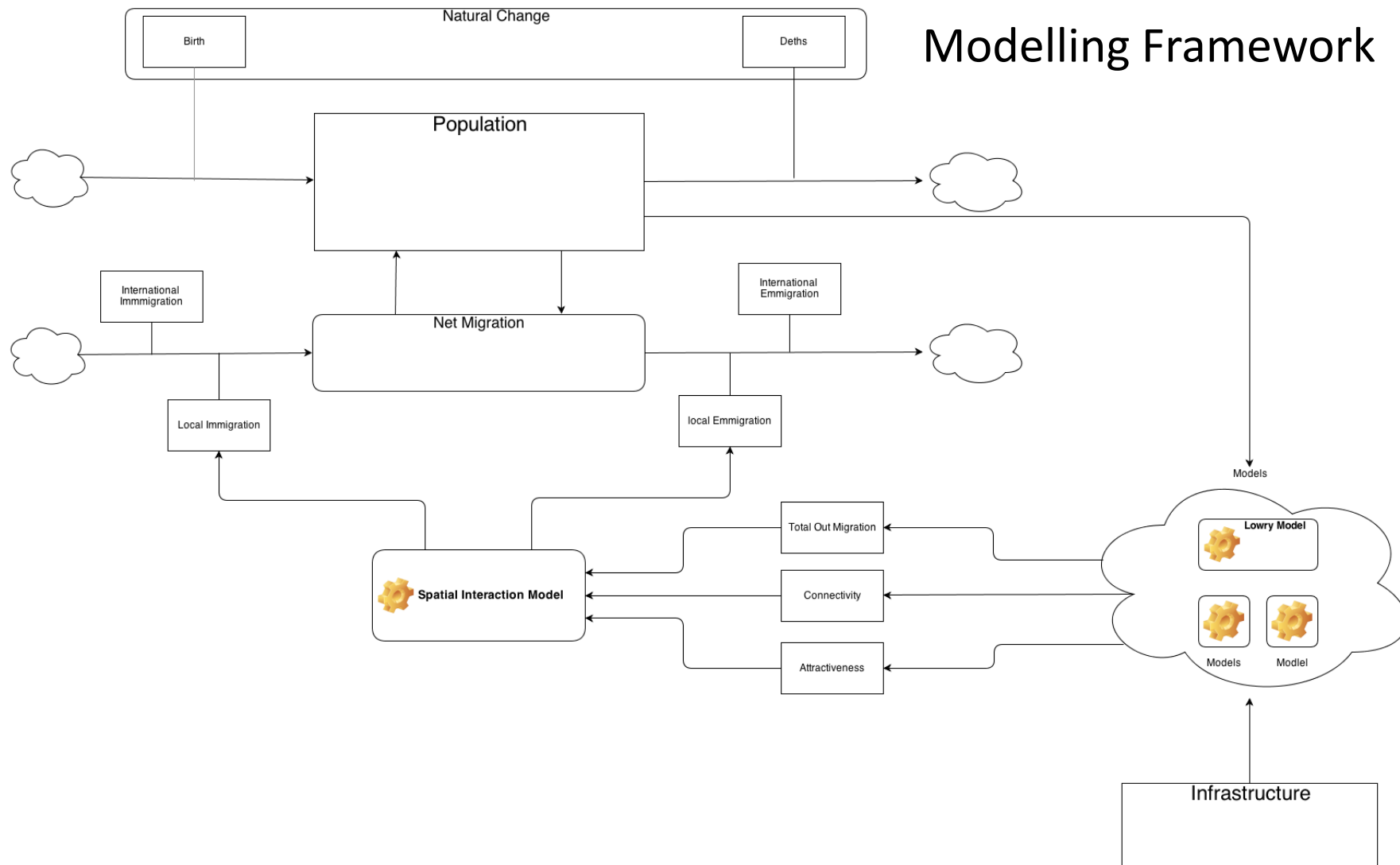# Towards Co-evolutionary Models of Demographics and Infrastructure
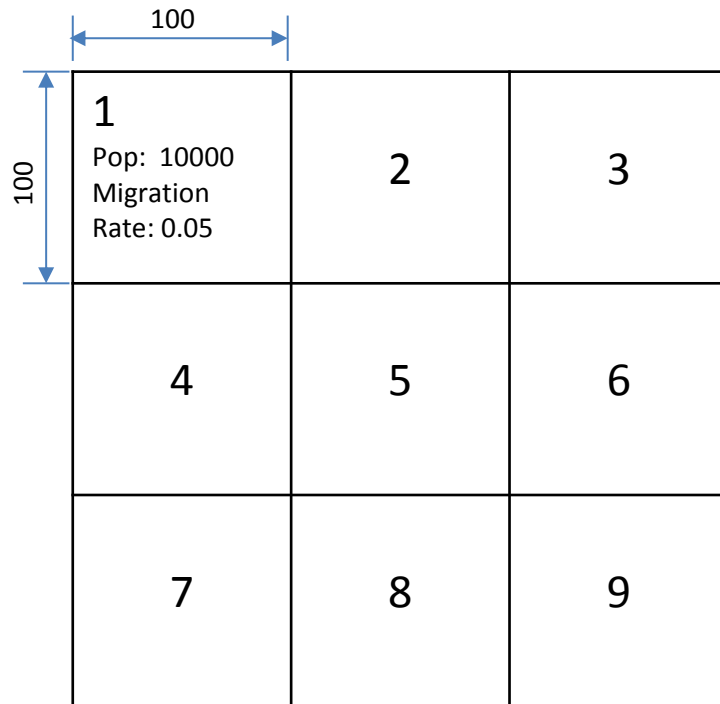
Chengchao Zuo, Mark Birkin

School of Geography
University of Leeds
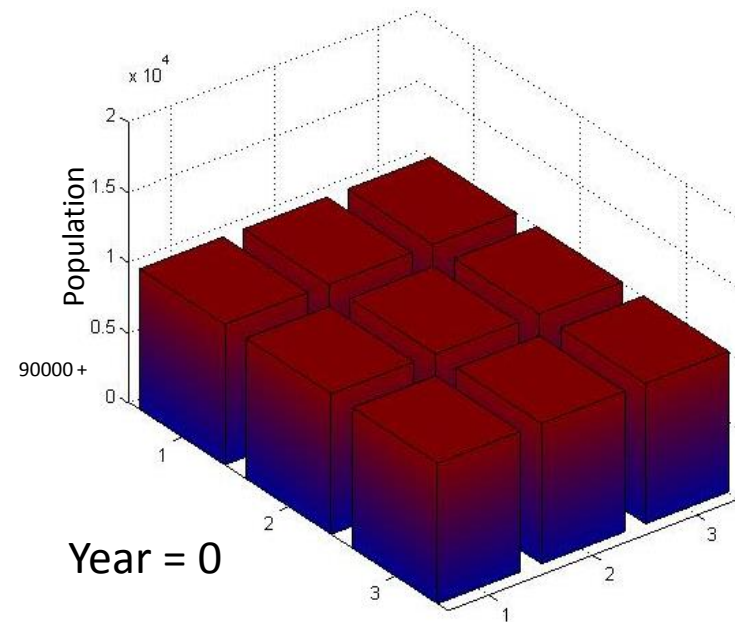
Modelling Framework

Conceptual Model

- 9 - region system with 9 uniformed regions
- ID by 1 ~ 9
- Each regions has 100 x 100 (unit^2)
- Population for each region is 100000
- Annual migration rate for each region is assigned as 5%.
- Migration flows are generated by Spatial Interaction Model
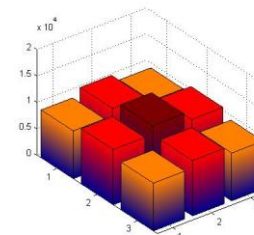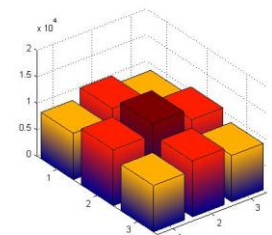

Year = 0

Baseline Scenario

- All the basic settings
- Attractiveness is set as 1
- Cost for Inter-regional traveling is measured by the Euclidian Distance between the centroids of two regions.
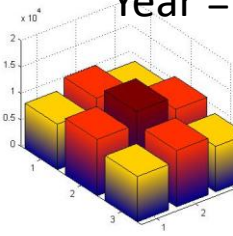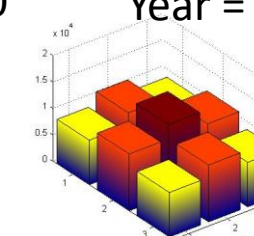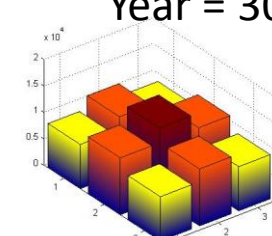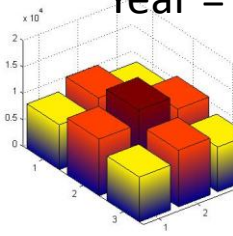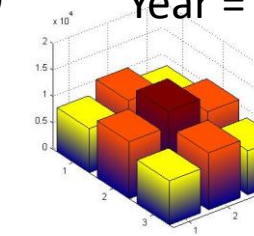- 100 iterations each for a single year
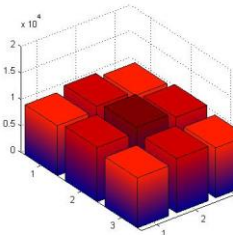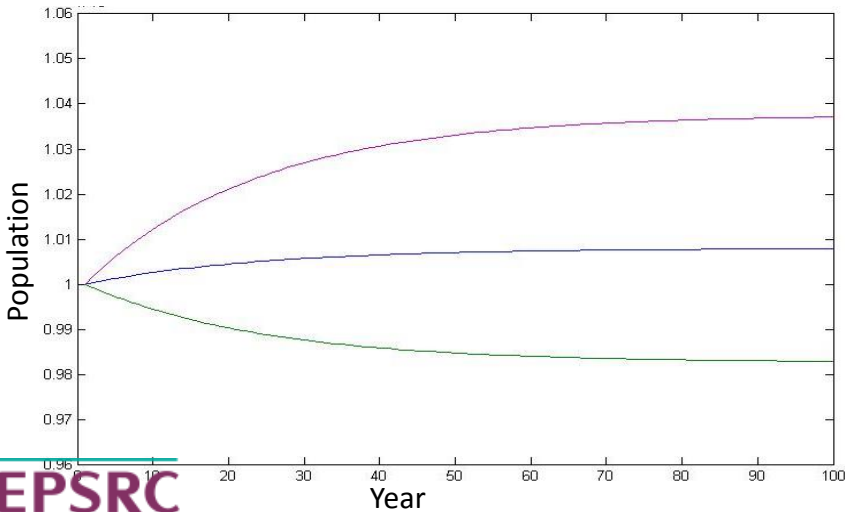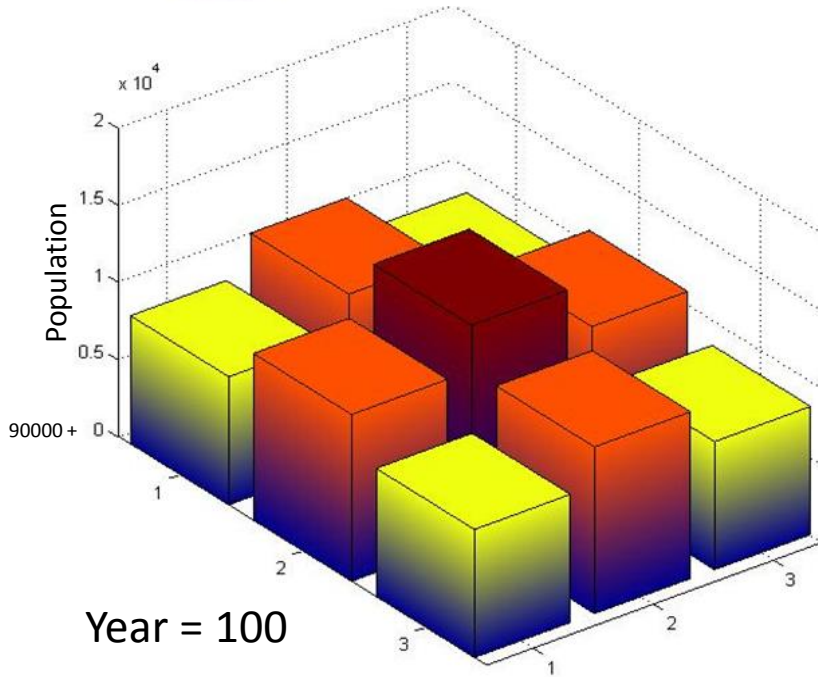
Year = 100

Year = 10   Year = 20   Year = 30

Year = 40   Year = 50   Year = 60
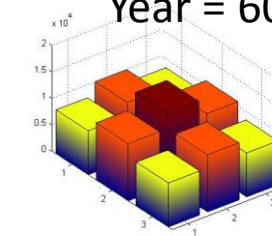
Year = 70   Year = 80   Year = 90

Policy 1: HSR connections between Region 5 and 2

- All the basic settings
- Attractiveness is set as 1
- The travel cost between Region 5 and 2 halved compare to baseline model
- 100 iterations each for a single year

Year = 100

Year

Year = 10

Year = 20

Year = 30

Year = 40

Year = 50

Year = 60

Year = 70

Year = 80

Year = 90
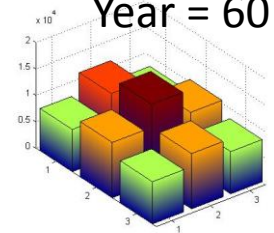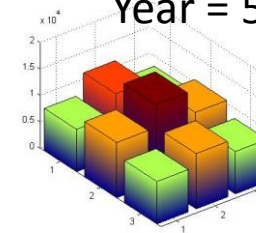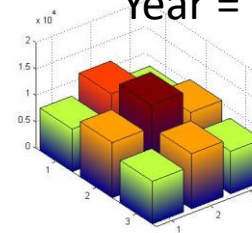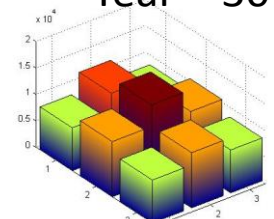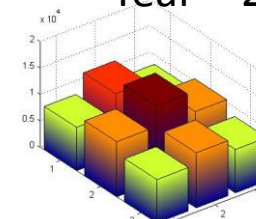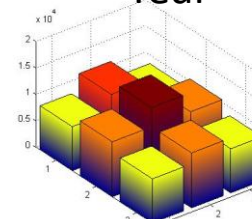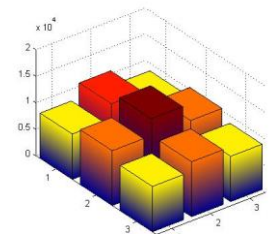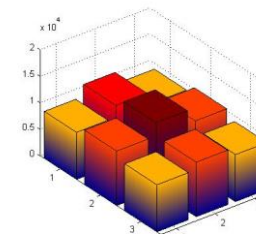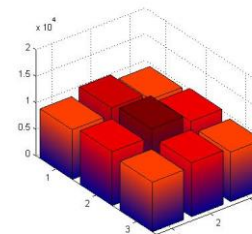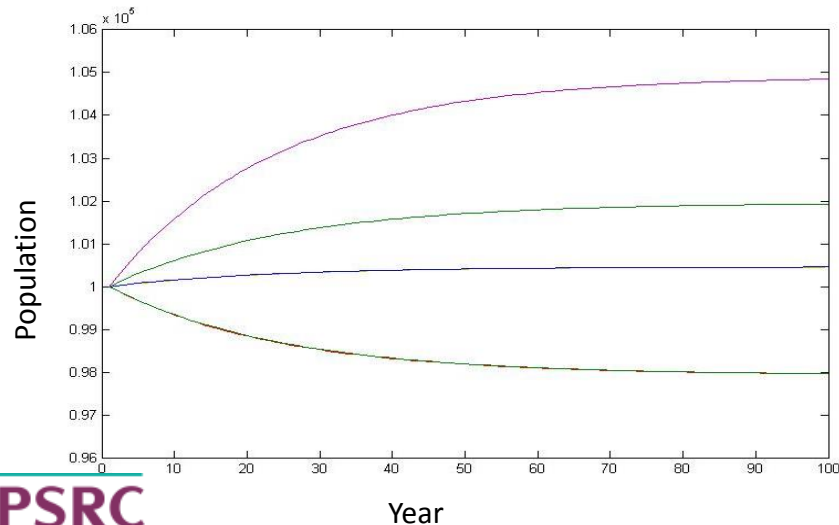
Policy 2: Higher employment in Region 1

- All the basic settings
- 3% increase of Attractiveness for Region 1
- Standard travel cost as Baseline scenario
- 100 iterations each for a single year

Year = 10   Year = 20   Year = 30
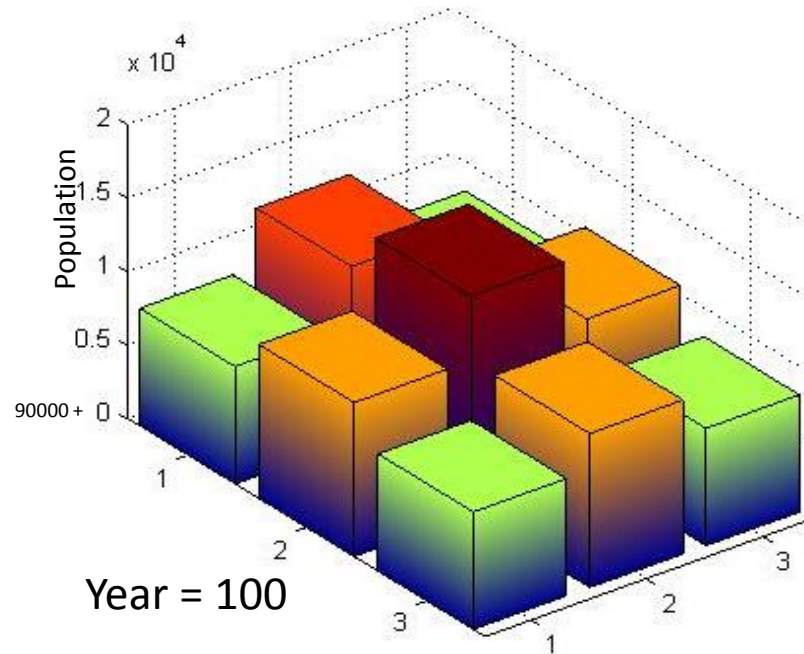
Year = 40   Year = 50   Year = 60

Year = 70   Year = 80   Year = 90
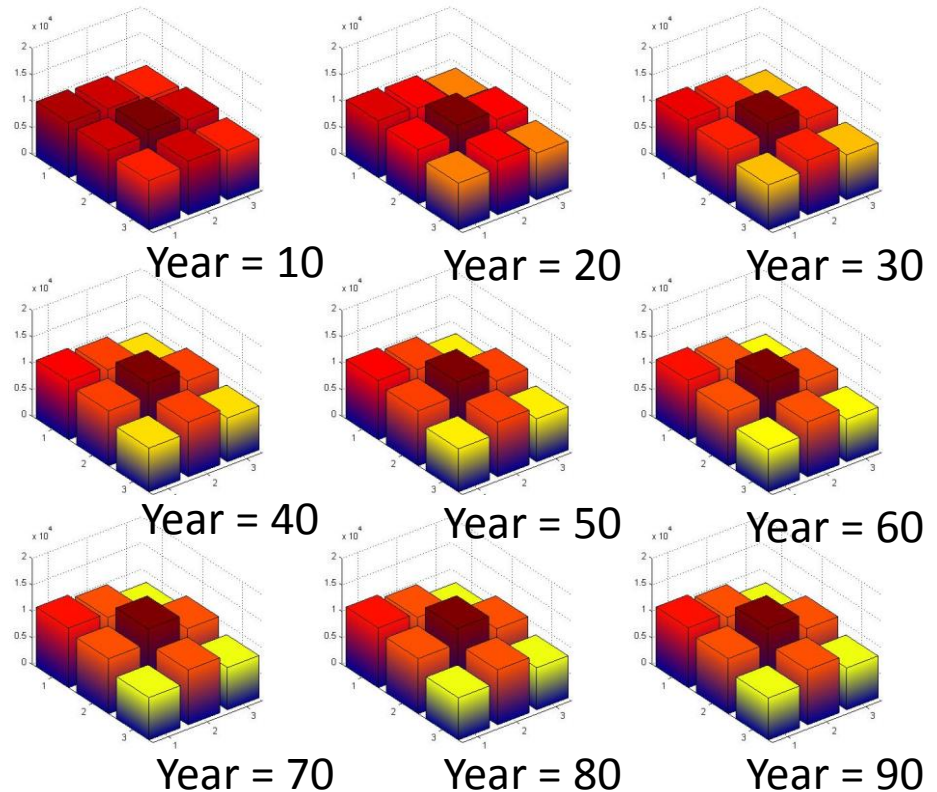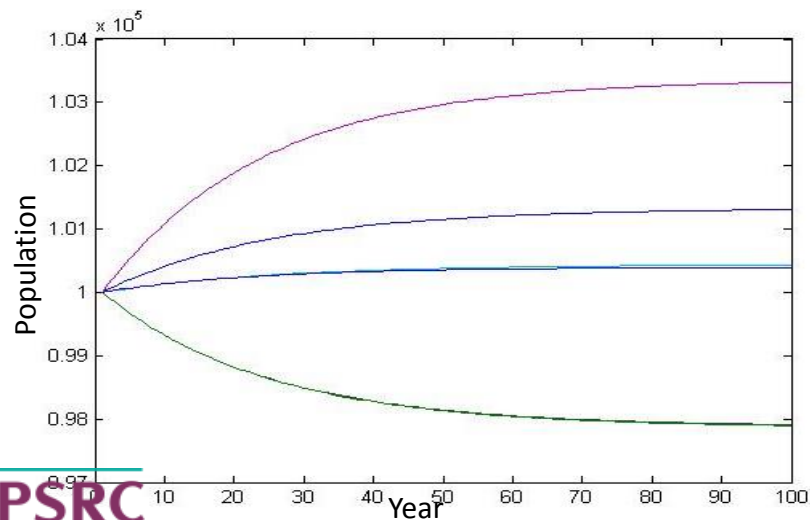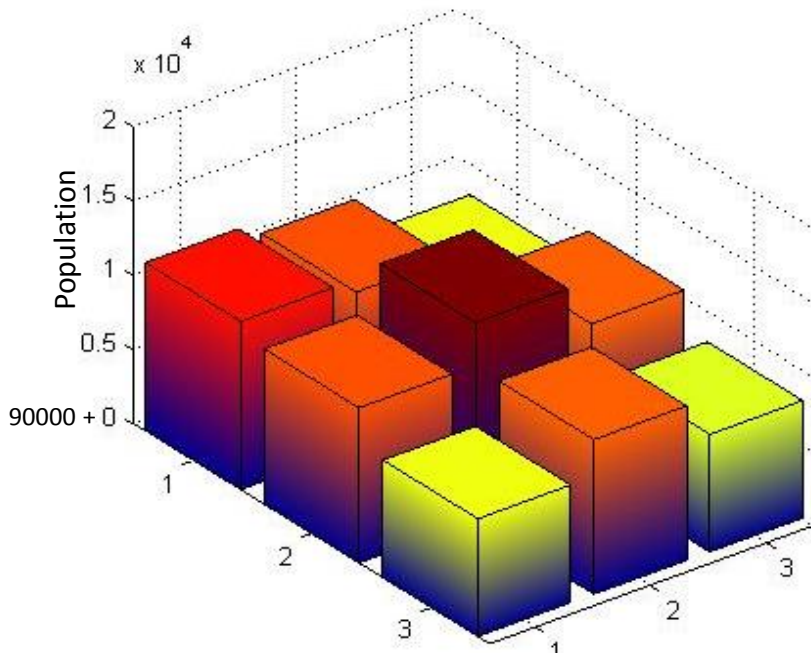
Policy 3: Positive feedback from population

- All the basic settings applied
- Attractiveness = Population
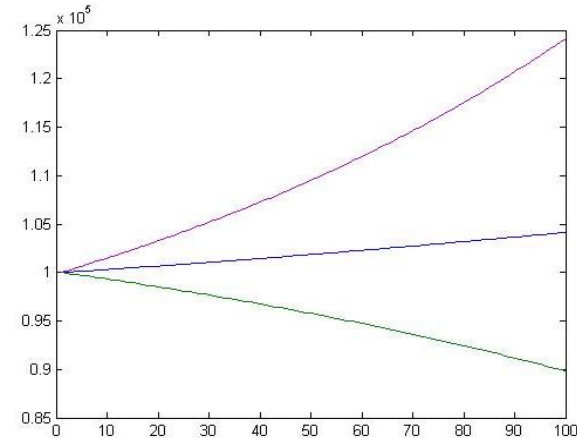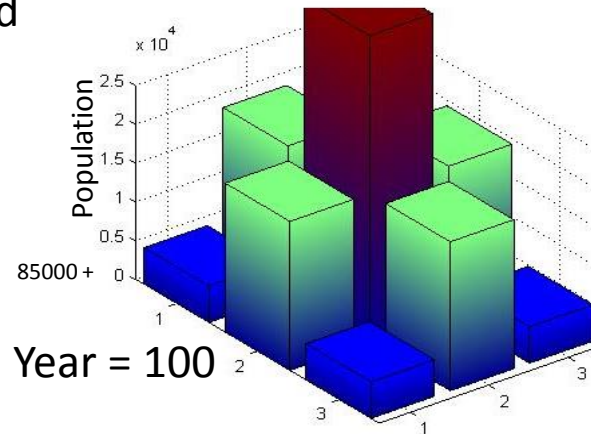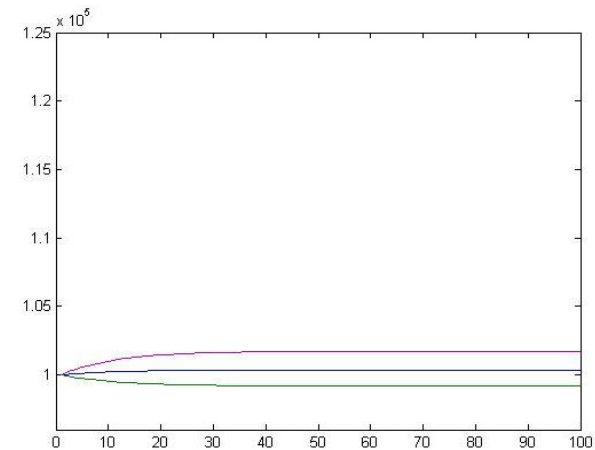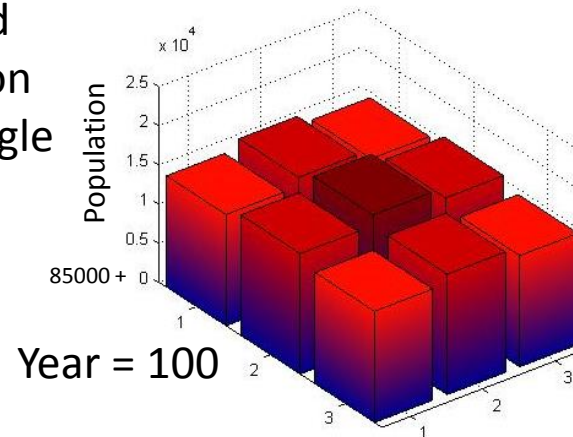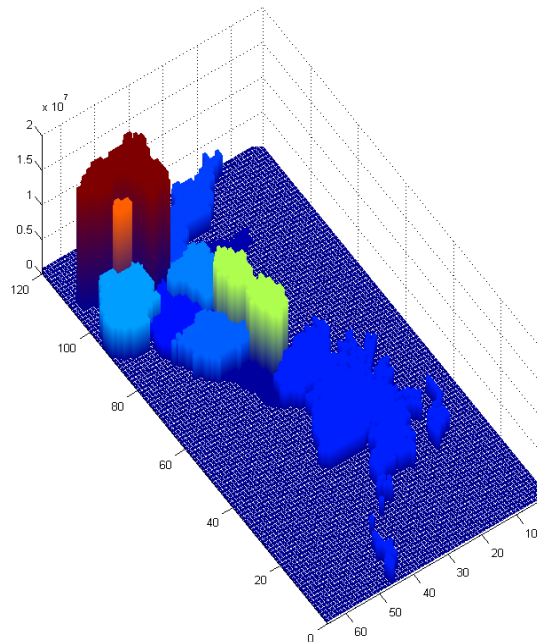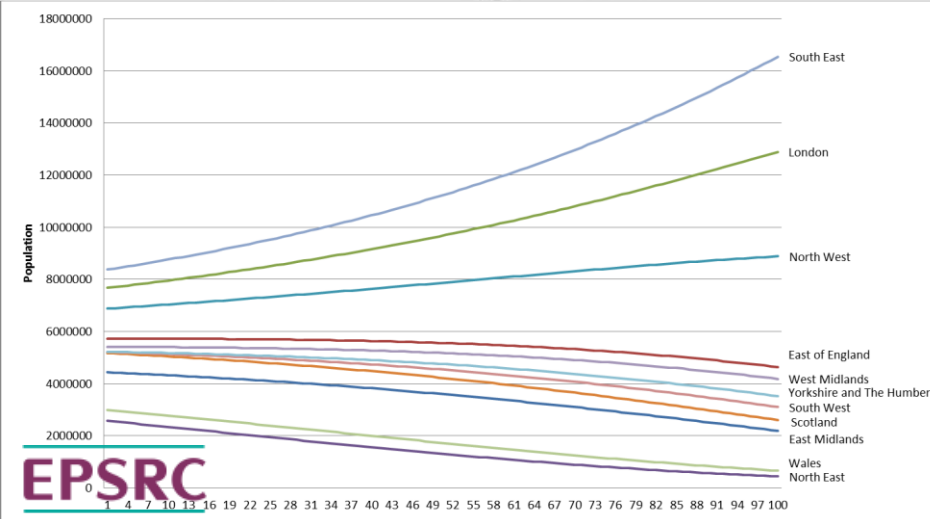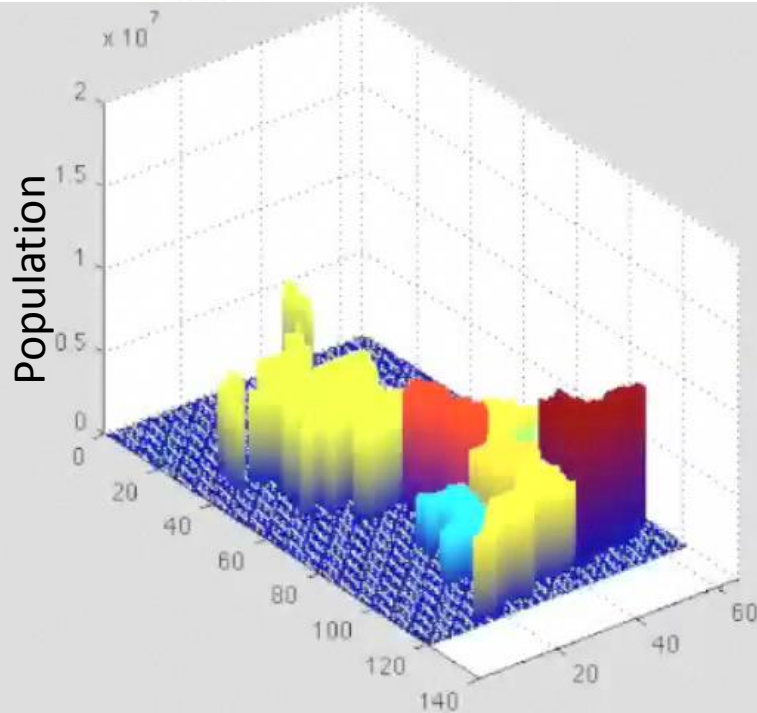- 100 iterations each for a single year

Year = 100

Policy 4: Negative feedback from population

- All the basic settings applied
- Attractiveness = 1/Population
- 100 iterations each for a single year

Year = 100

Apply the conceptual to the real world

- 11 Regions (9 GOR + Scotland + Wales)
- 2008 Population data
- Transport cost is measured by the Euclidian Distance between the Centroids (population weighted) of regions
- 100 iterations each for a single year
- Positive feed back from population (Attractiveness = Population)

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Apply the conceptual to the real world (with HSR)

- 11 Regions (9 GOR + Scotland + Wales)
- 2008 Population data
- Transport cost is measured by the Euclidian Distance between the Centroids (population weighted)
- 100 iterations each for a single year
- Positive feed back from population (Attractiveness = Population)
- Cost between London and West Midlands halved due to the HSR connection
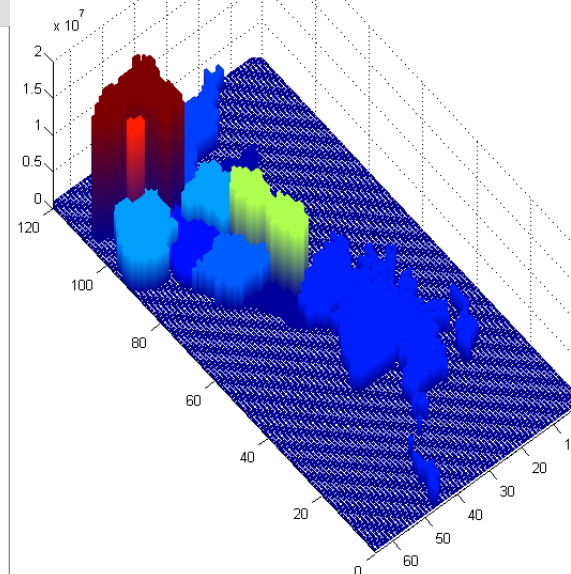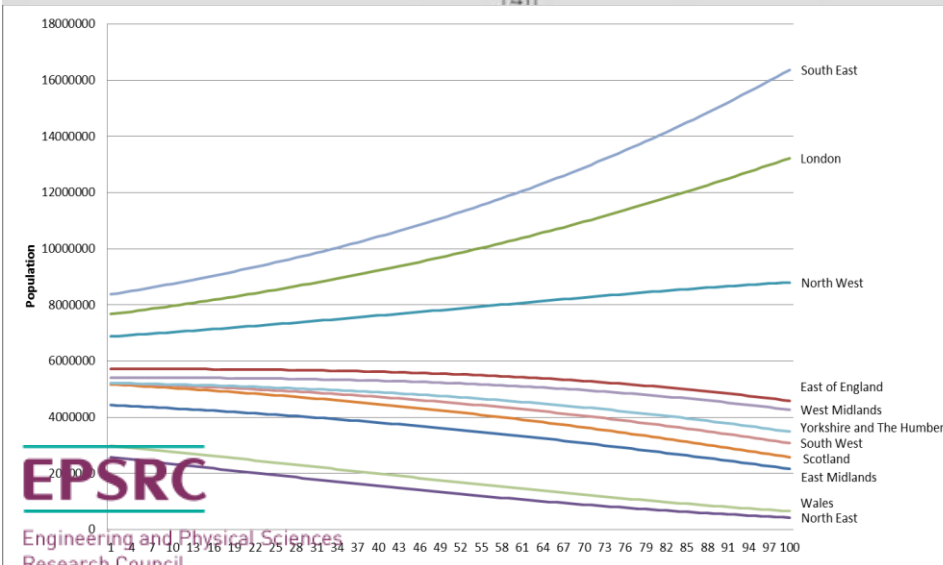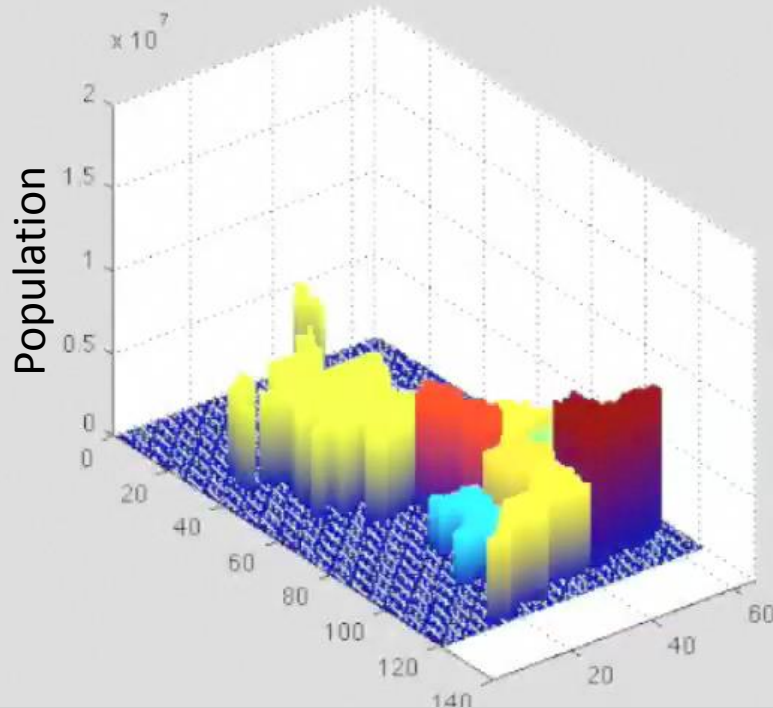
Thanks for Your Attention !

Questions ?