PUBLIC R&D SPILLOVERS AND PRODUCTIVITY GROWTH
Public R&D Spillovers and Productivity Growth

Context
Decline in public R&D since 1960 in the US

Research question: What is the impact of the decline in public R&D on productivity growth?

1. Data
Most comprehensive dynamic panel of listed firms matched to patents

2. How is public R&D different?
1. More fundamental (share of citations to scientific papers)
2. More ‘ahead of its time’ (years ahead of technology class creation)
3. More likely to generate spillovers (classes citing the patent), especially to small firms

3. From theory to data
Productivity-enhancing function with spillovers:

\[ \text{productivity growth} = \text{R&D} \times \text{spillovers} \]

\[ \frac{\Delta\ln(\text{VA/worker})}{\Delta \text{YP}^{-1}} = \alpha_0 + \gamma \sum_{a} s_{iat} \Delta p_{at} + \epsilon \]

4. Shift-Share IV for public R&D spillovers: funding shocks
Caused by wars, space race, geopolitics, pandemics, etc. (see NASA example, left)

Positive impact on firm-level productivity

5. Patent examiner IV for public & private spillovers
Examiner leniency provides variation in the visibility of innovation
Public R&D spillovers twice as impactful

6. Aggregation: growth with spillovers and heterogeneous firms
Firms vary in productivity and there are 2 types of spillovers
- Private (applied) and public (fundamental)
Decline in public R&D explains a third of the deceleration in TFP

Conclusion
- Large, positive impact of public R&D on firm productivity through technology spillovers
- Public R&D spillovers at least twice as impactful as private R&D spillovers
- Smaller firms are more negatively impacted by the decline in public R&D
- Decline in public R&D in the US can account for a third of the deceleration in TFP

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