BA_Patrice_Bolz_Calculations_1

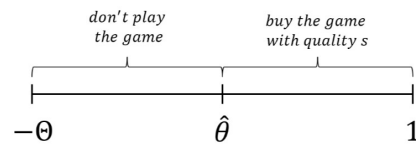## P2P

$$U = \begin{cases} \theta s + tsQ - p, & \text{falls Konsum} \\ 0, & \text{kein Konsum} \end{cases}$$

don't play
the game

buy the game
with quality s

$-\theta \qquad \hat{\theta} \qquad 1$

Ind. consumer θ

$$\hat{\theta} s + tsQ - p = 0 \qquad | + p \quad | - tsQ$$

$$\hat{\theta} s = tsQ + p \qquad | : s$$

$$\hat{\theta} = tQ + \frac{p}{s}$$

$$\implies 1 - \hat{\theta} = Q$$

$$1 - tQ - \frac{p}{s} = Q \qquad | + tQ$$

$$1 - \frac{p}{s} = Q + tQ$$

$$\frac{s}{s} - \frac{p}{s} = Q(1+t) \qquad | : (\ )$$

$$\underline{\underline{\frac{s-p}{s(1+t)} = Q}}$$

Profit Maximization

$$\max_{p} \Pi = p \cdot Q = p\left(\frac{s-p}{s(1+t)}\right)$$

$$\frac{\partial \Pi}{\partial p} = \frac{s - 2p}{s(1+t)} = 0 \qquad | \cdot s(\ )$$

$$s - 2p = 0$$

$$\underline{\underline{p^* = \frac{s}{2}}}$$

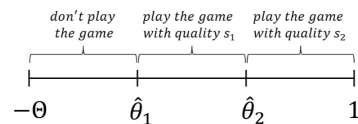$$Q^* = \frac{s - \frac{s}{2}}{s(1+t)} = \frac{\frac{1}{2}\cancel{s}}{\cancel{s}(1+t)}$$

$$\underline{\underline{\overset{1}{s}(1+t)2}}$$

$$\Pi^* = p^* \cdot Q^* = \frac{s}{2} \cdot \frac{1}{(1+t)2}$$

$$= \overline{(1+t)\,4}$$

F2P

$$U = \begin{cases} \theta s_2 + t\, s_2\, Q - p_2, & \text{falls } s_1 \text{ konsumiert} \\ \theta s_1 + t\, s_1\, Q - p_1, & \text{falls } s_2 \text{ konsumiert} \\ 0, & \text{kein Konsum} \end{cases}$$

don't play the game | play the game with quality s_1 | play the game with quality s_2

$-\theta \quad \hat{\theta}_1 \quad \hat{\theta}_2 \quad 1$

1. Ind. Consumer $\hat{\theta}_1$

$$\theta_1 s_1 + t \cdot s_1 \cdot Q - p_1 = 0 \qquad |$$

$$\theta_1 s_1 = p_1 - t \cdot s_1 \cdot Q \qquad | \; Q = 1 - \theta_1$$

$$\theta_1 \cdot s_1 = p_1 - t \cdot s_1\,(1 - \theta_1)$$

$$\theta_1 s_1 = p_1 - t \cdot s_1 + \theta_1 \cdot t \cdot s_1 \qquad | - \theta_1 \cdot t \cdot s_1$$

$$\theta_1 s_1 - \theta_1 t \cdot s_1 = p_1 - t \cdot s_1$$

$$\theta_1 (s_1 - t \cdot s_1) = p_1 - t \cdot s_1 \qquad | : (\quad)$$

$$\hat{\theta}_1 = \frac{p_1 - t \cdot s_1}{(1 - t) \cdot s_1} \qquad \boxed{(1)}$$

2. Ind. consumer $\hat{\theta}_2$

$$\theta_2 s_2 + t\, Q - p_2 = \theta_1 s_1 + t s_1 Q - p_1 \qquad | \; Q = (1 - \theta_1)$$

$$\theta_2 s_2 + t s_2 (1 - \theta_1) - p_2 = \theta_1 s_1 + t s_1 (1 - \theta_1) - p_1$$

$\downarrow *$ $\downarrow *$

$$\hat{\theta}_2 s_2 + t s_2 (1 - \hat{\theta}_1) - p_2 = \hat{\theta}_1 s_1 + t s_1 (1 - \hat{\theta}_1) - p_1$$

$$\hat{\theta}_2 (s_2 - s_1) + t \cdot (1 - \hat{\theta}_1)(s_2 - s_1) = p_2 - p_1$$

✳ Spieler muss indifferent sein. Daher handelt es sich hier um die gleiche Person und $\hat{\theta}$ beschreibt ihn

$$\hat{\theta}_2 = \frac{p_2 - p_1}{s_2 - s_1} - t \cdot (1 - \hat{\theta}_1) \qquad | \text{ Substituiere } \hat{\theta}_1 \text{ mit Gl. } (1)$$
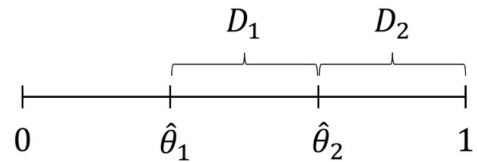
$$\hat{\theta}_2 = \frac{p_2 - p_1}{s_2 - s_1} - t \left(1 - \frac{p_1 - t \cdot s_1}{(1-t) s_1} \right)$$

$$\hat{\theta}_2 = \frac{p_2 - p_1}{s_2 - s_1} - t \cdot \left(\frac{s_1 - t s_1 - p_1 + t s_1}{(1-t) s_1} \right)$$

$$\hat{\theta}_2 = \frac{p_2 - p_1}{s_2 - s_1} - t \cdot \left(\frac{s_1 - p_1}{(1-t) s_1} \right)$$

Profit Maximization

$$\max_{p_1, p_2} \Pi = p_1 \left(\hat{\theta}_2 - \hat{\theta}_1 \right) + p_2 \left(1 - \hat{\theta}_2 \right)$$

$$\Pi = p_1 \left(\frac{p_2 - p_1}{s_2 - s_1} - \frac{\cancel{t \cdot (s_1 - p_1)}}{(1-t) s_1} - \frac{p_2 - \cancel{t s_1}}{(1-t) s_1} \right) + p_2 \left(1 - \frac{p_2 - p_1}{s_2 - s_1} + \frac{t \cdot (s_1 - p_1)}{(1-t) s_1} \right)$$

$$\frac{\partial \Pi}{\partial p_2} = 1 - \frac{2 p_2 - p_1}{s_2 - s_1} + \frac{t (s_1 - p_1)}{(1-t) s_1} + \frac{p_1}{s_2 - s_1} = 0$$

$$1 - \frac{2(p_2 - p_1)}{s_2 - s_1} + \frac{t \cdot (s_1 - p_1)}{(1-t) s_1} = 0 \qquad | \cdot (s_2 - s_1)$$

$$(s_2 - s_1) - 2(p_2 - p_1) + \frac{t \cdot (s_1 - p_1)(s_2 - s_1)}{(1-t) s_1} \qquad | \cdot 2$$

$$\frac{s_2 - s_1}{2} - (p_2 - p_1) + \frac{t (s_1 - p_1)(s_2 - s_1)}{(1-t) s_1 \cdot 2} = 0 \qquad | + p_2$$

$$p_2 = \frac{(s_2 - s_1)}{2} + \frac{t \cdot (s_1 - p_1)(s_2 - s_1)}{(1-t) s_1 \cdot 2} + p_1 \qquad (II)$$

$$\frac{\partial \Pi}{\partial p_1} = \frac{p_2 - p_1}{s_2 - s_1} - \frac{(1-t)\,p_1}{(1-t)\,s_1} - \frac{p_1}{s_2 - s_1} - \frac{(1-t)\,p_1}{(1-t)\,s_1} + \frac{p_2}{s_2 - s_1} + \frac{-t\,p_2}{(1-t)\,s_1}$$

$$\frac{2(p_2 - p_1)}{s_2 - s_1} - \frac{2(1-t)\,p_1}{(1-t)\,s_1} - \frac{p_2\,t}{(1-t)\,s_1} = 0$$

$$\frac{2(p_2 - p_1)\,s_1}{(s_2 - s_1)\,s_1} - \frac{2\,p_1(s_2 - s_1)}{(s_2 - s_1)\,s_1} - \frac{p_2\,t}{(1-t)\,s_2} = 0$$

$$\frac{2\,p_2\,s_1 - 2\,p_1\,s_1 - 2\,p_1\,s_1 + 2\,p_1\,s_1}{(s_2 - s_1)\,s_1} - \frac{p_2\,t}{(1-t)\,s_1} = 0 \qquad \bigg| + \frac{2\,p_1\,s_1}{(s_2 - s_1)\,s_1}$$

$$\frac{2\,p_2\,s_1}{(s_2 - s_1)\,s_1} - \frac{p_2\,t}{(1-t)\,s_1} = \frac{2\,p_1\,s_2}{(s_2 - s_1)\,s_1} \qquad \bigg| (s_2 - s_1)\,s_1$$

$$2\,p_2\,s_1 - \frac{p_2\,t\,(s_2 - s_1)}{(1-t)} = 2\,p_1\,s_2 \qquad \bigg| : 2\,s_2$$

$$p_1 = \frac{p_2\,s_1}{s_2} - \frac{p_2\,t\,(s_2 - s_1)}{(1-t)\,2\,s_2} \qquad \text{I)}$$

⟹ Der Rest wurde mit Wolfram Alpha berechnet. Die Datei finden Sie ebenfalls im Ordner: BA_Calculations_2_PB.nb

Es wurden für die Parameter jedoch andere Zeichen verwendet:

$p_1 \Rightarrow x$

$p_2 \Rightarrow y$

$a \Rightarrow s_1$

$b \Rightarrow s_2$

$t = t$