Innovation: Integrating micro and macro data

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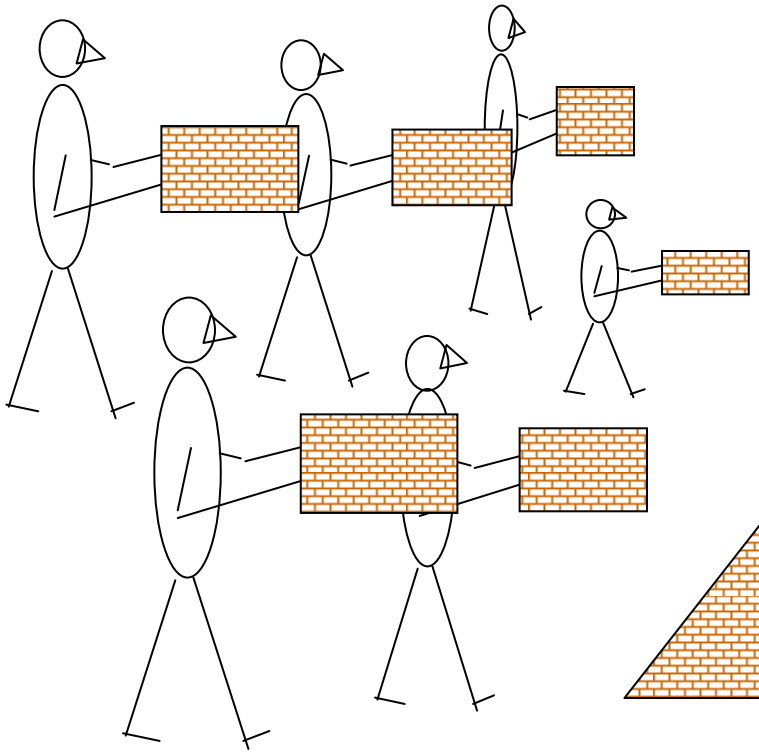
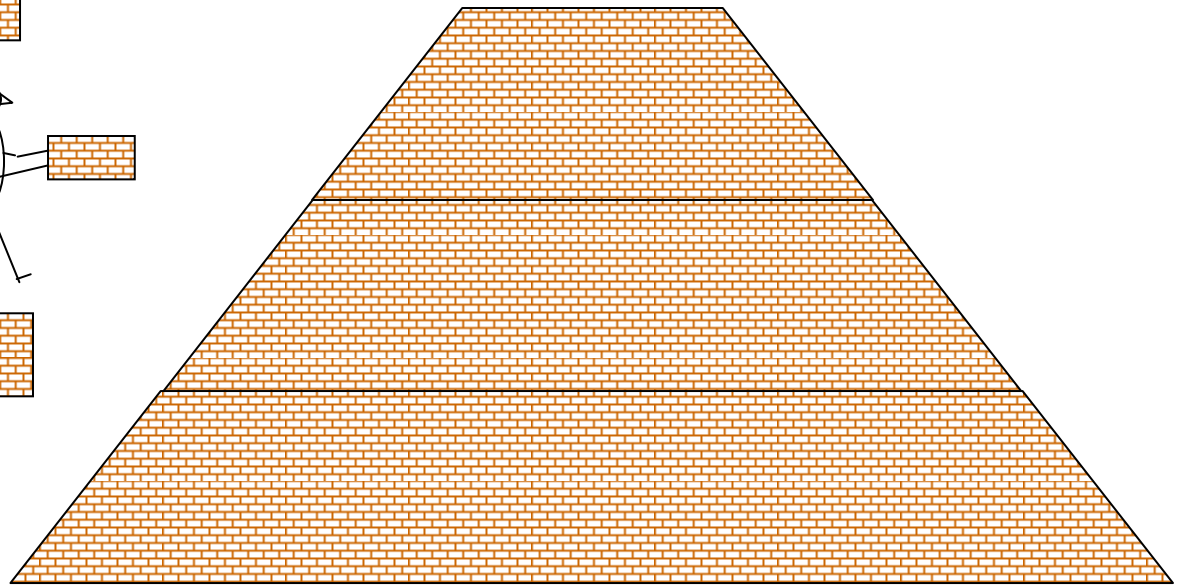
Optimal Innovation





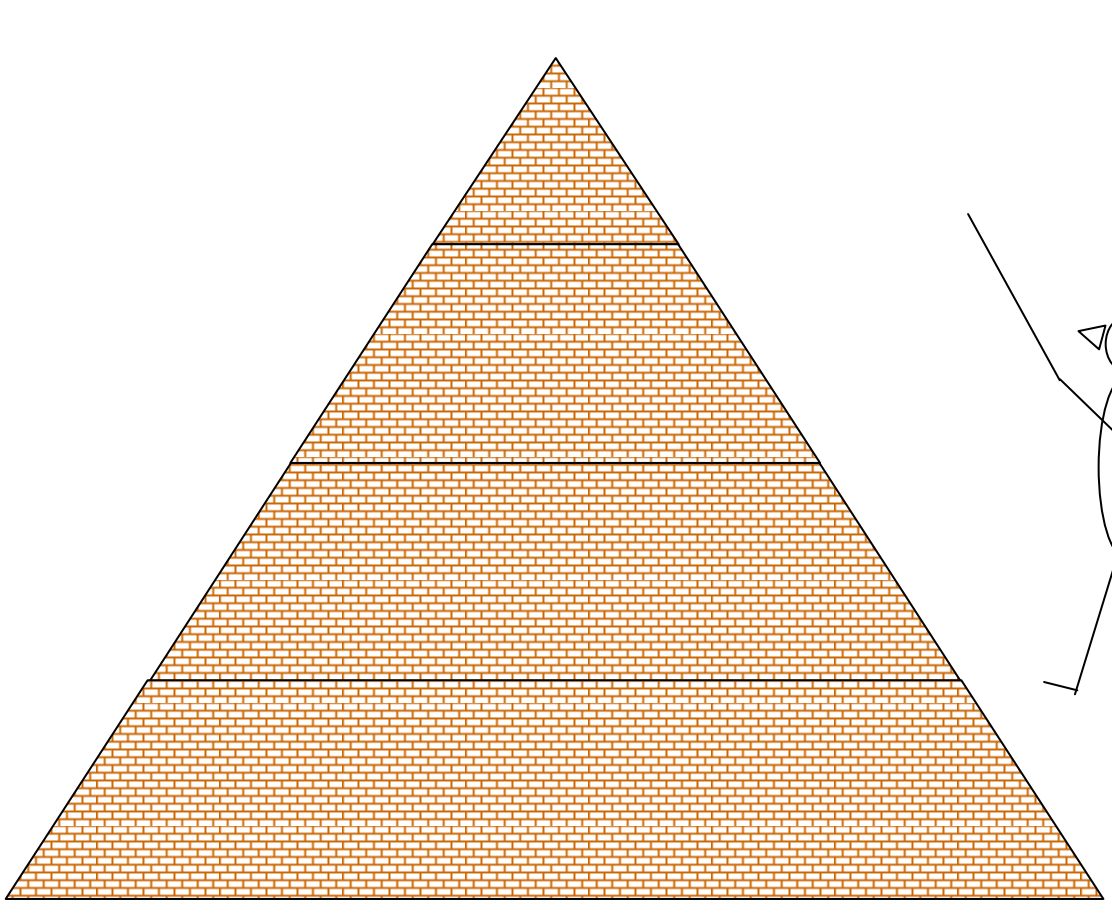
Main Questions

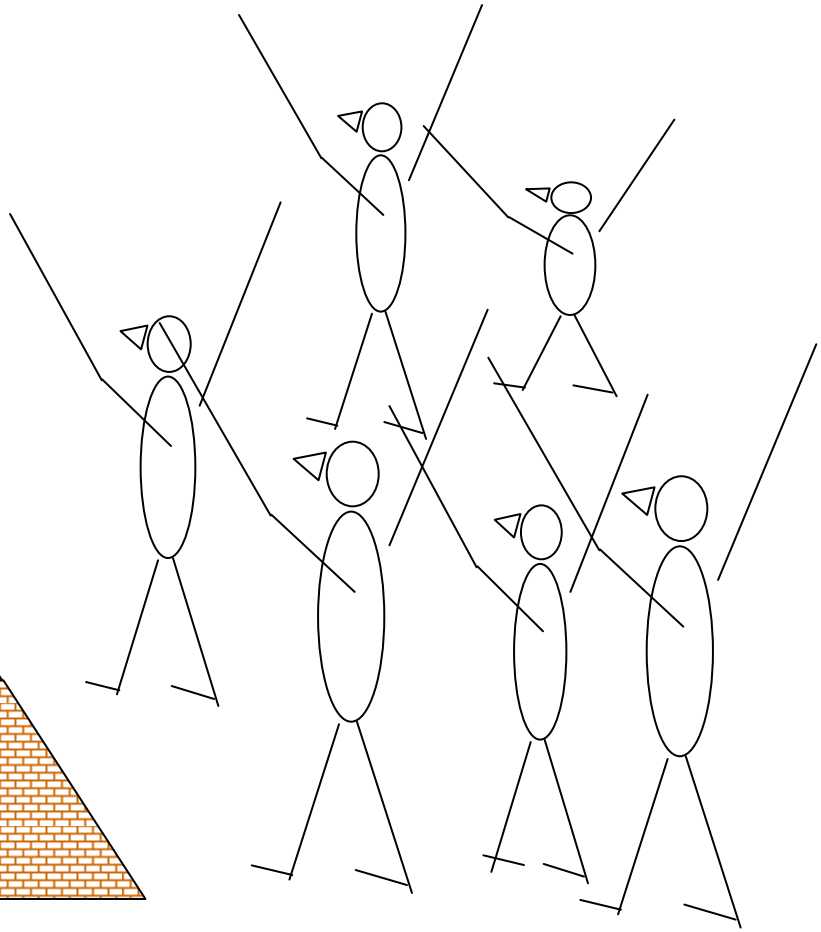
- How much *should* be spent, on aggregate, on innovative activities?
- Can policy be used to steer innovative activity (both in quantity and direction) closer to optimum?
- How can actors, at any level, make appropriate decisions concerning their supply, or use of, innovations?

Evolutionary modelling

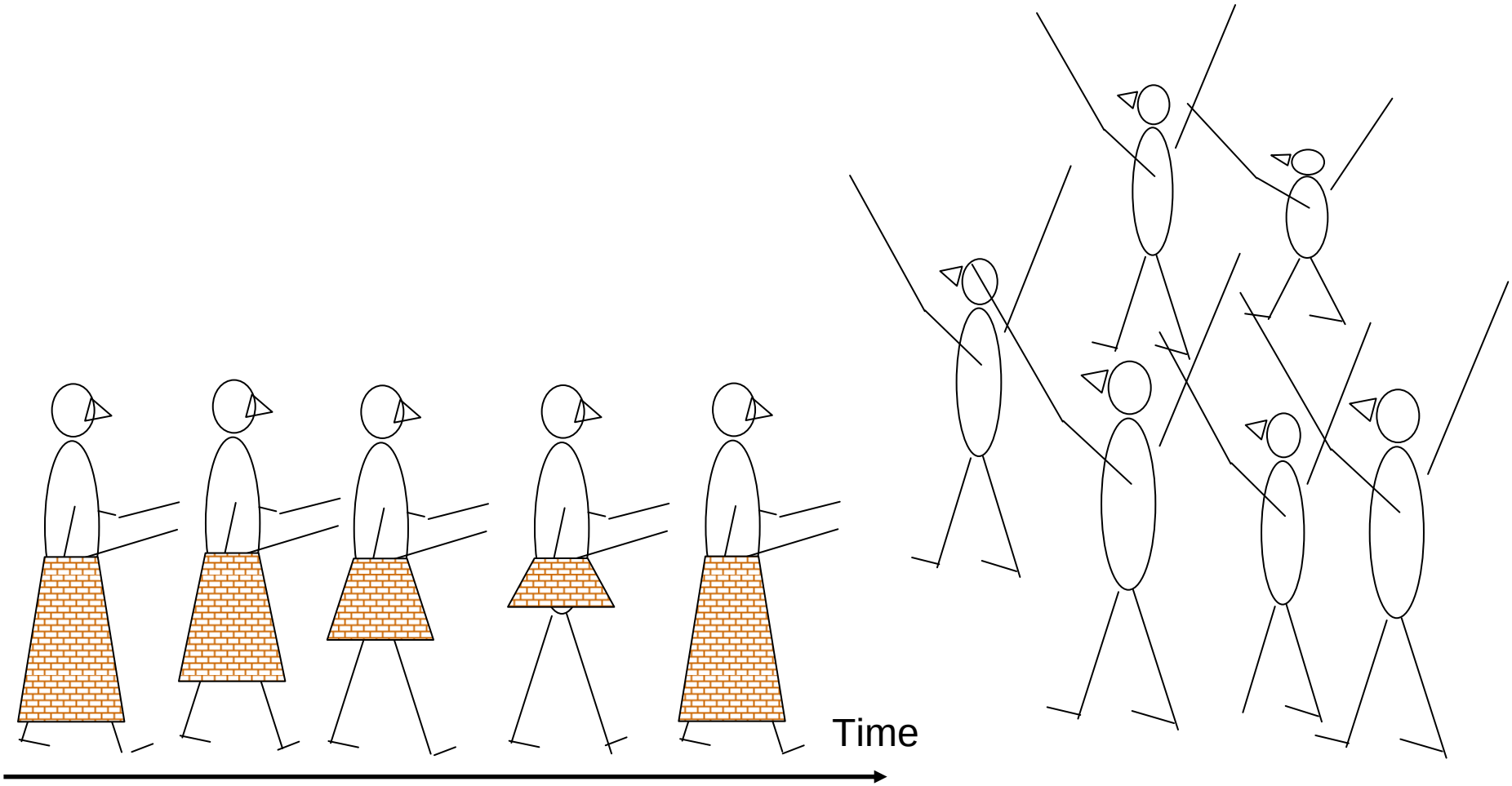
- Idea of creation of diversity (supply) and selection (demand) to model innovation is quite useful.
- However, two problems:
  - Outcome of evolutionary process has no ‘value’, no mechanism to decide whether we need to intervence in process, and how.
  - Creation side has ‘forethought’ (*Prometheus*). Feedback from envisioned future outcome matters (‘General Equilibrium’, Animal Spirits)

Optimal Innovation





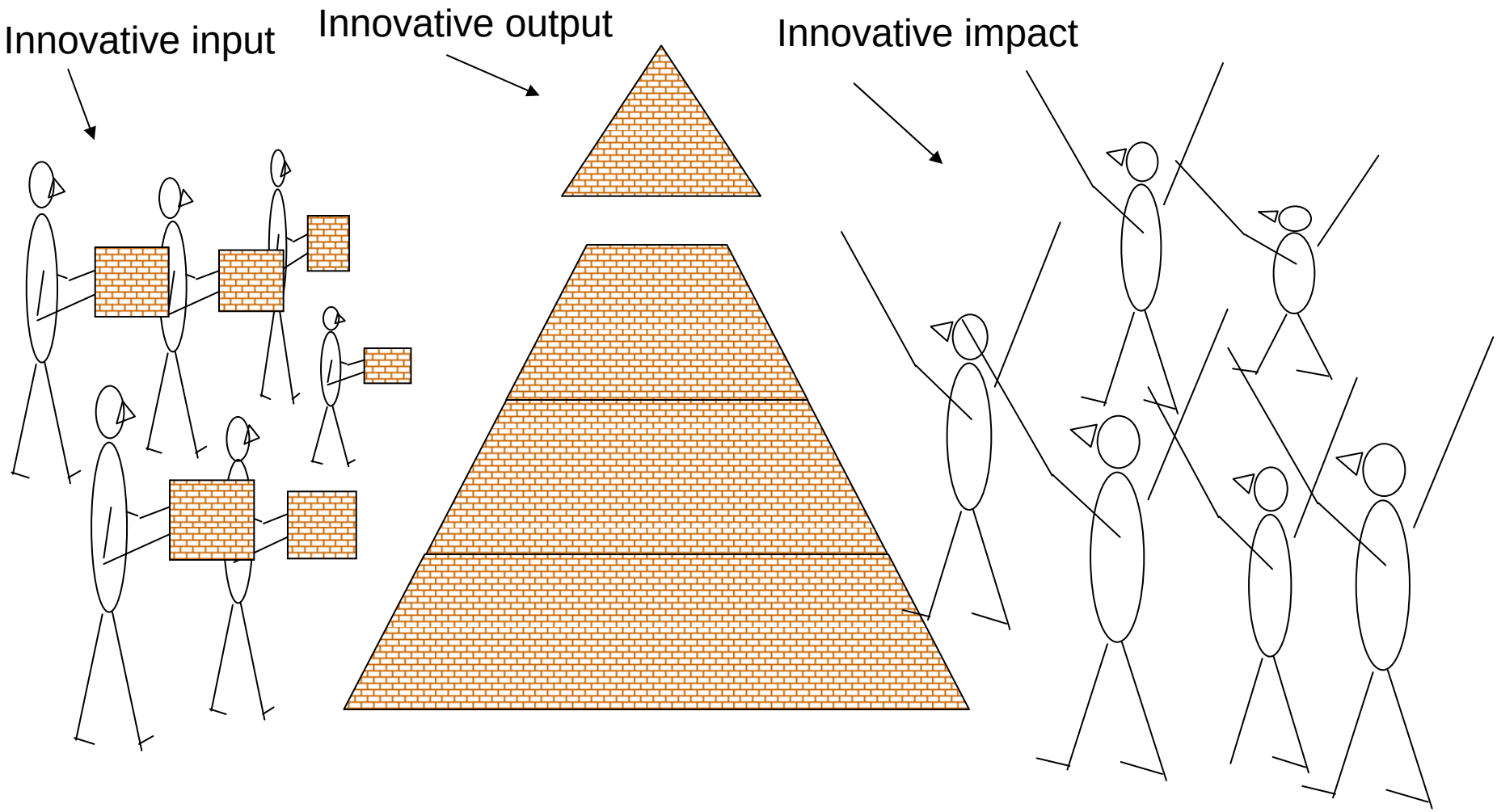
Innovations and taste



Too much of a good thing?

- Slippage between individual incentives and aggregate needs
  - Spillovers
  - Stepping on toes
  - Business Stealing
- Non-transitivity
  - New, in cycles….
- Network externalities
  - Spillovers on demand side, learning/demonstration effects
- Path Dependent traps
  - How to get rid of the internal combustion engine

Innovative Activity, Knowledge Growth and Impact (CDM Model)

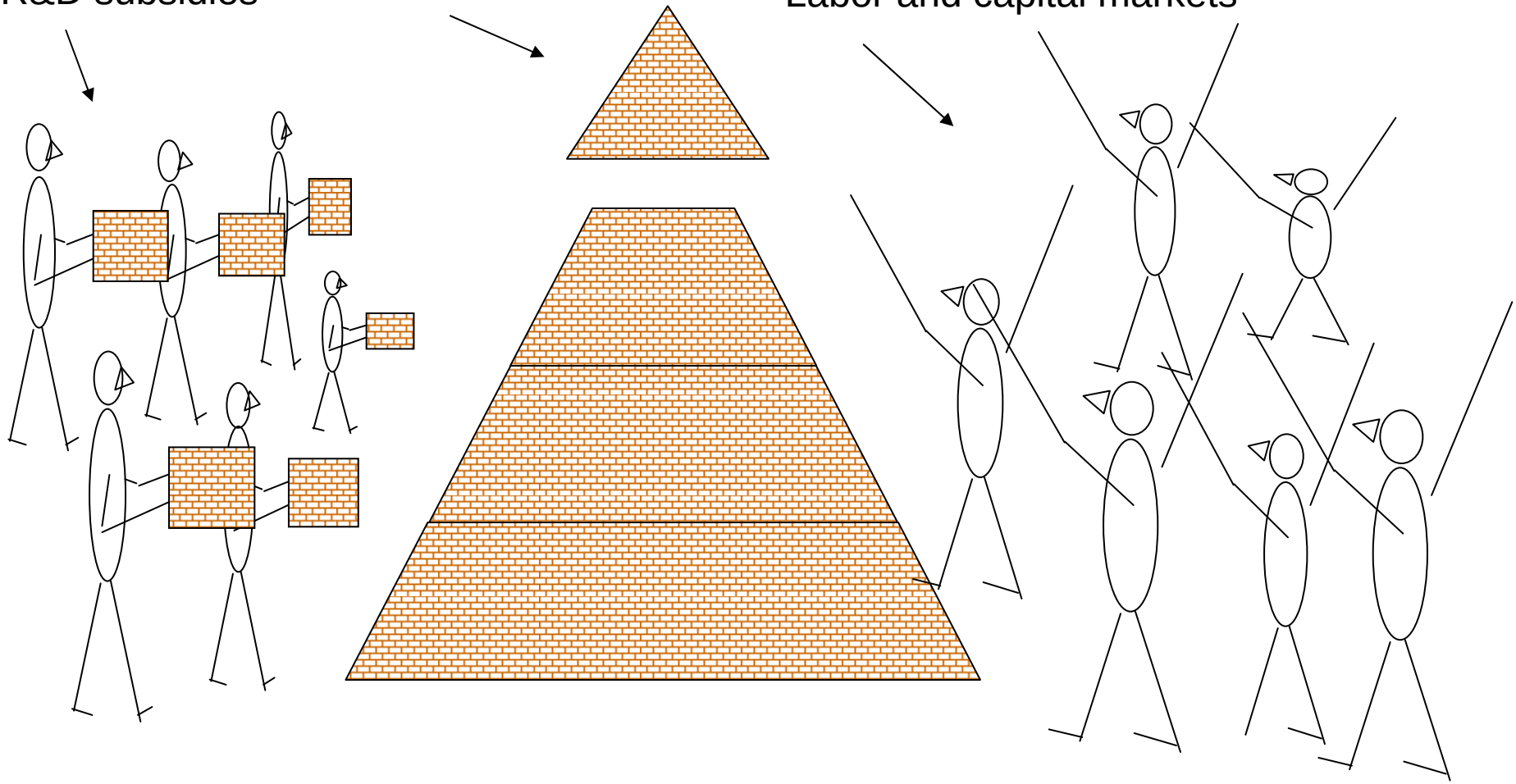


Policy levers in CDM

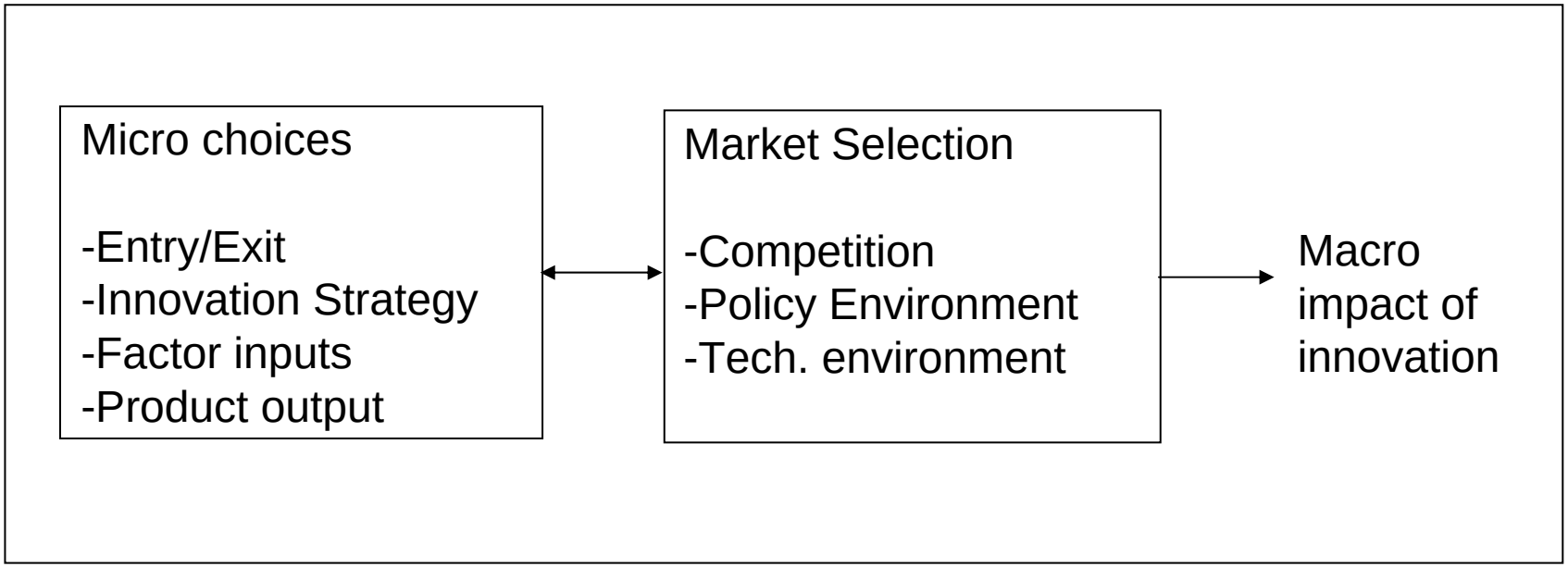
Human capital formation
R&D subsidies

Spillover, diffusion
Adoptive capacity

Labor and capital markets



Micro to macro



Innovation and Market Interaction

$S_i \in \{N, E, C\}$

conditional on C:

$y_i = F(A_i, X_i),$ where $i \in C$

$\Delta A_i = G(I_i, A_i, \bar{A})$

$I_i = H(Z_i)$

and aggregate productivity

$$\bar{A} = \sum_{i \in C} A_i + \sum_{i \in C} (\phi_i - \bar{\phi})(A_i - \bar{A})$$

Innovation data: micro through macro

- Discover incentives, at decision making level, of incentives of supply and use of innovative output.
  - Look at costs and benefits. Take into account expections (General Eq. effects)
  - Look at interactions between actors
- Process of knowledge accumulation
  - Depreciation, obsolescence
  - Spillovers, diffusion, appropriability, non-rivalness
  - Individual vs global knowledge stock
- Impact of knowledge stock on output/welfare
    - Non-transitivity of ‘newness’
    - Costs of churn