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Urbanization and Property Rights

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Outline

1. Motivation
2. Stylized facts
3. Previous literature and approach
4. The setting
5. Simulations
6. Conclusion

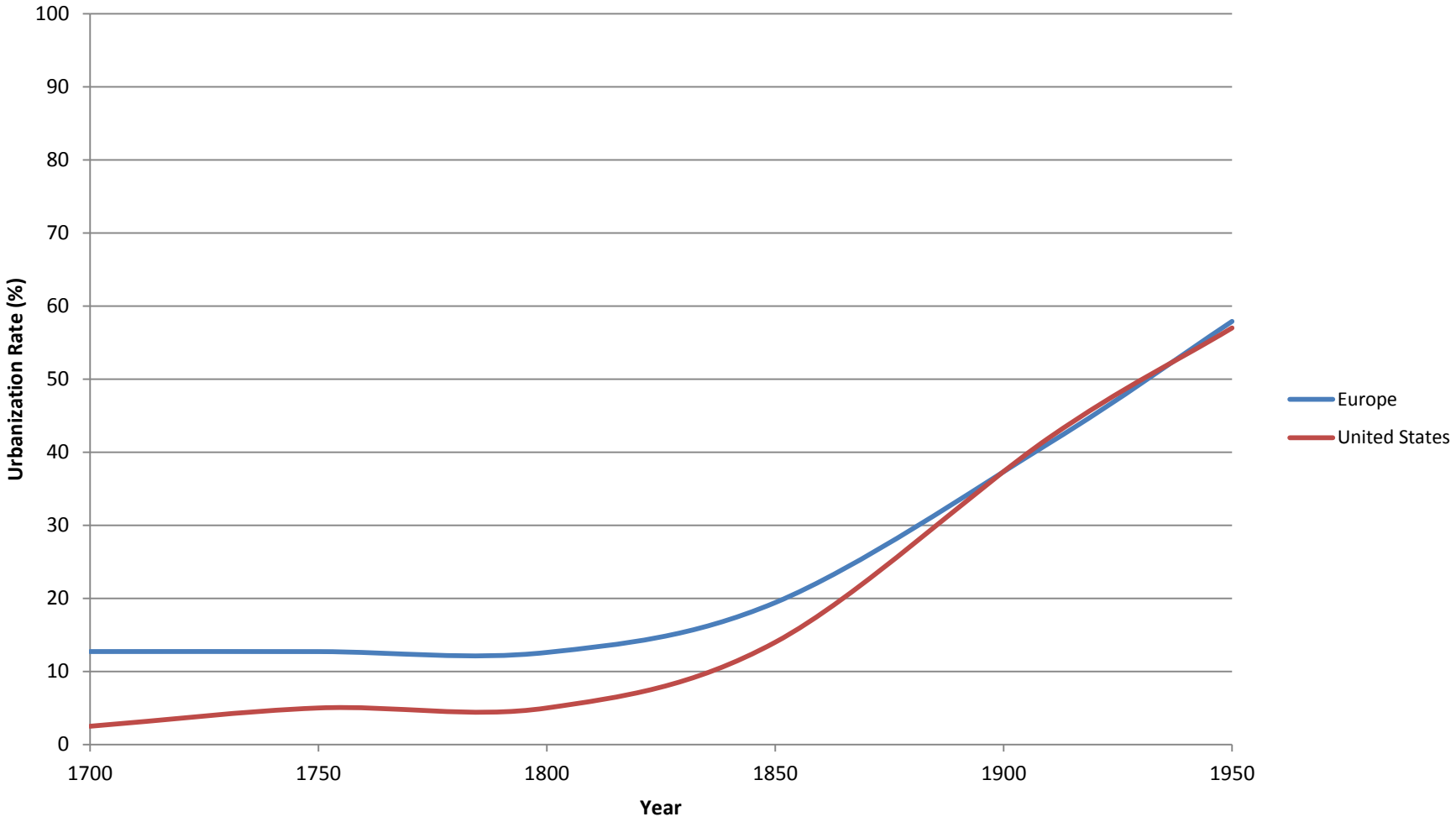
1. Motivation

- Many cities grow informally
  - Long time needed to build property right system
  - Unaffordability of formal land and housing
  - Urbanization without wealth generation (or sharing)
- Policy challenge
  - Pace of urbanization meets poor planning capacity
  - Formalization followed by influx of informal residents
- Questions
  - Is informality a transitory phenomenon that will be resorbed with economic development? Or a persistent feature of urbanization?
  - Long-term impact of policies in dynamic context?

2. Stylized facts

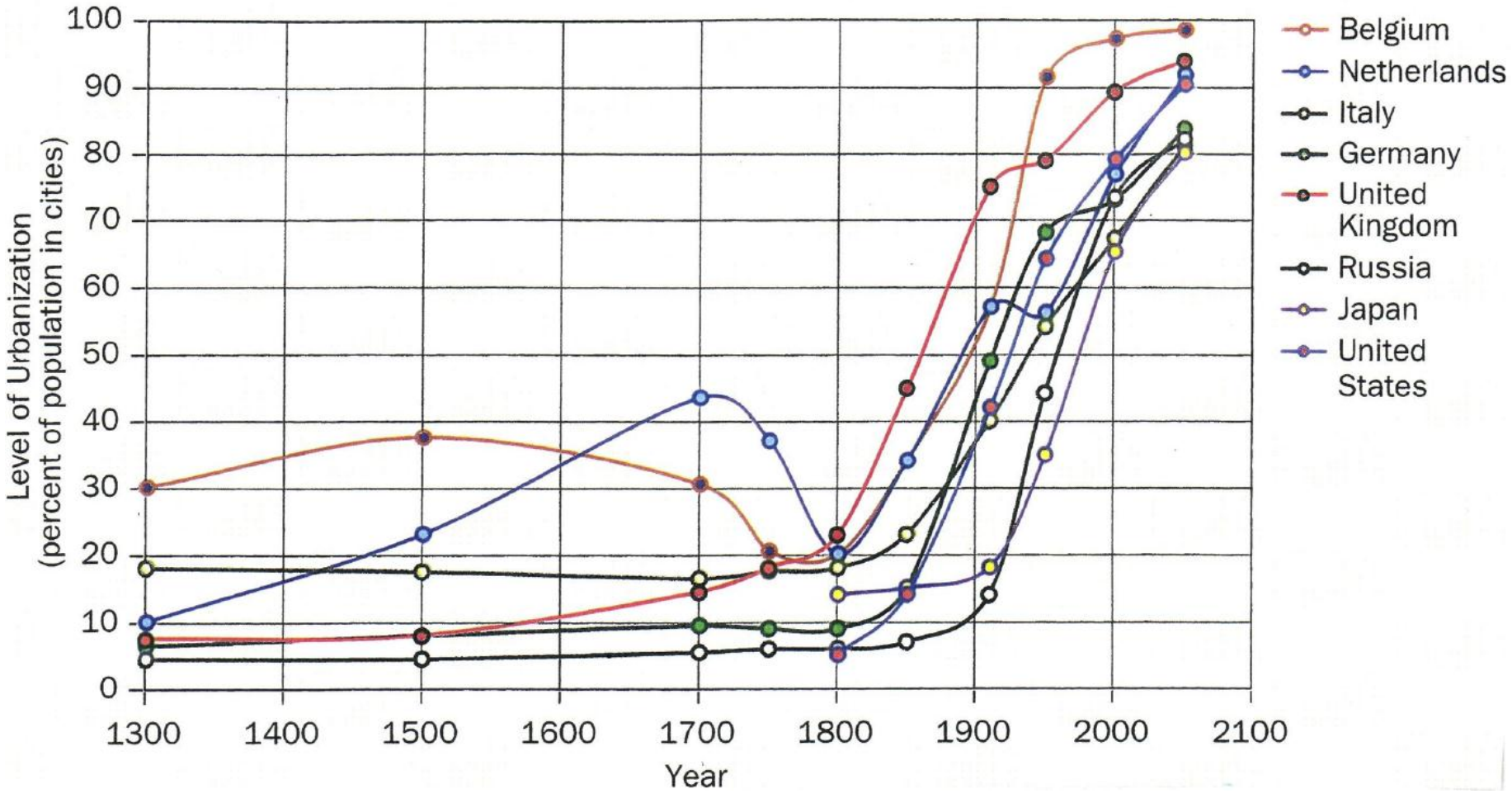
- On urbanization

Urbanization Rates (%) for Industrial Europe and the U.S. (1700-1950)



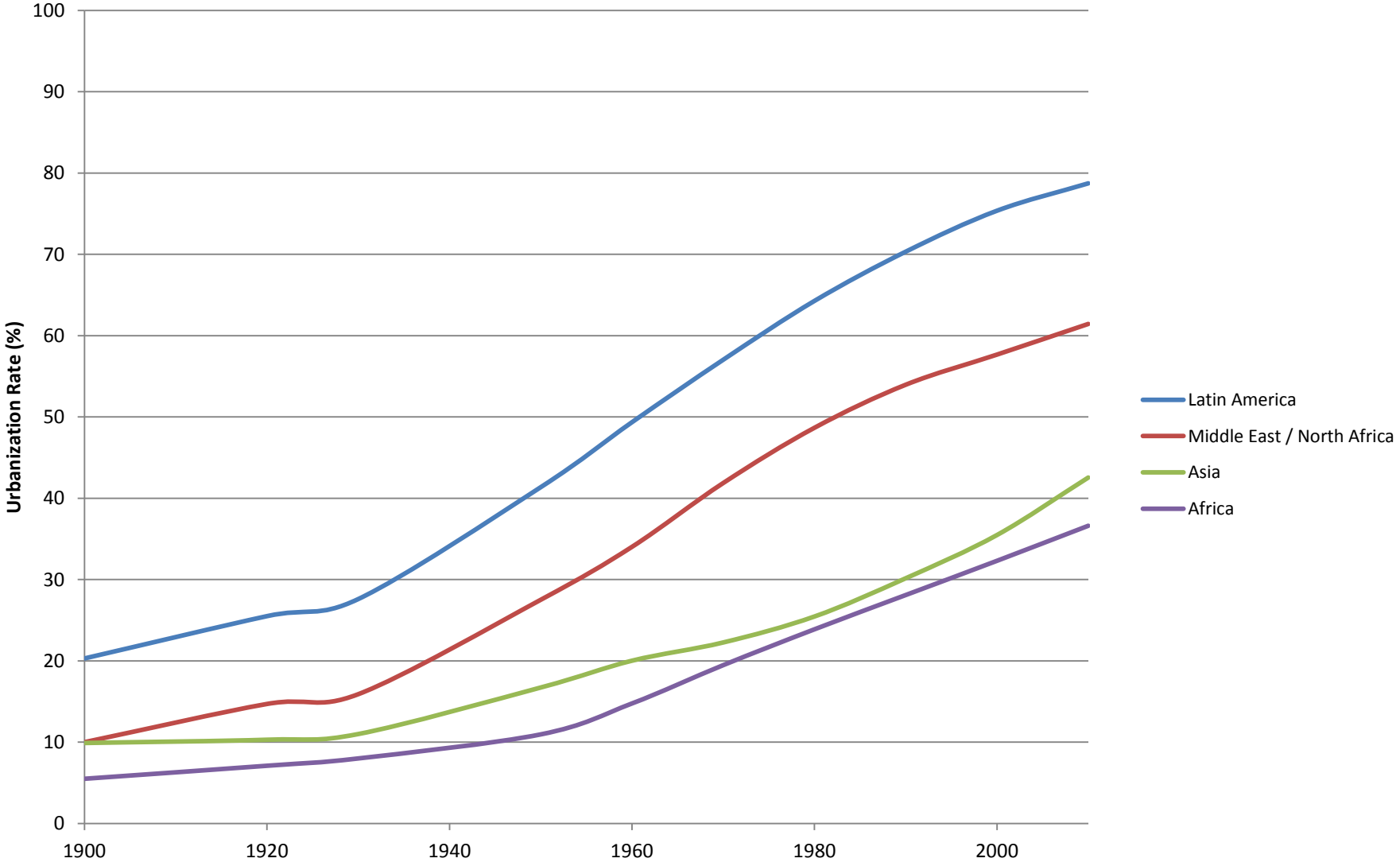
Source: Jedwab, R., L. Christiaensen and M. Gindelsky (2014, working paper) "Demography, Urbanization and Development: Rural Push, Urban Pull and… Urban Push?", Figure 1, page 27.

Urbanization Trajectories in Eight Countries, 1300–2050



Source: Reproduced from Shlomo Angel (2013), Planet of Cities, Figure 7.1, page 98.

Urbanization Rates (%) for the Developing World (1900-2010)



Source: Jedwab, R., L. Christiaensen and M. Gindelsky (2014, working paper) "Demography, Urbanization and Development: Rural Push, Urban Pull and… Urban Push?", Figure 1, page 27.

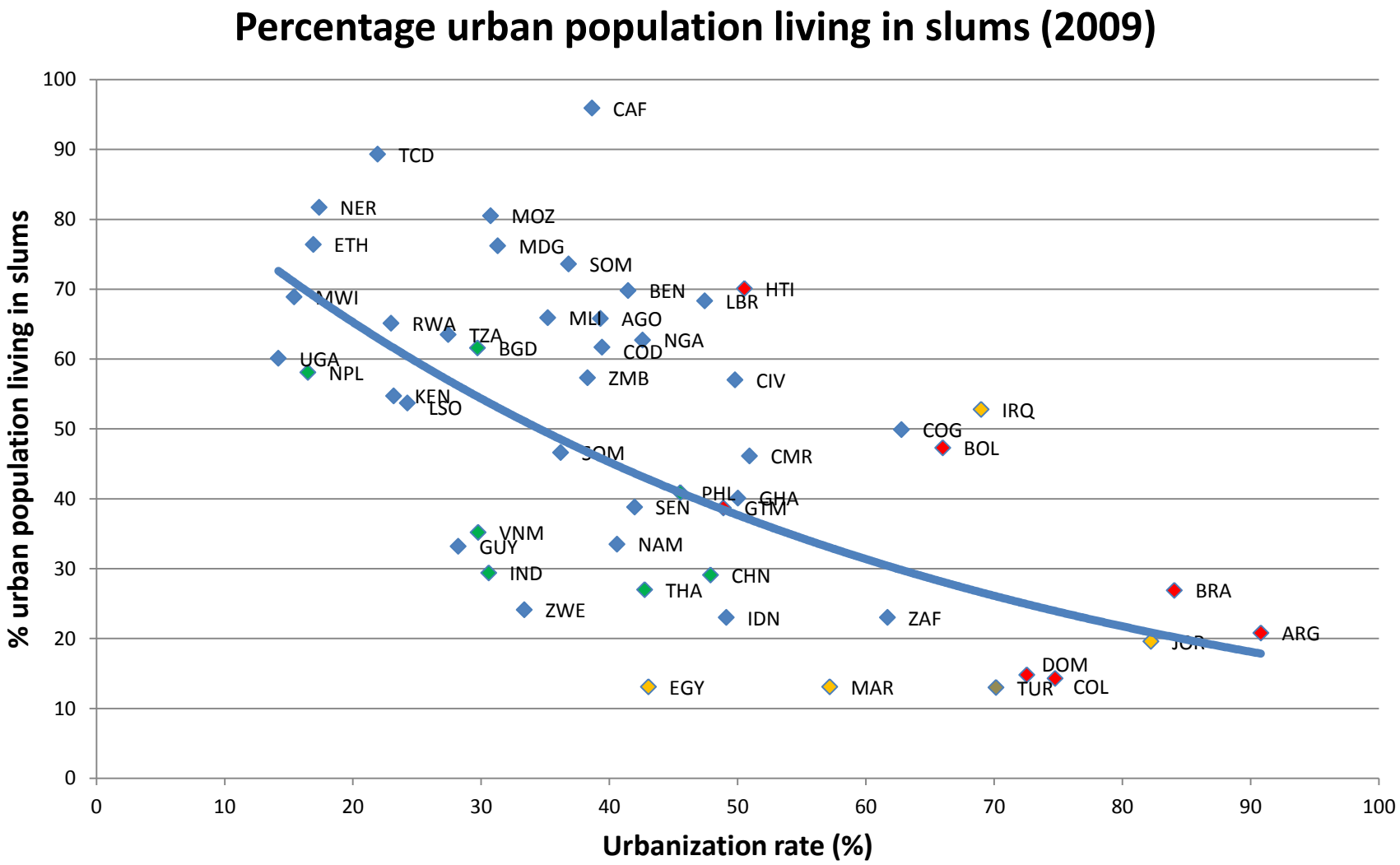
2. Stylized facts

- On property rights (and the building of land institutions)
  - Hindsight from industrialized countries
    - England
    - France and its cadaster
  - Data on property rights is scarce and inaccurate
    - City level data
      - UN-Habitat's Global Urban Observatory (squatters)
      - Global Policy Housing Indicators (registration of titles)
    - Country level data (MDG indicators)
      - Statistics on slums (tenure security criterion was removed but the indicator remains correlated with informality)

Estimated percent of all the properties in the greater municipality that have their title properly registered (%), 2012

City	% title properly registered
Abidjan, Cote d'Ivoire	70
Bishkek, Kyrgyzstan	60
Bogota, Colombia	87
Budapest, Hungary	90
Dar es Salaam, Tanzania	20
Dushanbe, Tajikistan	90
Jakarta, Indonesia	80
Kampala, Uganda	90
Kingston, Jamaica	89
Maputo, Mozambique	20
Recife, Brazil	77
Skopje, Macedonia	80
Yerevan, Armenia	96

Source: Global Housing Indicators (http://globalhousingindicators.org)



Source: World Bank (World Development Indicators) and United Nations (Millenium Development Goals Indicator 7.10)for 2009

3. Previous literature and approach

- Static models with formal and informal residents
  - Strategic interactions between owners and squatters (Turnbull 2008)
  - Coexistence between formal market and informal land use
    - Partial equilibrium with squatters (Jimenez 1984, 1985)
    - General equilibrium with squatters (Brueckner and Selod, 2009)
    - General equilibrium with diverse property rights conferring different levels of tenure security (Selod and Tobin, wp)
    - **These papers miss the path towards the equilibrium (!)**
- Our paper: first dynamic model
  - 3 ingredients: urbanization, migration selectivity, property rights
  - Dynamic setting: discrete-time dynamic stochastic game (infinite time, finite number of states and actions)
  - Simulations for dynamic optimization under uncertainty

4. The setting

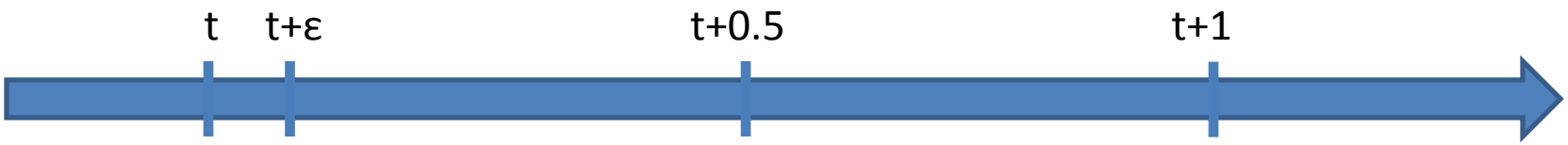
- The economy
  - Fixed number of individuals living forever (N=5 / quintiles): **1** **2** **3** **4** **5**
  - Distribution of abilities: **1** is less skilled
    5 is most skilled
  - Rural area
    - Fixed income (low, *not* a function of ability)
    - Fixed price of land (also low)

4. The setting

- Urban area
  - Both incomes and price of land are endogenous
  - Agglomeration effects
    - Individual incomes depend on own ability and efficient labor in the city (sum of all urban workers' abilities)
  - Congestion effects
    - Non-land congestion (convex function of population size)
    - Land congestion (land price is fraction of average urban income)
  - Net effect of agglomeration – congestion is akin to "net-wage curve" (see framework in Duranton, 2009)

4. The setting

- The timing of decisions and shocks
  - Period of several years (e.g. 10 years)
  - Individual states, decisions and random shocks:



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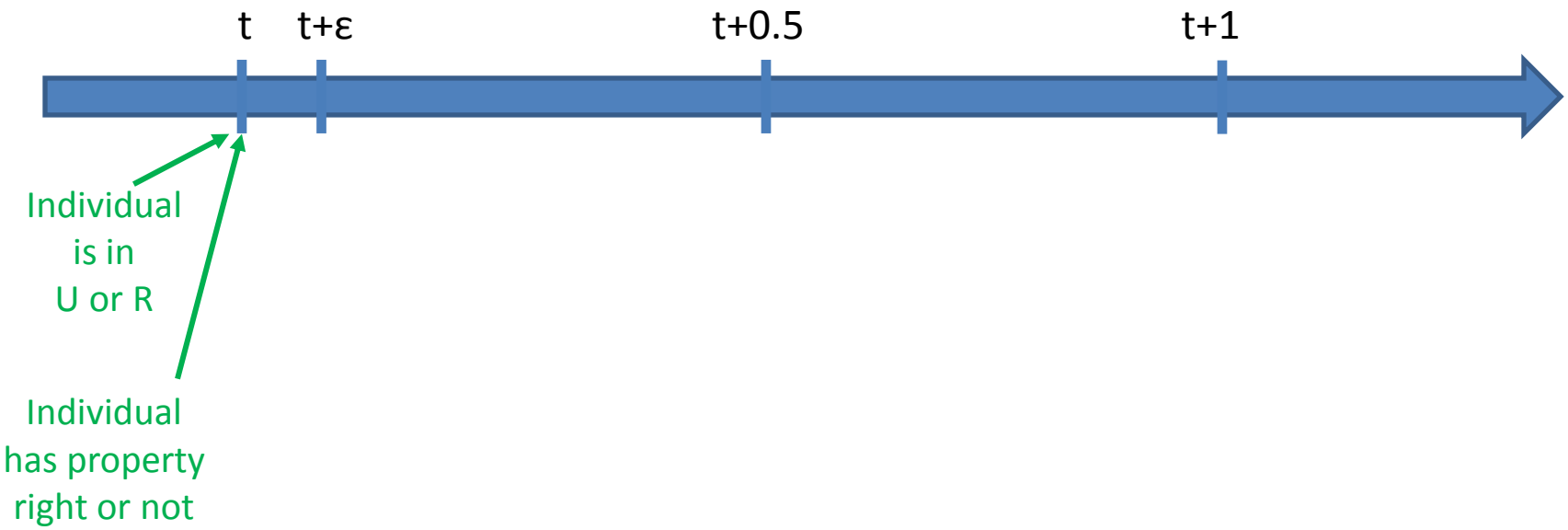

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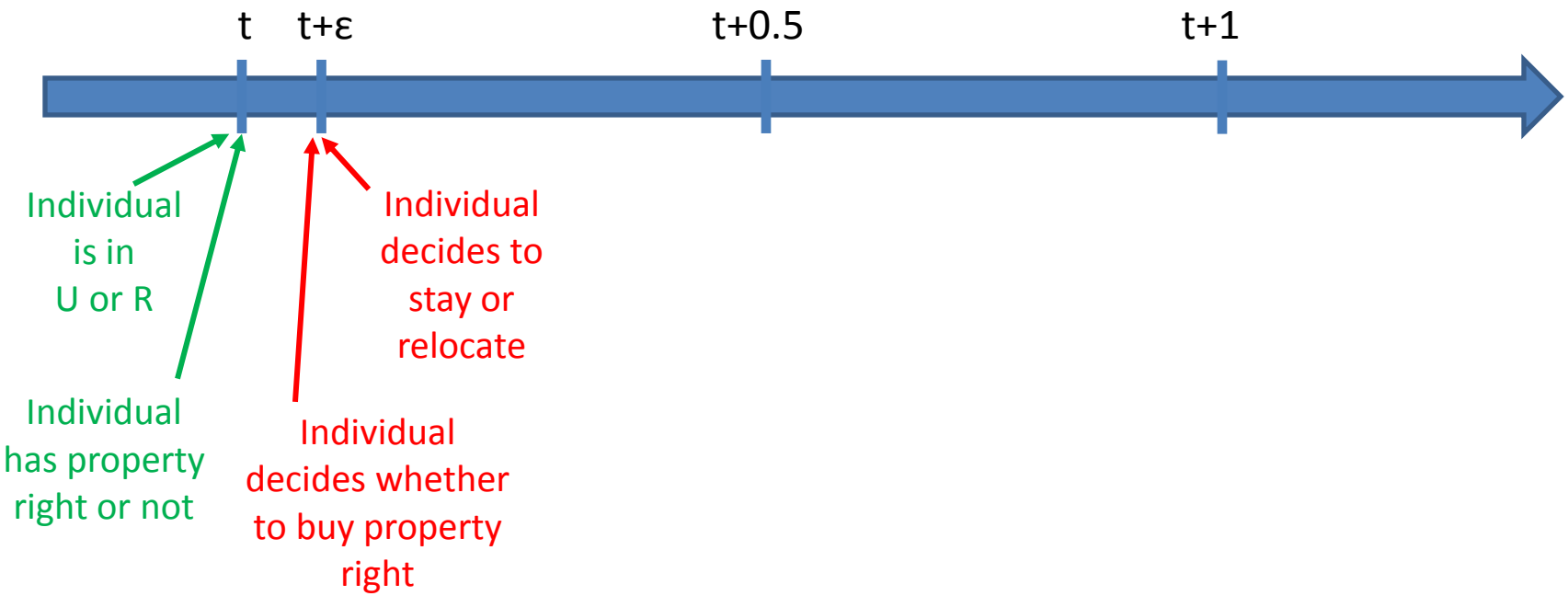

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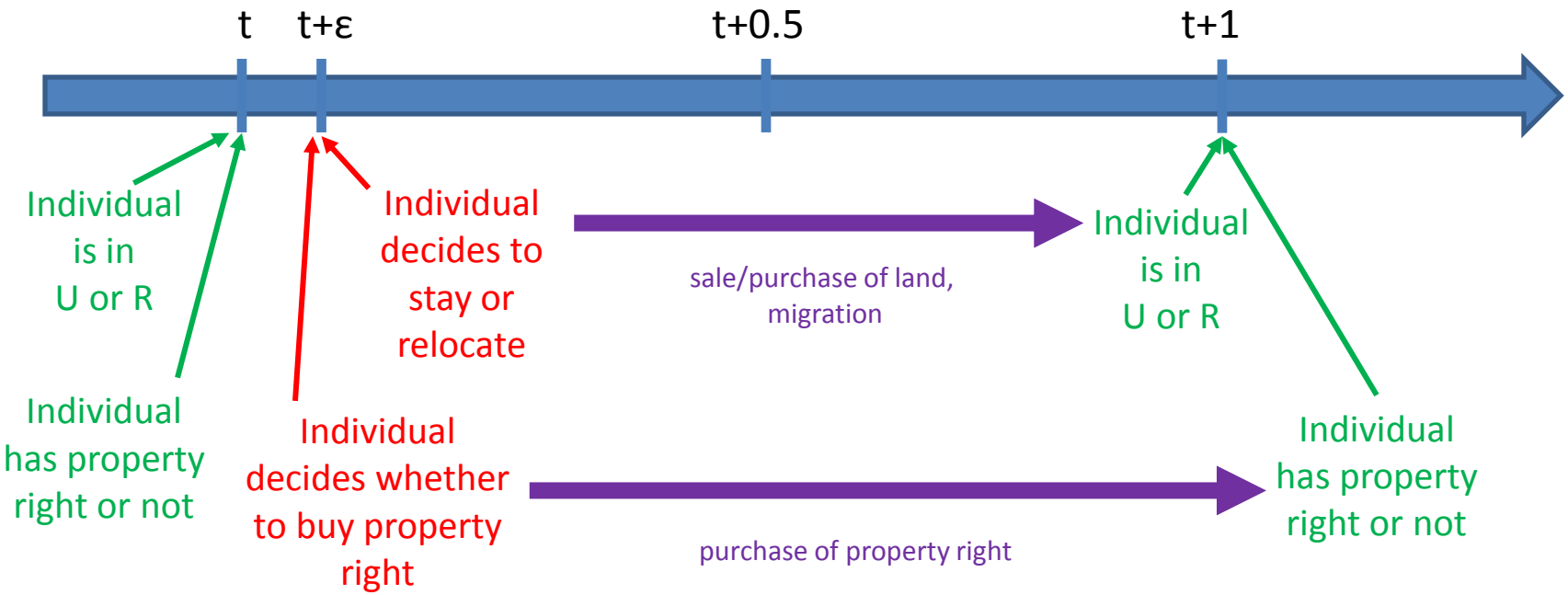

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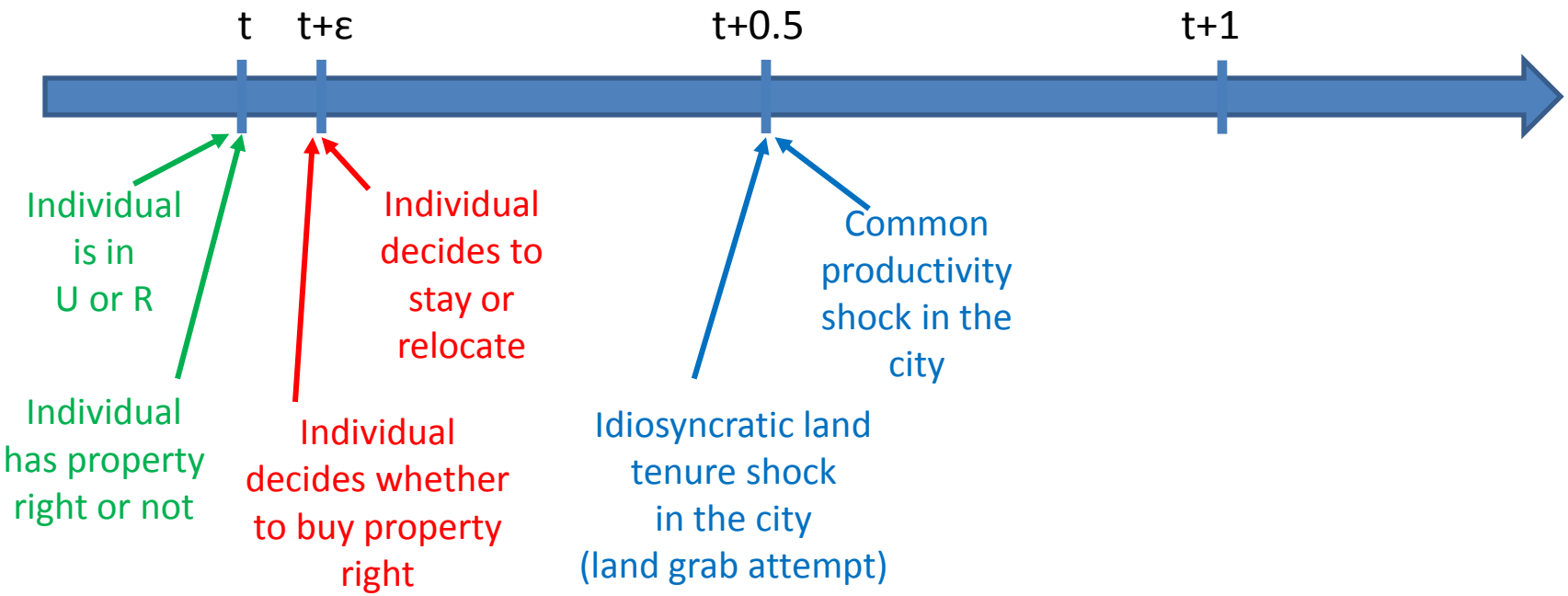

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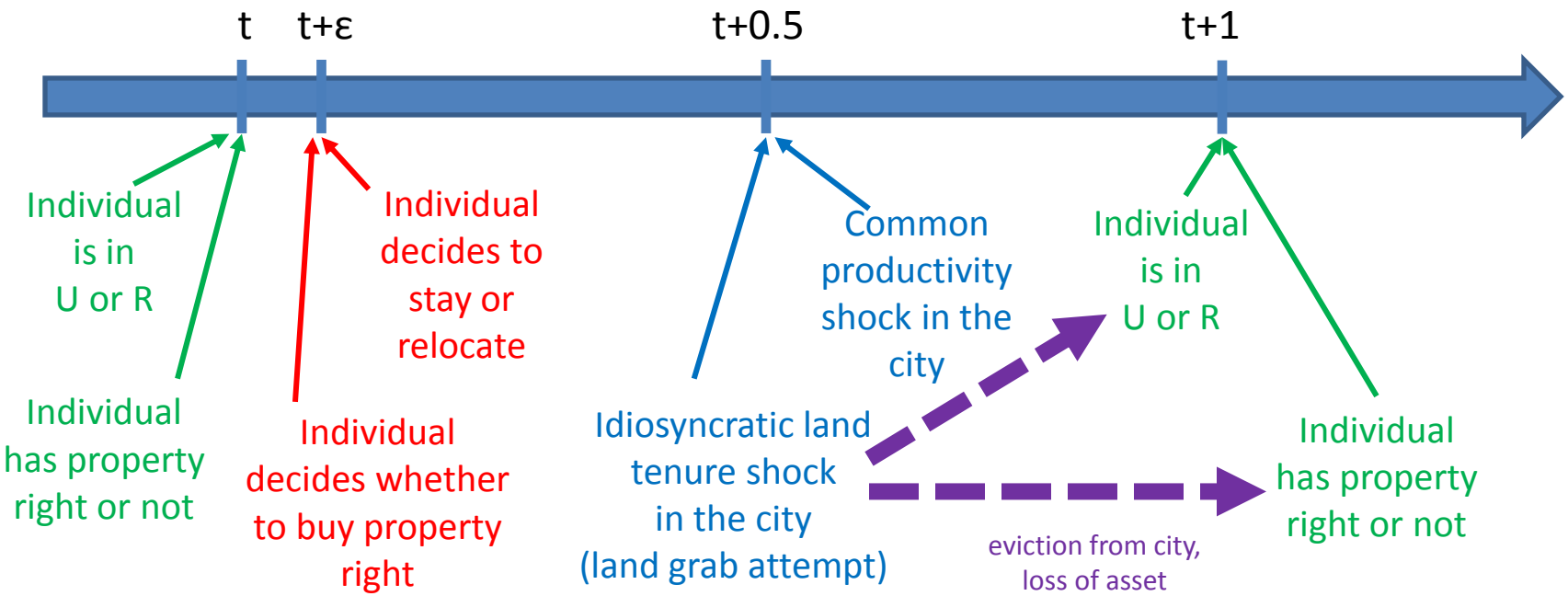


4. The setting

- Solving the model
  - Infinite horizon dynamic stochastic problem: we determine long run-equilibria (steady state(s) if any)
  - 2 types of solutions
    - Social planner solution
      - Maximizes the sum utilities
      - Conditional on agglomeration in one city only
    - Market solution(s) (focus only on Markov-perfect Nash equilibrium)
  - Transitions (urbanization dynamics) towards steady state(s) and the steady state(s)

5. Simulations

- Urbanization dynamics and steady state(s)
  - Base case scenario that illustrates
    - Migration patterns
    - Land tenure informality
  - Variations from base case
    - ↓ in land administration fee
    - ↓ in land tenure shock probability
    - ↓ in land admin. fee and tenure shock probability
- Notations
  - $\boxed{1}$: Mr 1 is in the rural area
  - $\boxed{1}$: Mr 1 is in the urban area without a property right
  - $\boxed{1}$: Mr 1 is in the rural area and holds a property right

Base case

Period	City	Rural area
1		1 2 3 4 5

Base case

Period	City	Rural area
1		1 2 3 4 5

5 and 4 decide to migrate to the city

5 and 4 do not purchase a property right

4 loses his plot of land

Base case

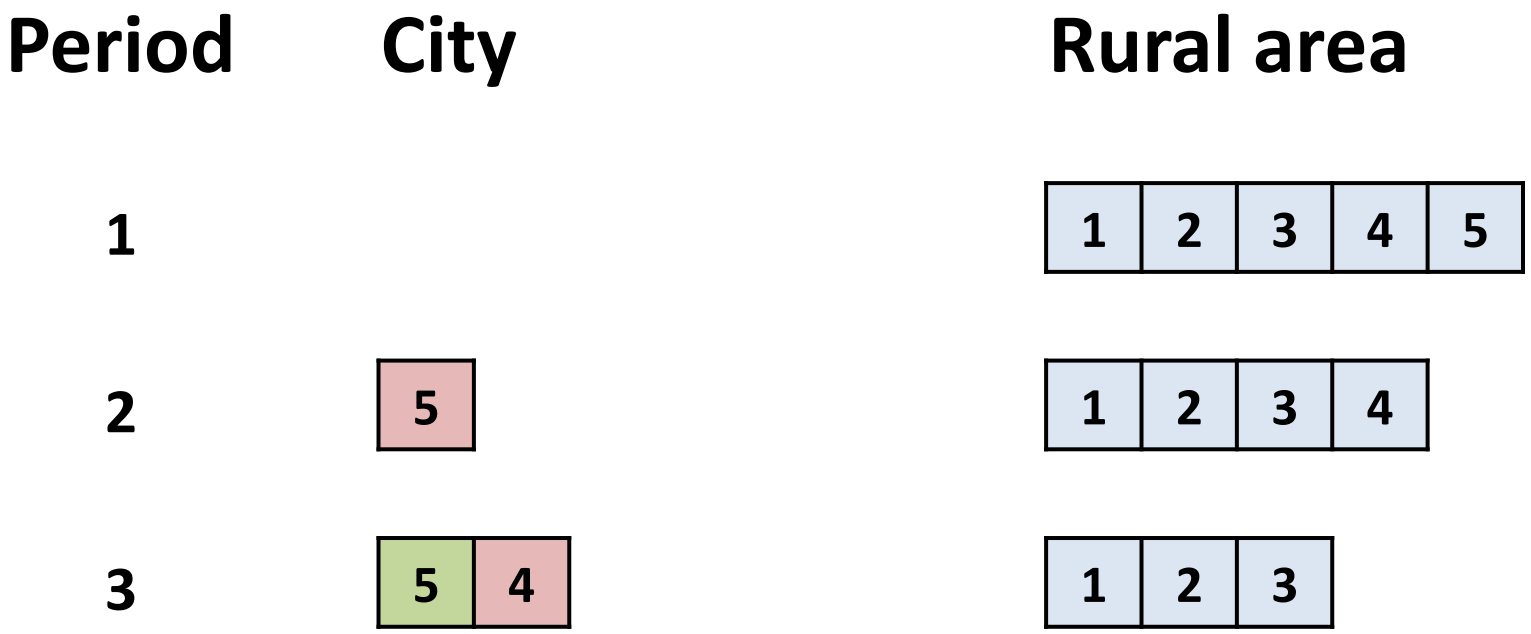
Period	City	Rural area
1		1 2 3 4 5
2	5	1 2 3 4

Base case

5 purchases a property right

4 migrates to the city but does not formalize

Base case



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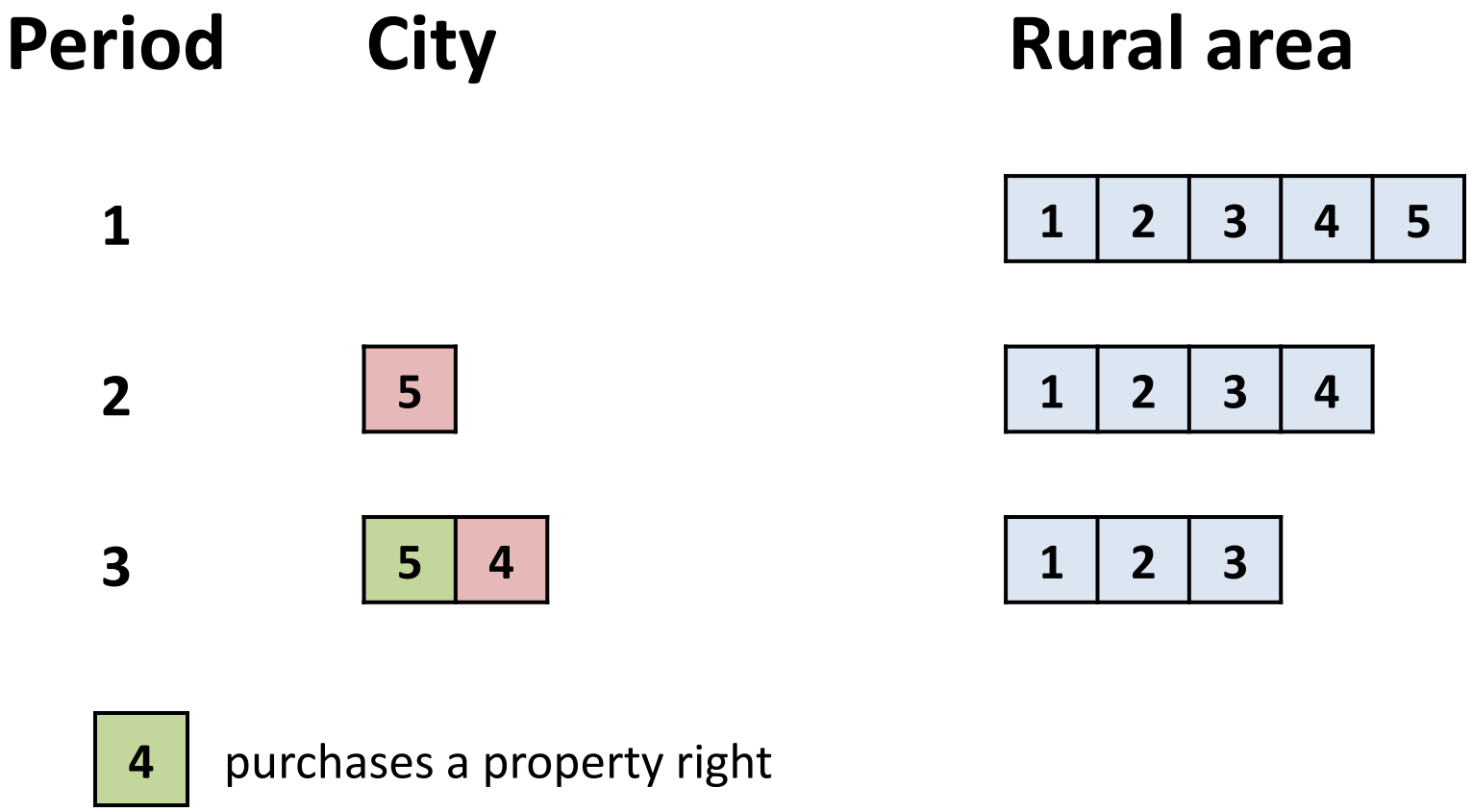
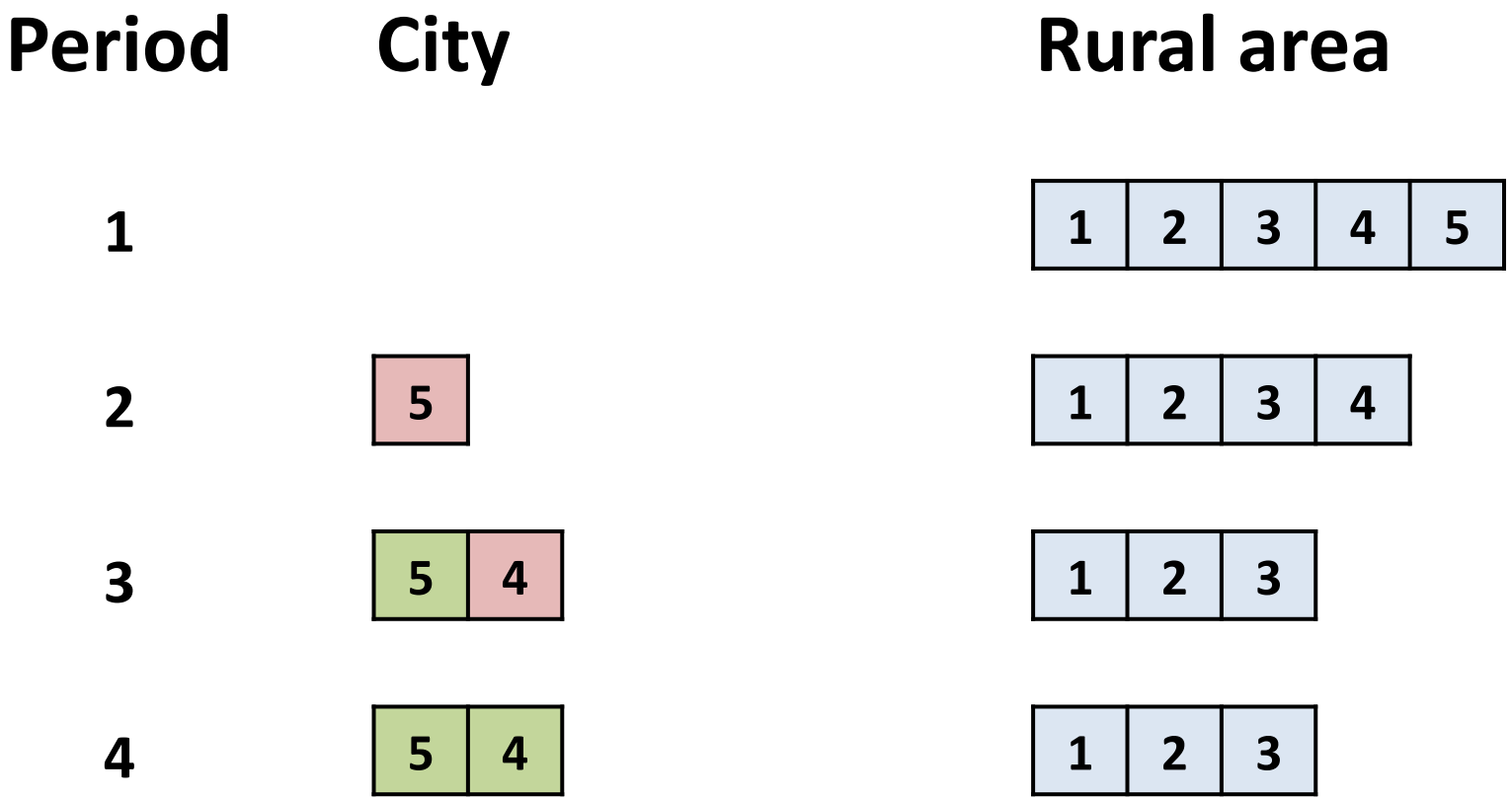

Period
City
Rural area
1
1 2 3 4 5
2
5
1 2 3 4
3
5 4
1 2 3
4
purchases a property right

Base case



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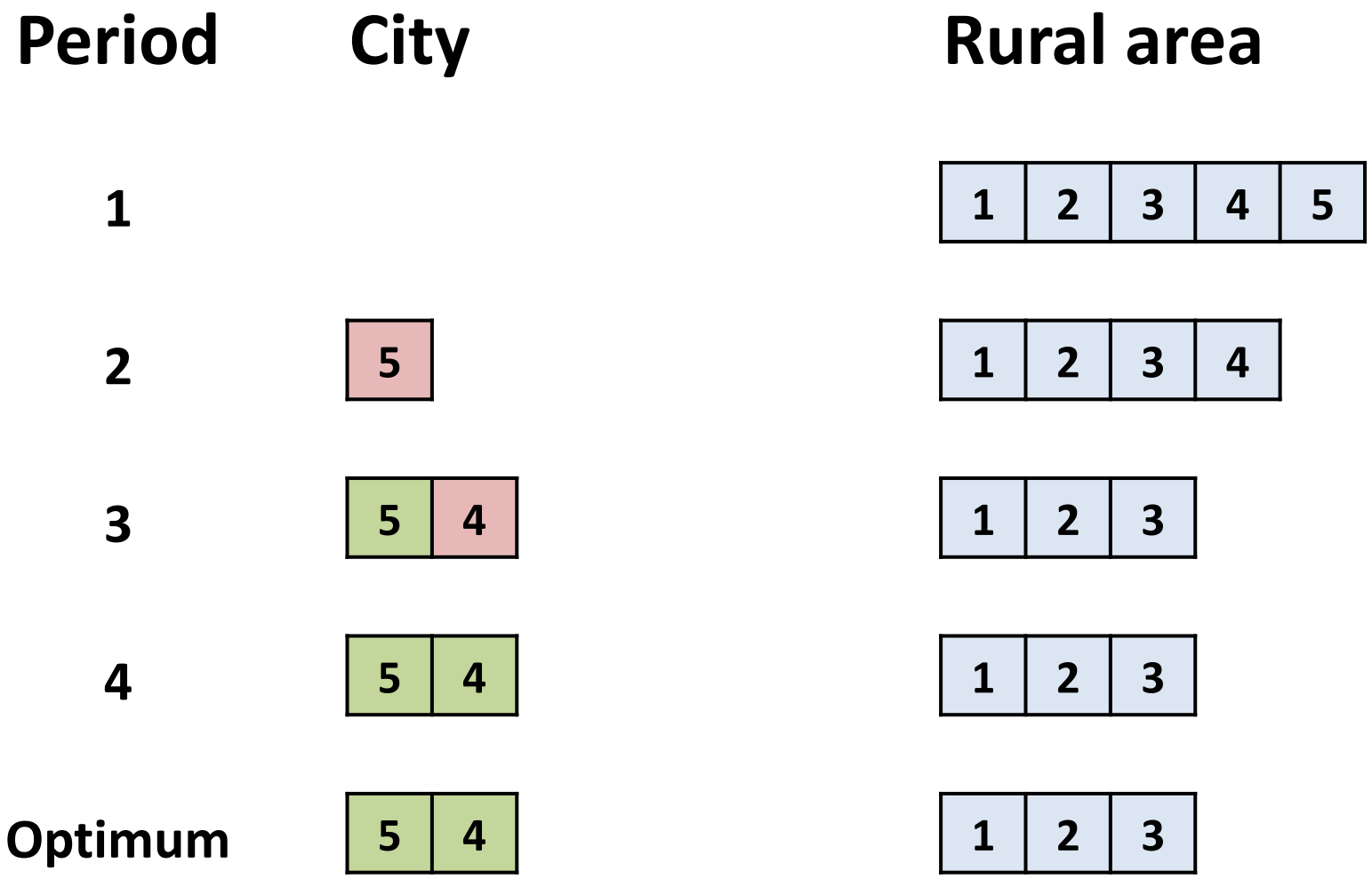
Period
City
Rural area
1
1 2 3 4 5
2
5
1 2 3 4
3
5 4
1 2 3
4
5 4
1 2 3
Optimum
5 4
1 2 3

Variant 1 (lower probability of grab)

Steady state	City	Rural area
Nash	5 4	1 2 3

Variant 1 (lower probability of grab)

Steady state	City	Rural area
Nash	5 4	1 2 3
Social optimum	5 4 3	1 2

Comment:

- **Relative secure tenure exists without formal property right (e.g. protection from eviction).**

Variant 2 (lower land administration fee and lower probability of grab)

Steady state	City	Rural area
Nash	5 4	1 2 3

Variant 2 (lower land administration fee and lower probability of grab)

Steady state	City	Rural area
Nash	5 4	1 2 3
Social optimum	5 4 3	1 2

Comments:

- **Nash and social optimum have informality in the long run.**
- **Social planner needs to have** 3 **formal to keep him in the city (it would be too costly to move him back to the city following eviction).**

5. Conclusion

- Land tenure uncertainty is a key feature in cities, hence the need for dynamic stochastic modeling
- Informality accompanies urbanization but for some parameter values does not vanish in the long run
- Pushing for complete formalization may not be optimal
- Future extensions
  - Other variants (e.g. Δ in ability distribution)
  - Demographic growth
  - Technological progress
  - Several cities
  - Uncertainty on the rural side (preventing migration)
  - Greater N?
- Scope for more research on property rights dynamics in general

Appendix 1: Core formulas

- Wage of individual *i=1,…I*
  - $w_t^{\,i} = a_i . \sigma . \left[1 + \sum_{i=1}^{I} a_i . d_t^{\,U,i}\right]^{1/\gamma}$
- Land price in city
  - $R_t = \lambda . \frac{\sum_{i=1}^{I} w_t^{\,i} . d_t^{\,U,i}}{\sum_{i=1}^{I} d_t^{\,U,i}}$
- Transitions
  - $x_{t+1}^{\,U,i} = d_t^{\,U,i} . Max\left\{x_t^{\,F,i}, d_t^{\,F,i}, 1 - \varepsilon_t^{\,G,i}\right\}$
  - $x_{t+1}^{\,F,i} = d_t^{\,U,i} . Max\left\{x_t^{\,F,i}, d_t^{\,F,i}\right\}$

Appendix 2: Parameter values for benchmark case

- Number of individuals: $I = 5$
- Distribution of abilities: $\{a_i\} = \{0.2, 0.4, 0.6, 0.8, 1\}$
- Scale parameter (wage function): $\sigma = 40$
- Inverse elasticity of individual wage to efficient labor: $\gamma = 3$
- Scale parameter (congestion function): $b = 1$
- Parameter (congestion function): $\delta = 2$
- Rural income: $\underline{w} = 6$
- Land administration fee: $f = 25$
- Relative risk aversion (utility function): $1 - \alpha = 0.5$
- Land price to income ratio: $\lambda = 0.4$
- Probability of common productivity shock: $\pi^P = 0.5$
- Probability of idiosyncratic land tenure shock: $\pi^G = 0.5$
- Discount factor: $\beta = 0.985^{10} = 0.86$