Appendix

Lexicographic heuristic and Luce's choice axiom as additive model

The population is infinite with three types of people: 1) Price focused (U_1), 2) Quality focussed (U_2), and 3) Network oriented (U_3). Let $p, q,$ and r be the probability of a person selected from $U_1, U_2,$ and U_3 respectively where $p > 0, q > 0, n > 0,$ and $p + q + n = 1$.

At each time, one person from the population is selected and make the decision of buying the product A or B. At the time t=0, there are X_{a0} bought the product A and X_{b0} persons baught product B. Let X_{at} and X_{bt} be the number of persons (X_{at} +$X_{bt} = X_{a0} + X_{b0} + t$) bought the product A & B respectivley at time t.

At each time, the person will select the choice of A or B is random. Given below the distribution of choice for each group

Group U_1

Choice at t = $\begin{cases} A & \text{with probability } 1 - \alpha \\ B & \text{with probability } \alpha \end{cases}$

Where $\alpha = \{\chi/(\chi + \lambda)\}$ and χ *and* λ are the prices of the two products.

Group U_2

Choice at t = $\begin{cases} A & \text{with probability } 1 - \beta \\ B & \text{with probability } \beta \end{cases}$

Where $\beta = \{\theta/(\omega + \theta)\}$ and ω *and* θ are the qualities of the two products

Group U_3

Choice at t = $\begin{cases} A & \text{with probability } X_{at}/(X_{a0} + X_{b0} + t) \\ B & \text{with probability } X_{bt}/(X_{a0} + X_{b0} + t) \end{cases}$

Where X_{at} *and* X_{bt} are the entrant's and incumbent's installed bases at time *t*

Let Z be unconditional choice at t. It will be a mixture of three groups and can take two values A and B. Using the law of total probability, we can write

$$P[Z = B] = P(U_1) * P[ChoiceB|U_1] + P(U_2) * P[ChoiceB|U_2] + P(U_3) * P[ChoiceB|U_3]$$

$$P[Z = B] = p\alpha + q\beta + n * X_{bt}/(X_{a0} + X_{b0} + t)$$

Which implies, at unconditional level

Choice at t = $\begin{cases} A & \text{with probability } 1 - (p\alpha + q\beta + n * X_{bt}/(X_{a0} + X_{b0} + t)) \\ B & \text{with probability } p\alpha + q\beta + n * X_{bt}/(X_{a0} + X_{b0} + t) \end{cases}$

We can see that $P[Z = B]$ is a linear function of $\alpha, \beta,$ and $X_{bt}/(X_{a0} + X_{b0} + t)$. We can consider the unconditional choice at t as an additive model.

Multiplicative Consumer Choice Model

In this model we use multiplicative structure of group level probabilities to determine the choice.

At unconditional level,

$$\text{Choice at t} = \begin{cases} A & \text{with probability } \alpha^p \beta^q [X_{bt}/(X_{a0} + X_{b0} + t)]^n \\ B & \text{with probability } 1 - \alpha^p \beta^q [X_{bt}/(X_{a0} + X_{b0} + t)]^n \end{cases}$$

Comparison of Additive and Multiplicative Model

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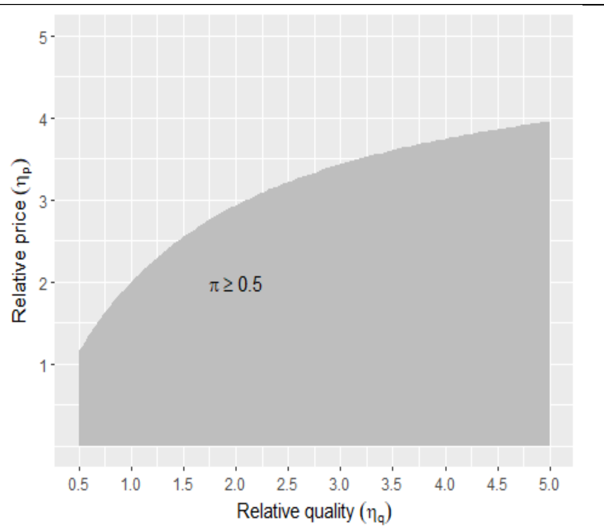
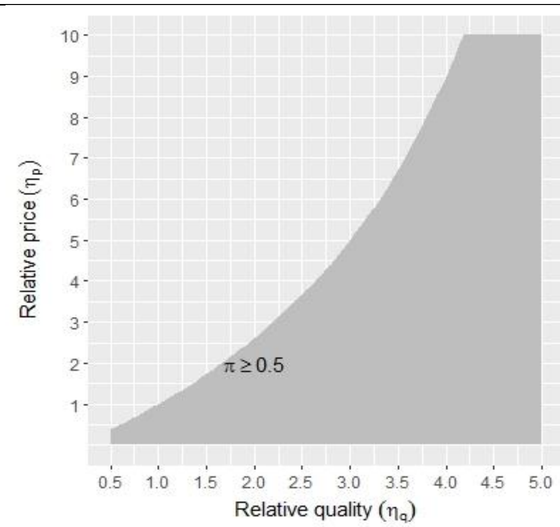
<tr><th>Multiplicative Choice Model</th><th>Additive Choice Model</th></tr>
<tr><td colspan="2">η_q and η_p for incumbent displacement in M market</td></tr>
<tr><td>
</td><td>
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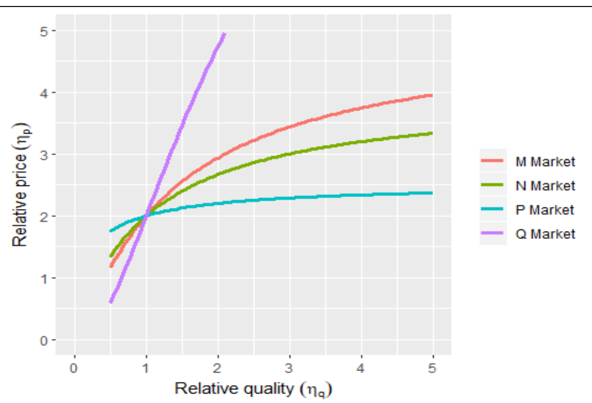
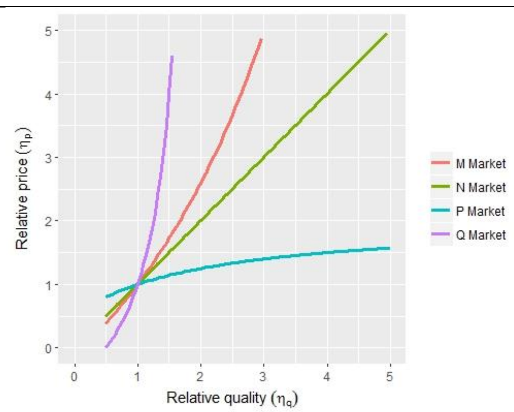
<tr><td>
</td><td>
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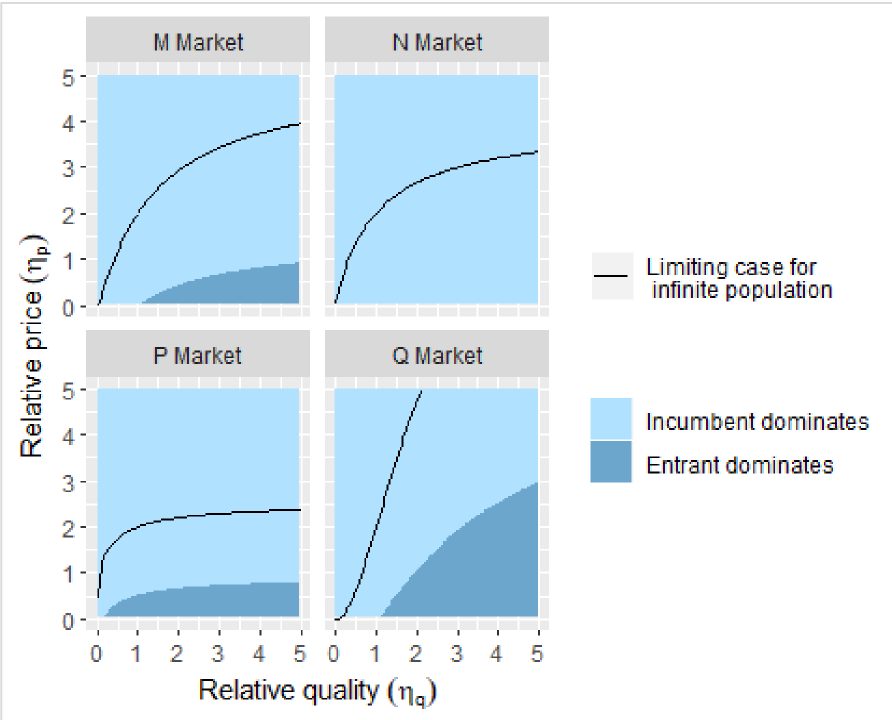
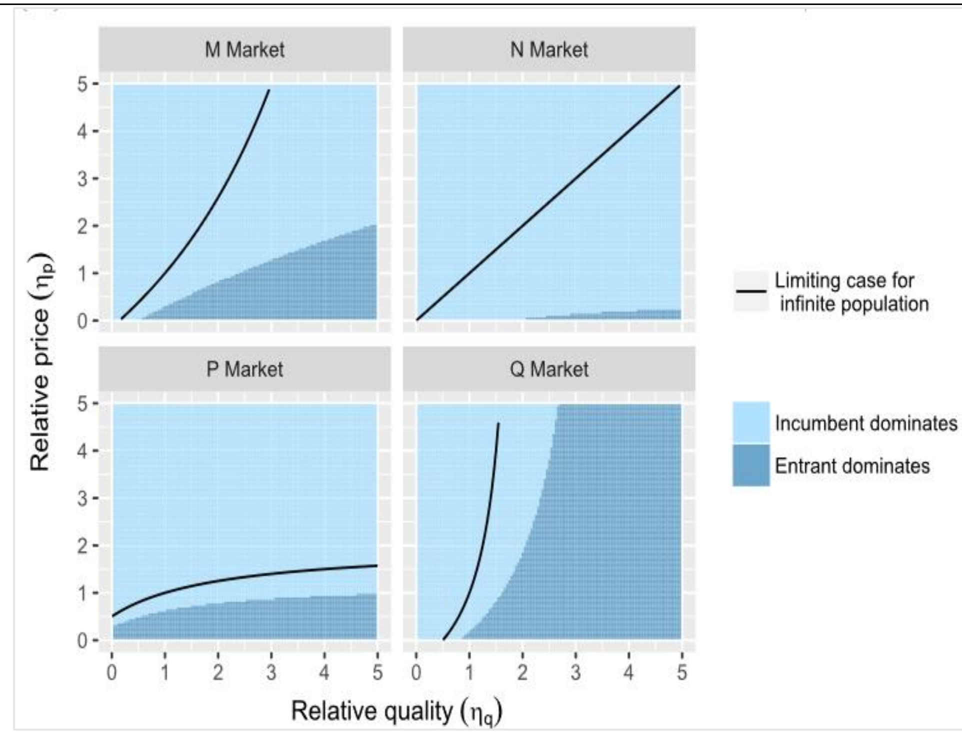
<tr><td>
</td><td>
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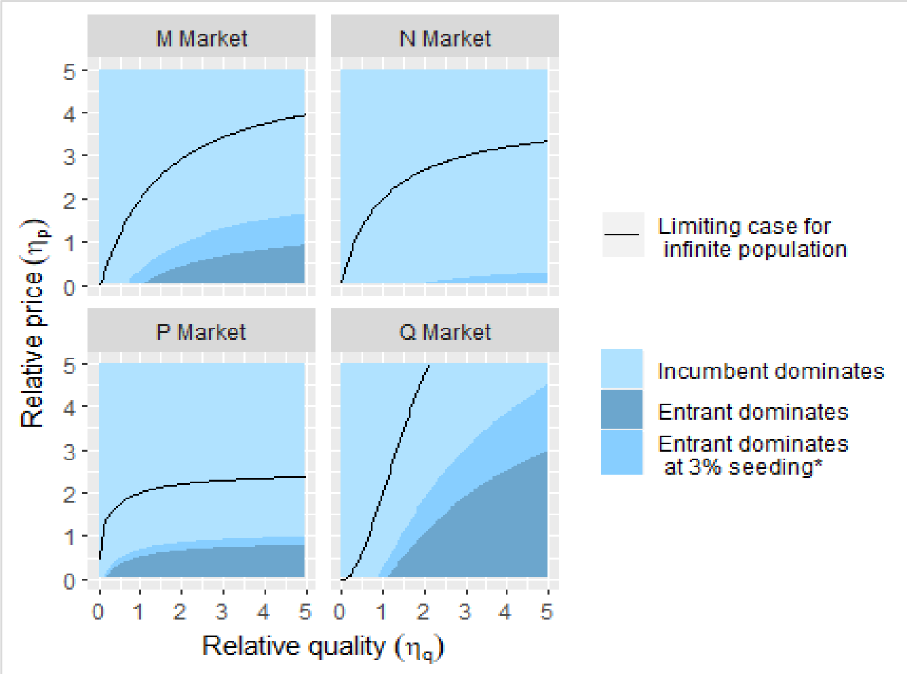
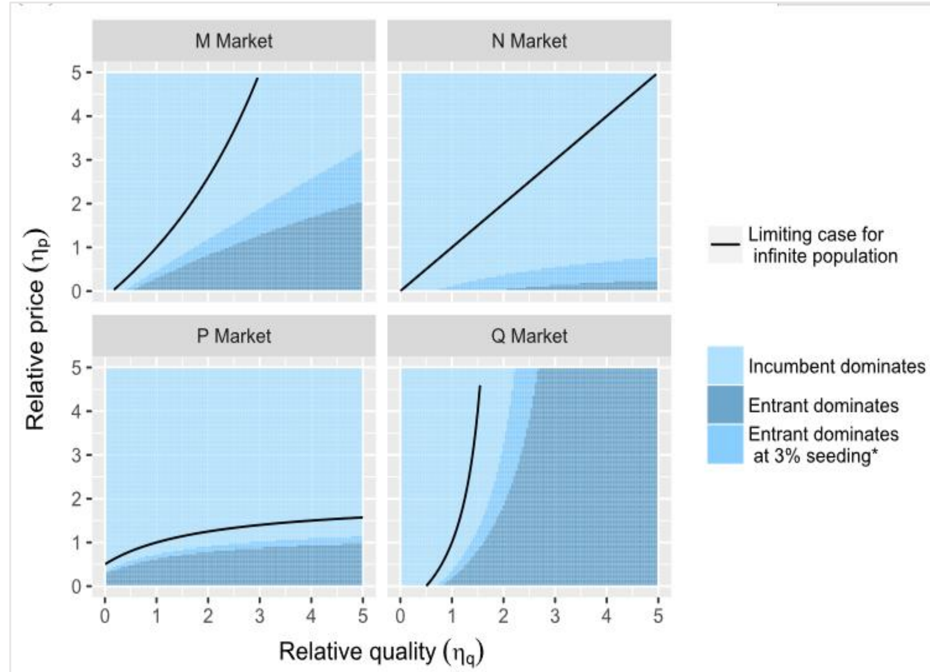
<tr><td>
</td><td>
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