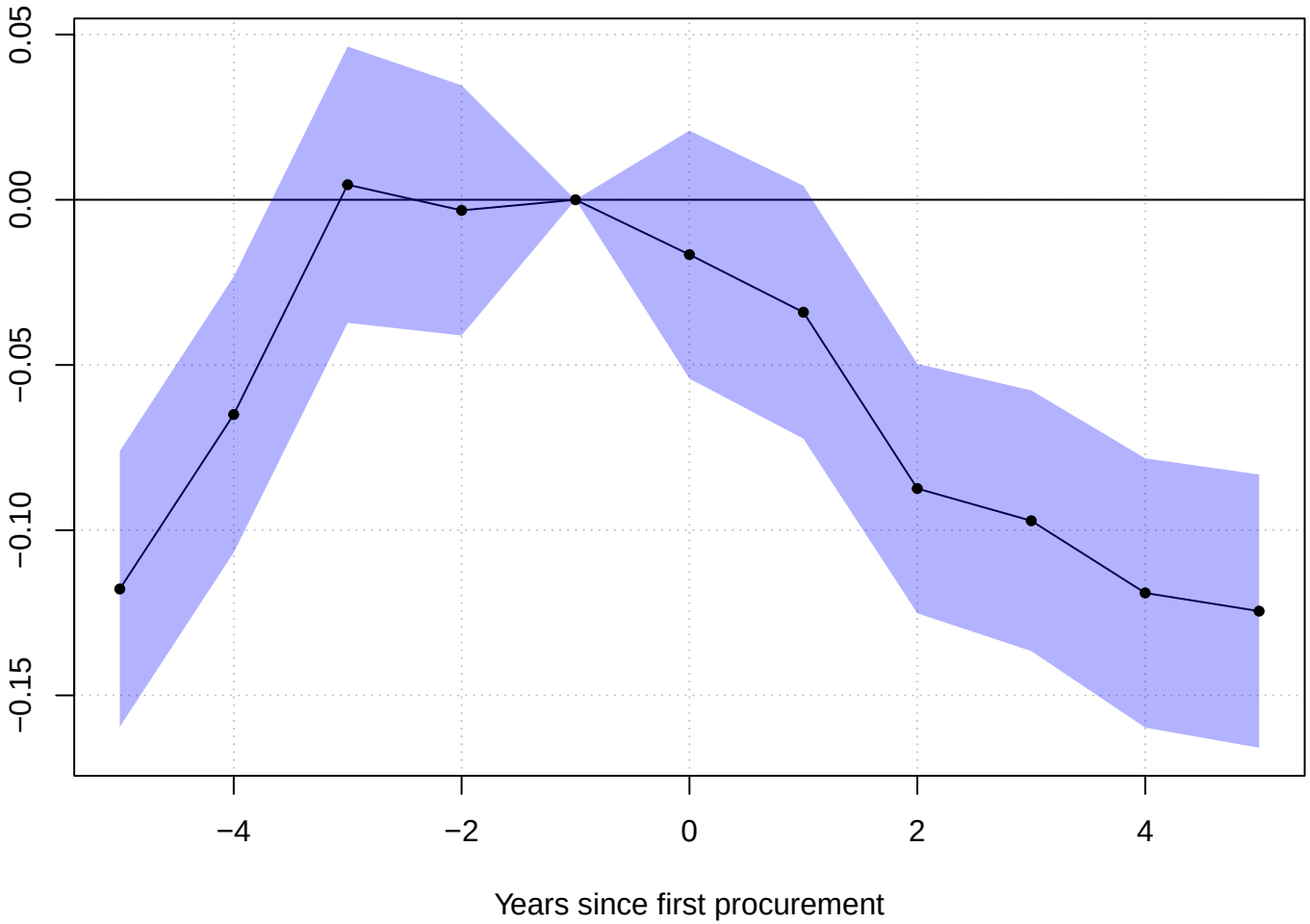
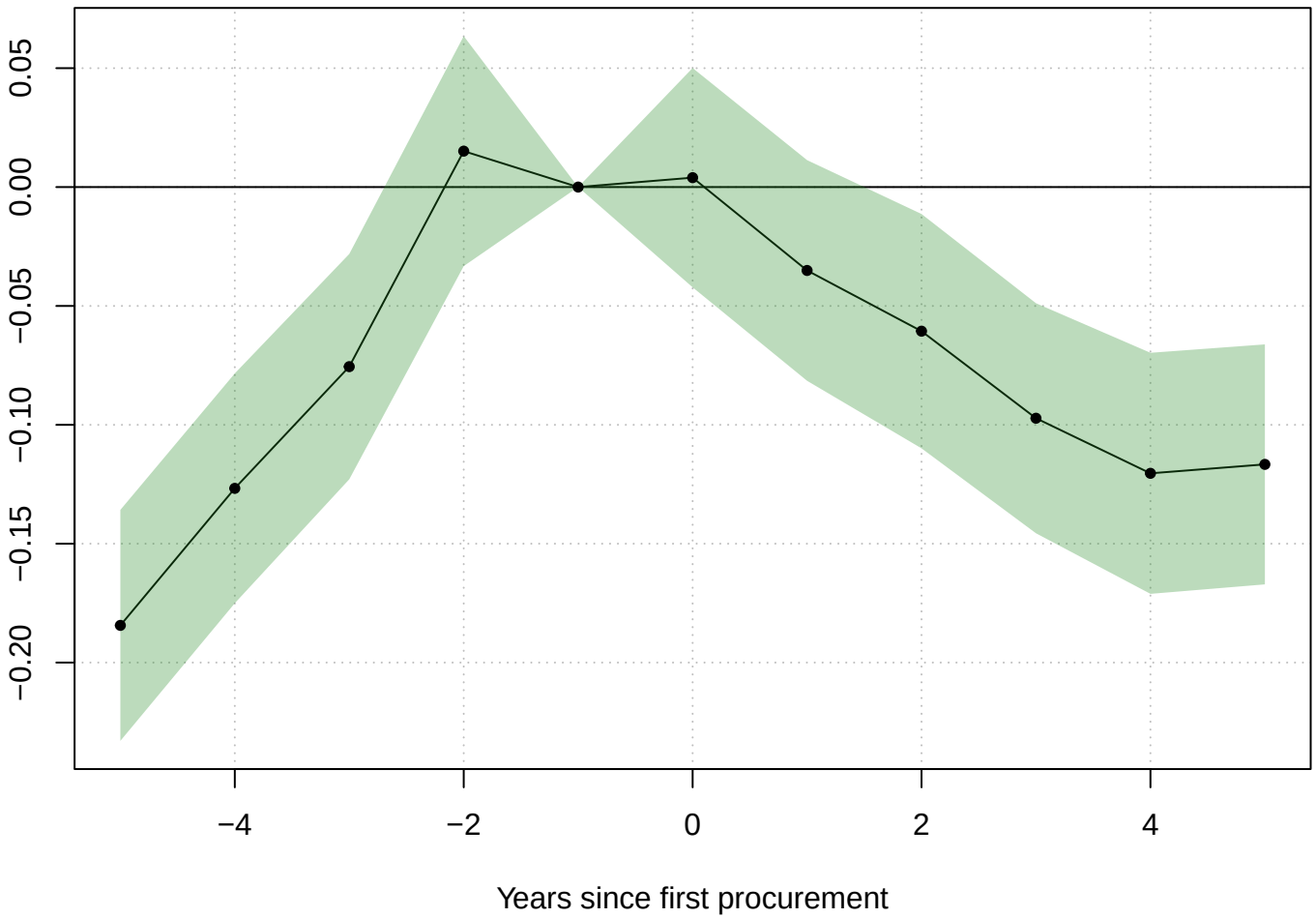
Phase I grants



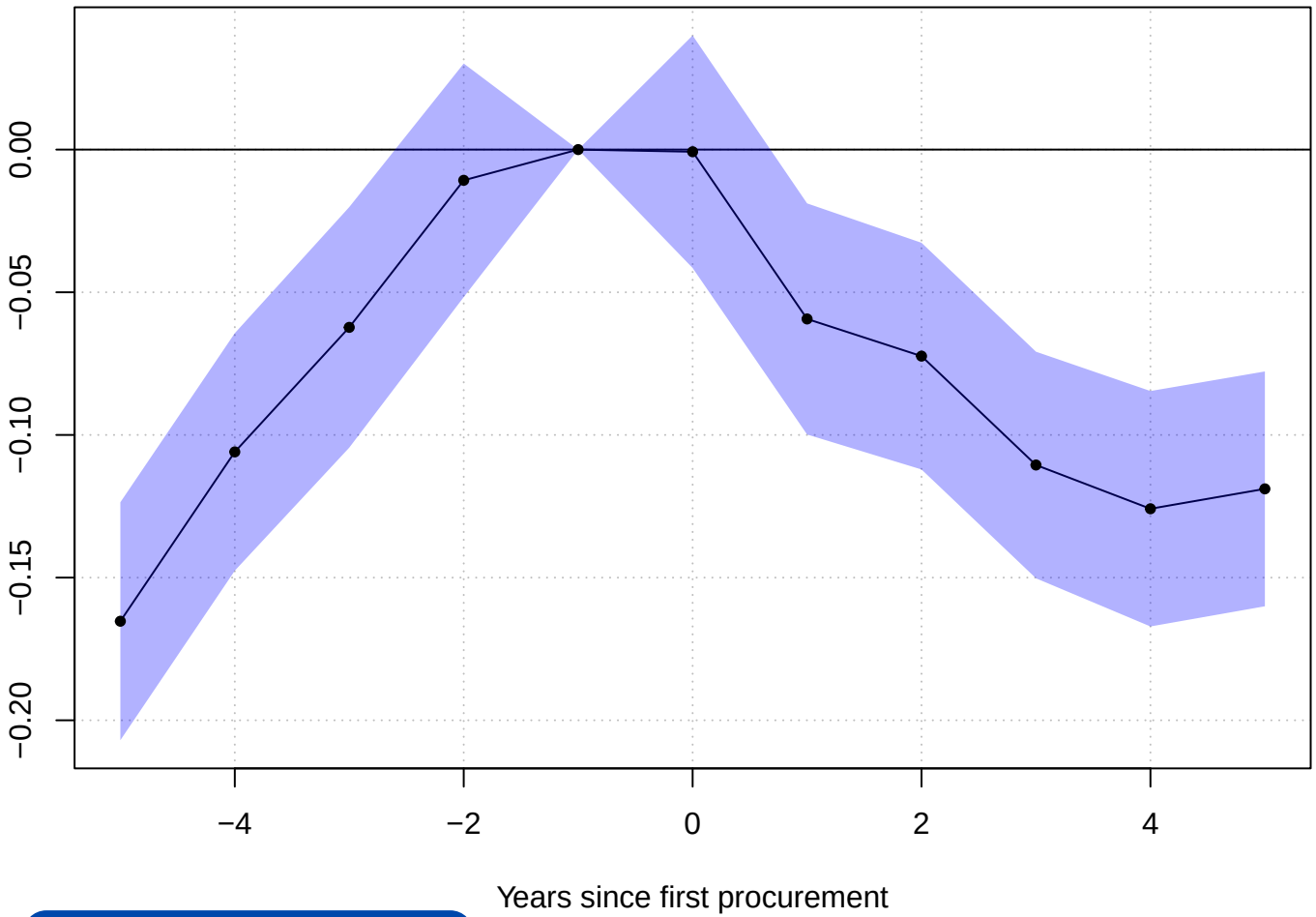
Phase I grants indicator



Phase II grants



Phase II grants indicator



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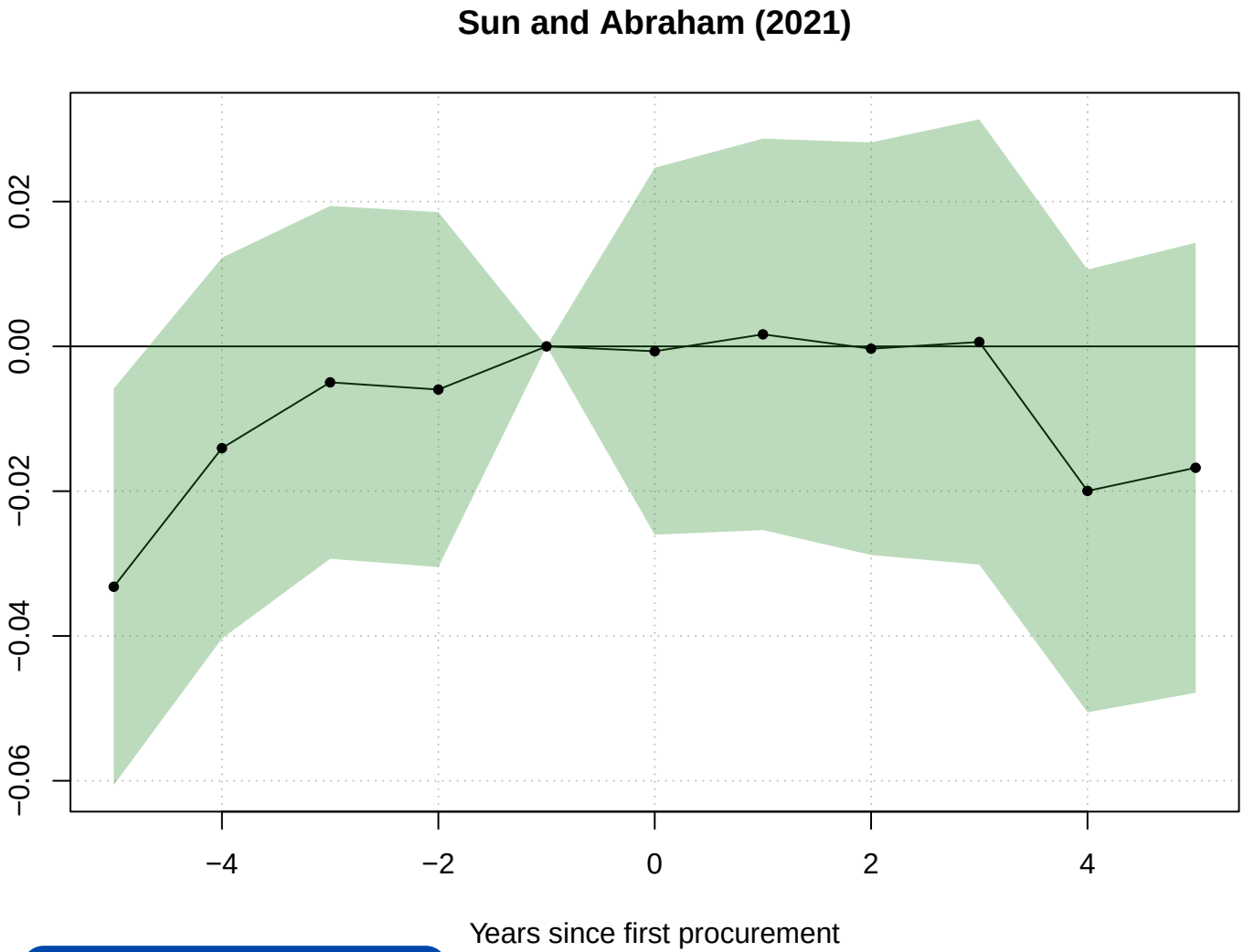
Patents



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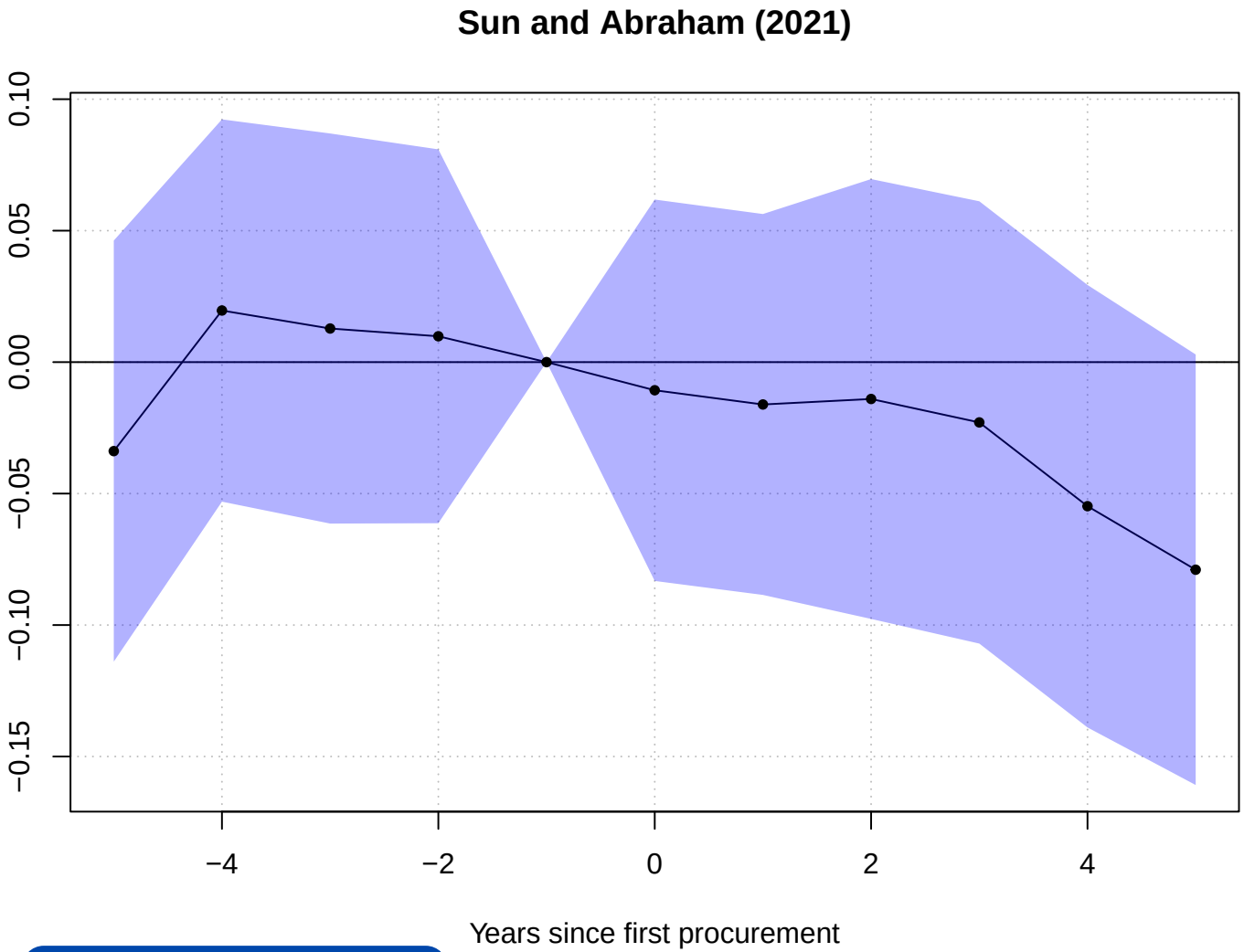
Citation-weighted patents



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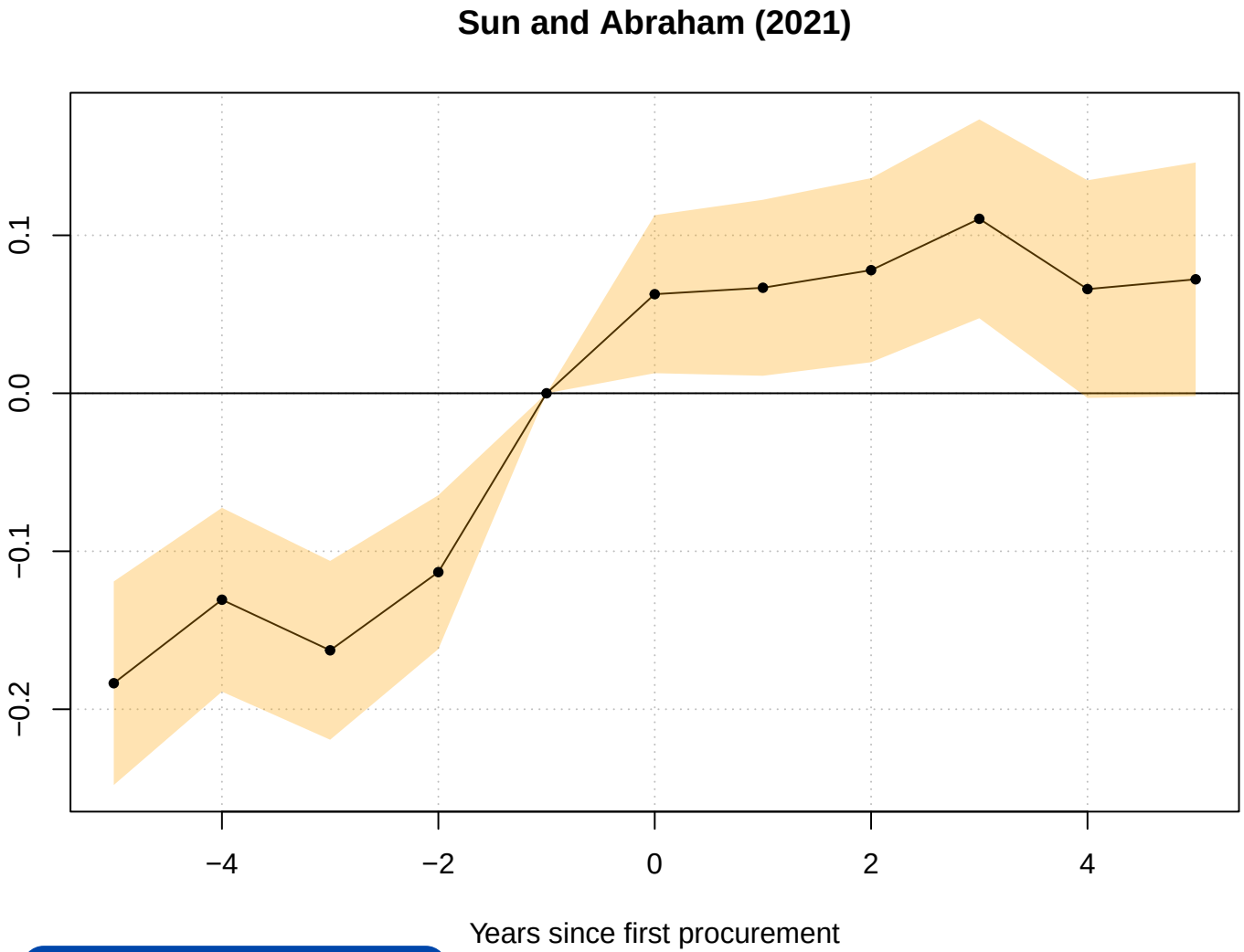
Non-Sbir contracts



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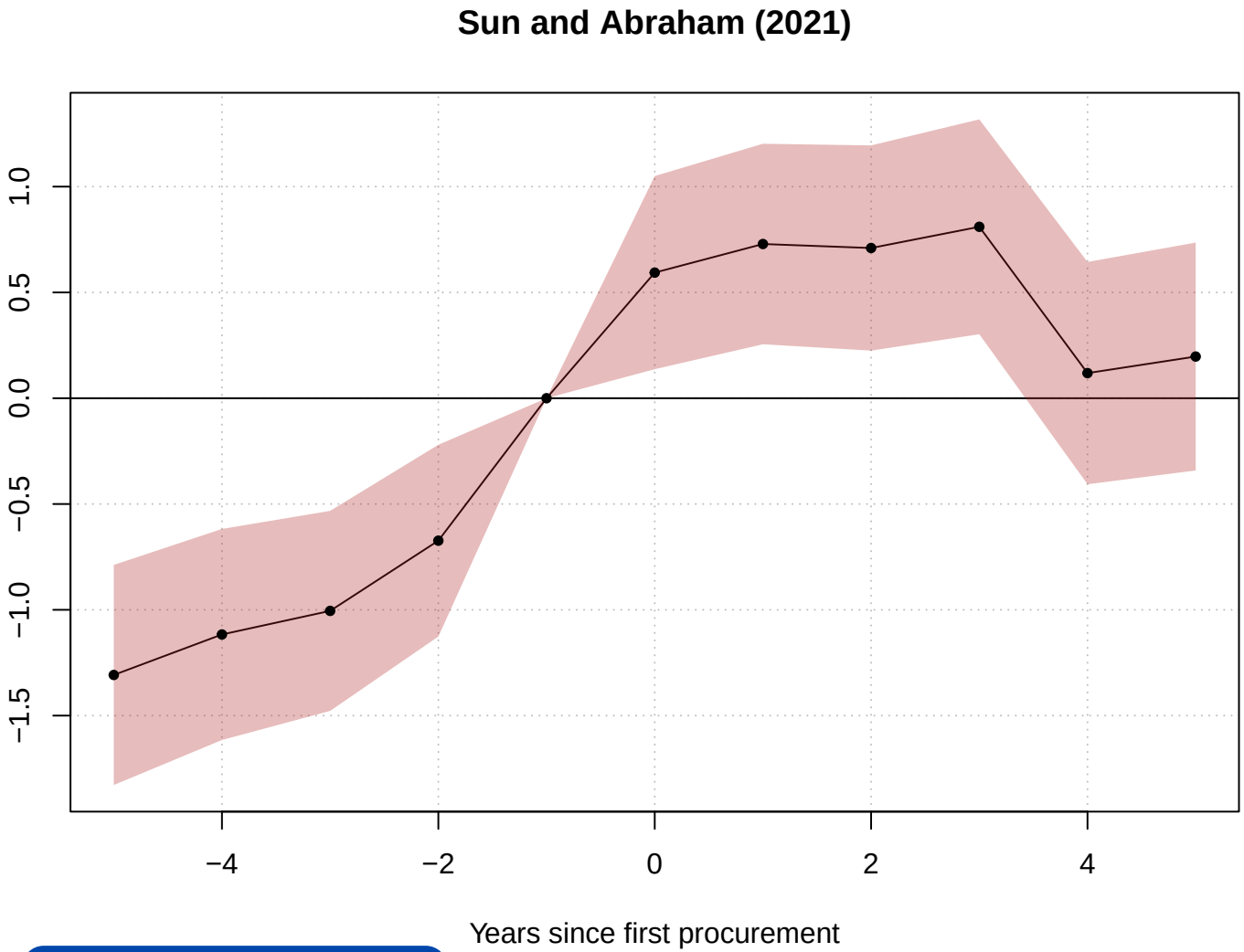
Non-Sbir contracts value



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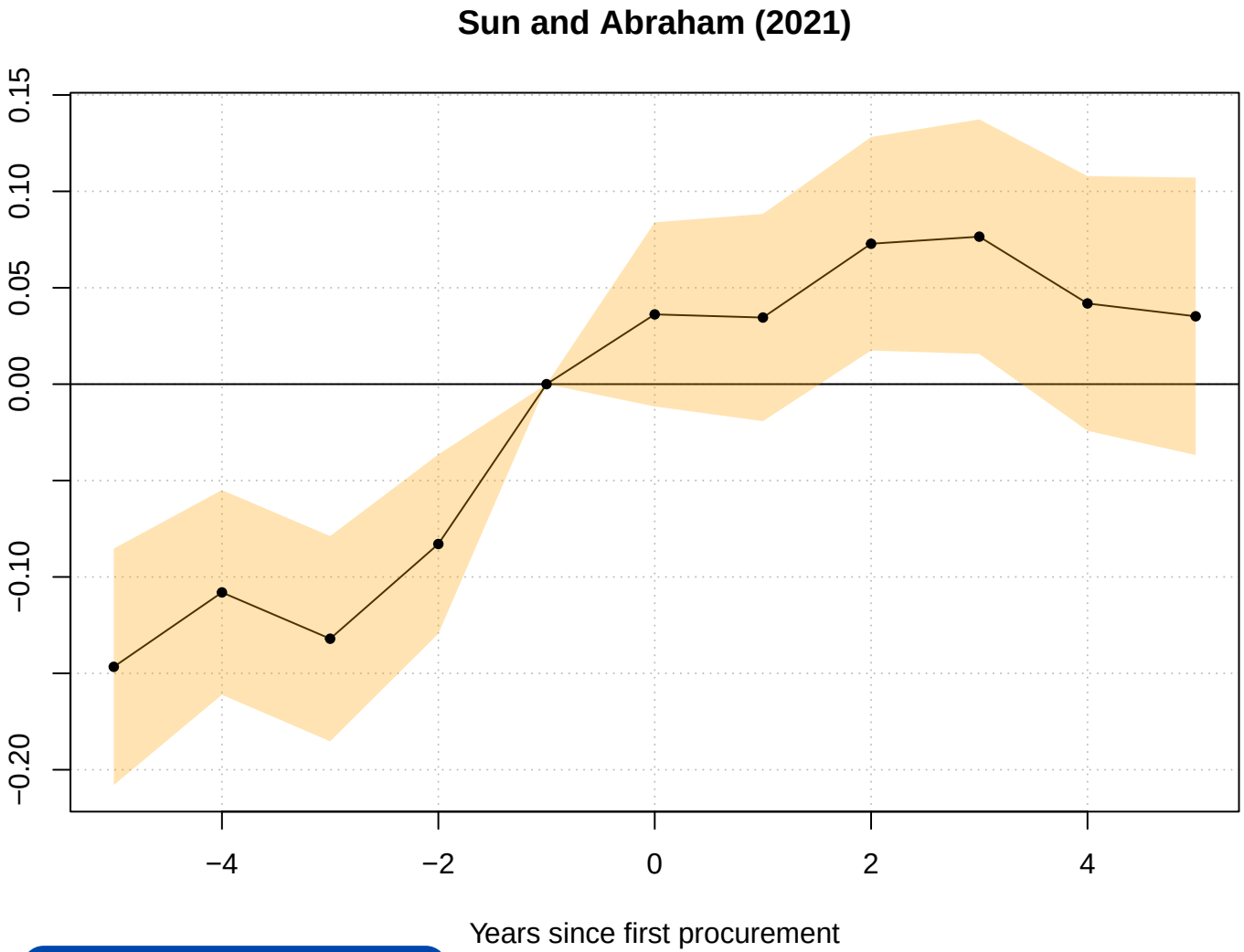
Competed contracts



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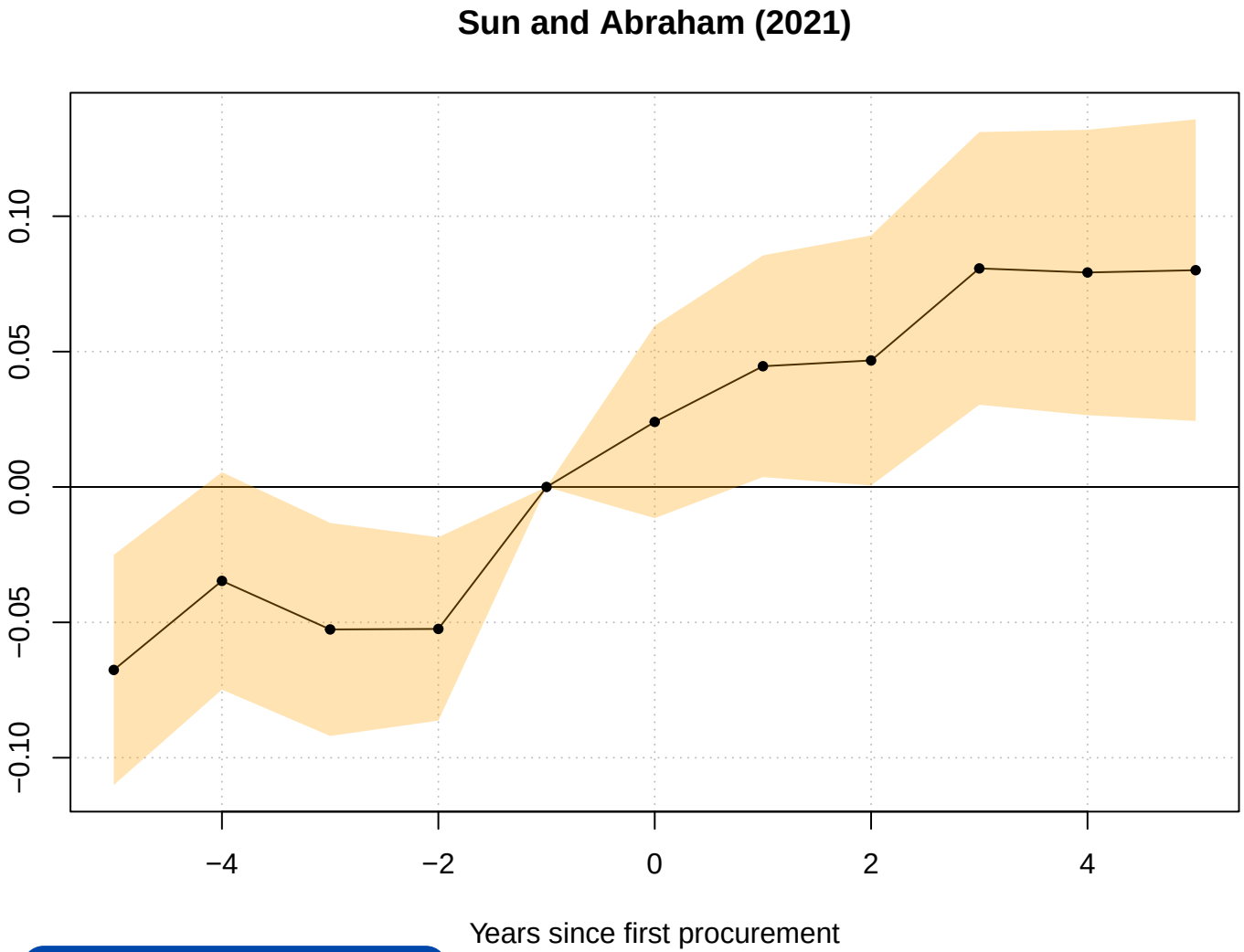
Non-competed contracts



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