



THE SOCIAL COMPLEXITY OF IMMIGRATION AND DIVERSITY

## *Demonstration & Example Outputs*

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# Current State of the DIM



- The Voter Model has not *quite* reached the stage of being the first reference model
- It had not been independently validated
- Some further changes are desirable – we want your comments/suggestions/criticisms
- We will then explore variants of the model
- Thus these results should not be taken as indicating anything about the real world, rather they are aimed at giving you a flavour of a quite complex model
- Present model in Netlogo for rapid adaption and immediacy of results
- There is a deep issue about initialising social simulations

# Demonstration Run

Picture  
of World

The screenshot displays a complex simulation interface. At the top left, a control panel shows 'Year: 1982', 'Month: jan', 'Secs/tick: 1', 'Elect: 289', and 'Pop: 379'. The central area is a 'Picture of World' grid with various colored icons representing agents. To the right is a 'Parameters and Controls' panel with sliders for variables like 'start-date', 'end-date', 'ticks-per-year', 'birth-mult', 'death-mult', 'move-prob-mult', 'drop-friend-prob', 'drop-activity-prob', 'prob-partner', 'forget-mult', 'density', 'majority-prop', 'init-move-prob', 'prob-move-near', 'immigration-rate', and 'emigration-rate'. Below the world view is a 'Pseudo-narrative log of events happening to a single agent' with a text log showing events like '1953: (person 191) (aged 9) started at (school 1)'. At the bottom are 'Simple Statistics concerning Outcomes' including 'Pop: 379', '1st gen: 79', '2nd gen: 24', 'Empty: 41', 'Vis Min: 44', 'Inv Min: 9', 'Link Dens: 0.0119', 'Av Clus: 0.59', 'Av Fr Sam: 0.44', and 'Av HH Sam: 0.49'. On the left, several 'Indicative Graphs and Histograms' are shown, including 'Voting' (line graph), 'Age Distribution' (bar chart), 'Household Size Dist' (bar chart), 'Friendship Dist (Adults)' (bar chart), 'FOF Dist (Adults)' (bar chart), 'Pop' (line graph), 'Turnout by Ethnicity' (line graph), 'Turnout by Immigrant Gen' (line graph), and 'Class Distribution' (bar chart).

Indicative  
Graphs  
and  
Histograms

Parameters  
and  
Controls

Simple  
Statistics  
concerning  
Outcomes

Pseudo-narrative log of events  
happening to a single agent

# Two Contrasting Sets of Runs

## “Inner City” set, 20 runs

- death-mult 1.2
- immigration-rate 0.035
- density 0.9
- forget-mult 2.28
- drop-friend-prob 0.3
- prob-move-near 0.2
- majority-prop 0.6
- drop-activity-prob 0.15
- int-immigration-rate 0.01
- prob-partner 0.35
- move-prob-mult 0.7
- init-move-prob 2.5
- emmigration-rate 0.055
- birth-mult 1

## “Country” set, 20 runs

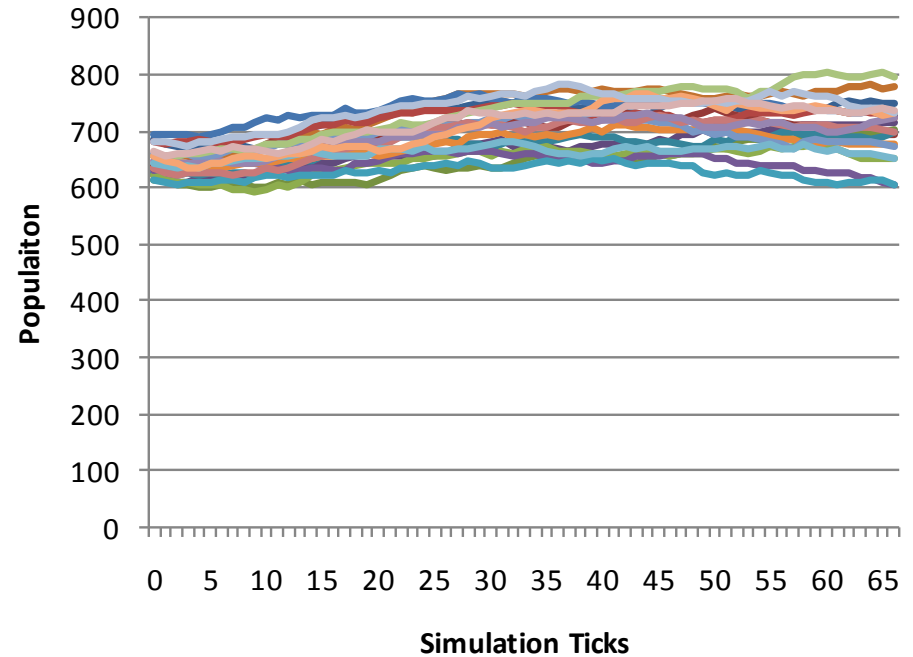
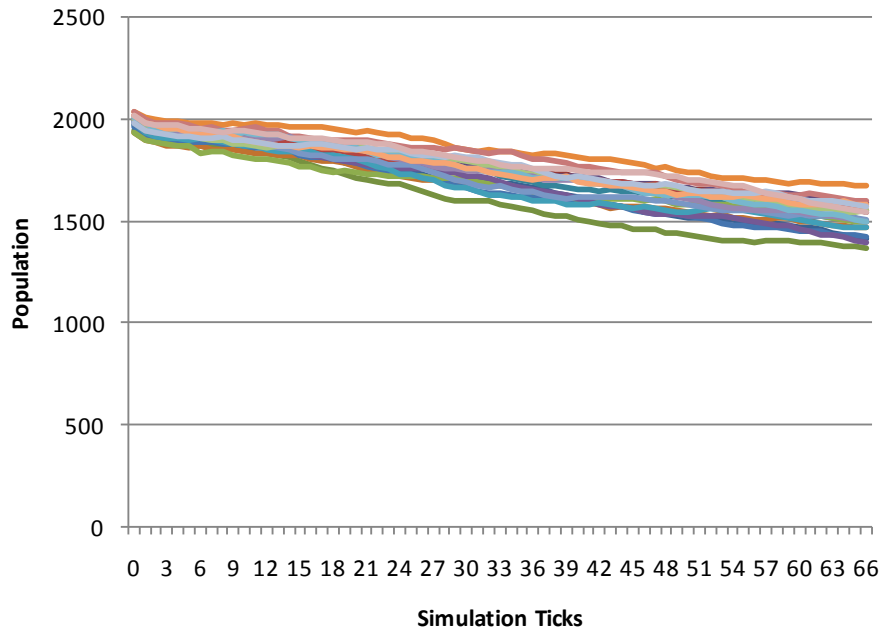
- death-mult 1.5
- immigration-rate 0.005
- density 0.32
- forget-mult 0.56
- drop-friend-prob 0.18
- prob-move-near 0.2
- majority-prop 0.95
- drop-activity-prob 0.065
- int-immigration-rate 0.015
- prob-partner 0.17
- move-prob-mult 0.2
- init-move-prob 2.5
- emmigration-rate 0.15
- birth-mult 0.6

# Population



“Inner City” set, 20 runs

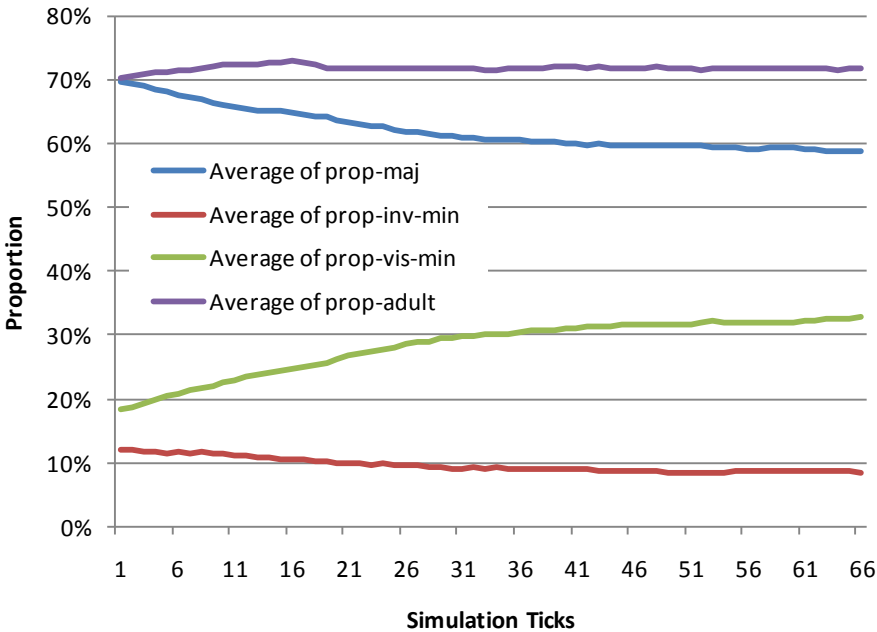
“Country” set, 20 runs



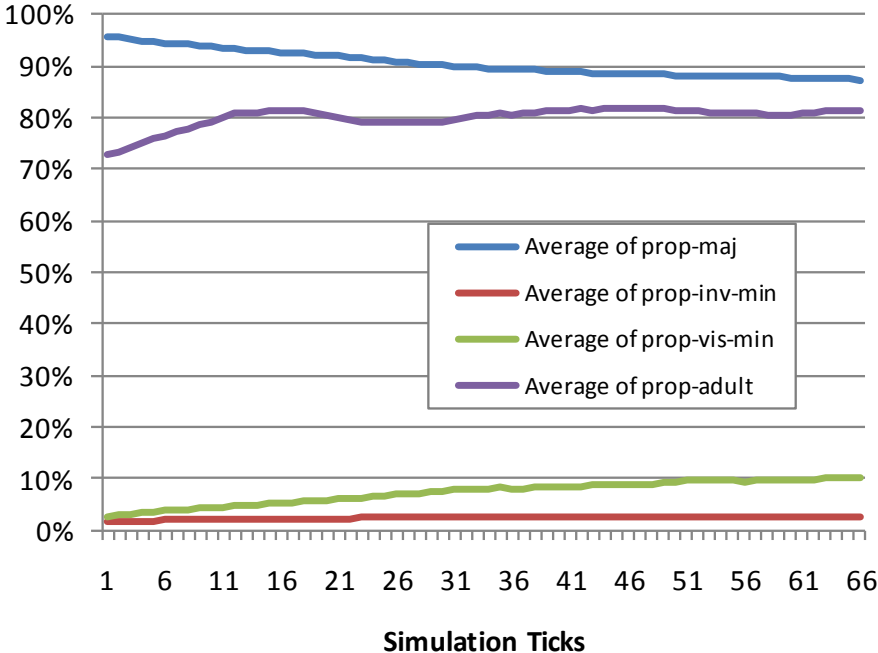
# Population Makeup



“Inner City” set, 20 runs



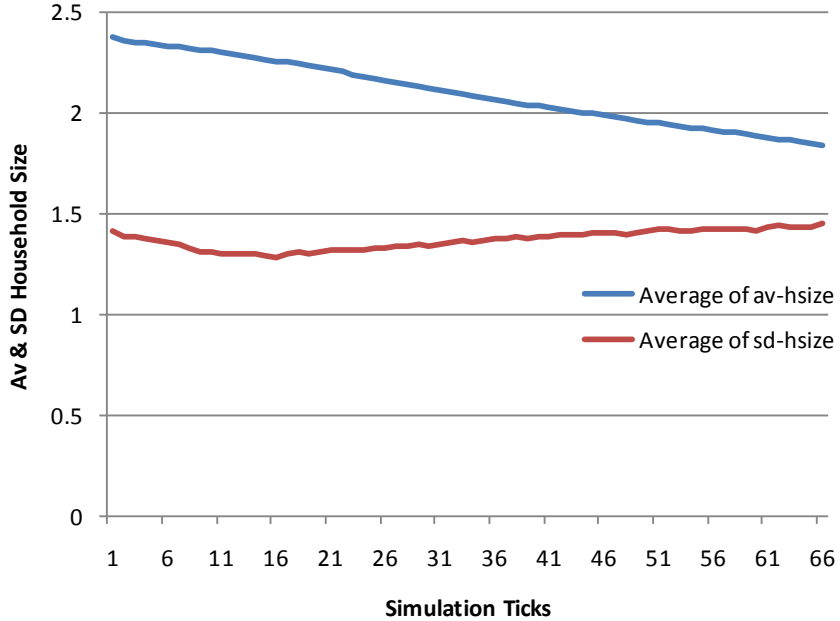
“Country” set, 20 runs



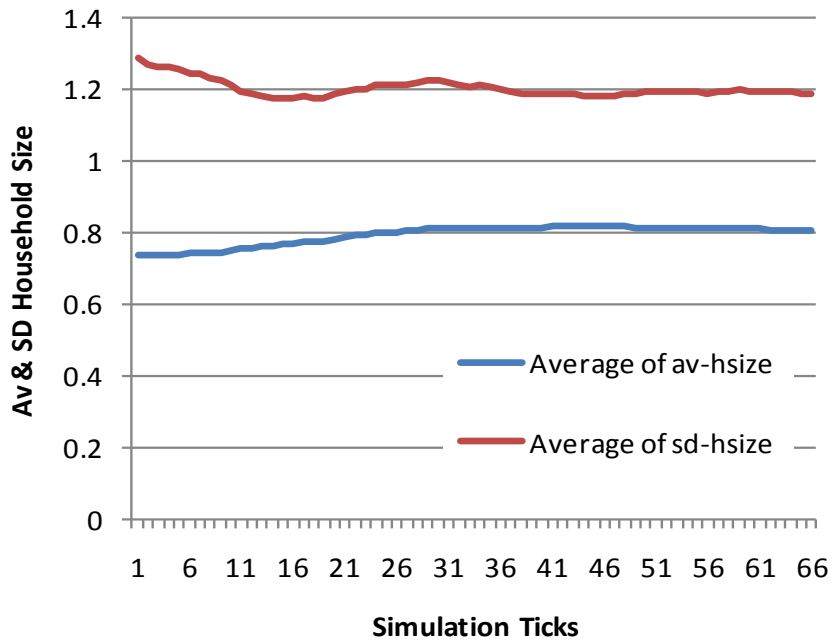
# Household Size



“Inner City” set, 20 runs



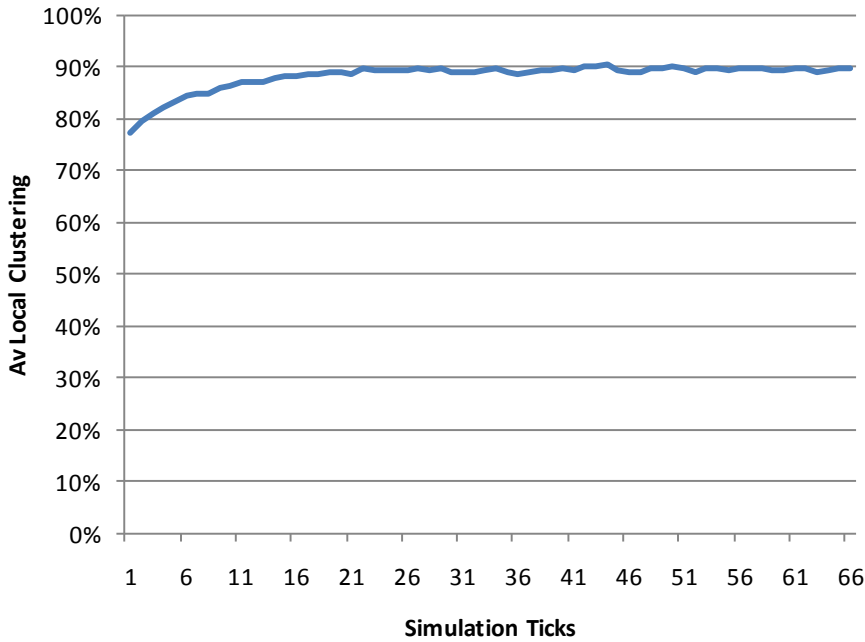
“Country” set, 20 runs



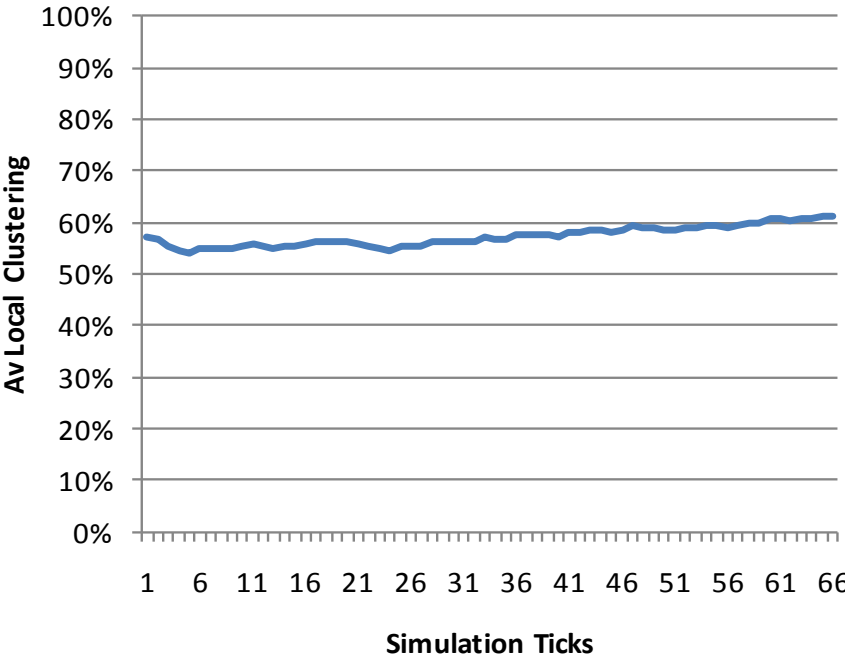
# Av Local Clustering



“Inner City” set, 20 runs



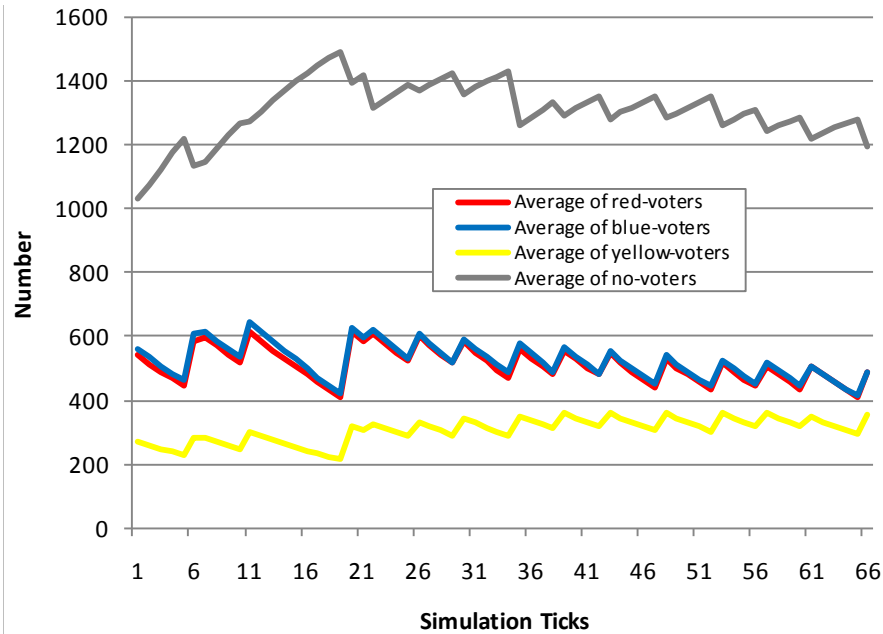
“Country” set, 20 runs



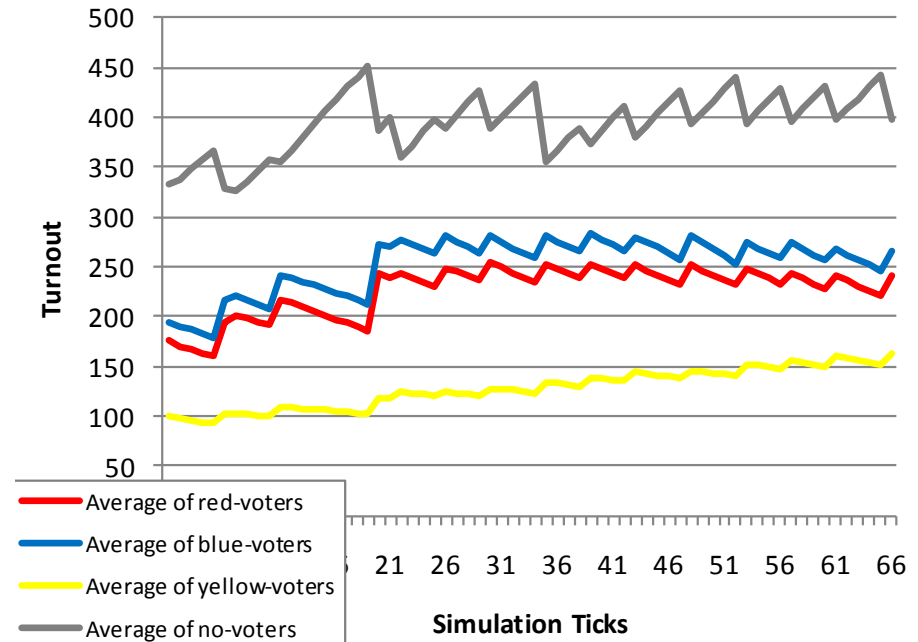


# Av. Number of Voters

“Inner City” set, 20 runs



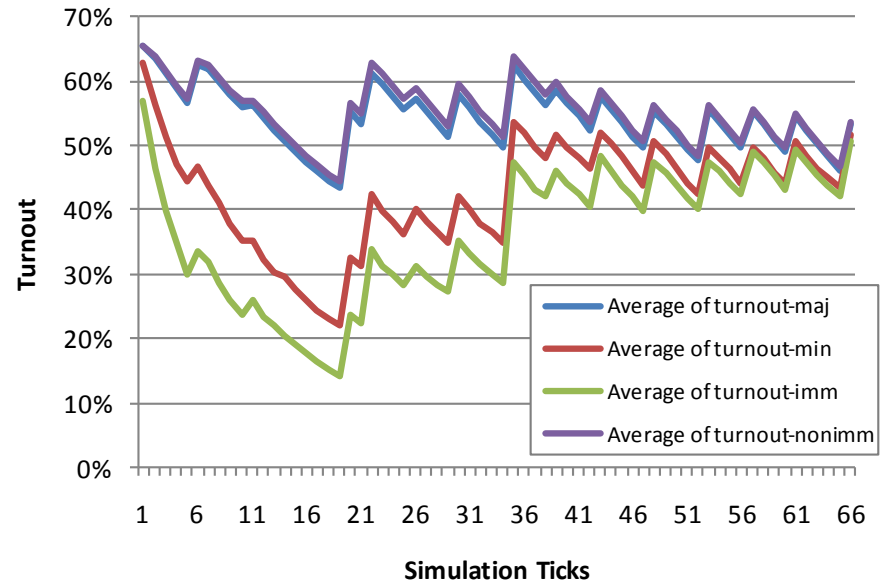
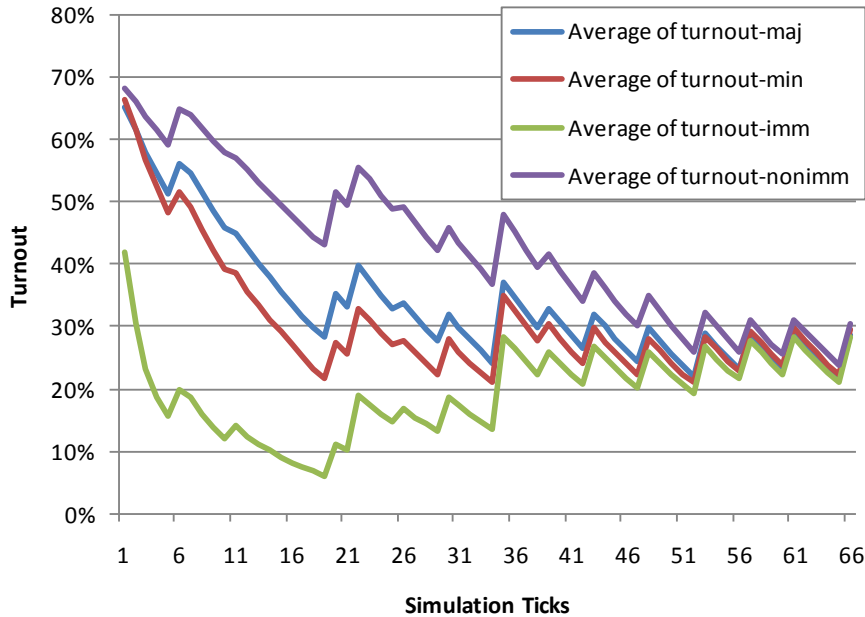
“Country” set, 20 runs



# Turnout by Sector

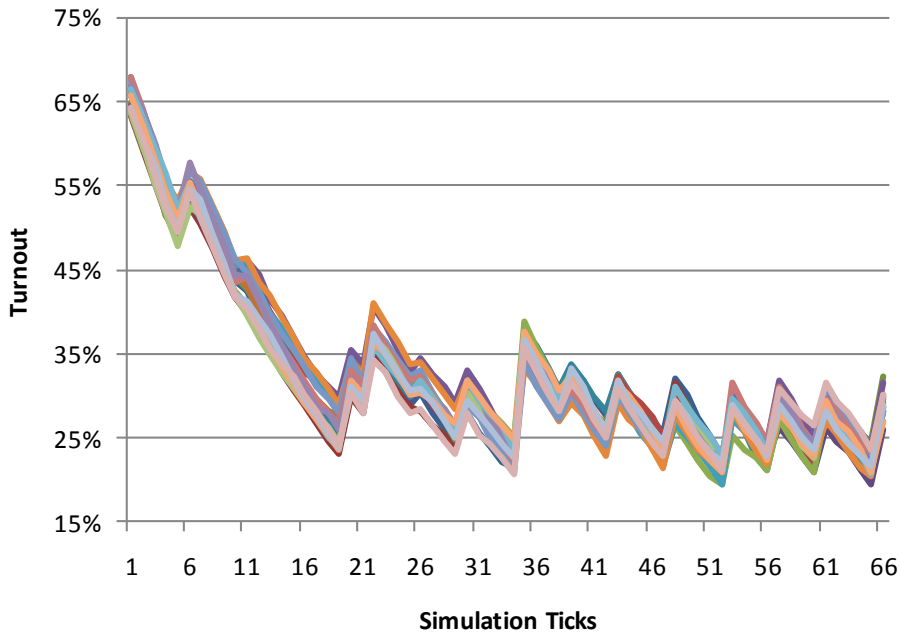
“Inner City” set, 20 runs

“Country” set, 20 runs

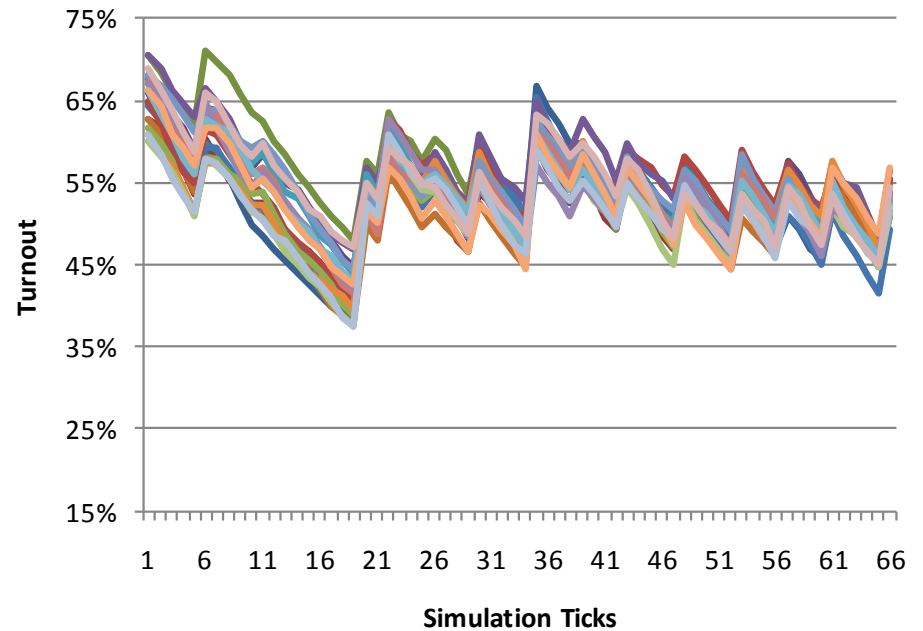


# Variance in Turnout

## “Inner City” set, 20 runs

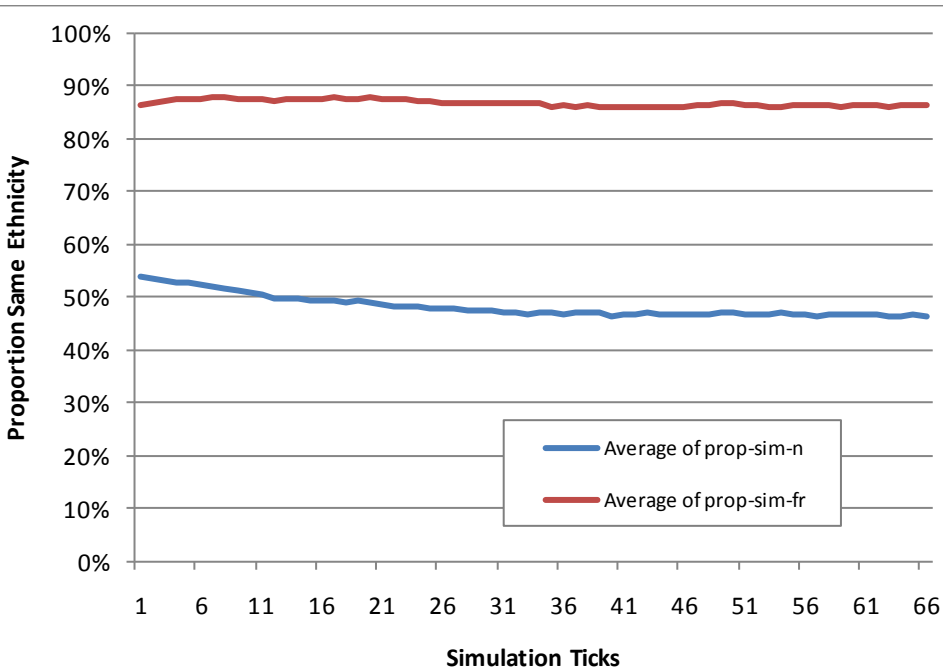


## “Country” set, 20 runs

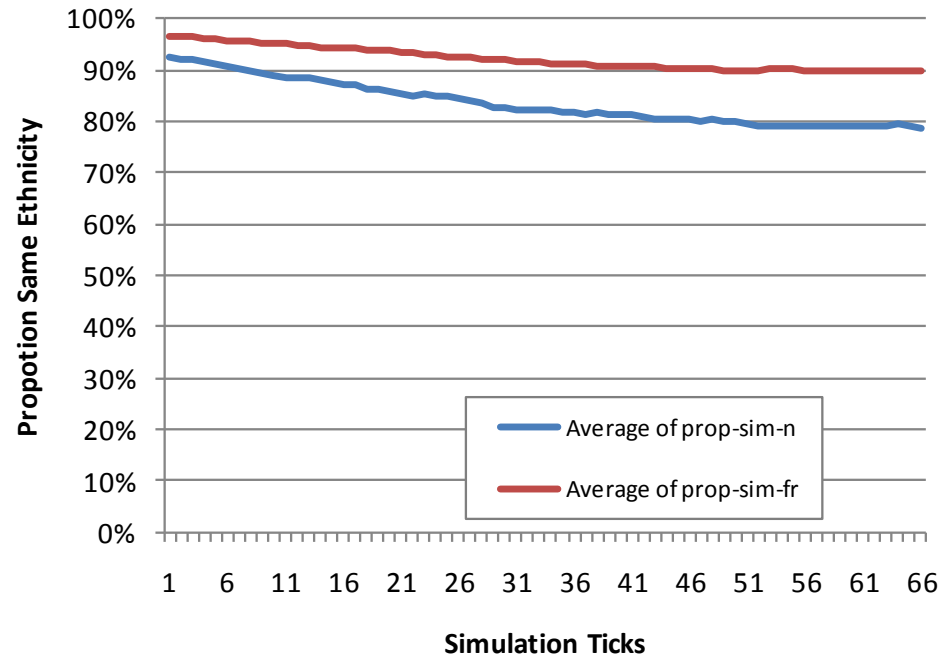


# Same Ethnicity over Links

“Inner City” set, 20 runs



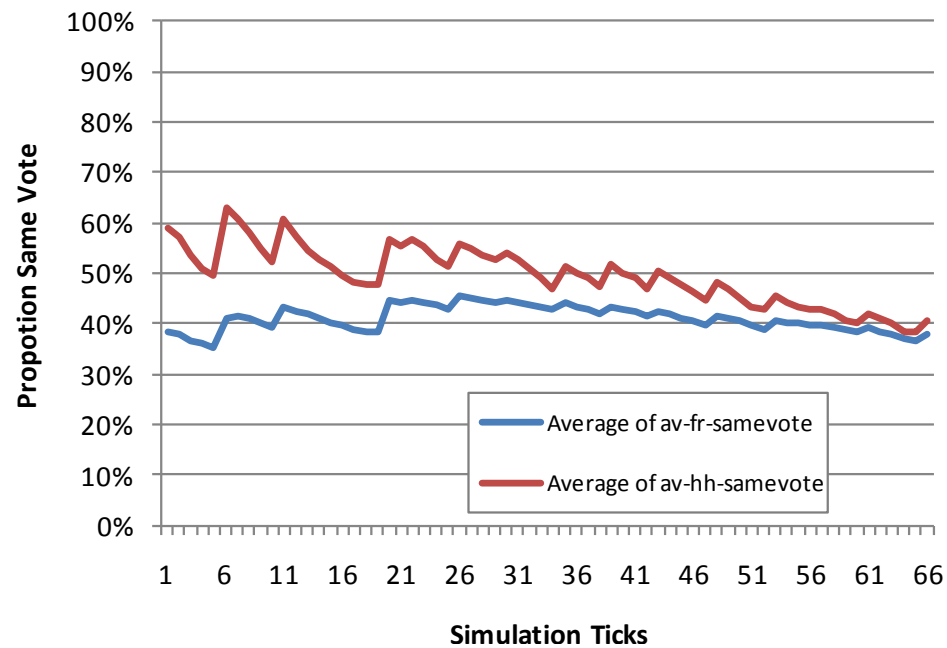
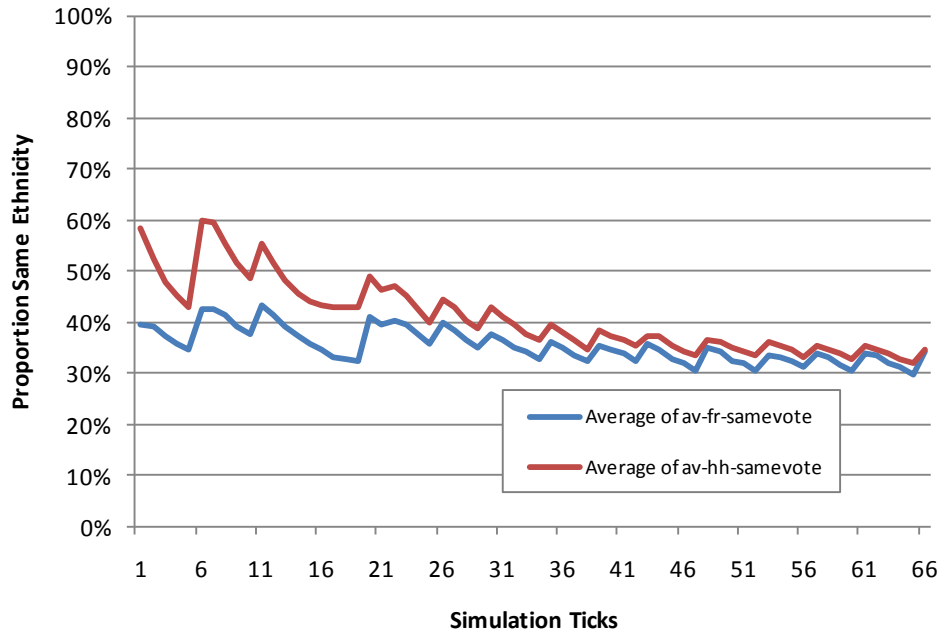
“Country” set, 20 runs



# Same Voting over Links

“Inner City” set, 20 runs

“Country” set, 20 runs

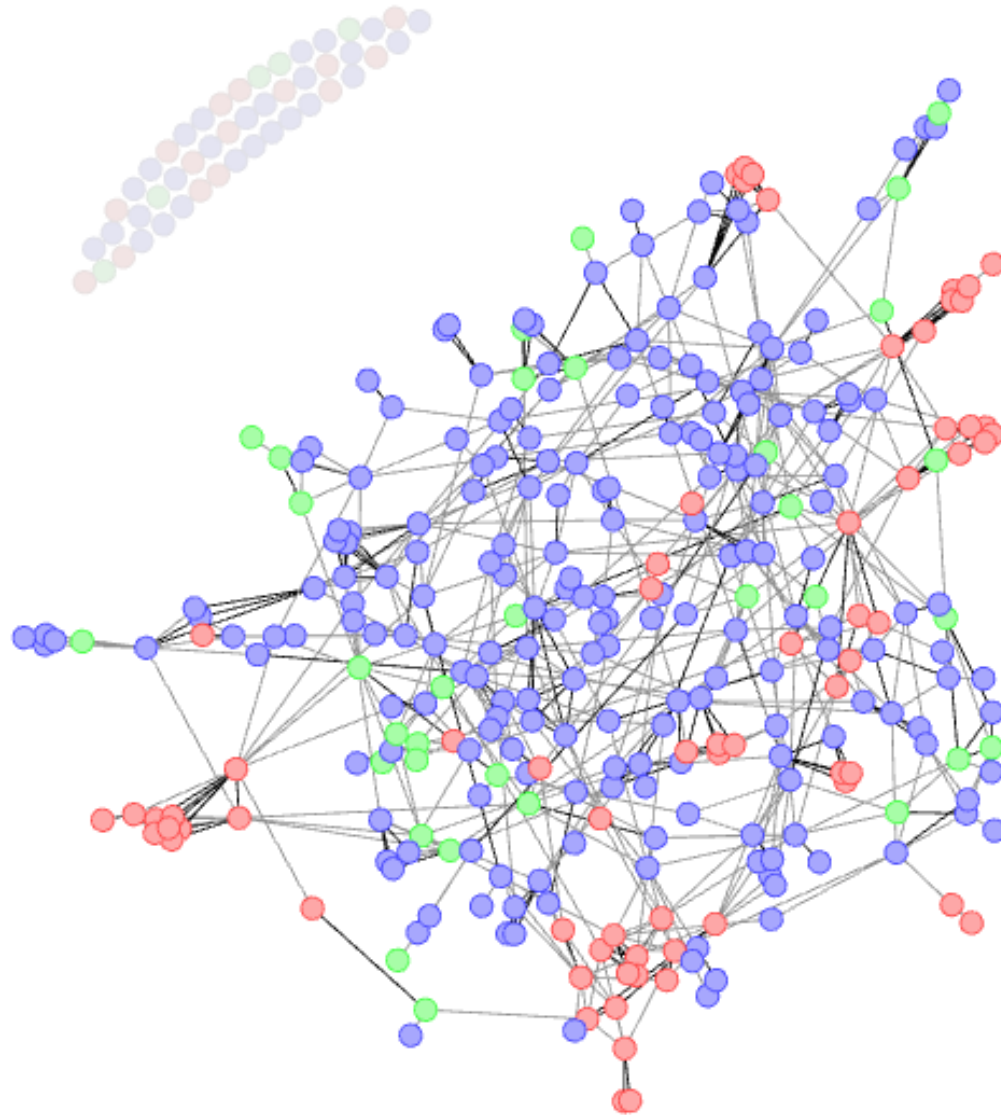


# Example Development of Social

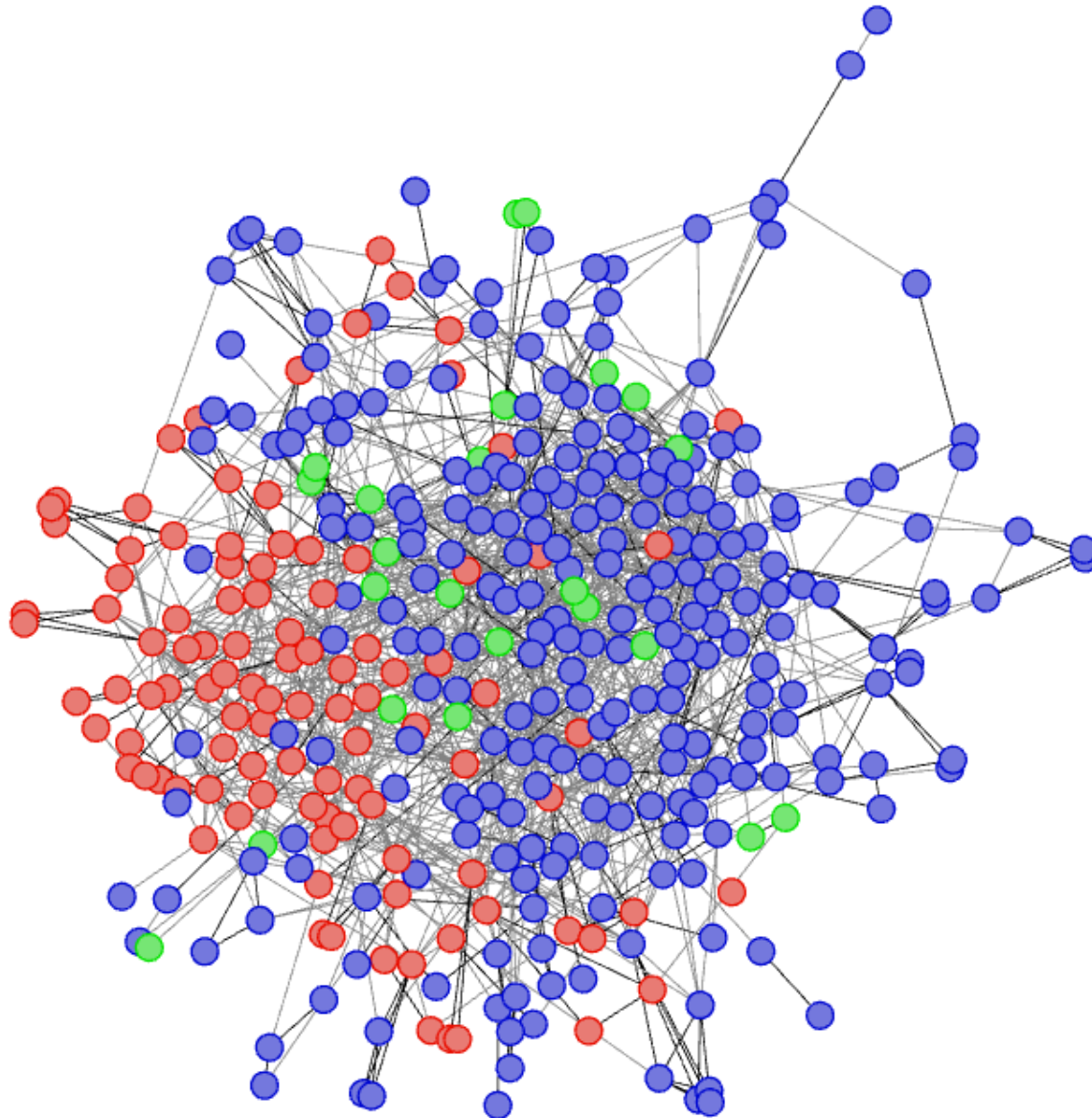


- Three “snapshots” of the social network from a single run of the “Inner City” version
- Darker links are within-household, lighter are other social links
- Each link indicates a relationship where *if the agents are so minded* they might discuss or otherwise influence each other concerning politics, voting etc.
- The issue about initialisation is clearly visible here

# Social Network at 1950

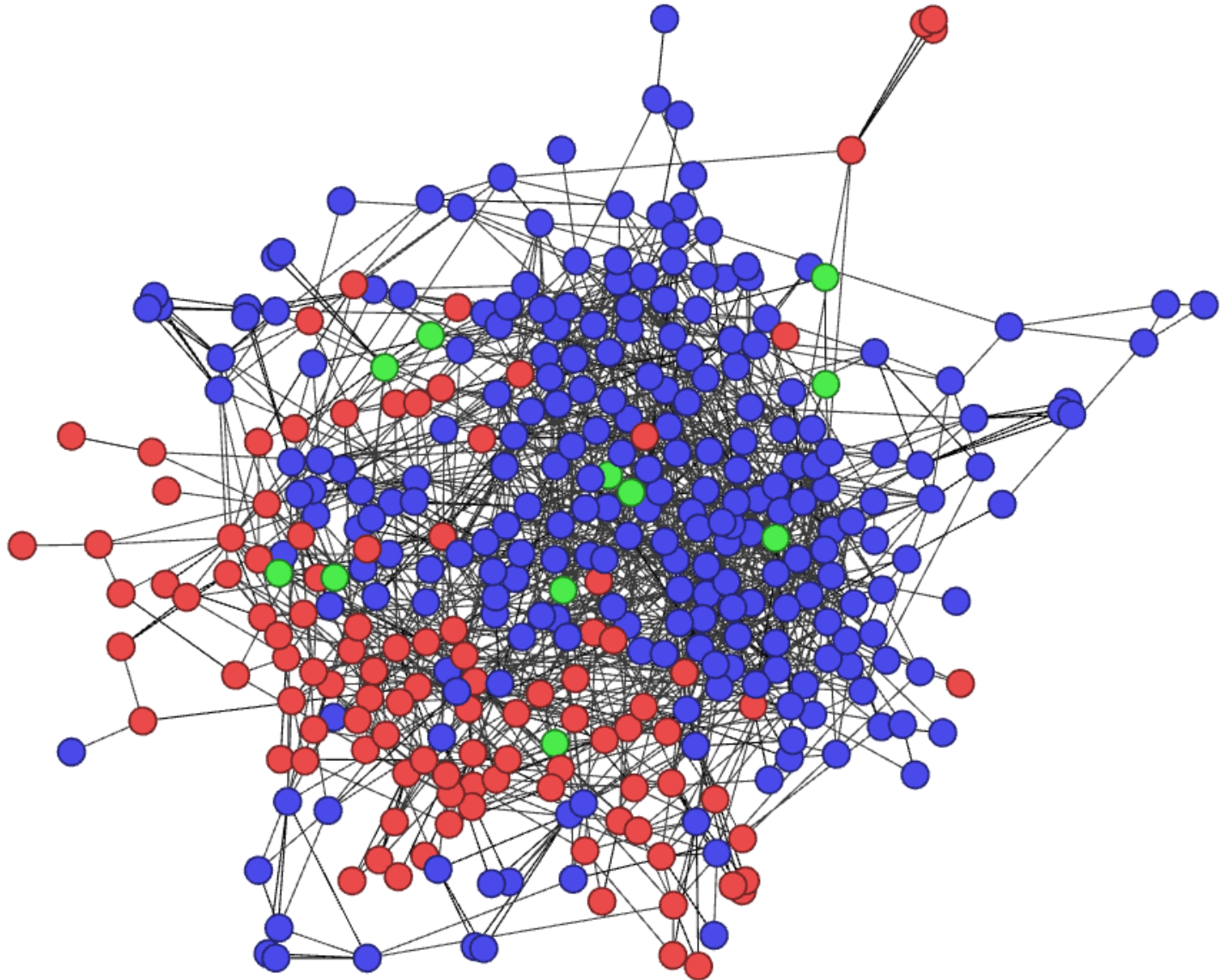


# Social Network at 1980





# Social Network at 2010



# Brief Exploration

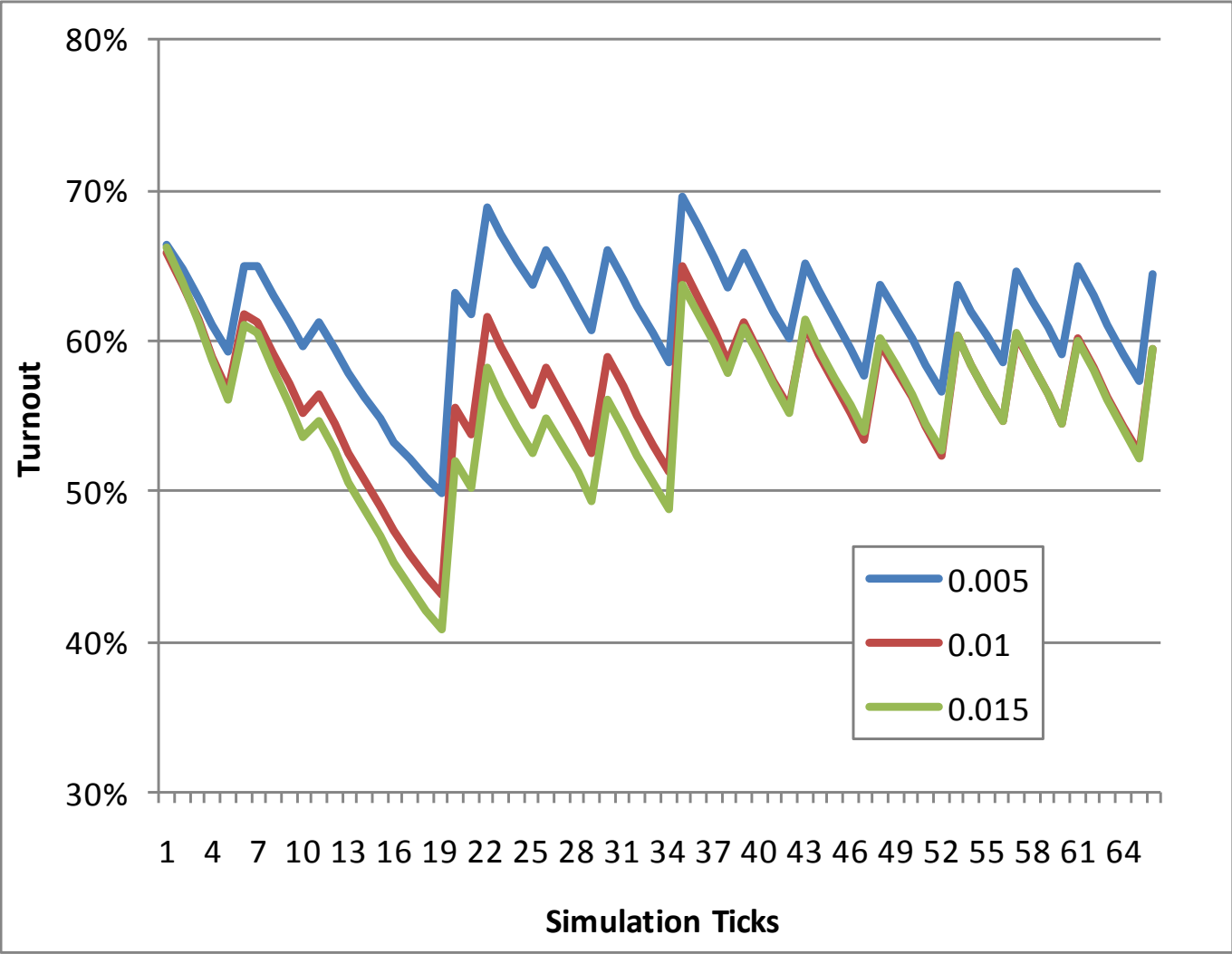


- 270 runs with grid 30x30, ~1700 pop, over 66 years
- 10 runs each with combinations of
  - Emmigration rate: 0.5%, 1%, 1.5% pa
  - International Immigration rate: 0.5%, 1%, 1.5% pa
  - Proportion of Majority: 80%, 85%, 95%
- Each graph plots turnout vs. one factor over all other combinations

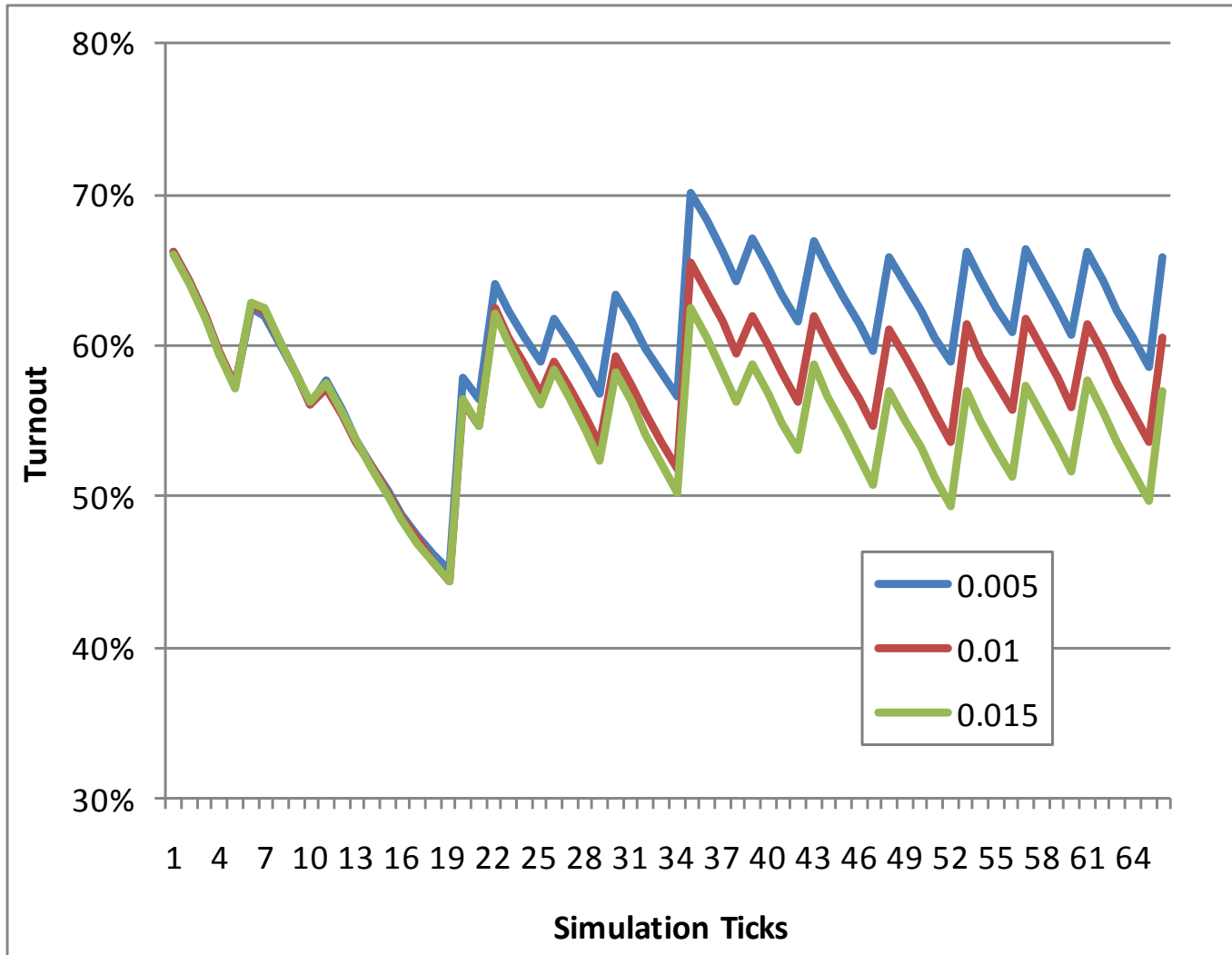
Other headline parameter settings:

- [move-prob-mult 0.2] [prob-partner 0.13] [int-immigration-rate 0.01] [drop-friend-prob 0.15] [density 0.64] [birth-mult 0.825] [prob-move-near 0.1] [forget-mult 1.09] [init-move-prob 2.5] [death-mult 1.2] [drop-activity-prob 0.05]

# Effect of Immigration Rate



# Effect of Emmigration Rate



# Effect of Majority Proportion

