MARKET DISTORTION AND SOCIAL WELFARE DECLINE IN UNREGULATED DIGITAL MARKETING

Computational economics and public policy

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INTRODUCTION

In a world without digital marketing regulations, advertising practices shift dramatically. The absence of oversight results in new dynamics that reshape how advertisers compete, engage users, and influence the digital landscape.

PROBLEM

Consequences of No Regulations

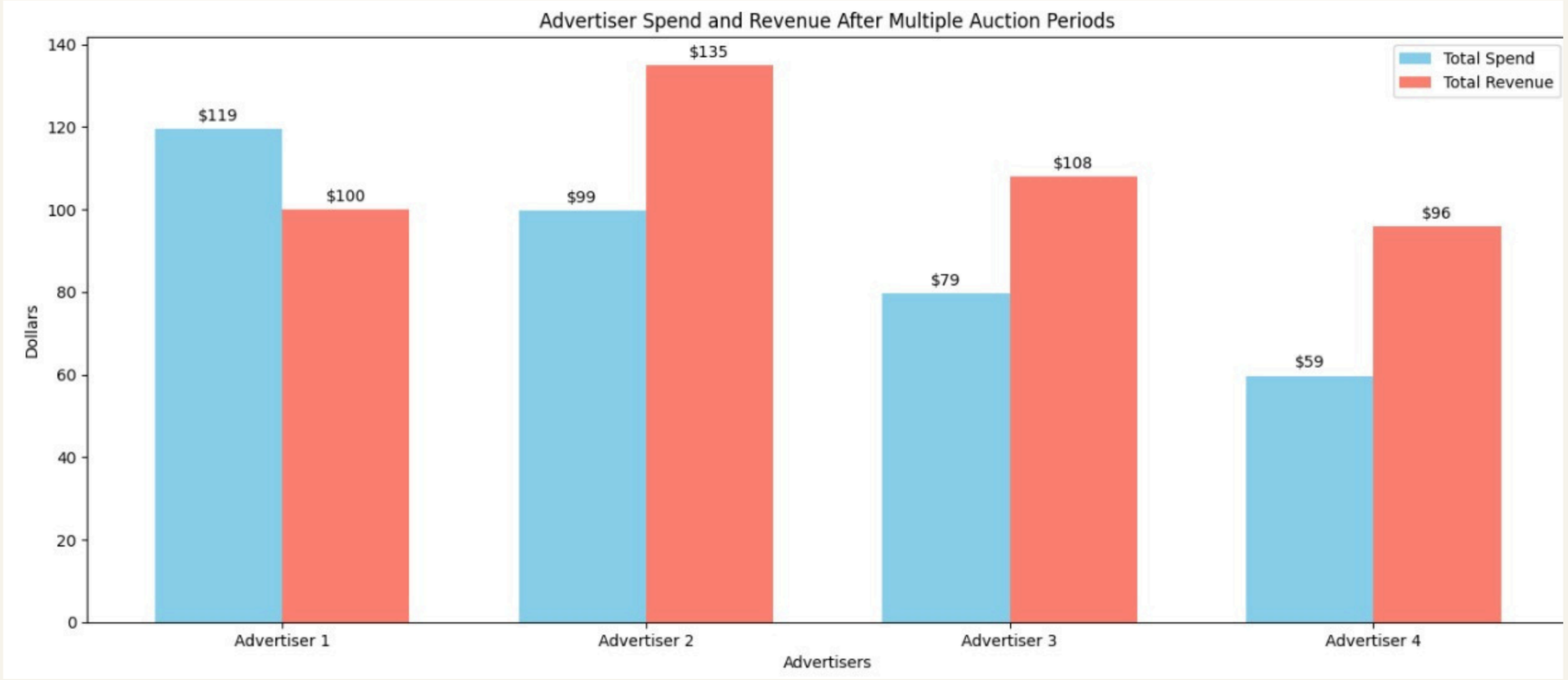
- Aggressive Bidding Wars: Unchecked bidding drives up costs, making it hard for smaller players to compete.
- Monopoly by Big Players: Dominance by large companies with extensive resources.
- Quality Erosion: Emphasis on quantity and sensationalism over meaningful content.
- Data Exploitation: Massive data collection without user consent for hyper-targeted ads.

DIFFERENT TYPE OF AUCTION

- The model we used to simulate the ADspace included agents like bidders, AD platforms, and regulating agencies.
- Parameters like ROI, Bid amounts, Budget, revenue, and revenue per budget.
- The model is run for 150 consequent bids, which captures how the ADspace operates over a day.
- The customers are treated as the product the platform is trying to sell. The viewer(customer) traffic is modeled to decay with each Auction that happens throughout the 150 periods.

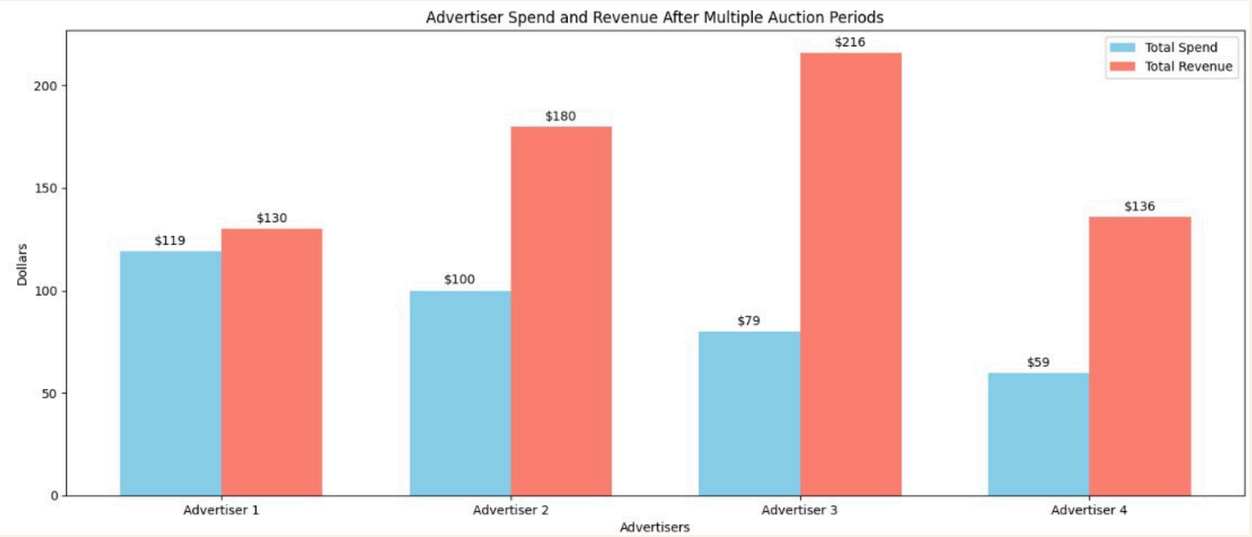
DIFFERENT TYPE OF AUCTION

The Platform hosting the AD auction has the decision to conduct the type of auction they want. In this we are given a model where 4 bidders participating in the auction and see how the type of auction changes the outcomes ROI,



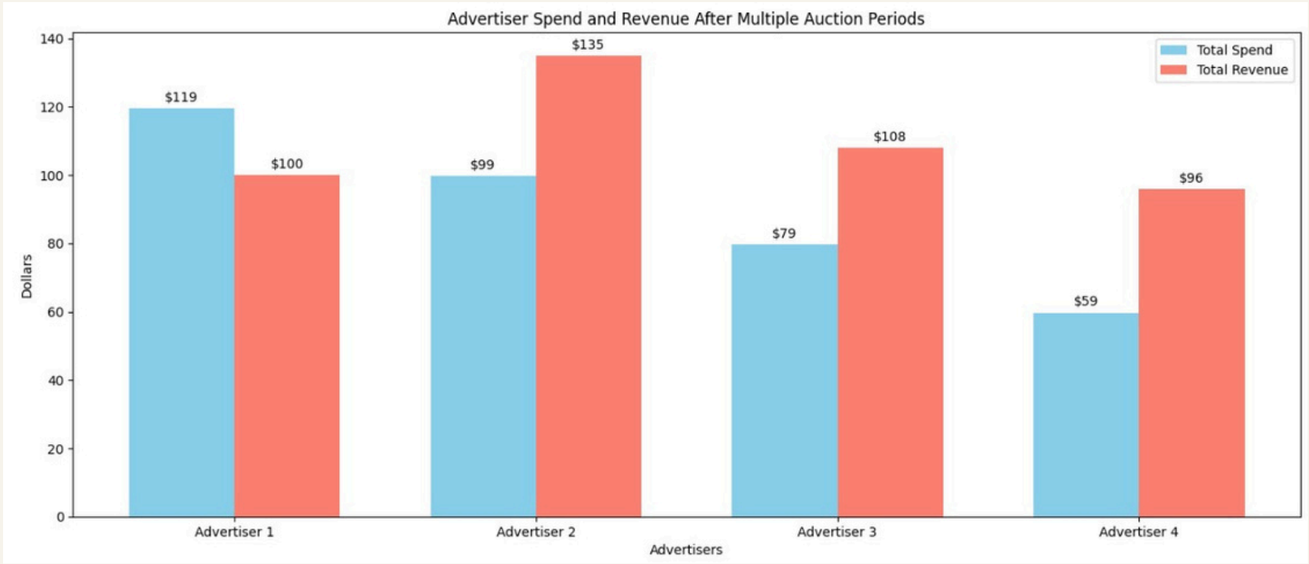
On the Top, the auction held was the First-Price Auction

DIFFERENT TYPE OF AUCTION



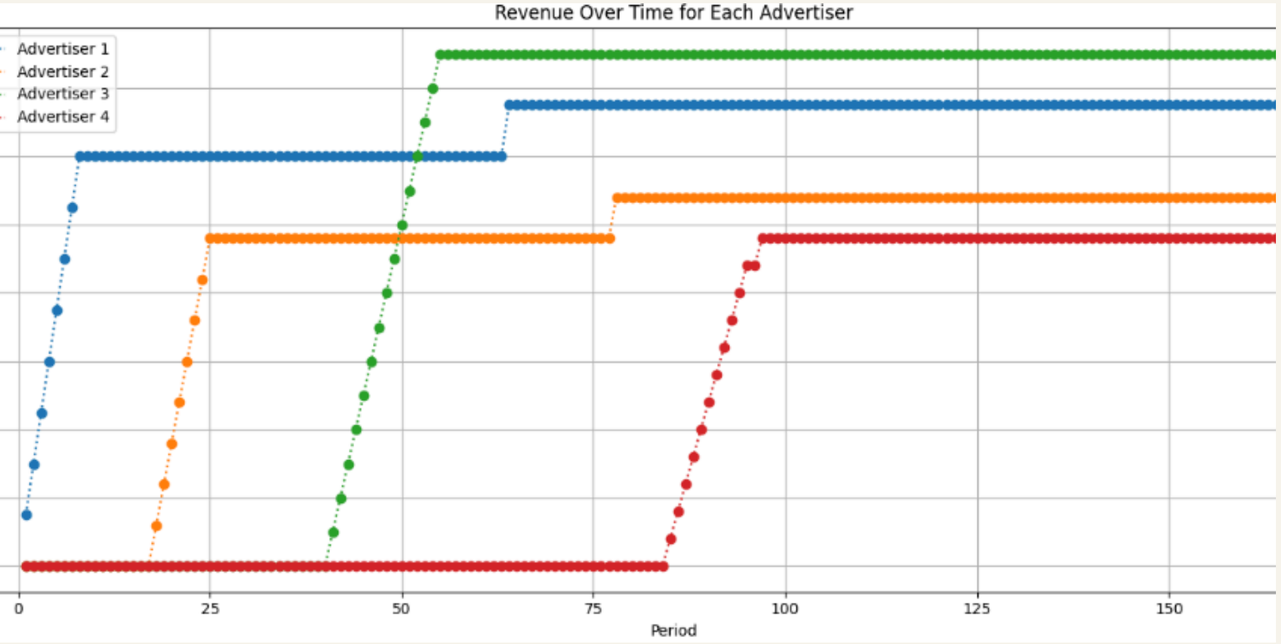
In the left, the type of auction held is Second price auction, which is chosed for its exceptional ROI

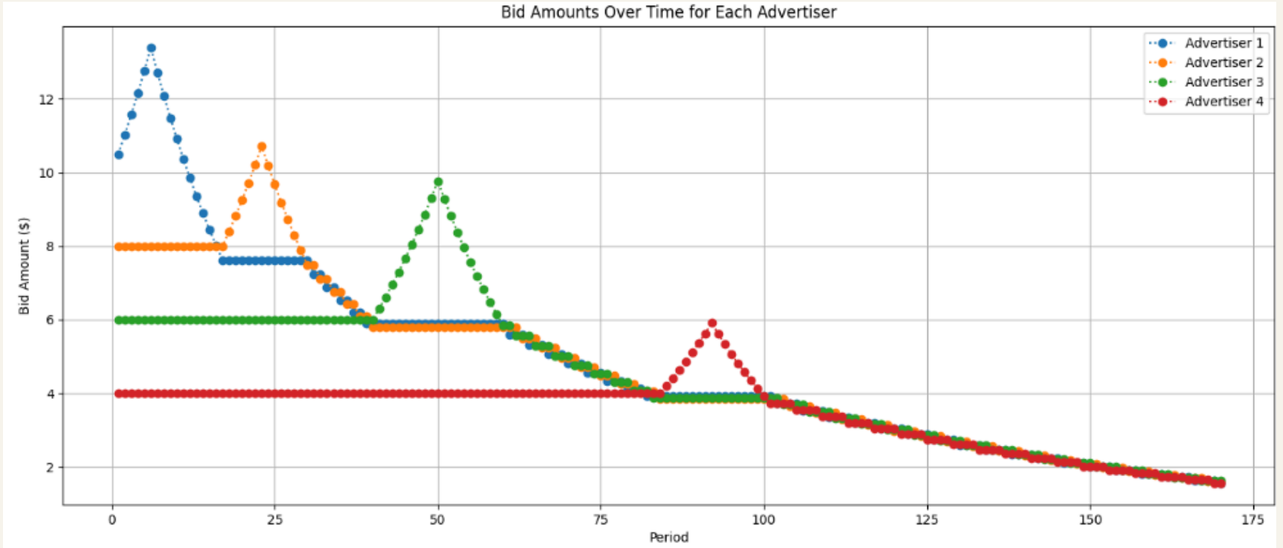
In the Right, the type of auction held is Auction where the bidder pays the average of the top 2 highest bids.



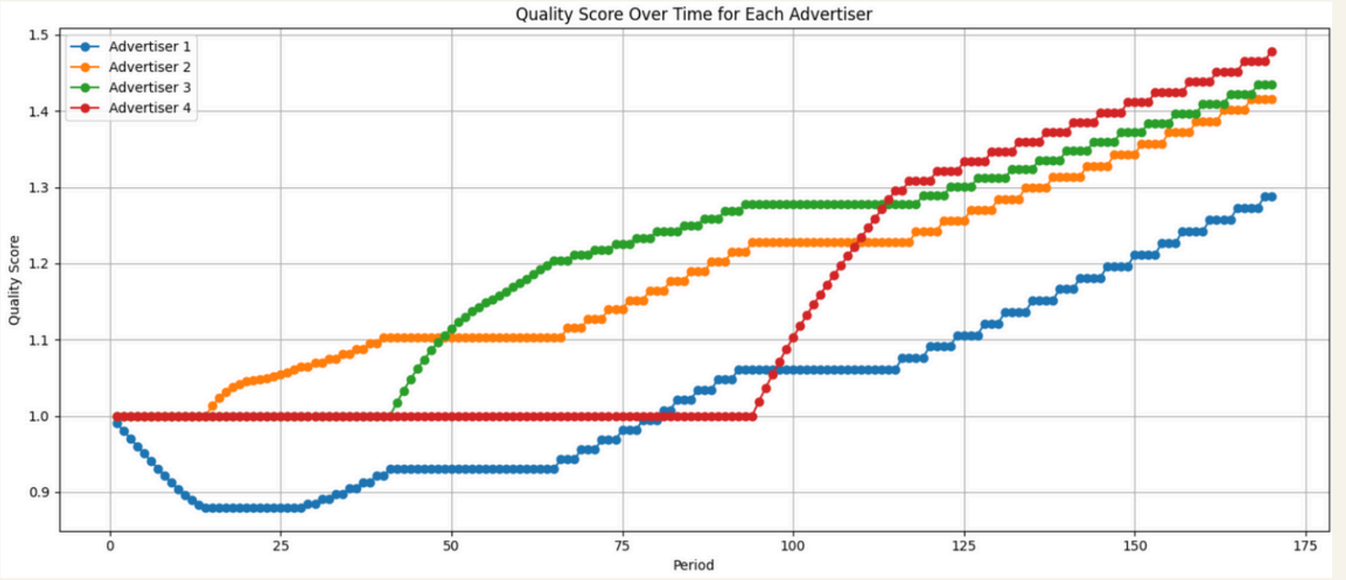
INTRODUCTION OF AD-RANK

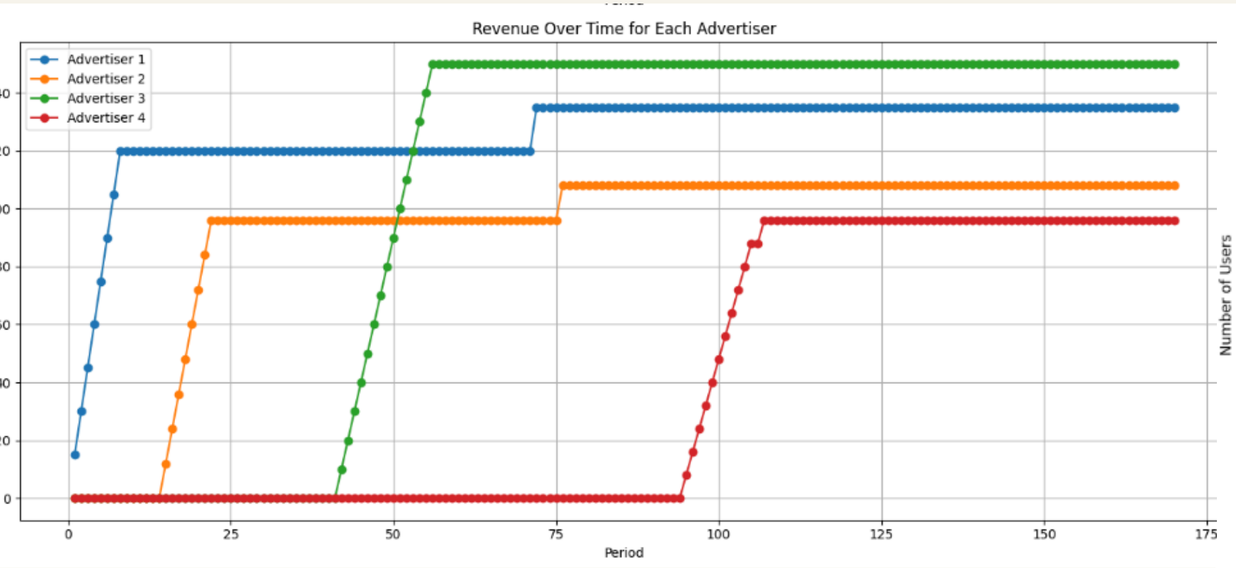
Before Quality Score: Ads were frequently irrelevant/bad experience to users because advertisers could secure positions solely through high bids. This diminished user satisfaction and ultimately reducing the user base.

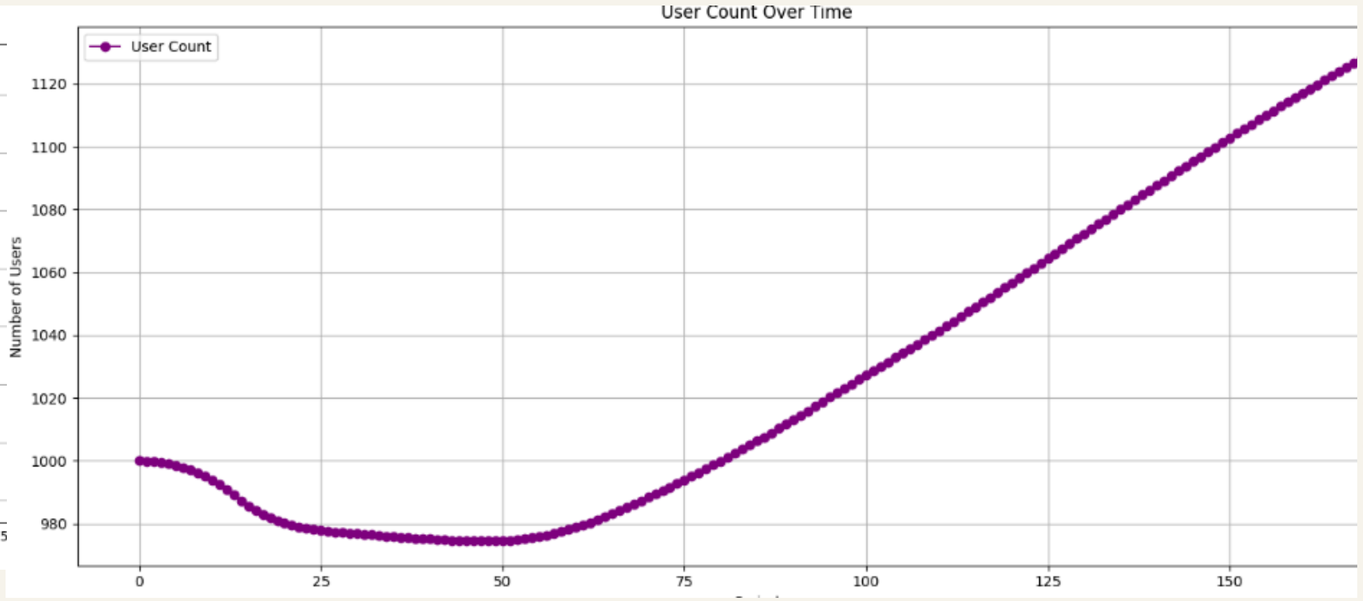




After Quality Score: Quality Score directly rewards ad relevance .Ads that are more likely to match user intent and provide a positive experience rank higher. This has improved overall user satisfaction and hence the user base increases







AUCTION MODEL

The Main classes of the model:

- MarketEnvironment : Simulates real-world market conditions, varies the market demand
- Agent : Defines the bidders. (initial_bid,budget,revenue_per_click,subsidy,learning_rate,memory_size,max_bid, exploration rate)
- Platform : Manages auction rounds, determines winners, tracks ad quality.

Strategy implementation: Agents adjust bids based on recent ROI, win rates, and budget, enabling agents to dynamically respond to market demand and maximize their bidding effectiveness.

The learning mechanism enables agents to adapt by storing experiences (such as bid, win status, and ROI) and analyzing competitor bids, which helps refine their strategies over time based on past performance and competitive insights.

EFFECT OF SUBSIDY AND MAX_BID_CAP

- Initial_bid=5
- Revenue_per_click=15
- Max_bid_cap=15 (To avoid aggressive Bidding)

Small Business:

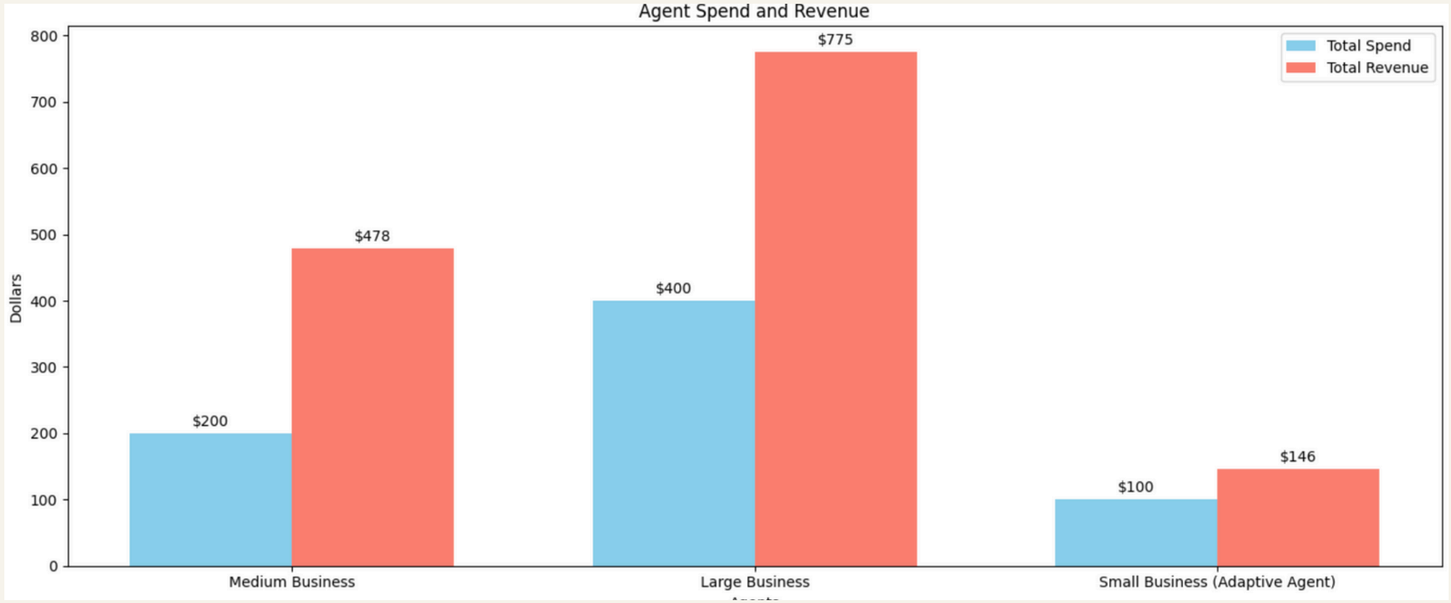
- budget=100, subsidy=60, learning_rate=0.1

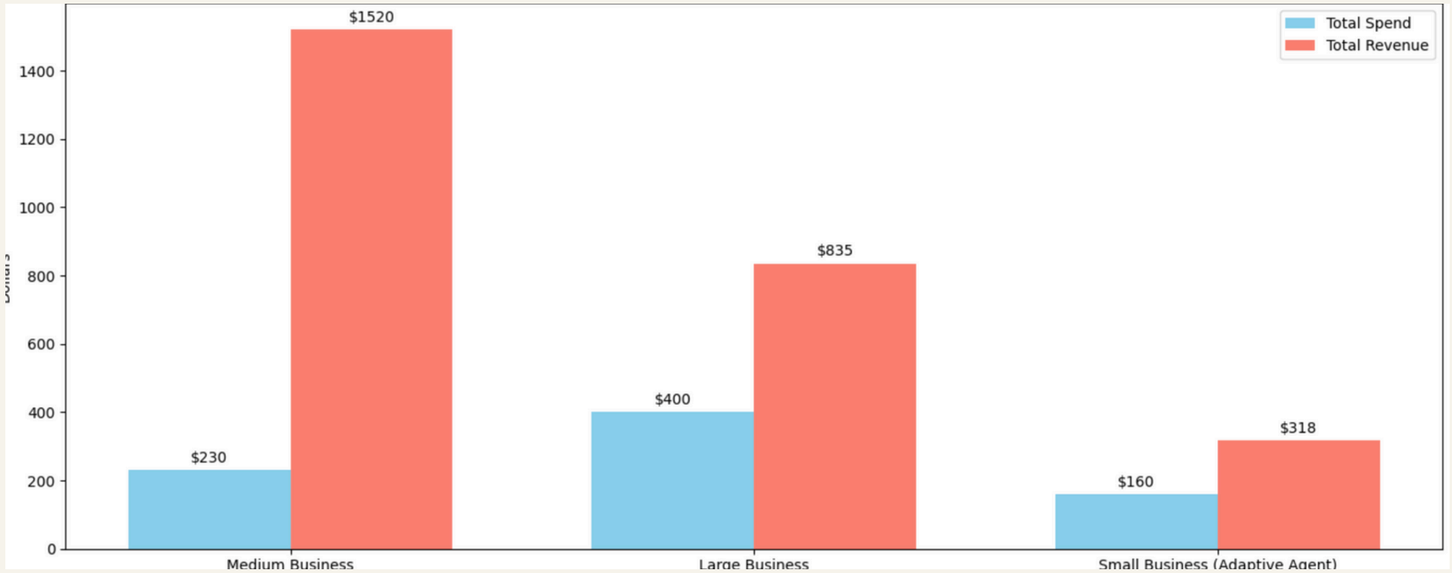
Medium Business:

- budget=200, subsidy=30, learning_rate=0.15

Large Business:

- budget=400, subsidy=0, learning_rate=0.2





THANK YOU