Abstract
This research investigates the emergence of retail clusters on a supply chain network comprised of suppliers, retailers, and consumers. Agent-based models are employed to study retail location choice in a market of homogeneous goods and complementary goods. Our research is motivated by real-world observations that customers choose to patronize retailers based on factors such as convenience, price, and quality. We develop a market simulation framework to study retail location choice in a market of homogeneous goods and complementary goods. Our primary contributions are as follows:

1. We develop a model for retail location choice in a market of homogeneous goods and complementary goods.
2. We study the impact of shipping costs and consumer behavior on the formation of retail clusters.
3. We analyze the sensitivity of the results to changes in the parameters of the model.

Conclusions
This paper builds agent models to examine retail location choice on a supply chain network of consumers, retailers, and suppliers, considering the impact of both market demand and consumer behavior. We find that the formation of retail clusters is influenced by the shipping cost and consumer behavior. In a market of homogeneous goods, we find that the formation of retail clusters is influenced by the shipping cost and consumer behavior. In a market of complementary goods, we find that the formation of retail clusters is influenced by the shipping cost and consumer behavior. Moreover, the likelihood of clustering increases with the gap between the number of retailers of homogeneous goods and complementary goods. Our sensitivity tests also find different patterns when the shipping cost or consumers' willingness to travel changes. It can be learned that based on our simplified supply chain model, the development of a market does not always lead to condensed agglomeration of business locations.

A market of two complementary goods
Consumers: consumer hopes to buy two products (names, 1 and 2) with minimum cost, indicating minimum travel distance. A trip is defined as a round-trip for a consumer from home to visit R1 and R2. Given W1 number of R1 and W2 number of R2, there is in total W1 * W2 trip candidates, from which a consumer chooses the shortest trip on the circle. The utility for consumer p to patronize Retailer R1 equals:
\[ u_p = \sum_{i=1}^{W1} \sum_{j=1}^{W2} p_{ij} \]

Suppliers: There are two categories of suppliers selling product 1 and 2, which are evenly distributed and colocated. Suppliers of the same goods offer the same unit sales price.

Probability distribution of the numbers of clusters with 10 retailers of product 1 and the number of retailers of product 2 ranging from 2 to 15 (shown in the horizontal axis). The case of only one cluster is most likely to emerge. The greater gap between the number of retailers of product 1 and the number of retailers of product 2, the more likely that the case of fewer clusters will emerge.

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