

## TD 2 , EXERCICE 2

$$0) G = (m(X), m(Y)) = (2004.5, 287)$$

$$1) G_1 = (x_1, y_1) = (2002, 141.2)$$

$$G_2 = (x_2, y_2) = (2007, 432.8)$$

Equation de la droite de Mayer:

$$Y = a(X - x_1) + y_1 \quad a = \frac{y_2 - y_1}{x_2 - x_1} = 58.320$$

$$Y = 58.320(X - 2002) + 141.2$$

$$2) C(X, Y) = m(XY) - m(X)m(Y)$$

$$= \frac{1}{n} \times \sum_{i=1}^n x_i y_i - m(X)m(Y)$$

$$= \frac{1}{10} 5757621 - 2004.5 \times 287$$

$$= 470.600$$

$$3) a = \frac{\text{Cov}(X, Y)}{V(X)} = \underline{\underline{57.042}}$$

$$b = m(Y) - a \cdot m(X)$$

$$= 287 - 57.042 \times 2004.5$$

$$= -114054.539$$

$$D_{Y/X} : Y = 57.042 \times X - 114054.539$$

Par  $D_{X/Y} : X = \hat{a}Y + \hat{b}$

$$\hat{a} = \frac{\text{Cov}(X, Y)}{V(Y)} = 0.01735$$

$$\hat{b} = m(X) - \hat{a} \cdot m(Y)$$

$$= 2004.5 - 0.01735 \times 287 = 1999.521$$

$$D_{X|Y}: X = 0.017 \times Y + 1999.520$$

$$4) X = 2011$$

Avec la droite de Mayer:

$$58.32 \cdot (2011 - 2002) + 141.2 = 666.0799$$

Avec la droite  $D_{Y|X}$

$$57.042 \times 2011 - 1124054.539 =$$

$$656.923$$

5) Calcul de  $r(X, Y)$

$$r(X, Y) = \frac{C(X, Y)}{S(X)S(Y)} = \frac{470.600}{2.872 \times 161.677}$$
$$= \underline{\underline{0.995}} \approx 1$$

Forte relation linéaire.

Verification avec Lin Reg.