

$$(1) (1+t)X + P_Y Y = M \quad (20X + 20Y = 1000) \quad U_1 = 625 < U_0$$

$$(2) \text{ 政府稅 } tX = 10 \times 25 = 250$$

$$(3) \begin{cases} MRS_{XY} = \frac{P_X}{P_Y} \Rightarrow \begin{cases} \frac{X}{Y} = \frac{1}{2} \\ (P_X + t)X + P_Y Y = M - T \end{cases} \Rightarrow \begin{cases} X_2 = 27.5, Y_2 = 18.75 \\ U_2 = 747.125 < U_0 \end{cases} \end{cases}$$

(4) 因為  $X_1 < X_2$ , 所以消費稅較能抑制消費

(5) 但  $U_2 > U_1$ , 故小寧寧可接受定額稅

$$(6) \begin{cases} MRS_{XY} = \frac{P_X + t}{P_Y} \Rightarrow \begin{cases} \frac{X}{Y} = 1 \\ (P_X + t)X + P_Y Y = M + T \end{cases} \Rightarrow \begin{cases} X^* = 21.25, Y^* = 21.25 \\ U_1 = 946.5625 < U_0 \end{cases} \end{cases}$$

故知小寧的效用會下降

$$2. \text{ Max } U = f(X, Y) = X^{\frac{2}{3}} Y^{\frac{1}{3}}$$

$$\text{subject to } 300 = 10X + 20Y$$

$$X = 20, Y = 5$$

價格↑到20元

$$300 = 20X + 20Y \quad MRS_{XY} = \frac{2Y}{X} = \frac{P_X}{P_Y} = \frac{20}{20} = 1$$

$$\Rightarrow Y = \frac{1}{2} X \quad X = 10, Y = 5$$

$$\text{總效用: } U = X^{\frac{2}{3}} Y^{\frac{1}{3}} = (20)^{\frac{2}{3}} (5)^{\frac{1}{3}} = (200)^{\frac{1}{3}} = \left(\frac{1}{2} X^2\right)^{\frac{1}{3}} = (2000)^{\frac{1}{3}}$$

$$X = (4000)^{\frac{1}{3}} \approx 15.8740, Y = (500)^{\frac{1}{3}}$$

$$\text{① 替代效果: 由 } (X, Y) = (20, 5) \text{ 到 } \left[(4000)^{\frac{1}{3}}, (500)^{\frac{1}{3}}\right] = (4000)^{\frac{1}{3}} - 20 < 0$$

$$\text{② 所得效果: 由 } (X_1, Y) = \left[(4000)^{\frac{1}{3}}, (500)^{\frac{1}{3}}\right] \text{ 到 } (10, 5)$$