

Unravel the indicators affecting retail success in Chicago based on the spatial interaction model



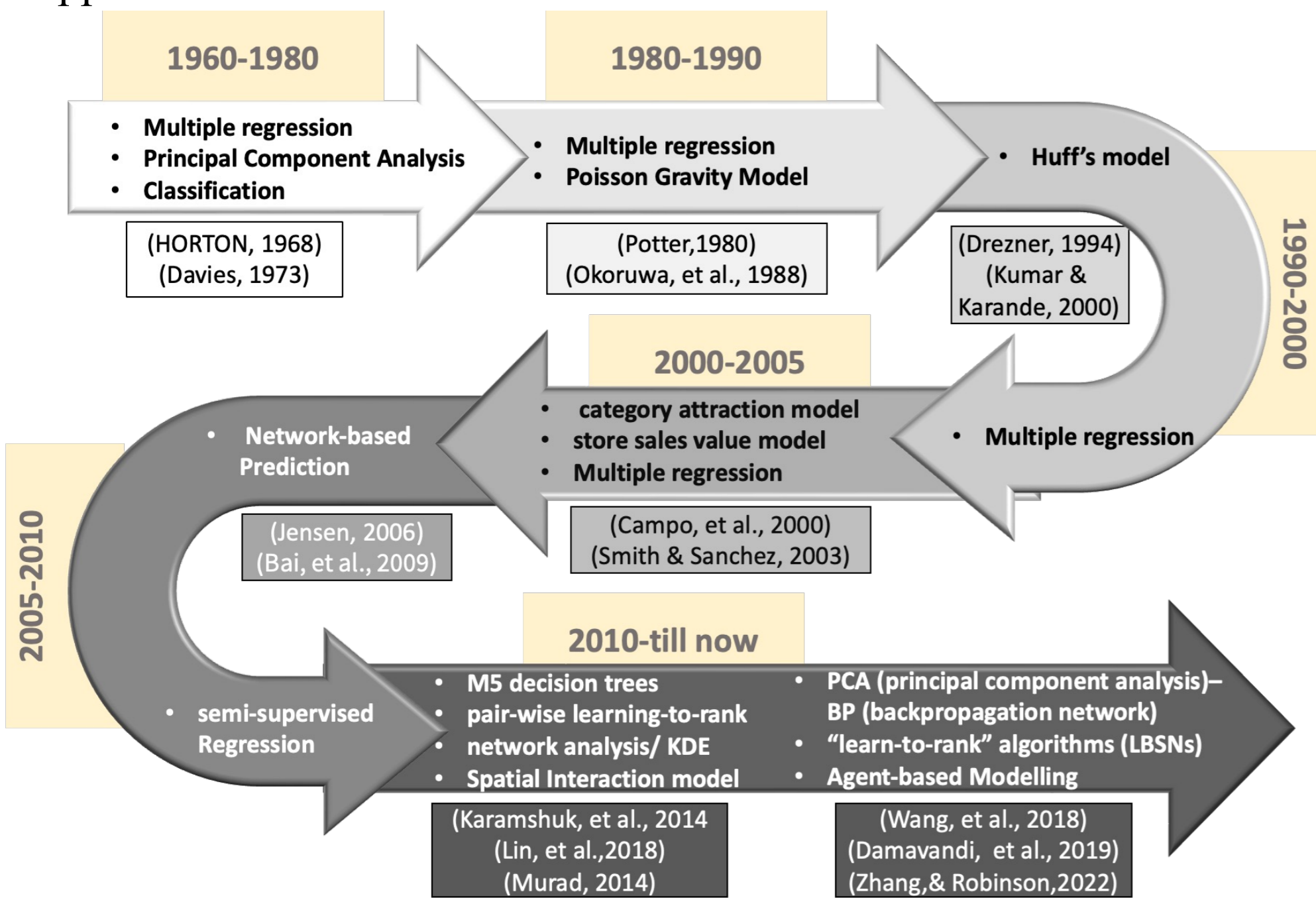
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1. Background

- For retailers, the prevalence methods that have been taken are checklists, regression models etc., which offer limited help with the site selection issues.
- For academia, with the development of data collection and analysis tools, methods of retail research are amid a new transformation.
- The evolution of retail location in academia is shown below, which is process from macro to micro perspective, from rough to more specific and comprehensive factors, and from limited to advanced quantitative approaches.



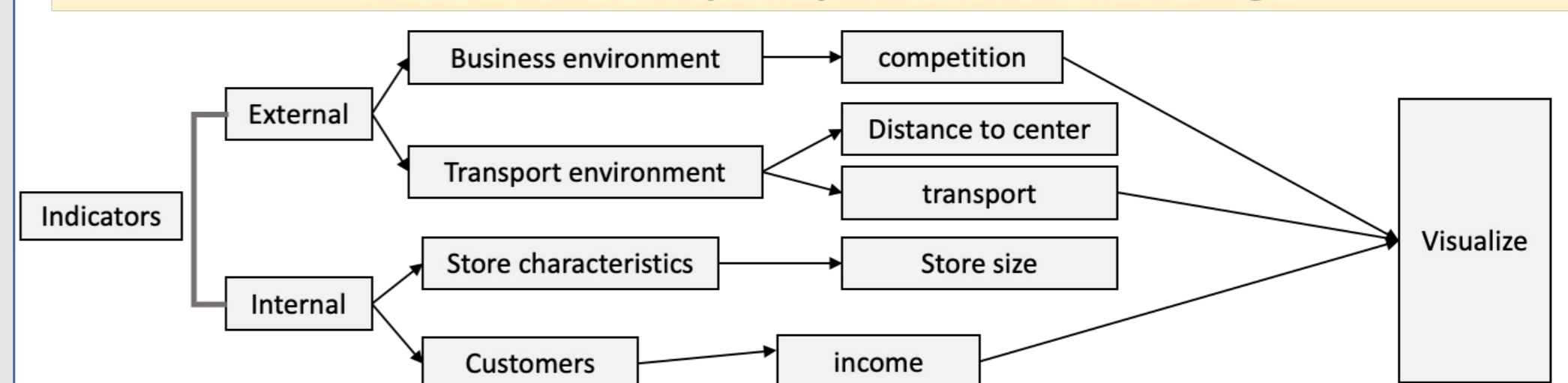
2. Research Questions

- What specific variables can be chosen to understand the spatial patterns of retailing and its customer visits in Chicago?
- Generally, what factors can be discovered to be related to the store performance based on SIM?
- Specifically, based on different classification, how do the factors perform differently in SIM?

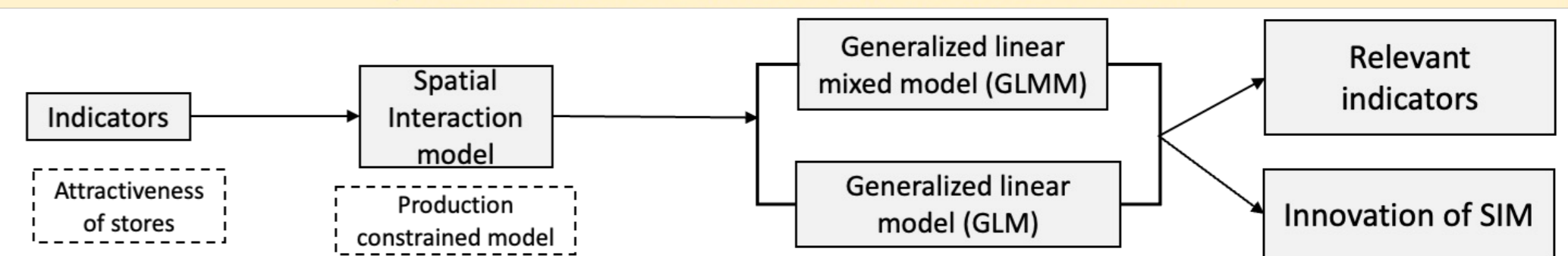
3. Methods and initiation

- For contents, it attempts to explore comprehensive indicators influencing store performance, containing business environment, transport environment, store, and customer characteristics.
- For methodology, a generalized linear mixed model (GLMM) is adopted for the spatial interaction model (SIM) to obtain more flexibility about the random variables in the model. Meanwhile, it also endeavours to build the spatial interaction model based on K-means clustering, which will help to understand the retail pattern from a micro perspective.
- For data, GPS data sources is the main source for the study, which will reveal the application of SIM for the big data source.

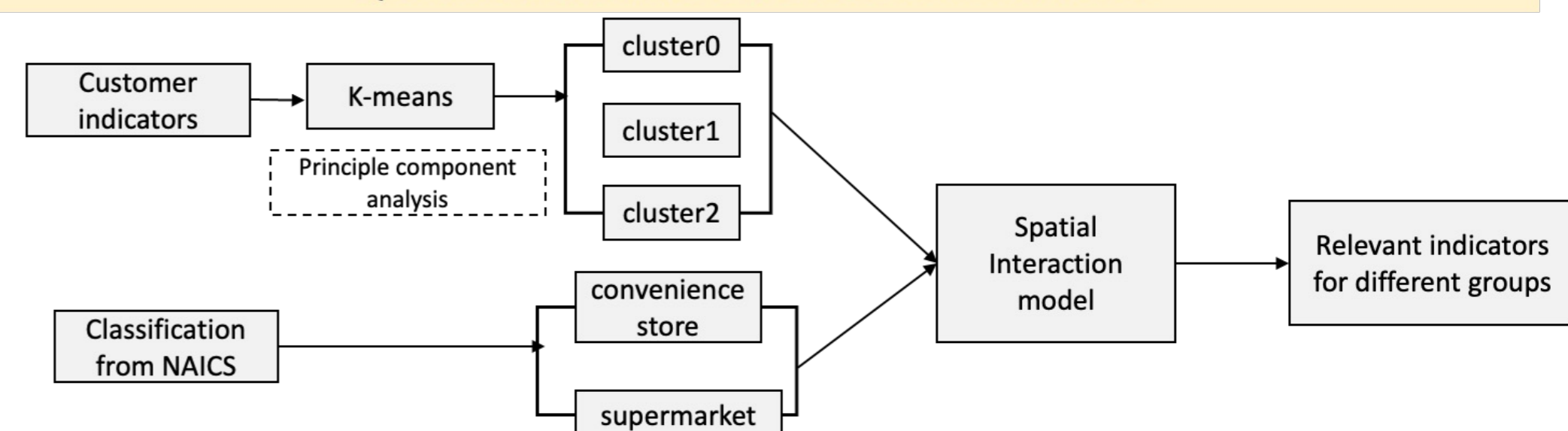
Q1: Variables and Spatial pattern of retail in Chicago



Q2: Related factors of store visits from macro level



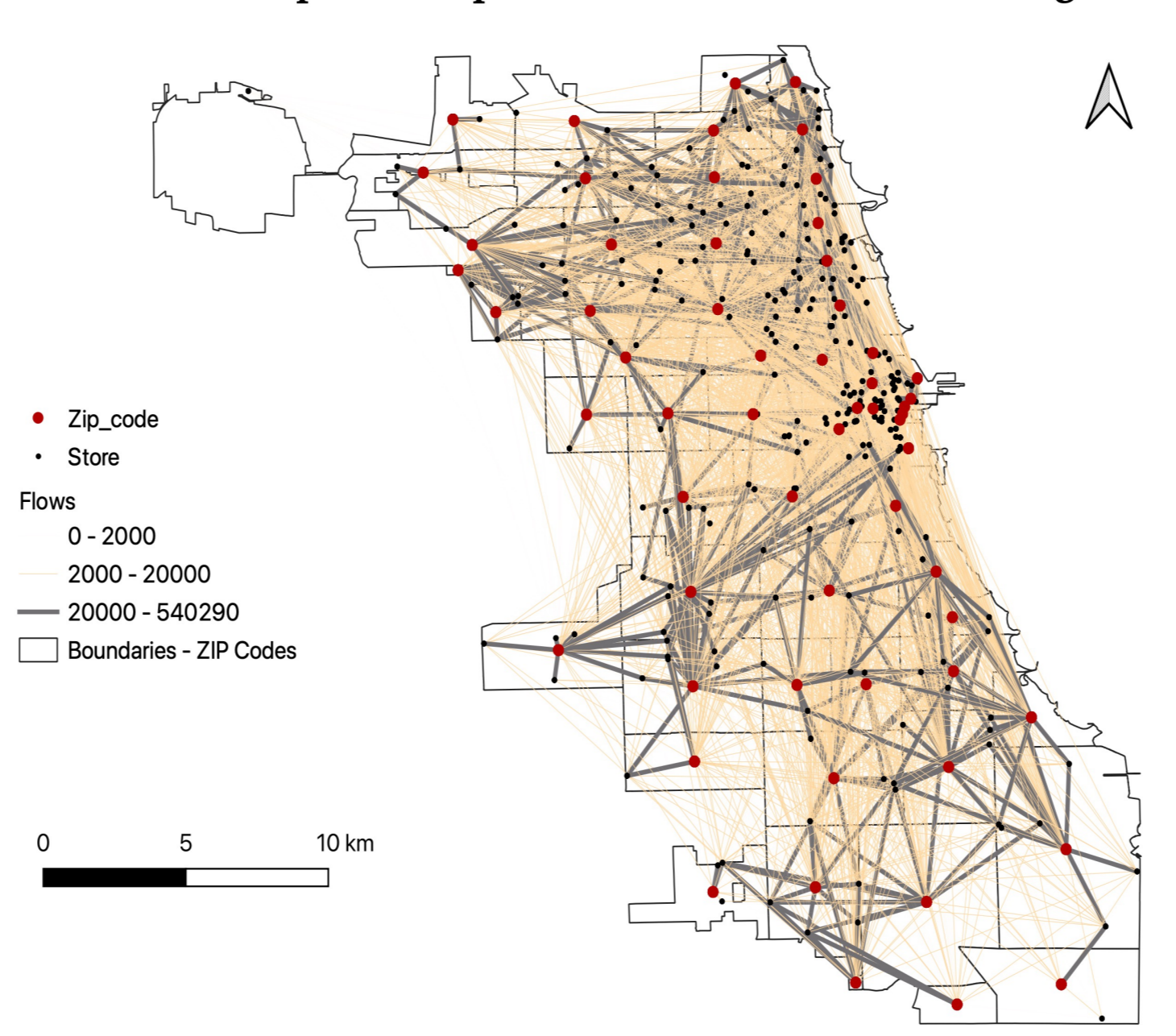
Q3: Related factors of store visits from micro level



4. Main Findings

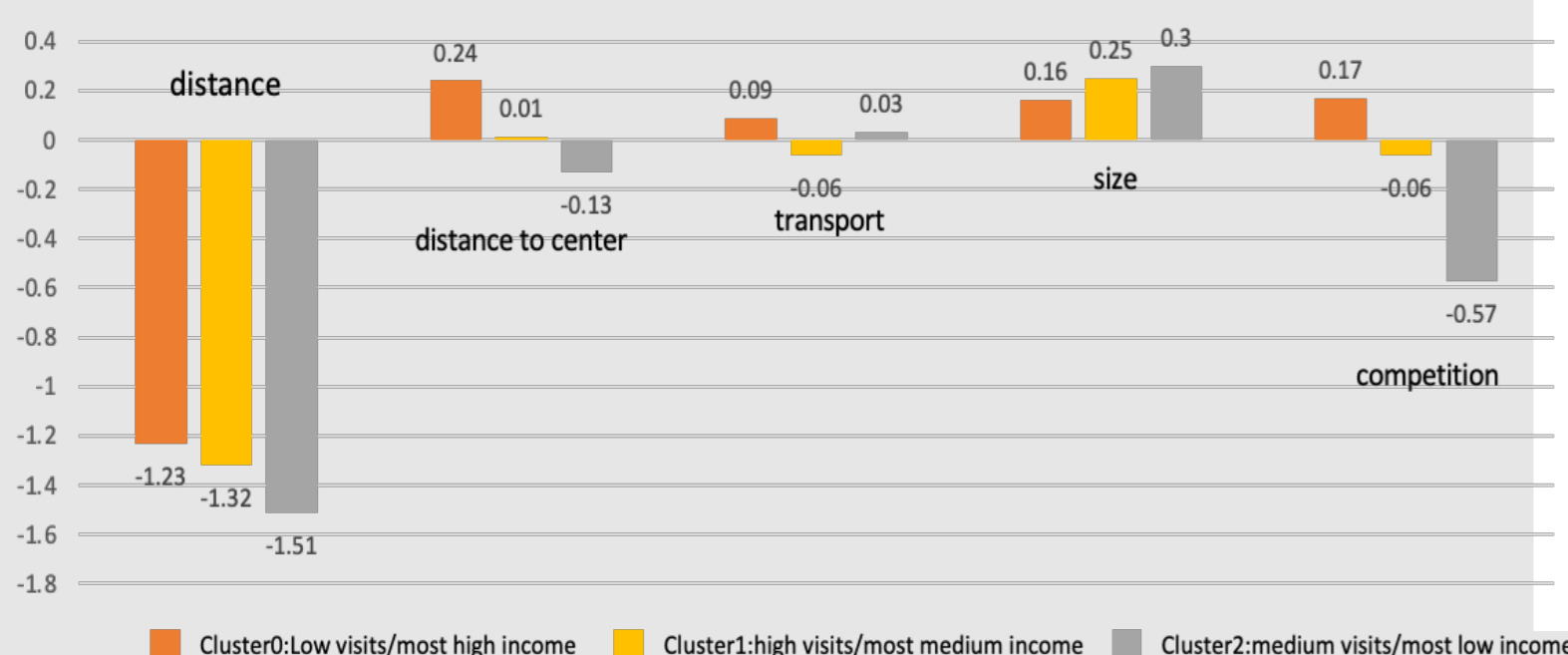
- From macro perspective, it is proved that the visits of stores will decrease with the increase of the competition. Competition, transport, and medium high-income group possess negative impacts on store patronage. Size of stores, distance to centre, high income and the medium low-income group would help to increase the store flow.
- However, from micro perspectives, the competition will influence the performance of supermarket more negatively than convenience stores.
- For income groups of stores, the patronage of stores with the most low-income customers is more effective to competition, while the visits of store with the most high-income customers possess a positive relationship with competition.

Flow map from zip code to destination in Chicago

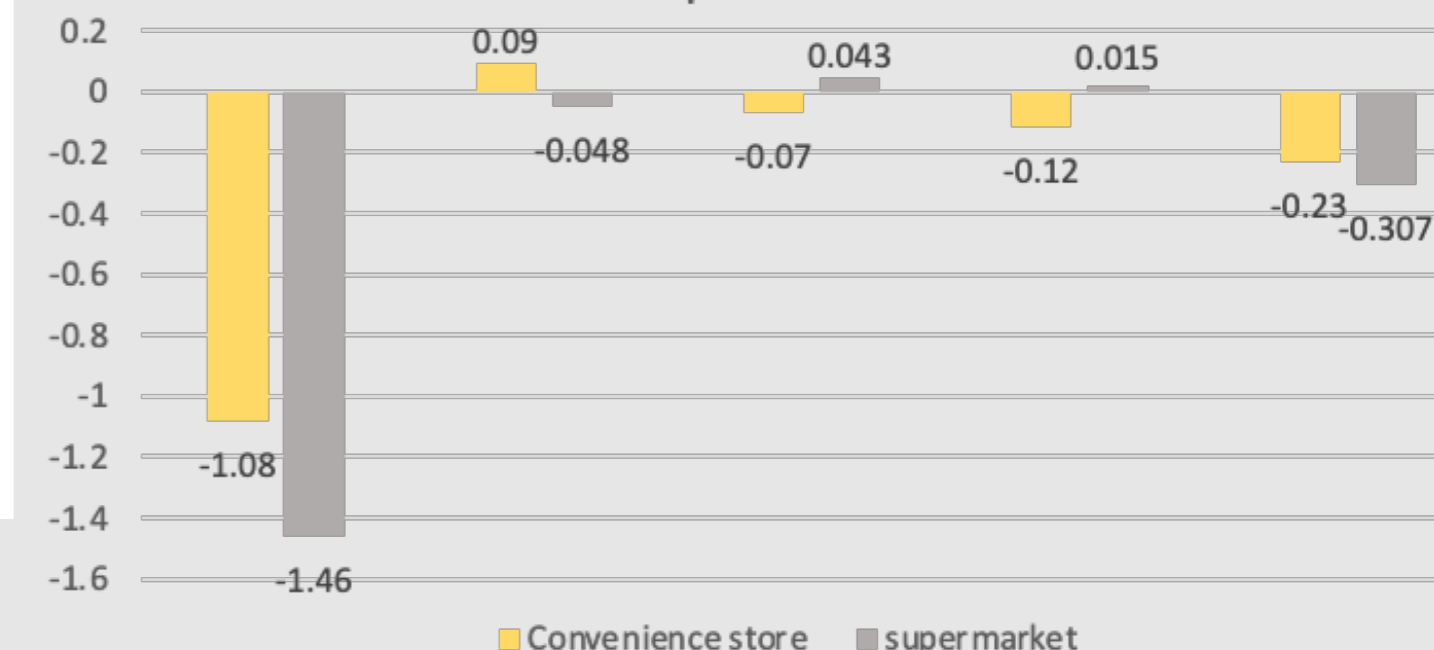


- However, from micro perspective, the size of convenience stores affects its patronage negatively. For the transport factors, it shows a negative relationship between store patronage which is out of our expectation.
- it could be found that the transport factor is negative for convenience store but positive for supermarket, which may be possibly caused by the different travel mode to different kinds of stores.

Coefficient comparison of clusters



Coefficient comparison of convenience store and supermarket



- For the performance of models, considering the random effects utilizing GLMM in the spatial interaction model, the performance of model improved significantly. Comparing the parameters (γ and β value) in the model, the GLMM performs more negatively significant than the GLM for SIM.