

PROGRAMMING FINAL PROJECT

Airbnb Simulation & Seasonal Analysis

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Part 1: Simulation

How do different bidding rules shape the evolution of the Airbnb market?

Model & Method

- Agent-based model with three main entities: City, Hosts, and Places.
- Each month, hosts earn profit and use it to bid for reachable listings.
- Ownership updates depend on profit, distance, and bidding rule.
- Simulated multiple months under two behavioural rules.

Bidding rules

V0 = Aggressive

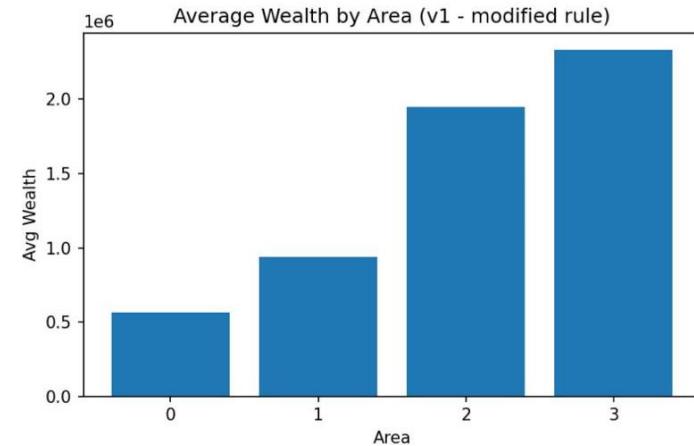
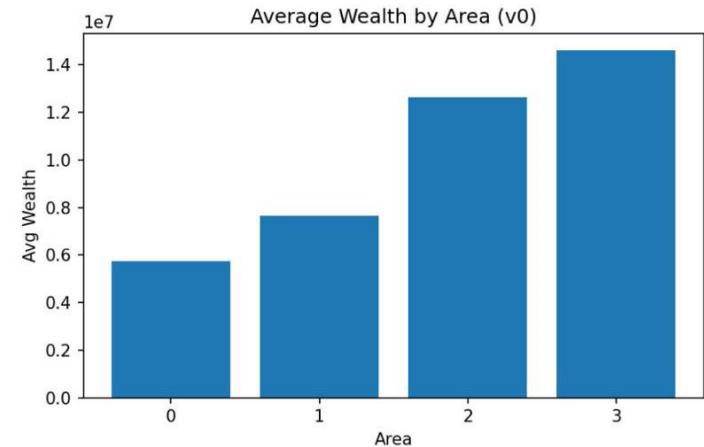
- Hosts Invest 100% of profits into bidding

V1= Conservative

- Hosts invest 70% of profits leading to a slower expansion

Conclusion

- Bidding strategy strongly affects long-term market structure.
- v0 creates fast concentration & v1 yields more balanced growth.



Part 2: Seasonal Analysis

How does seasonal availability vary across time in Barcelona?

Data & Method

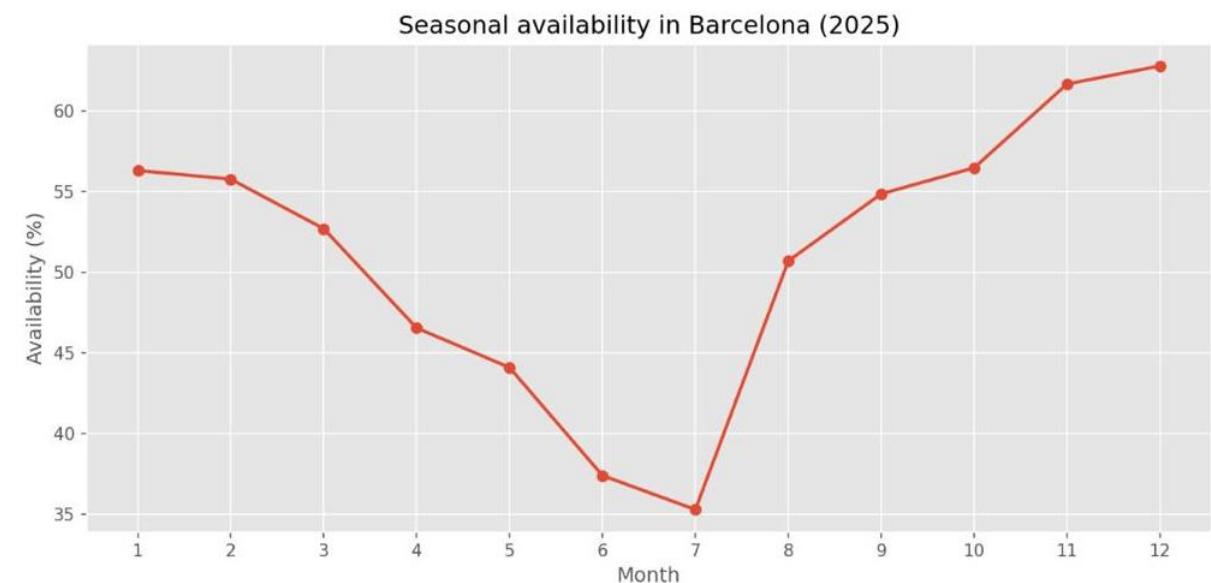
- Dataset: Inside Airbnb, **Barcelona calendar (June 2025)**.
- Cleaned dates and availability values.
- Computed average monthly availability rate.

Findings

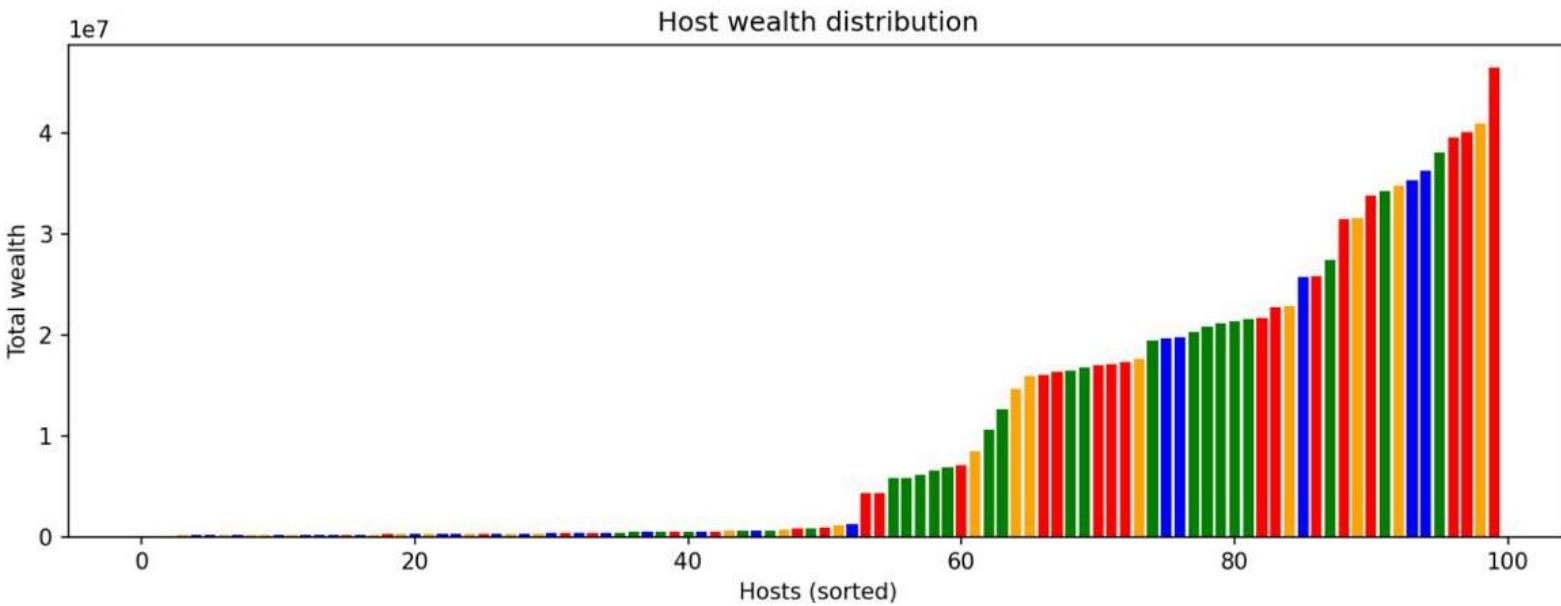
- Strong seasonal pattern across months.
- Lowest availability in July (peak tourism).
- Higher availability across autumn and winter.

Conclusion

- Our monthly availability curve confirms the expected demand seasonality.



ANNEX



```
# v0 – Original rule:  
# Hosts spend all their current profits on any affordable  
property  
if place.price <= self.profit:  
    bid = place.price      # offer full price  
    self.profit -= bid  
    city.register_bid(self, place, bid)
```

```
# v1 – Modified rule:  
# Hosts can only use up to 70% of their current profits  
max_budget = 0.7 * self.profit  
if place.price <= max_budget:  
    bid = place.price  
    self.profit -= bid  
    city.register_bid(self, place, bid)
```