DISSERTATION PROPOSAL

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"Algorithms and Consumer Insights:
Unveiling the Economic Impact of AI Pricing and Large Language Models"

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This dissertation explores the intersection of artificial intelligence (AI) and consumer behavior in three distinct chapters.

Chapter 1 delves into how AI-driven pricing algorithms (specifically reinforcement learning algorithms) are influenced by product ranking systems in online platforms. I study two types of ranking systems: personalized (which sort products based on consumer's utility) and unpersonalized. The findings indicate that personalized rankings might unintentionally support tacit collusion among algorithms to keep prices high, particularly when consumers engage in sequential search to find better fit products. On the other hand, unpersonalized rankings seem to disrupt tacit collusion by pricing algorithms, leading to lower prices and benefiting consumers. This suggests that even without price discrimination, personalization can sometimes harm consumer interests specifically when pricing decisions are delegated to AI algorithms.

Chapter 2 examines the accuracy of Large Language Models (LLMs) like OpenAI's GPT in marketing research. Initial tests showed that LLMs grasp basic economic concepts, but they don't always accurately predict real consumer behavior. For example, in home insurance decisions, the model's predictions differed significantly from what consumers actually chose, indicating a need for caution in using LLMs for market research. The LLM results can be rationalized by a loss aversion parameter which is approximately 3 times that of what is observed in literature. We conduct a series of experiments to understand why LLMs may display extreme risk averse behavior when asked to act as a consumer and choose between risky options. The results indicate that these models require further refinement and evaluation before they can be reliably used in understanding consumer preferences.

In Chapter 3, I compare two methods of analyzing counterfactual scenarios in economics: using generative models like LLMs and economic structural modeling methods. Structural models help predict the impact of hypothetical changes based on established economic theories, while LLMs generate scenarios based on patterns in data. However, LLMs don't inherently understand economic principles; they rely solely on the data they're trained on. This chapter aims to highlight the strengths and weaknesses of both approaches in drawing conclusions from economic data, especially in scenarios where direct observation is difficult or impossible.

In summary, this dissertation seeks to provide insight into how AI impacts consumer welfare, the reliability of LLMs in market research, and the comparative analysis of generative and structural models in economic forecasting.