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Exploring the indirect energy impacts of digitalised daily life

A test case of smart heating using the FeliX model

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ECE, S3

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Photograph and graphics: Marcel Seger, Poornima Kumar

Our lives are increasingly digitised and automated.

Why are digitalisation's indirect energy impacts so important?

Diffuse, usage-dependent long-term climate outcomes.

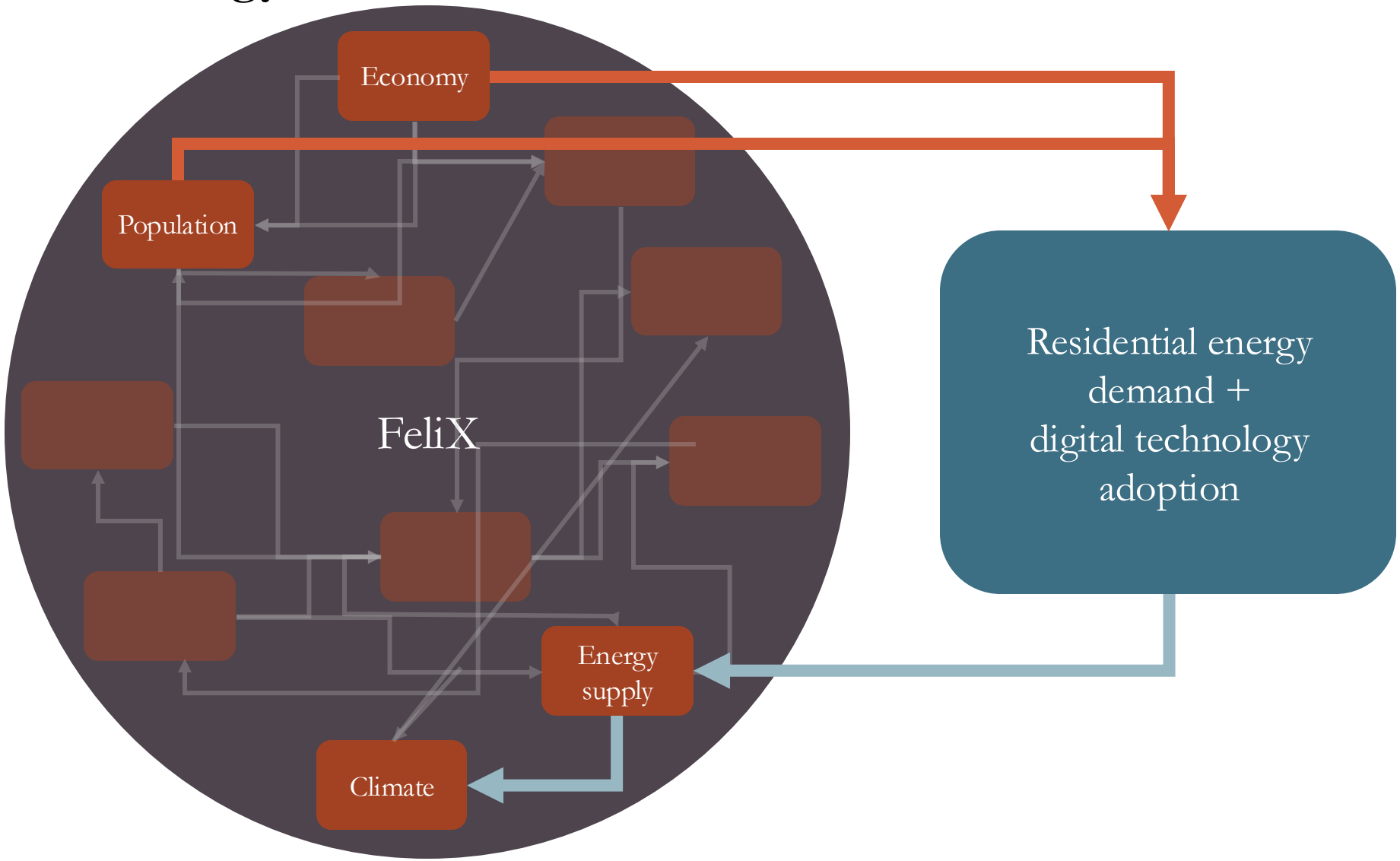
- Efficiency
- Substitution
- Rebound

Objectives

How do interactions between **technological and social learning dynamics** shape the adoption of digital technologies?

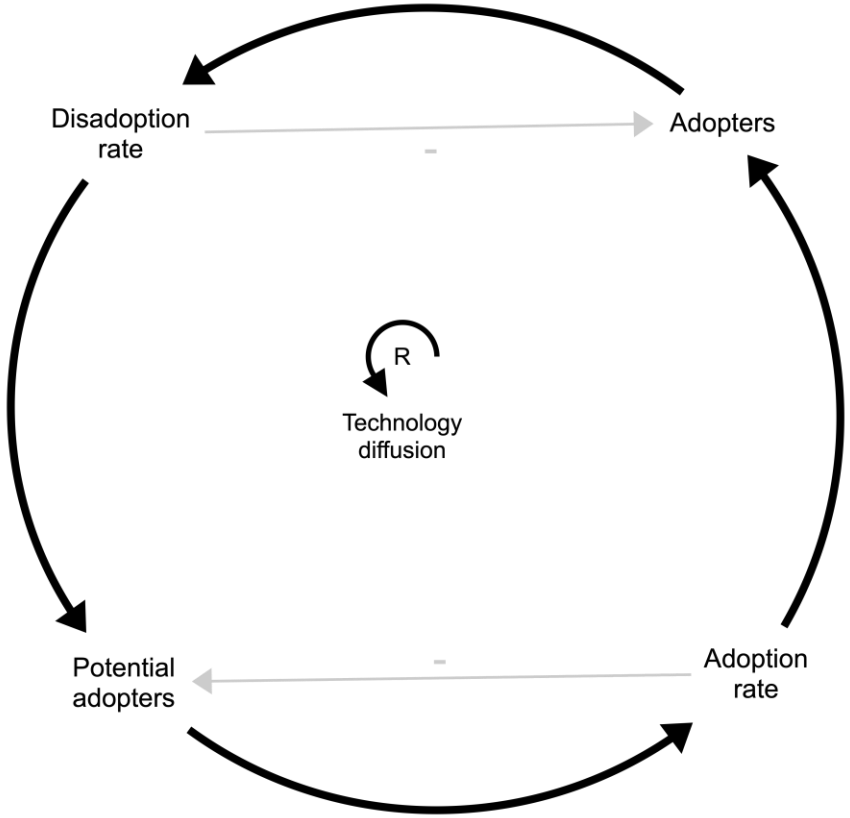
What are the implications for **energy demand**?

Methodology



System dynamics modelling

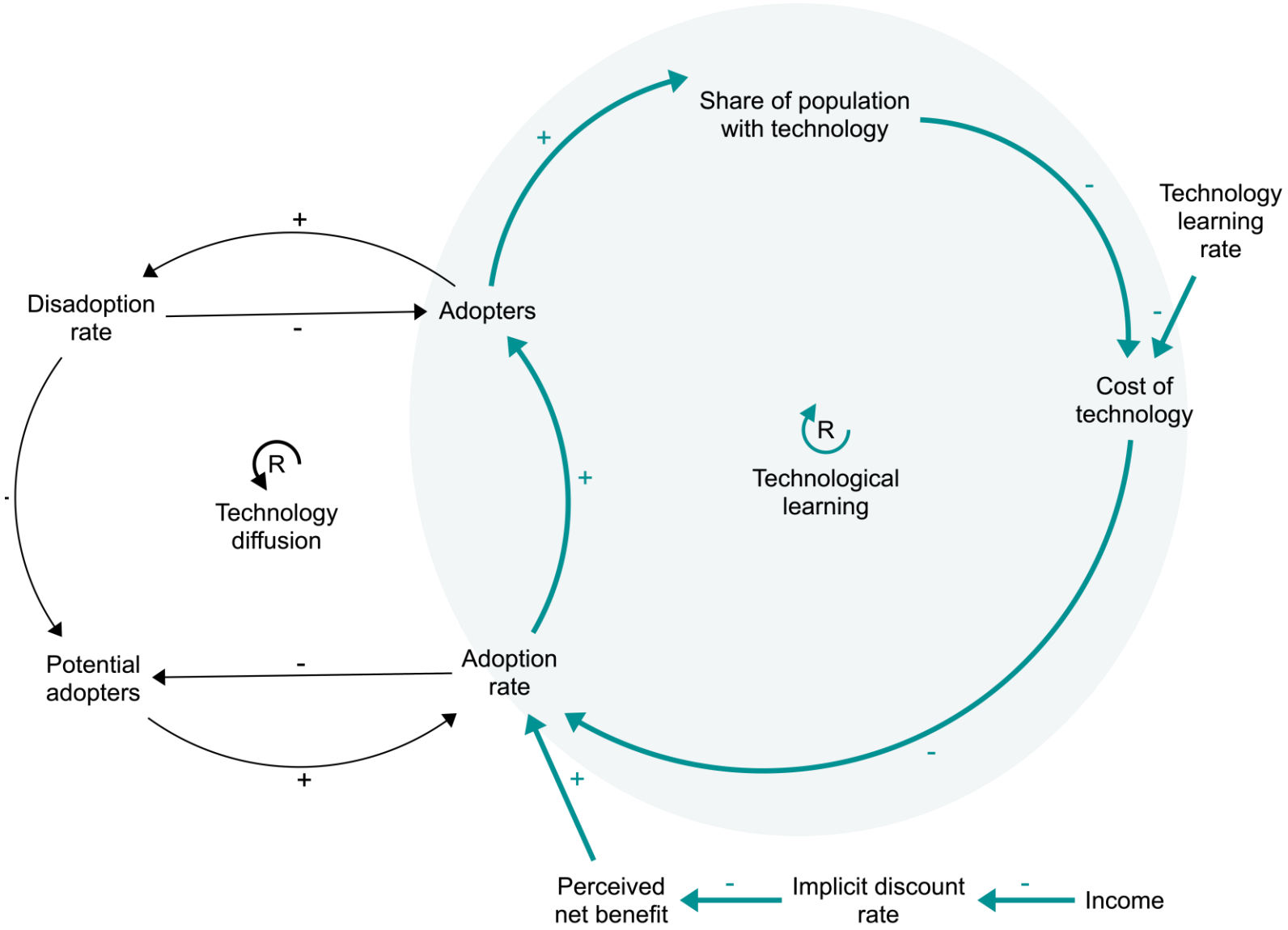
Adapted from Ye, Q., Liu, Q., Swamy, D., Gao, L., Moallemi, E. A., Rydzak, F., & Eker, S. (2024). *FeliX 2.0: An integrated model of climate, economy, environment, and society interactions.* https://doi.org/10.1016/j.envsoft.2024.106121



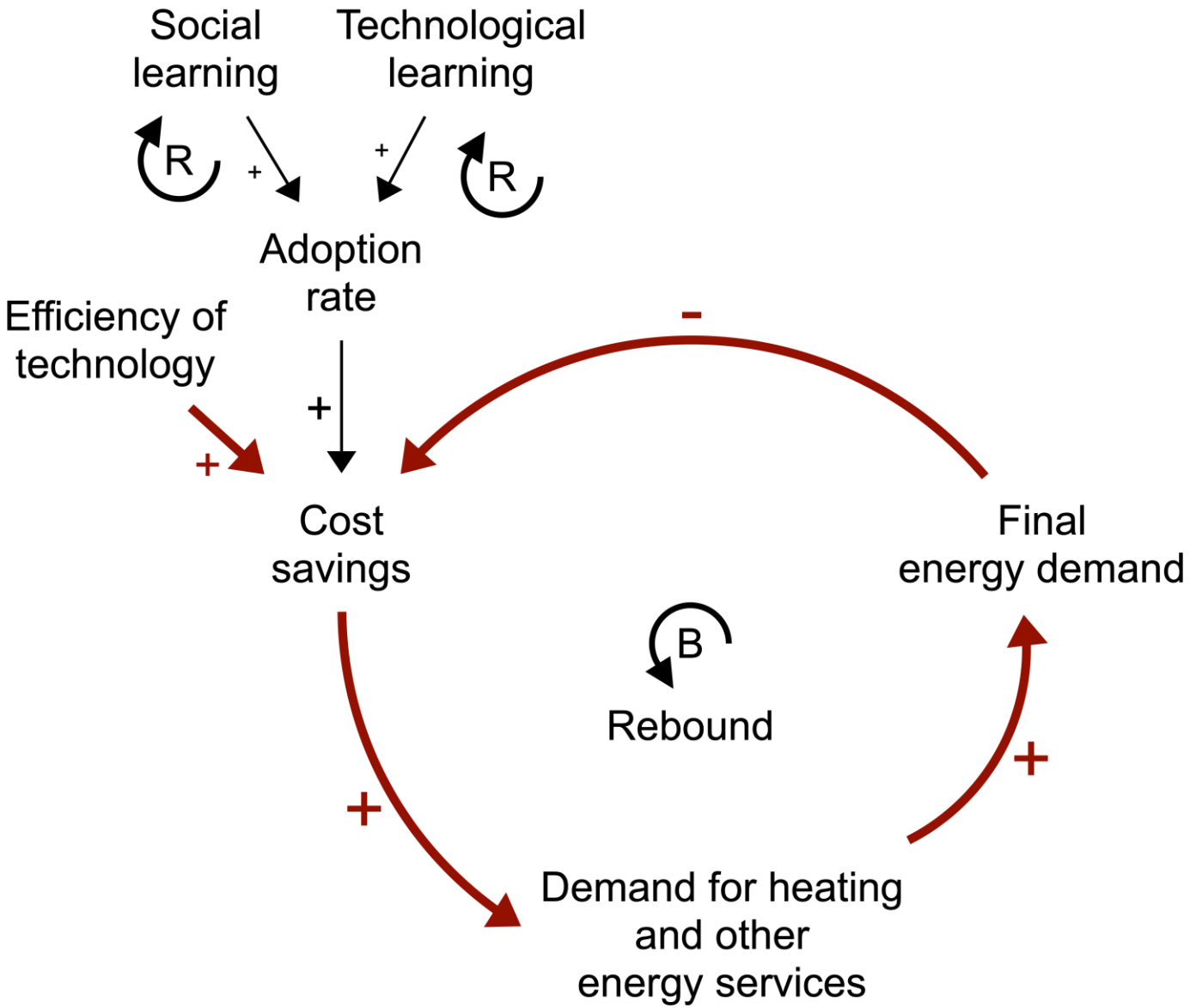
Potential adopters of energy efficient technologies become adopters through an adoption rate.

Adopter types:

- heat pump
- heat pump + smart thermostat
- gas boiler + smart thermostats=

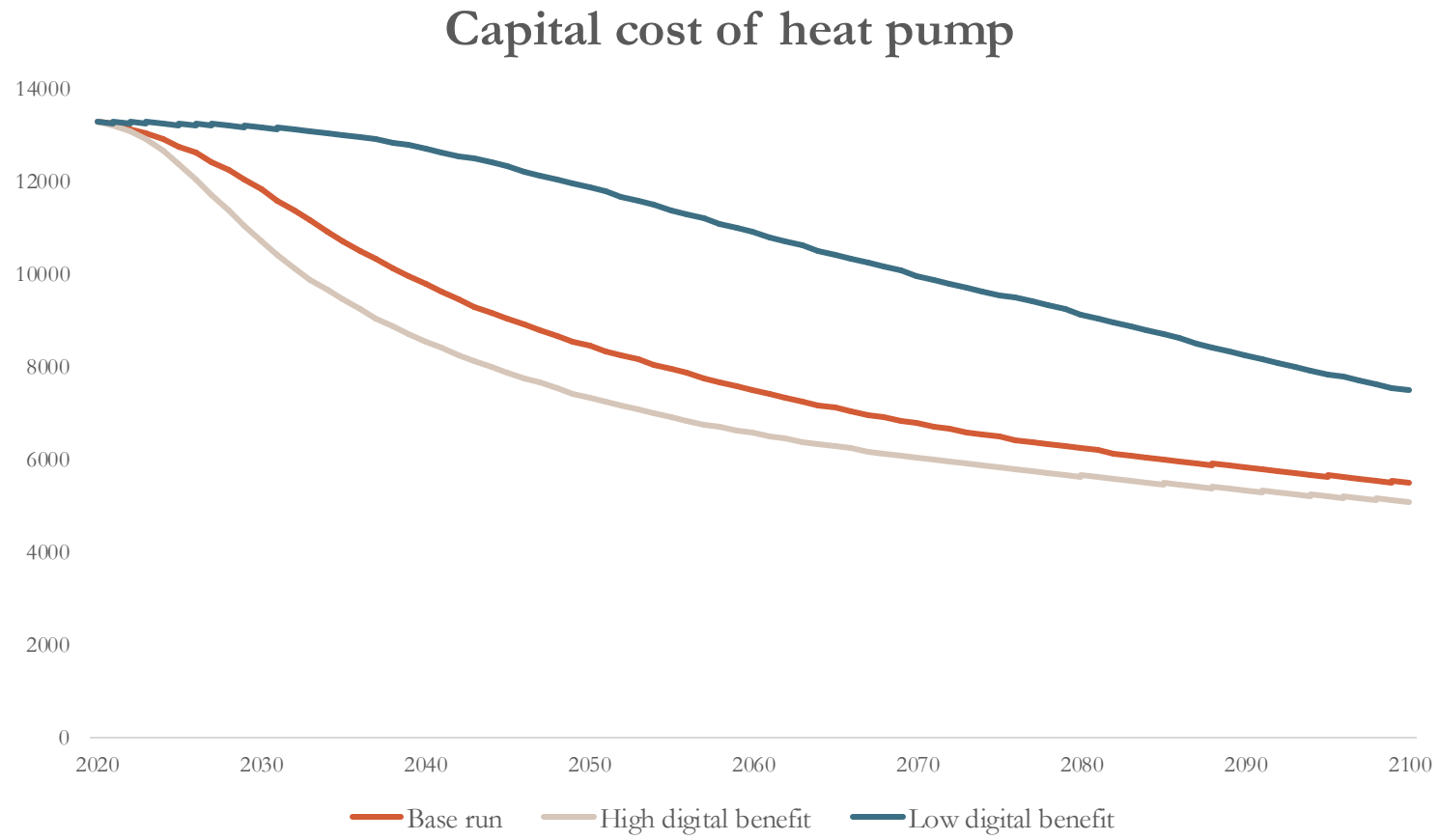


As cumulative adoption increases, technology cost decreases (technological learning).

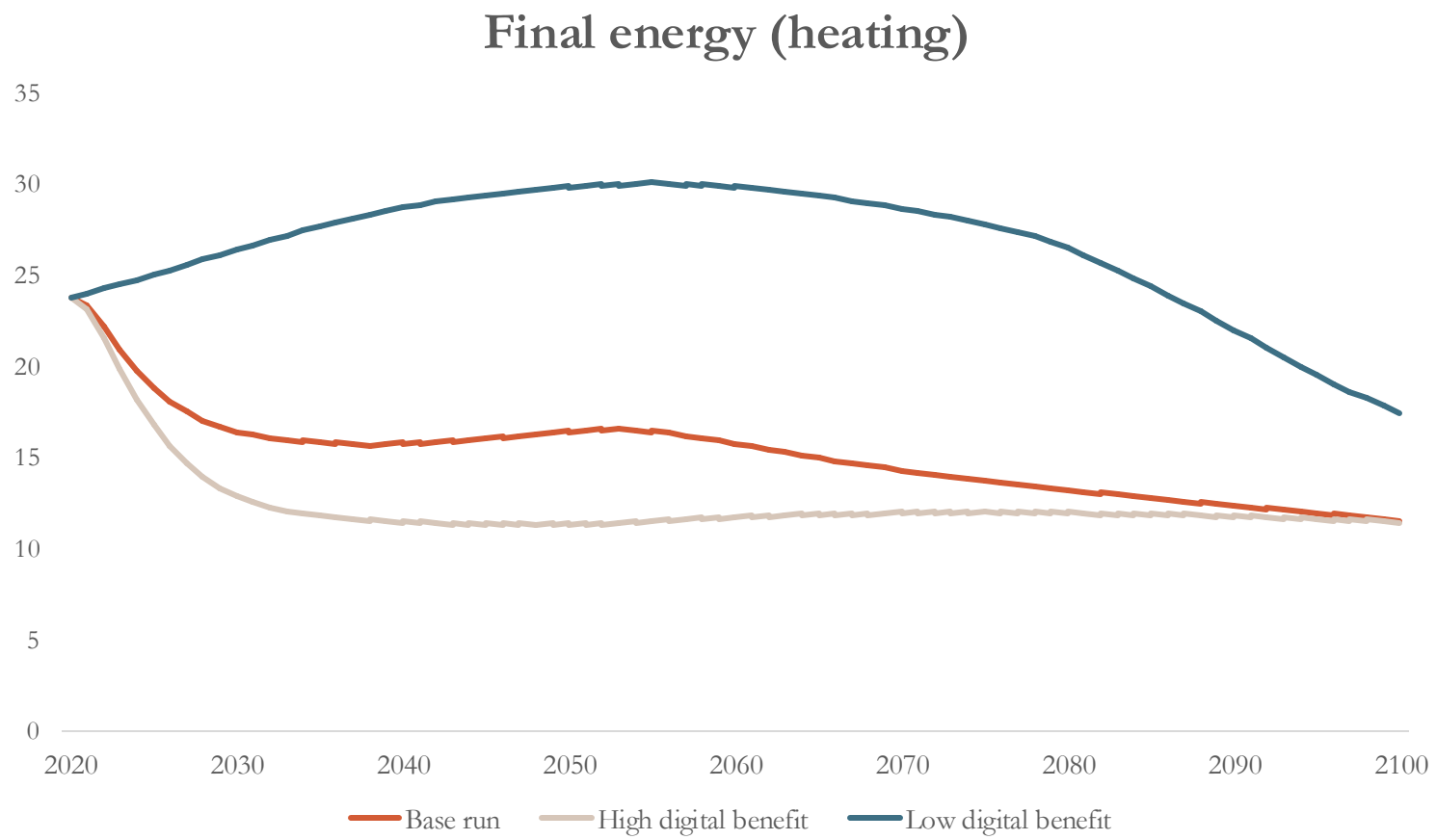


Digital technologies enable cost savings that may be reinvested in other energy activities (rebound).

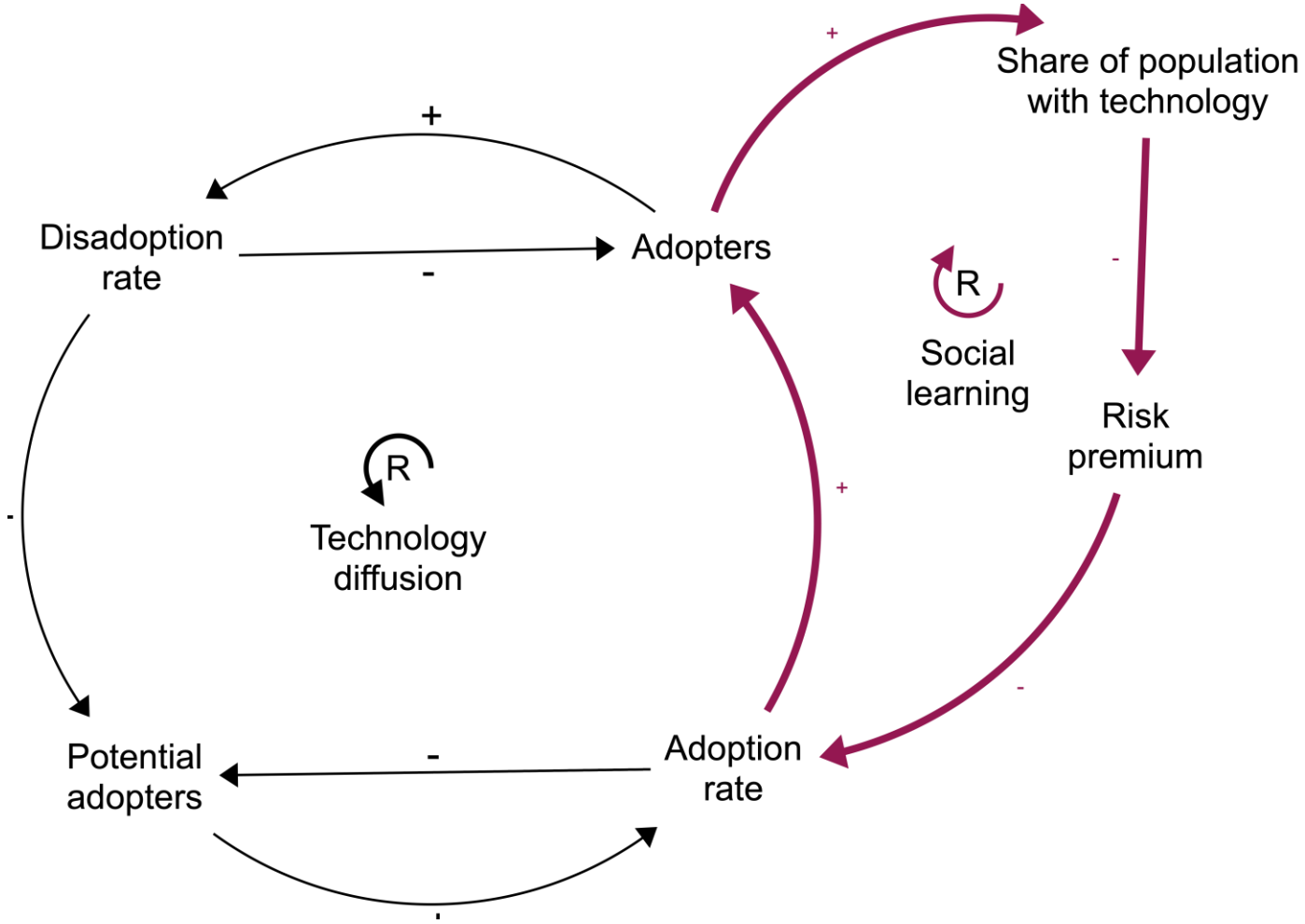
Preliminary results



Preliminary results



Next steps


Share of population with technology
Disadoption rate
Adopters
Social learning
Risk premium
Technology diffusion
Potential adopters
Adoption rate
R
R
+
+
-
-
+
-
-
-

Thanks for a wonderful summer, ECE, IIASA, YSSP!

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Thanks for your time!

Questions?

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