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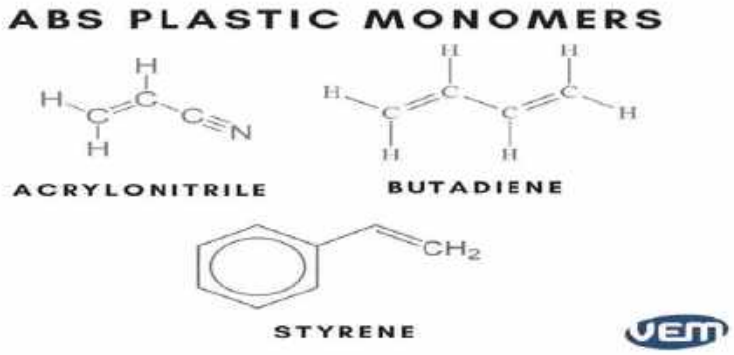
ABS el EU

Paving the way for an ABS recycling revolution in the EU

ABS

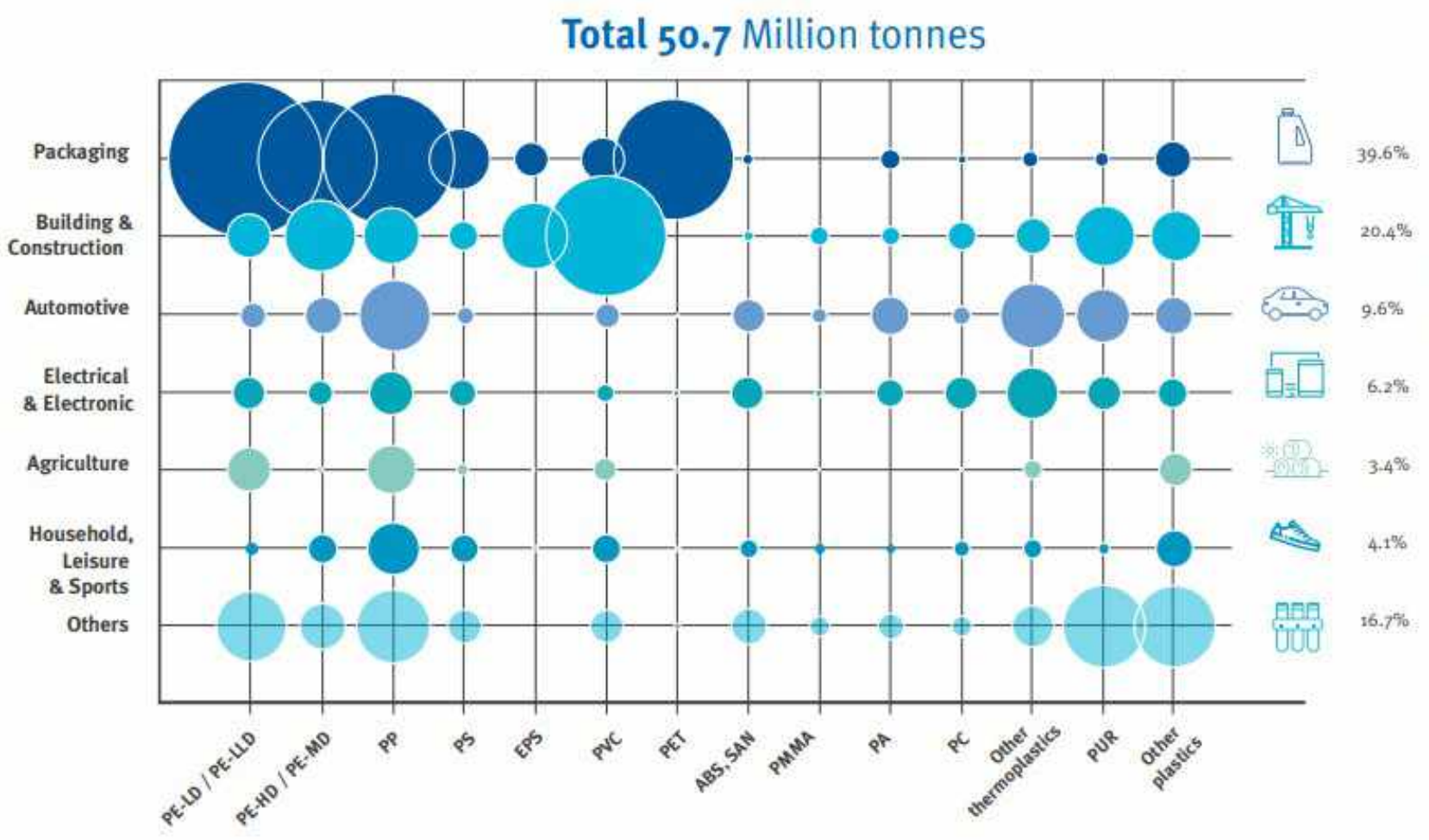
FOR WHAT
FOR WHOM



RECYCLING AN EFFORTFUL TASK

Less than 20% of plastics are recycled in Europe !

ABS is a delicate case :very robust not designed to be recycled



The ABSolEU Consortium

The Consortium

The ABSolEU consortium that spans the entire ABS value chain, as it comprises 3 global – and iconic – brand owners, 2 RTOs, an ABS-producing company, a recycler, a traceability solutions company, a standardization institute and a company specialised in stakeholder engagement.

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GREDEG TEAM :

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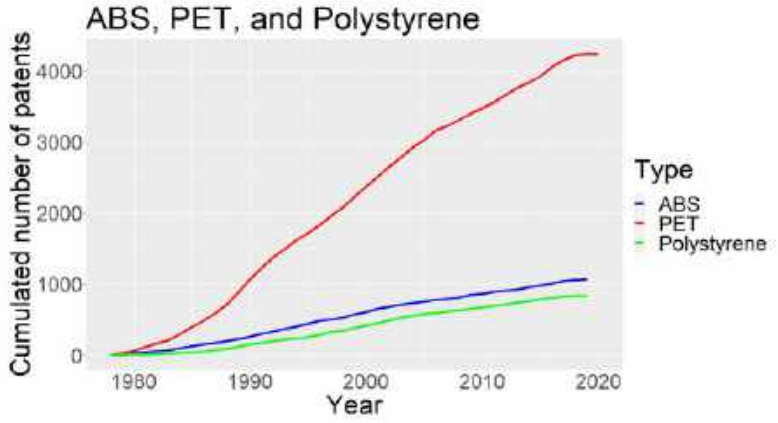
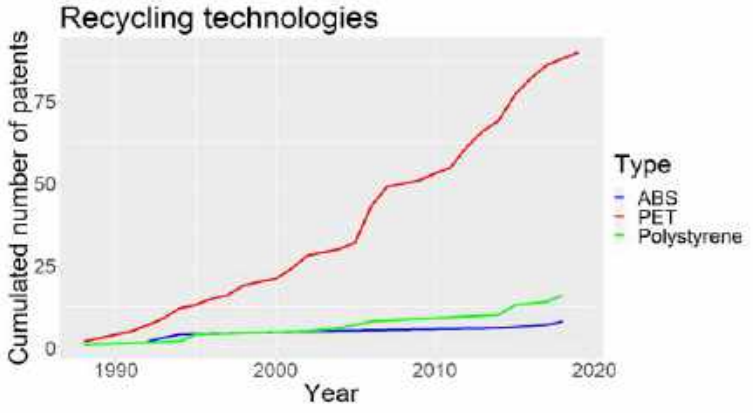
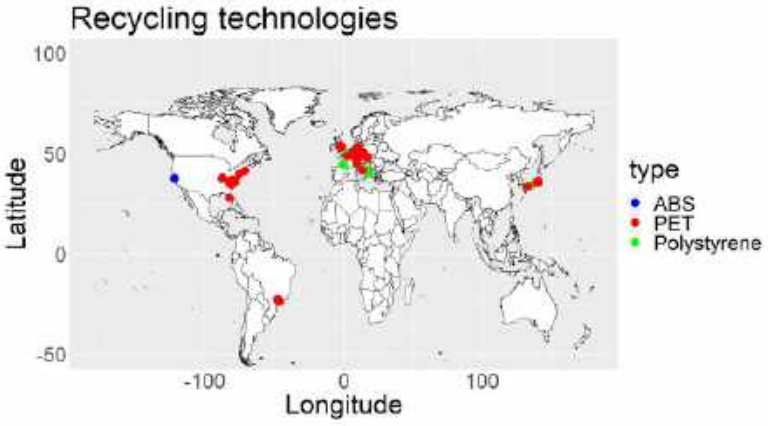
Task 1: State of the art on innovation related to rABS

Technological trajectories: ABS, PET and Polystyrene



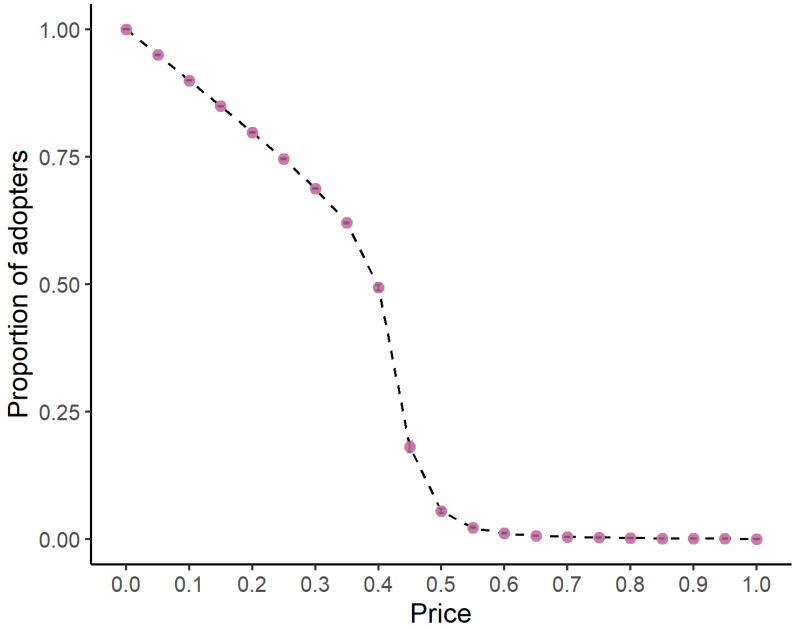




Top applicant	N. of Patents
ABS	
BAYER	159
ABS Recycling	
BAYER / others	1
PET	
GENERAL ELECTRIC	304
PET Recycling	
EASTMAN	7
Polystyrene	
BASF	111
Polystyrene Recycling	
BASF / POLYSTYVERT	2

The model of technological diffusion

- The Percolation model meaningfully describes innovation diffusion as it resides on the concept of *reservation price* 1
- Reservation prices are preferences, randomly distributed across potential adopters in a population for innovation in rABS
- Potential adopters are embedded in a social information network
- Like in physics or epidemiology diffusion of innovation is characterised by a *phase transition* with *critical threshold* values of key parameters
- This *threshold* plays the role of SOCIAL TIPPING POINT.



1) Zeppini, P., & Frenken, K. (2018). Networks, percolation, and consumer demand. *Journal of Artificial Societies and Social Simulation*, *21*(3).

The new model

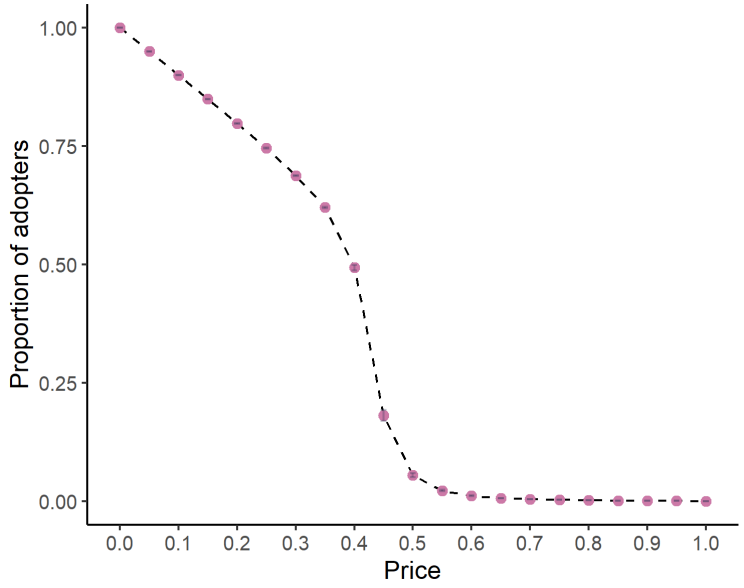
The socio-economic system of ABSolEU involves at least *three dimensions*

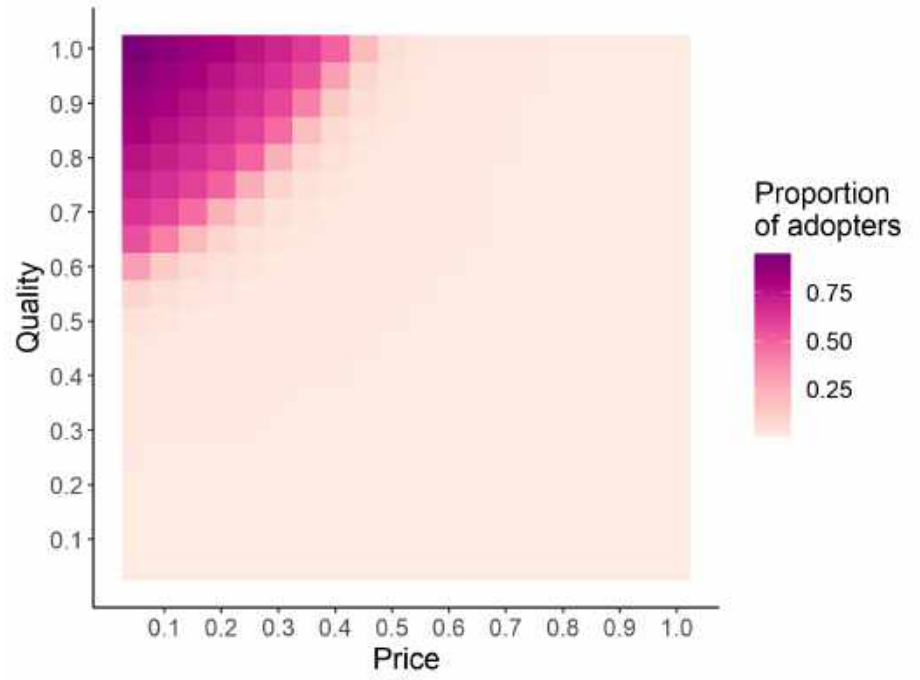
- Price
- Technical quality
- Environmental quality

We then extend the model to…

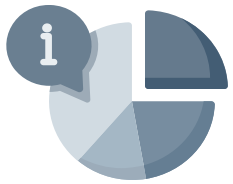
- ***Multi-dimensional percolation***

- E.g. the interplay of price and a quality measure gives a *critical boundary* in a two-dimensional space



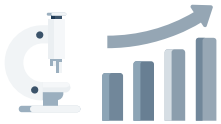


Task Modeling innovation diffusion for rABS (UCA)



Competition between different technologies of rABS

Model 1

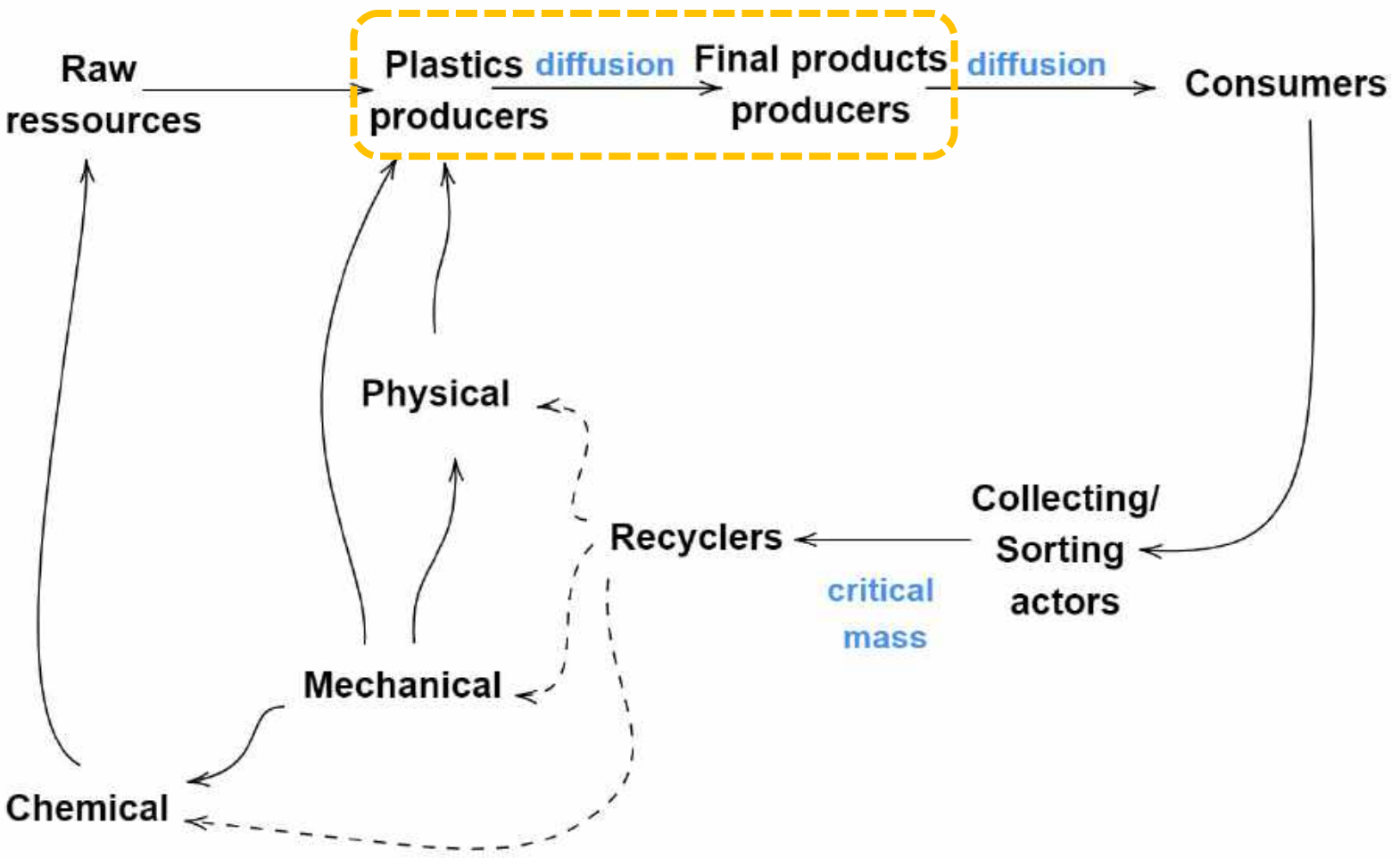


Learning/Technological progress

Additional dimensions:
Technical quality and environmental quality

Model 2

rABS diffusion modelling



Simulations results on model 1

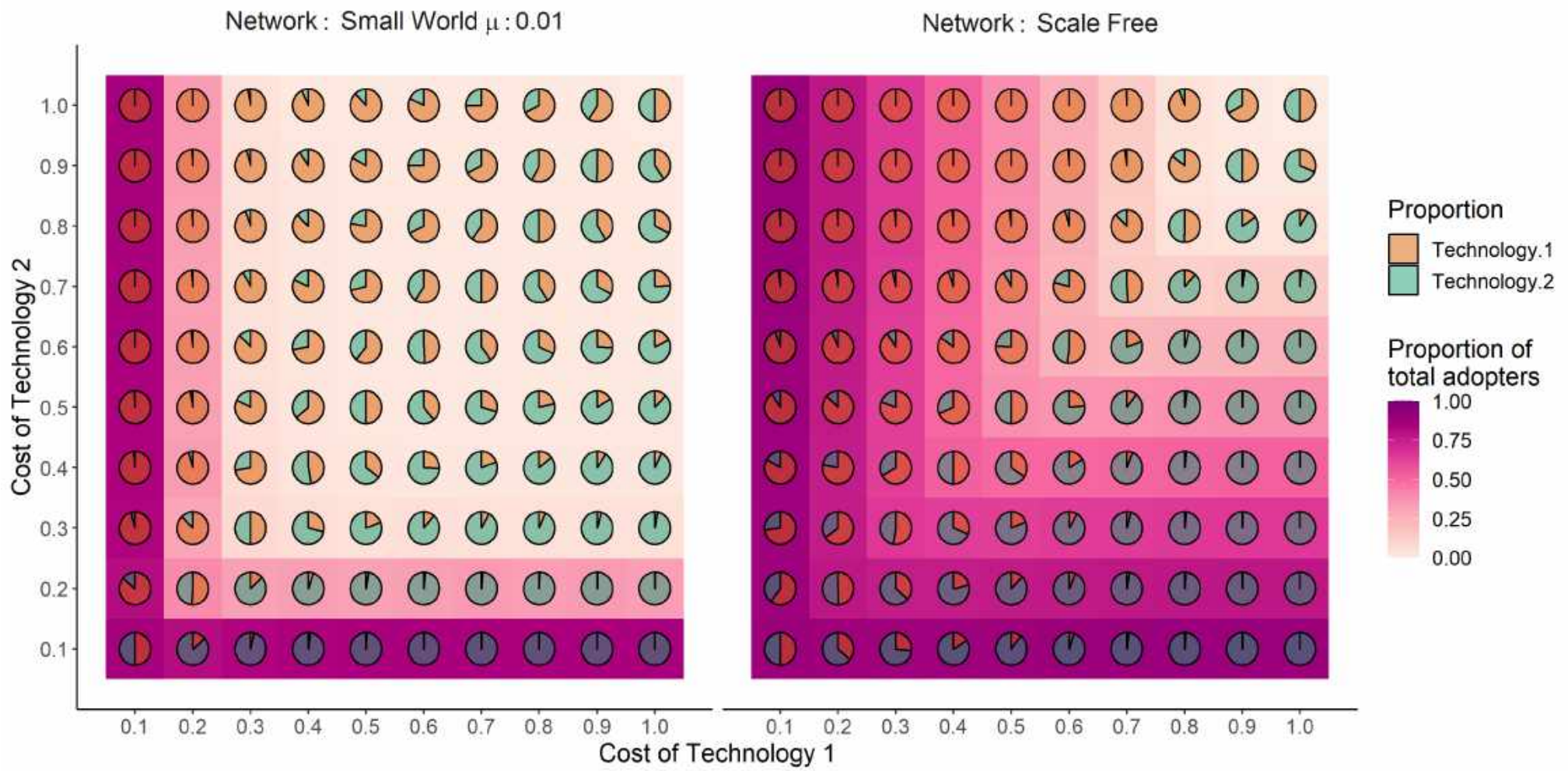


Figure: Average proportion of total adopters (pink color shade) and average proportion of adopters of each of the two technologies (pie charts), obtained over 100 replications for each parameters' combination in Small World network (μ = 0.01) and in Scale Free network, with 10000 nodes, average connectivity 4, and 10 seeds for each technology.

Simulations results

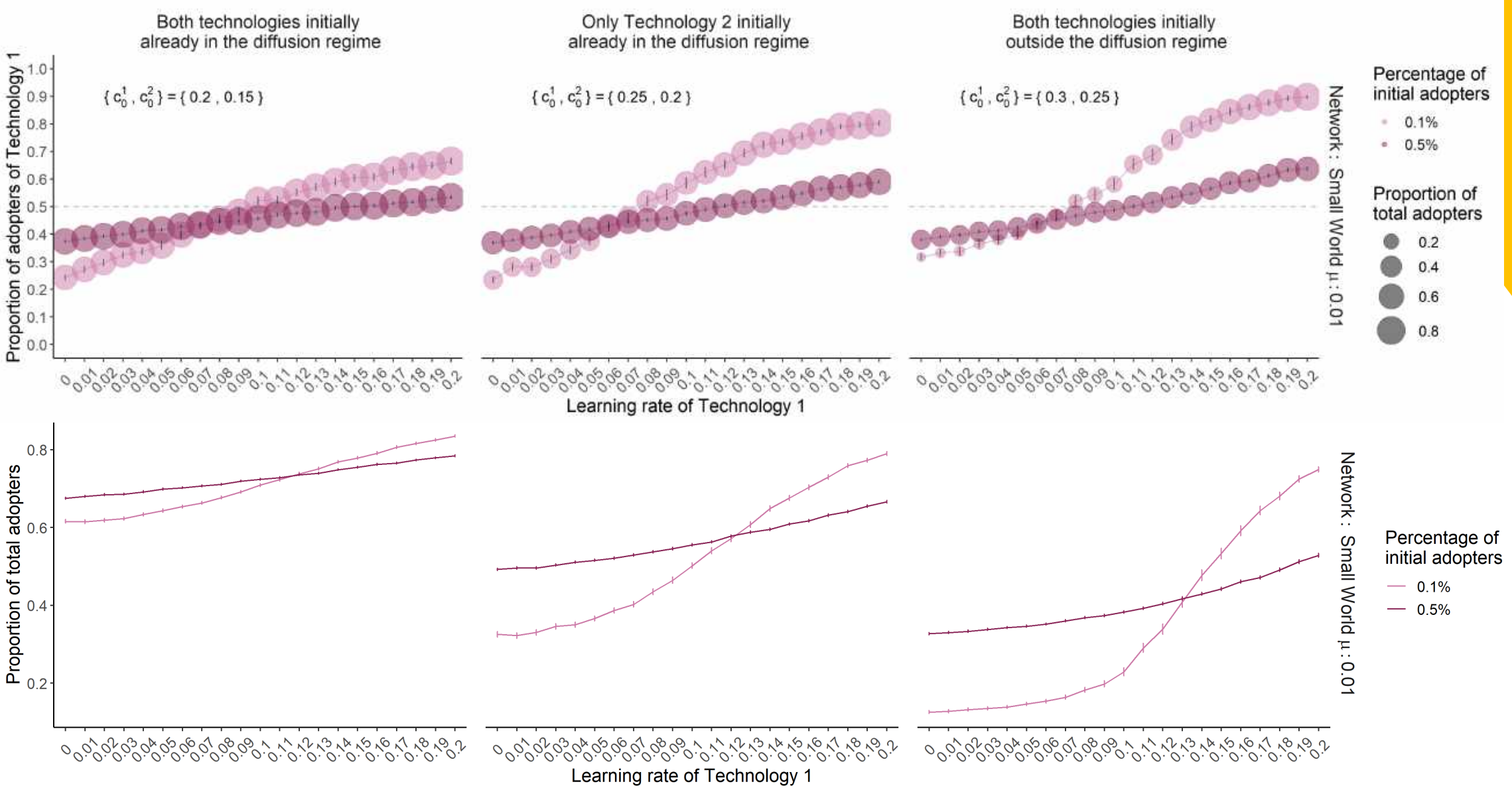


Figure: Effect of both learning and the rate of initial adopters on diffusion size and market shares in Small World network (μ = 0.01), with 10000 nodes and average connectivity 4. The estimates are obtained over 500 replications for each parameters' combination.

Simulations results

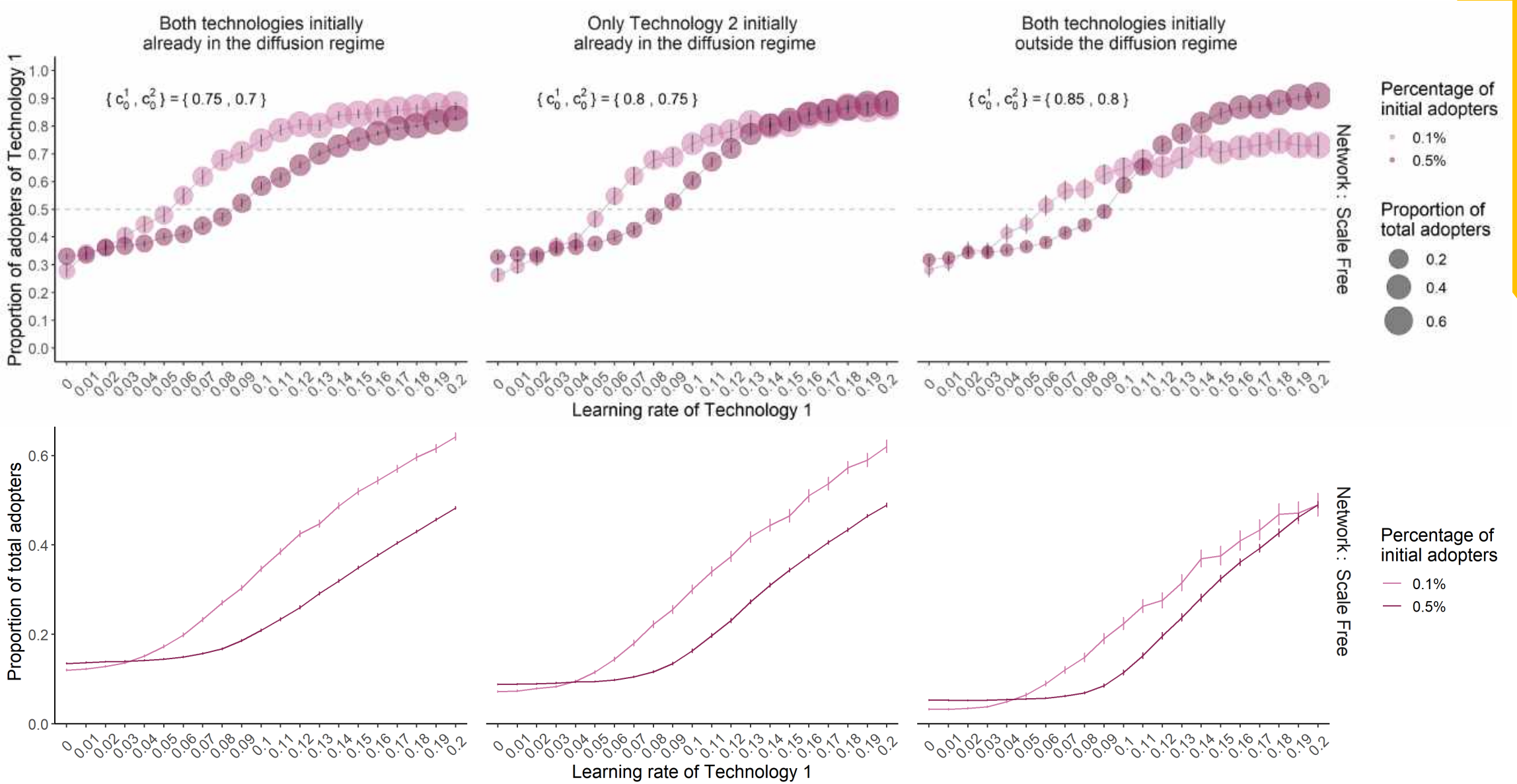


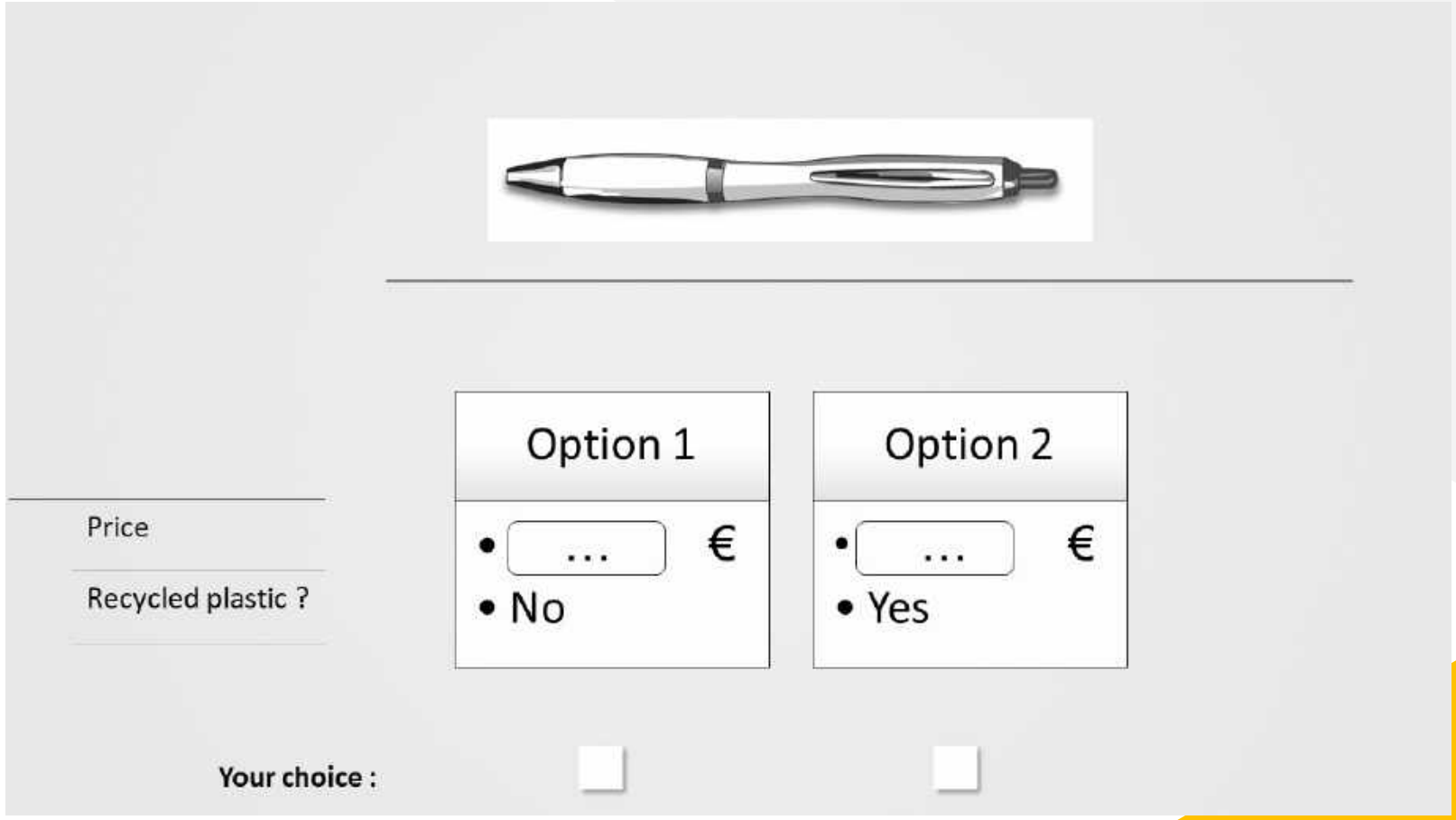
Figure: Effect of both learning and the rate of initial adopters on diffusion size and market shares in Scale Free network, with 10000 nodes and average connectivity 4. The estimates are obtained over 500 replications for each parameters' combination.

Investigating consumer acceptance with framing effects

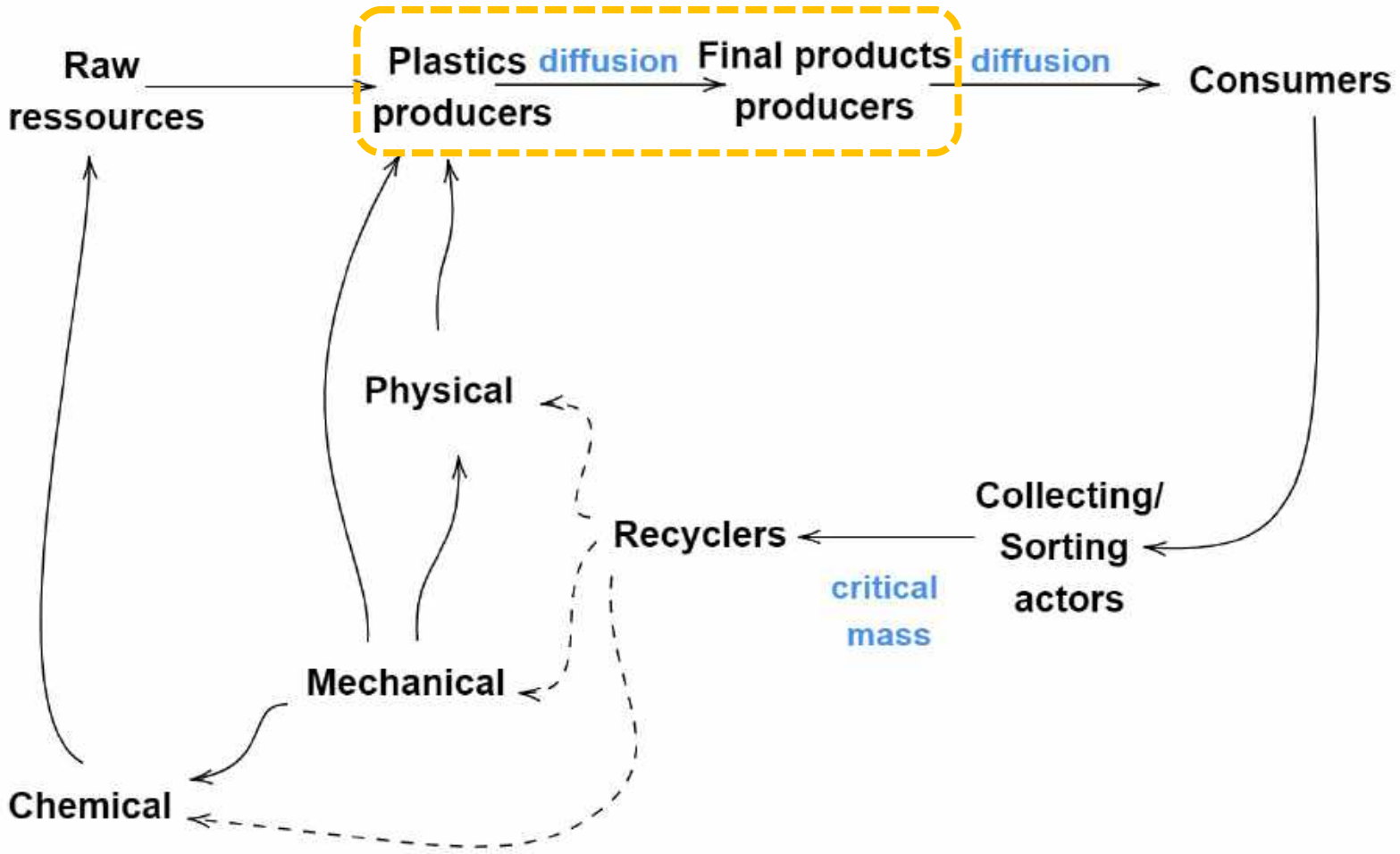
- **The experimental design :**
  - Initial endowment with an amount of money (30 €) that can be used to buy one of the products
  - A short instructions video describing the different types of plastics
  - **Real choices ABS**, mechanically recycled
    - Pen, Computer mouse, Usb key, Toys, Electrical power strip
  - **Real choices non-ABS**, mechanically recycled
    - Drinking cup, Bottle, Pen case, Blanket, Electrical power strip
  - A short instructions video describing the difference between mechanical and physical recycling
  - Hypothetical choices about innovative trajectories in rABS (physical recycling technology)
    - Toys, Computer, Car, Coffee machine, Lunch box, Toothbrush
  - A series of questionnaires
    - Demographics
    - Environmental profile (NEP scale)
    - Other questions

Task 2Investigating consumer acceptance with framing effects

- **The experimental interface:**
  - Real choices:



The big picture of rABS diffusion modelling



Investigating consumer acceptance with framing effects

- **The experimental interface:**
  - Hypothetical choices: