

# THE END OF ECONOMIC GROWTH? UNINTENDED CONSEQUENCES OF A DECLINING POPULATION

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<sup>†</sup>The views expressed here are those of the authors and do not necessarily reflect those of the Board of Governors or the Federal Reserve System.

# Motivation

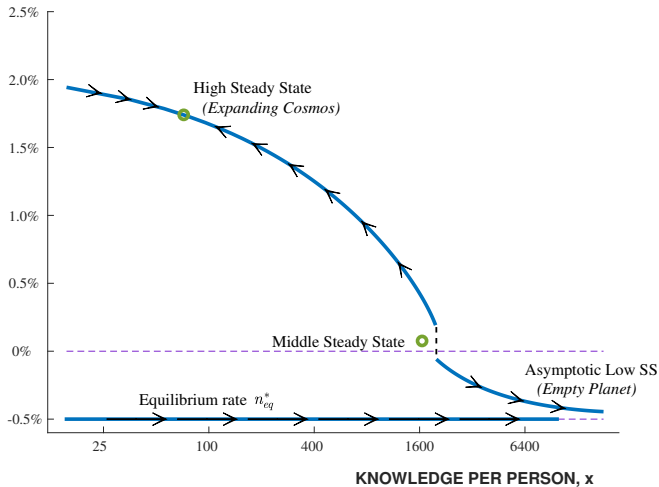
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- ▶ Great thought-provoking work!
- ▶ A straightforward “big” question:  
*What does negative population growth imply for economic growth?*
- ▶ Two main takeaways:
  - ⇒ **Empty planet** (declining popln. & stagnant prosperity) could be an equilibrium!
  - ⇒ It could even become an **optimal** outcome!
- ▶ Even more worrying when considered with Bloom et al. (2020, AER)

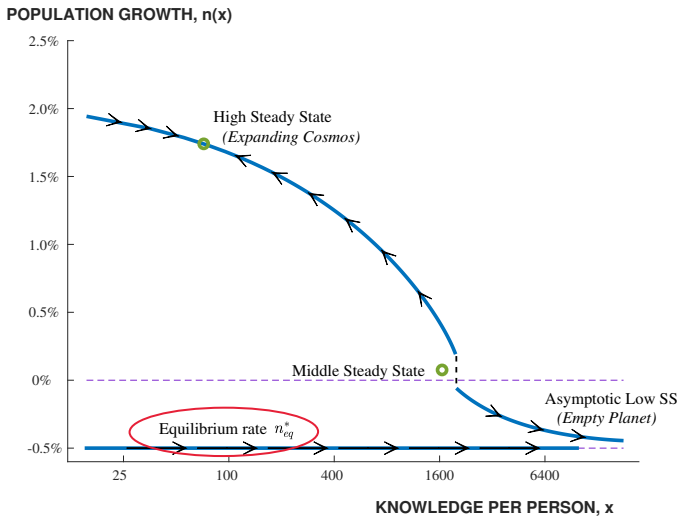
$$g = \underbrace{\text{research productivity}}_{\downarrow \text{Bloom et al. (2020)}} \times \underbrace{\text{\# of researchers}}_{\downarrow \text{in future? this paper}}$$

# Main Result

POPULATION GROWTH,  $n(x)$

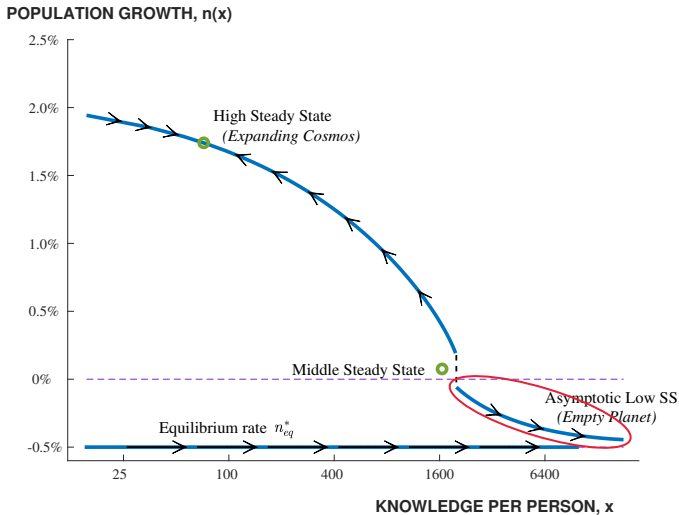


# Main Result



$n_{eq} < 0$  can be sustained as a decentralized equilibrium with endogenous fertility decision.

# Main Result



$n_{sp}$  converges to  $n_{eq}$  when knowledge per person is too high.

⇒ *The planet empties optimally!*

# Reflections

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1. Depreciation / obsolescence of knowledge reducing  $x$ ?
  - ▶ Ideas become obsolete or remain untapped
  - ▶  $x \downarrow \Rightarrow$  marginal product of researchers / offsprings  $\uparrow \Rightarrow$  optimal fertility  $\uparrow$
2. The alternative economy: expanding cosmos
  - ▶ Would it be sustainable in a world with limited resources?
  - ▶ Natural / non-renewable resources?
3. More broadly, what about welfare?
  - ▶ If welfare in “empty planet” is higher than in “expanding cosmos,” should we worry about  $n_{eq} < 0$ ?
4. Could Malthusian forces reverse the emptying?

# Future of Growth and the Role of Policy

- ▶ Back to the idea production equation:

$$g = \text{research productivity} \times \# \text{ of researchers}$$

⇒ Policy makers should tackle both channels!

1. Promoting skilled immigration?
2. Competition policy / diffusion of ideas?
3. The role of developing economies

# Future of Growth and the Role of Policy

## 4. Support for basic research

- ▶ Enabling breakthrough innovations  $\Rightarrow$  boost to productivity growth
- ▶ Role of public institutions / universities

## 5. Are some breakthrough inventions around the corner?

- ▶ Diffusion of AI / automation
- ▶ Green economy offering new opportunities



# Conclusion

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- ▶ Enlightening work, enjoy reading it!