Exercise 1  *Vertical product differentiation (30%, keep your answers short)*

There are $N$ firms that each produce one product at zero marginal cost. Quality for a product is described by some positive number $q_i \in [q, \overline{q}]$ with $q_1 < q_2 < \ldots < q_N$. Assume the price of good $i$ is $p_i$. There is a unit continuum of consumers uniformly distributed over the interval $[\alpha, \overline{\alpha}]$ with $\overline{\alpha} > 0$. Consumer $\alpha$ gets utility $\gamma + \alpha q_i - p_i$ from consuming good $i$ or 0 from not consuming any good. We assume initially that firms set only prices (qualities are given).

1. Under what condition is each firm active (sell positive quantity)? Derive the firms’ demands when this is the case.

2. Compute each firm’s own price elasticity of substitution, and the elasticity of substitution of demand $i$ to the price of firm $j$.

3. Assume there are only two products and firms simultaneously choose quality. Derive each firm’s profit as a function of quality. What are the equilibrium levels of quality?

Exercise 2  *Research Article (60%, Keep your answers short)*


1. The large pack demand does not decrease much when a small pack is promoted. The same hold for the small pack demand and large pack promotion. Why is this puzzling and why is the former more puzzling than the later.

2. What do we learn from comparing consumers’ responses to branded and unbranded promotion?

3. Assume you want to estimate how much the demand for the large pack decreases when the small pack is promoted? What would be an ideal experiment?

4. What are the main identification challenges with the evidence presented in the paper regarding consumer response to quantity surcharge?

5. What are the broader implications of the paper for the modeling of consumer responses to promotion?