

### APPENDIX B3

#### ASSUMPTIONS' CROSS CHECKING FOR THE CASE I.1

Given any value of consumer's location  $x$ , the utility from buying the product from new branch of player1 will always be higher than buying the product from the original branch of player 1 and utility from buying the product from new branch of player 2 will be always higher than buying the product from the original branch of player 2 because of the following.

$$\begin{aligned}
 u_2 &= V - p_1^* - (x - m_1^*)^2 + n_1^* &= V - \frac{13}{8} - (x - 0)^2 + 1 \\
 &> V - \frac{13}{8} - (x - 0)^2 + \frac{1}{2} \\
 &> V - p_1^* - (x - x_1^*)^2 + y_1^* = u_1
 \end{aligned}$$

$$\begin{aligned}
 u_4 &= V - p_2^* - (x - m_2^*)^2 + n_2^* &= V - \frac{13}{8} - (x - 1)^2 + 1 \\
 &> V - \frac{13}{8} - (x - 1)^2 + \frac{1}{2} \\
 &> V - p_2^* - (x - x_2^*)^2 + y_2^* = u_3
 \end{aligned}$$

Therefore, in this case, the competition will be between the new branch of player 1 and new branch of player 2 or the only market separating line we need to consider is  $x_{c_3}$ . By substitute the optimal location, product's quality level, and pricing of both players into  $x_{c_3}$ ,  $\pi_1$ , and  $\pi_2$ , the results are  $x_{c_3} = 1/2$ ,  $\pi_1 = 1/2$ , and  $\pi_2 = 1/2$ . Since there is only one market separating line,  $x_{c_3}$ , and both optimal price and market share of both players are positive, we can conclude that the assumptions are correct.