$m = 120$ $\quad p_1 = 1 \quad p_2 = 1$

$$u(x_1, x_2) = x_1^{2/3} \cdot x_2^{1/3}$$

$$x_1 p_1 + x_2 p_2 = m$$

$$\frac{2/3}{1/3} \cdot \frac{x_2}{x_1} = p_1 / p_2$$

$$\bar{x}_1 = \frac{2}{3} \cdot \frac{120}{p_1} = 80$$

$$\bar{x}_2 = \frac{1}{3} \frac{120}{p_2} = 40$$

$$p_1' = 2 \qquad \Delta p_1 = 1$$

$$x_1 = \frac{2}{3} \cdot \frac{120}{2} = 40$$

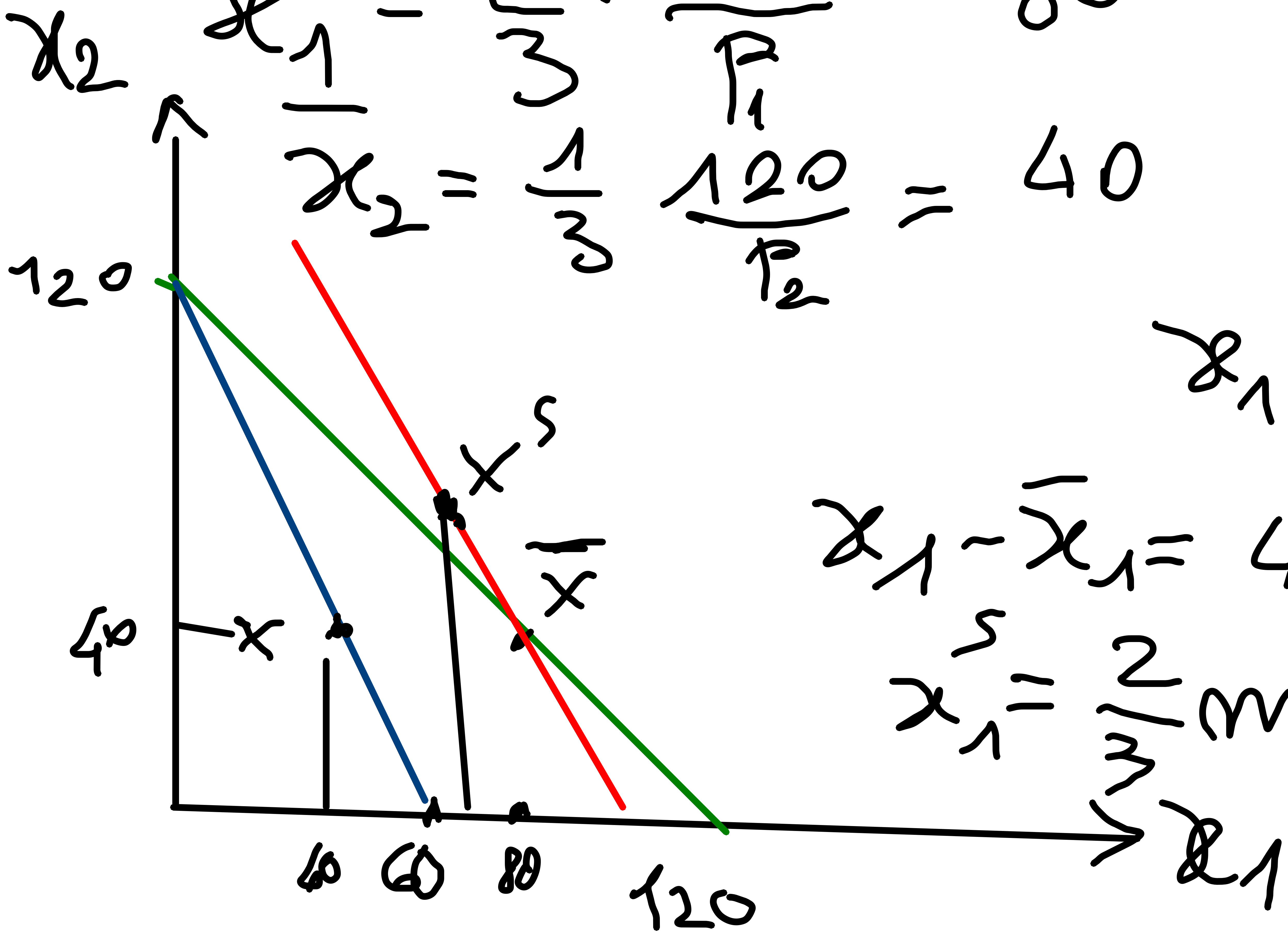
$$x_1 - \bar{x}_1 = 40 - 80 = -40$$

$$m' = m + \bar{x}_1 \Delta p_1$$

$$m' = 120 + 80 = 200$$

$$x_1^s = \frac{2}{3} m' \cdot \frac{1}{2} = \frac{200}{3}$$

$$x_1^s - \bar{x}_1 = \frac{200}{3} - 80 = -\frac{40}{3}$$



$$\Delta x_1^s = \frac{200}{3} - \underline{80} = -\frac{40}{3}$$

$$\Delta x_1^s = x_1^s - \bar{x}_1 = \text{substitution effect}$$

$$\Delta x_1^n = x_1 - x_1^s = 40 - \frac{200}{3} = -\frac{80}{3} \quad \text{income effect}$$

$$\Delta x_1 = x_1 - \bar{x}_1 = \Delta x_1^s + \Delta x_1^m =$$

$$= 40 - 80 = -\frac{40}{3} - \frac{80}{3} = -40$$

$$\frac{\Delta x_1^s}{\Delta p_1} < 0$$

$$\frac{\Delta x_1^m}{\Delta p_1} = \frac{\Delta x_1^m}{\Delta m} \cdot \frac{3\Delta m}{\Delta p_1} < 0$$

WITH COBB-DOUGLAS PREFERENCES X1 IS NORMAL: SUBSTITUTION AND INCOME EFFECT HAVE THE SAME SIGN

$$\frac{\Delta x_1^m}{\Delta p_1} = \frac{\Delta x_1^m}{\Delta PP} \cdot \frac{\Delta PP}{\Delta p_1}$$

$$\Delta PP = m - m'$$

$$m' - m = \bar{x}_1 \cdot \Delta p_1 = \text{compensation}$$

$$\frac{m' - m}{\Delta p_1} = \bar{x}_1 \qquad \frac{\Delta PP}{\Delta p_1} = -\bar{x}_1$$

endowment = ω_1, ω_2

$$m = p_1 \omega_1 + p_2 \omega_2 = m^{\omega}(p_1, p_2)$$

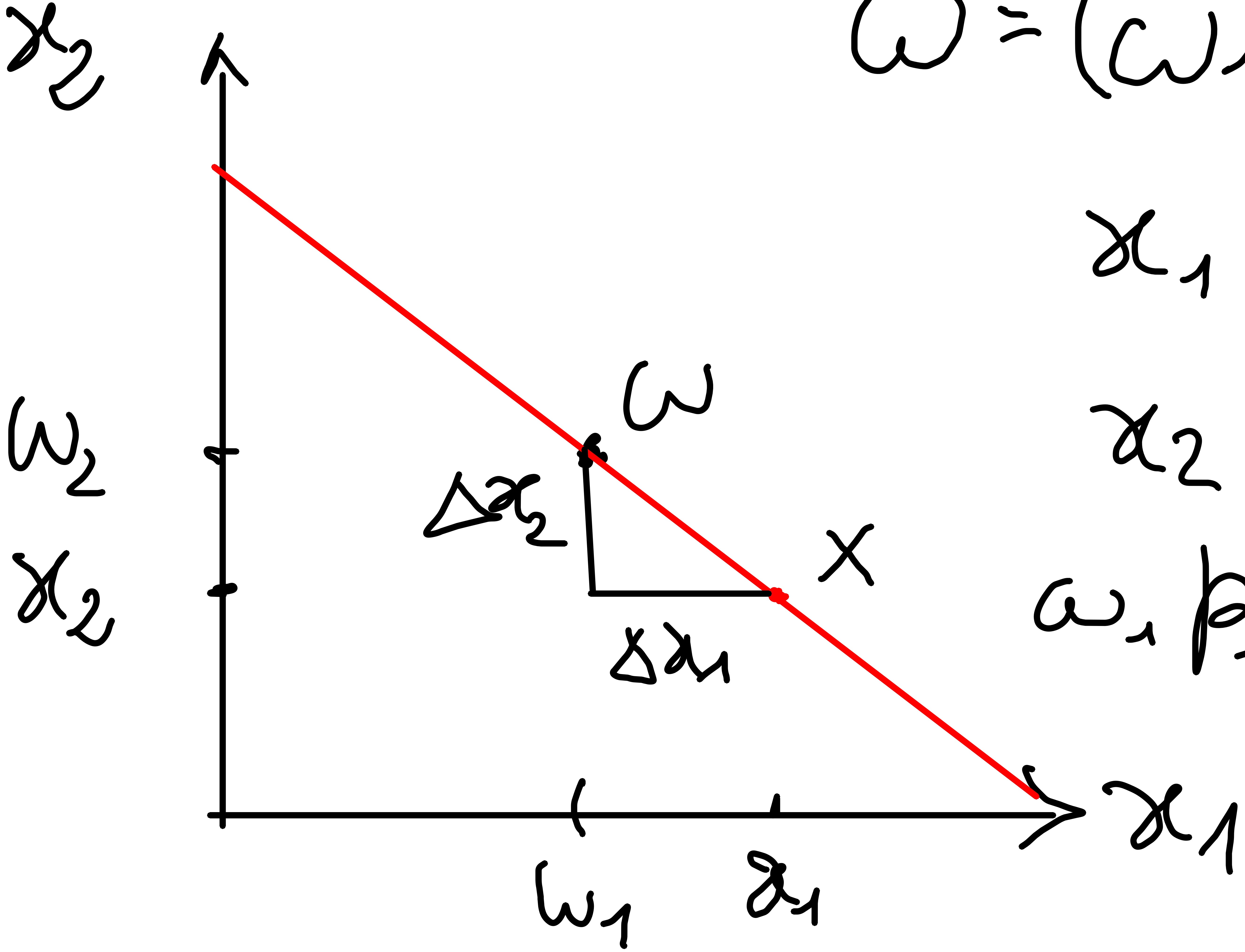
budget constraint:

$$p_1 \omega_1 + p_2 \omega_2 = p_1 x_1 + p_2 x_2$$

$$(x_1 - \omega_1) p_1$$

$x_1 - \omega_1$ = net demand of good 1 = excess demand

$x_2 - \omega_1$ = net demand of good 2 = " "



$\omega = (\omega_1 , \omega_2)$ $\quad p_1 , p_2$

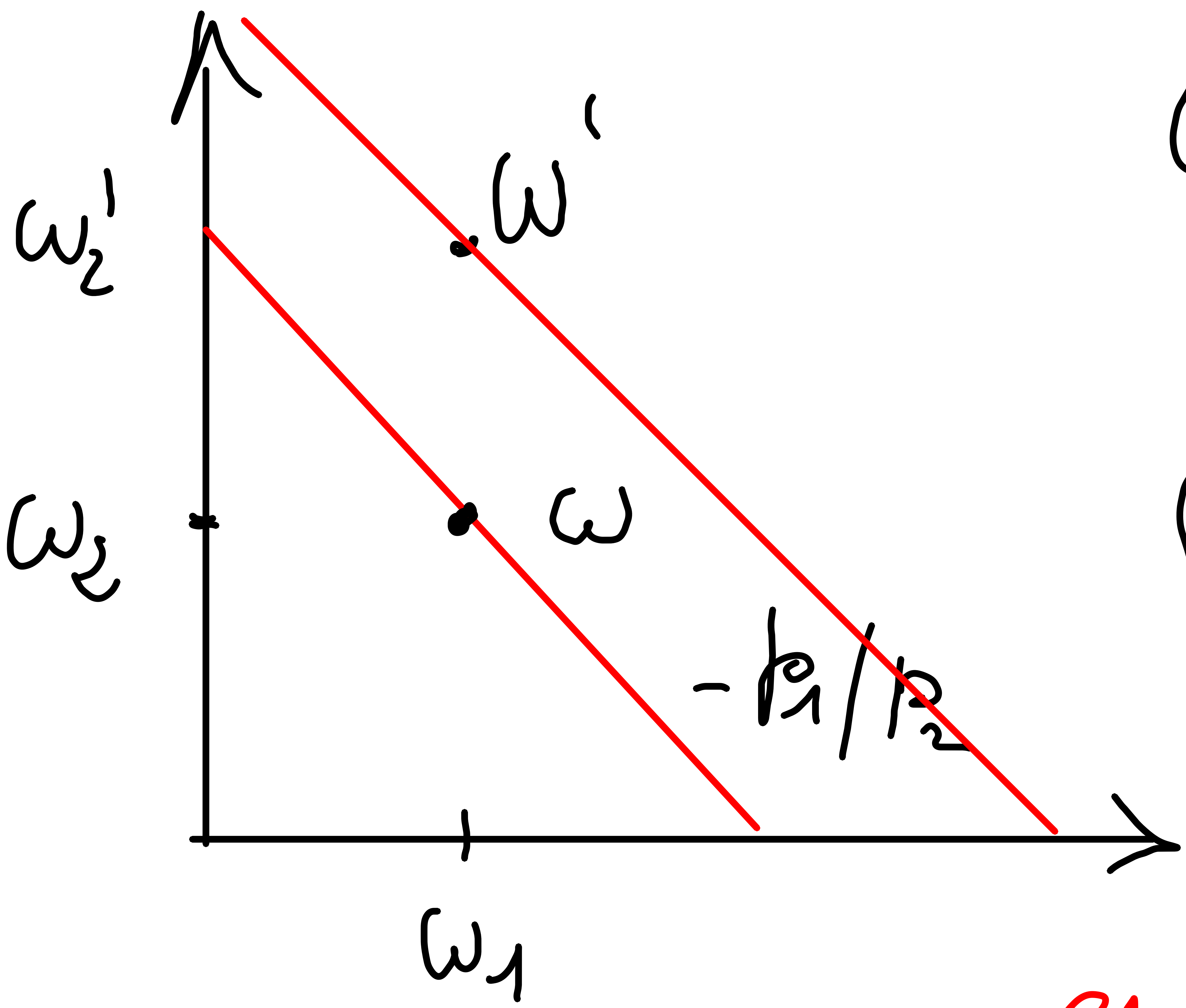
$x_1 - \omega_1 =$ net dem. of good 1

$x_2 - \omega_2 =$ net demand of good 2

$$\omega_1 p_1 + \omega_2 p_2 = x_1 p_1 + x_2 p_2$$

$$(x_1 - \omega_1) p_1 + (x_2 - \omega_2) p_2 = 0$$

$$\frac{x_2 - \omega_2}{x_1 - \omega_1} = - \frac{p_1}{p_2}$$



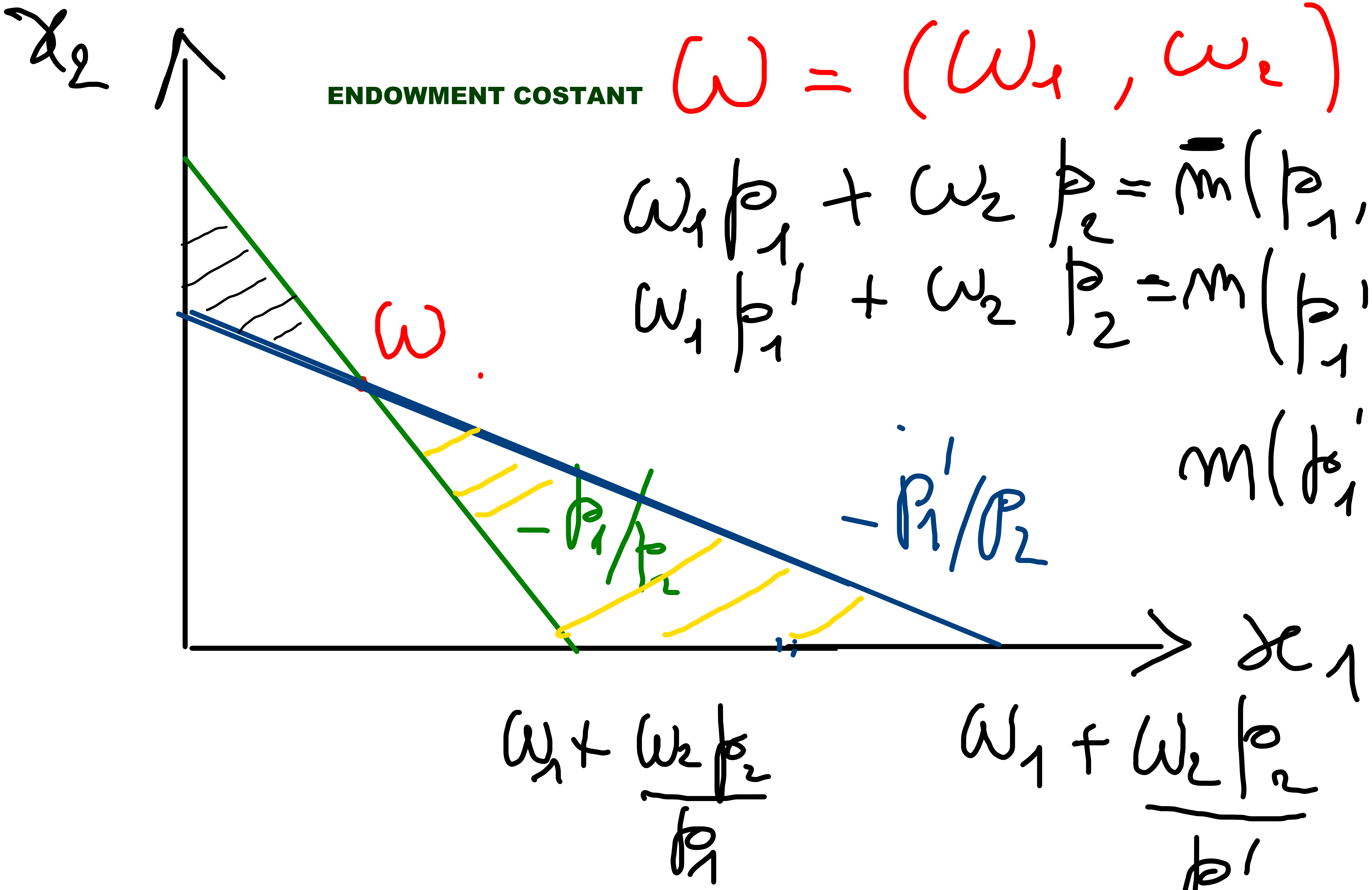
$$\omega = (\omega_1, \omega_2)$$

$$p_1, p_2$$

$$\omega' = (\omega_1, \omega_2')$$

$$\omega_2' > \omega_2$$

endowment change



ENDOWMENT COSTANT $\omega = (\omega_1, \omega_2)$ $\quad p_1, p_2$

$$\omega_1 p_1 + \omega_2 p_2 = \bar{m}(p_1, p_2)$$

$$\omega_1 p_1' + \omega_2 p_2 = m(p_1', p_2)$$

PRICE CHANGE: $p_1' < p_1$

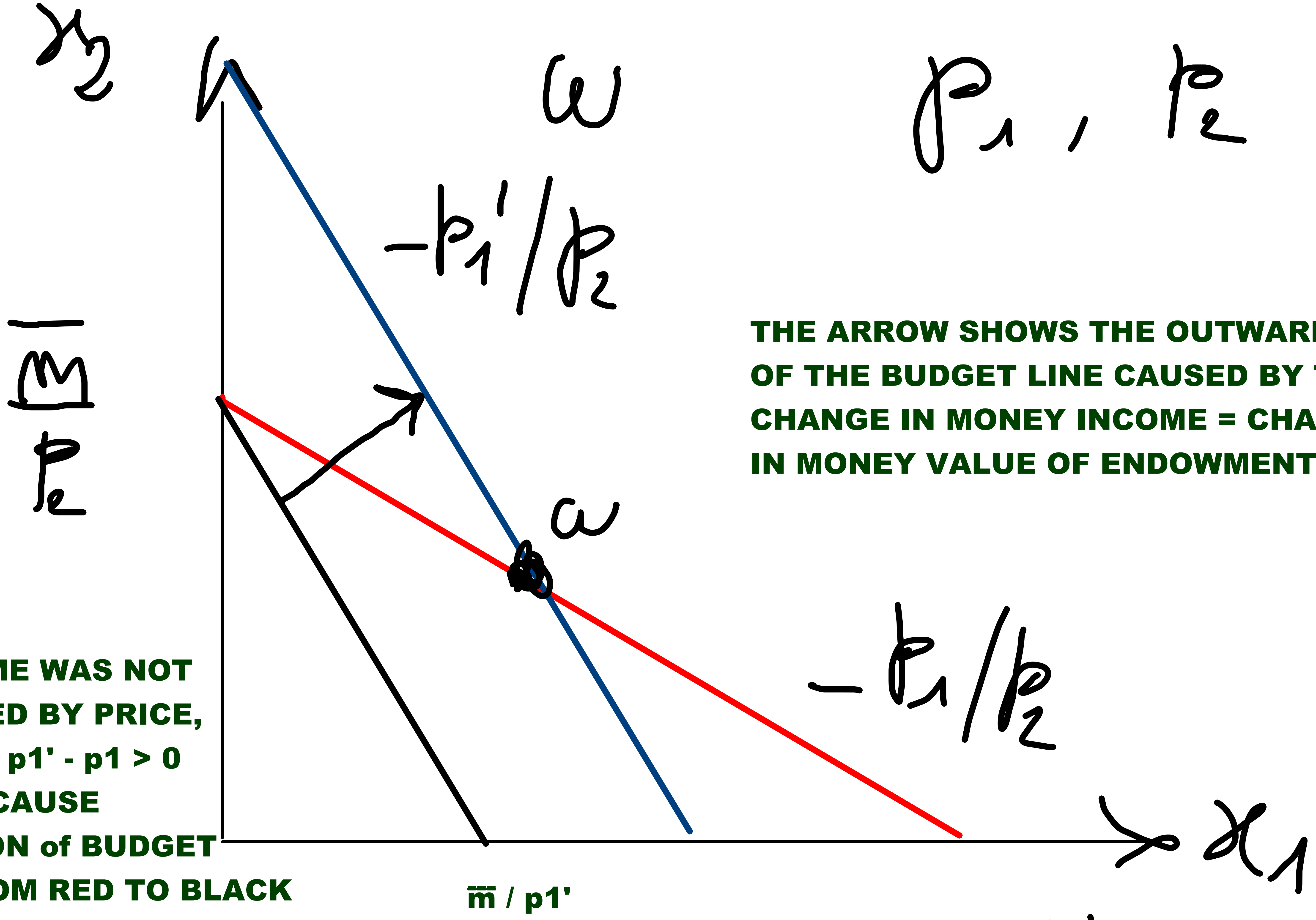
$$m(p_1', p_2) - \bar{m}(p_1, p_2) = \omega \cdot (p_1' - p_1) = \omega \cdot \Delta p_1$$

THE CHANGE IN PURCHASING POWER CAUSED BY THE PRICE CHANGE IS AMBIGUOUS:

YALLOW AREA: BUNDLES THAT ARE NOT AFFORDABLE AT p1 BUT ARE AFFORDABLE AT p1'

GRAY AREA: BUNDLES THAT ARE AFFORDABLE AT p1 BUT ARE NOT AFFORDABLE AT p1'

p_1, p_2 $\qquad p_1' > p_1$



THE ARROW SHOWS THE OUTWARD SHIFT OF THE BUDGET LINE CAUSED BY THE CHANGE IN MONEY INCOME = CHANGE IN MONEY VALUE OF ENDOWMENT

$-\frac{p_1'}{p_2}$ **SLOPE OF THE BLUE AND BLACK BUDGET LINES**

$$\bar{m} = \omega_1 p_1 + \omega_2 p_2$$

IF INCOME WAS NOT AFFECTED BY PRICE, CHANGE p1' - p1 > 0 WOULD CAUSE ROTATION of BUDGET LINE FROM RED TO BLACK

$$\omega_1 p_1' + \omega_2 p_2 = m^{\omega}(p_1', p_2)$$

$$\omega_1 p_1 + \omega_2 p_2 = \bar{m}(p_1, p_2)$$

$$\Delta m^{\omega} = \omega_1 \cdot \Delta p_1$$

CHANGE IN MONEY INCOME = CHANGE IN MONEY VALUE OF ENDOWMENT CAUSED BY p1' - p1>0

price change