Here we explore what determines whether prices are higher/lower in a model with price uncertainty. The simplest model is that firms draw cost c_j from a distribution F_j and then make an offer p_j. The consumer then decides whether to accept one of the offers, their demand is given by $D_j(p)$.

Then firm prices satisfy:

$$p_j(c_j) = \arg\max_{p_j} \int_{\mathbb{R}^{N-1}} (p_j - c_j) D_j(p_j, p_{-j}(c_{-j})) dF(c_{-j}) \tag{1}$$

where $p_{-j}(c_{-j}) = (p_n(c_n))_{n \neq j}$ and $F(c_{-j})$ is the distribution of costs for the rival firms.

The FOC is:

$$\int \left[D_j(\cdot) - (p_j - c_j) \frac{\partial D_j(\cdot)}{\partial p_j} \right] dF(c_{-j}) = 0 \tag{2}$$

Define $\pi(p_j, p_{-j}, c_j) = (p_j - c_j) D_j(p_j, p_{-j})$ the profits of firm j given prices and costs.

Assume that $\pi(p_j, p_{-j}, c_j)$ is concave in p_j[1] then we have that

0.1 Example: logit demand

With logit demand we have that

[1] Standard assumption, required for the FOC to provide the optimal price.