Economics, Finance and Entrepreneurship Department

BS2250 Intermediate Microeconomics

1

$$U(X, Y) =$$

$$U_X(X, Y) =$$

$$U_Y(X, Y) =$$

$$MRS =$$

$$Px0 = 25$$

$$Py0 = 20$$

$$M0 = 1000$$

$$100 = 25X + 20Y$$

a. Optimal consumption bundle and utility at optimum

$MRS = \frac{Px}{Py}$ $\frac{3Y}{2X} = \frac{5}{4}$ $12Y = 10X$

$$X_0 = 24$$

$$Y_0 = 20$$

$$U_0 = U(X_0, Y_0) = 20^{2/5} 24^{3/5}$$

$$U0 = 22.3120$$

b. New optimal consumption bundle

$$Xd(Px, Py, M) =$$

$$Yd(Px, Py, M) =$$

$$Px1 = 50$$

$$X1 = 12$$

$$Y1 = 20$$

$$U1 =$$

$$U1 = 14.7204$$

c. Expenditure Function and Compensation Variation

$$U =$$

$$U =$$

$$U =$$

$$e(Px, Py, someU) =$$

Compensations Variation (CV) and Equivalent variation (EV) Px0=25 and Px1=50

$$e0 = e(Px0, U0) = 1.000.000$$
$$e\_CV = e(Px1, U0) = 1.515.700$$
$$CV = e\_CV - e0 = 515.7166$$
$$e\_EV = e(Px0, U1) = 659.7540$$
$$EV = e\_EV - e0 = -340.2460$$

d. Substitution and Income Effects using CV and EV

$$X^* = \overline{U}\left(\frac{\alpha}{\beta} \times \frac{P_Y}{P_X}\right)^{\beta}$$

- Using CV X^S can be obtained

$$CV = \int_{P_x^0}^{P_x^1} X(U_0, P_x, P_y) dP_x$$
$$CV = \int_{P_x^0}^{P_x^1} U_0 \left(\frac{\alpha}{\beta}\frac{P_y}{P_x}\right)^{\beta} dP_x$$
$$CV = \frac{X(U_0, P_x^1, P_y) - X(U_0, P_x^0, P_y)}{1-\beta}(P_x^1 - P_x^0)$$
$$SE = \frac{CV}{(P_x^1 - P_x^0)}(1 - \beta)$$
$$SE = \frac{515.7166}{(25)}(0.6)$$
$$SE = 12.377$$

$$Xi = 15.8341$$
$$X(U_0, Px1) - X((U_0, Px0) = 18.1886 - 24 =- 5,8114$$

- Using EV X^M can be obtained

$$EV = \int_{P_x^1}^{P_x^0} X(U_1, P_x, P_y) dP_x$$
$$EV = \int_{P_x^0}^{P_x^1} U_1 \left(\frac{\alpha}{\beta}\frac{P_y}{P_x}\right)^{\beta} dP_x$$
$$X(U_0, P_x^0, P_y) - X(U_0, P_x^1, P_y) = \frac{EV}{(P_x^0 - P_x^1)}(1 - \beta)$$

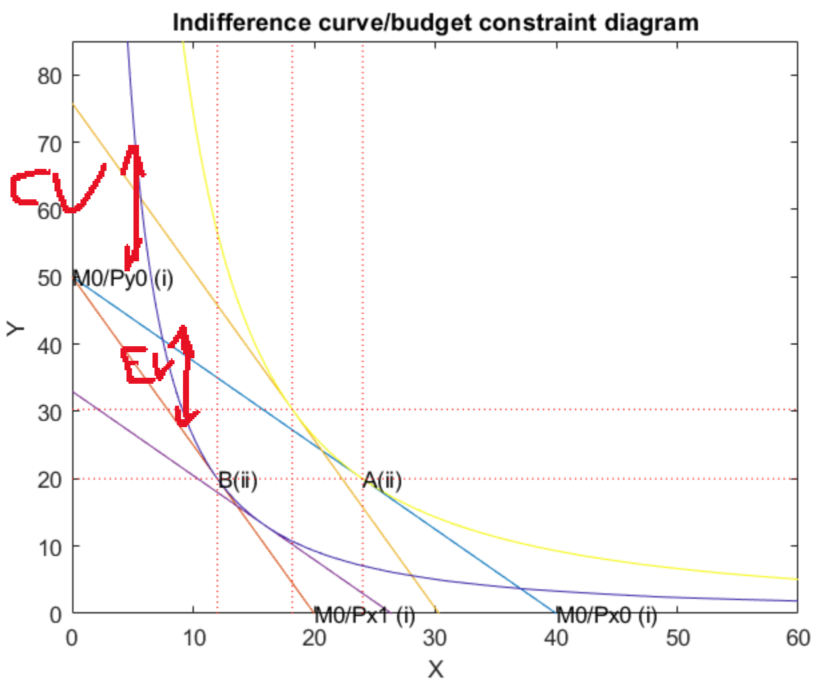
$$IE = \frac{EV}{(P_x^0 - P_x^1)}(1 - \beta)$$

$$IE = \frac{-340.2460}{(-25)}(0.6)$$

$$IE = 8.166$$

$$TE = SE + IE = 12.377 + 8.166 = 20.543$$

e. **Graphic**



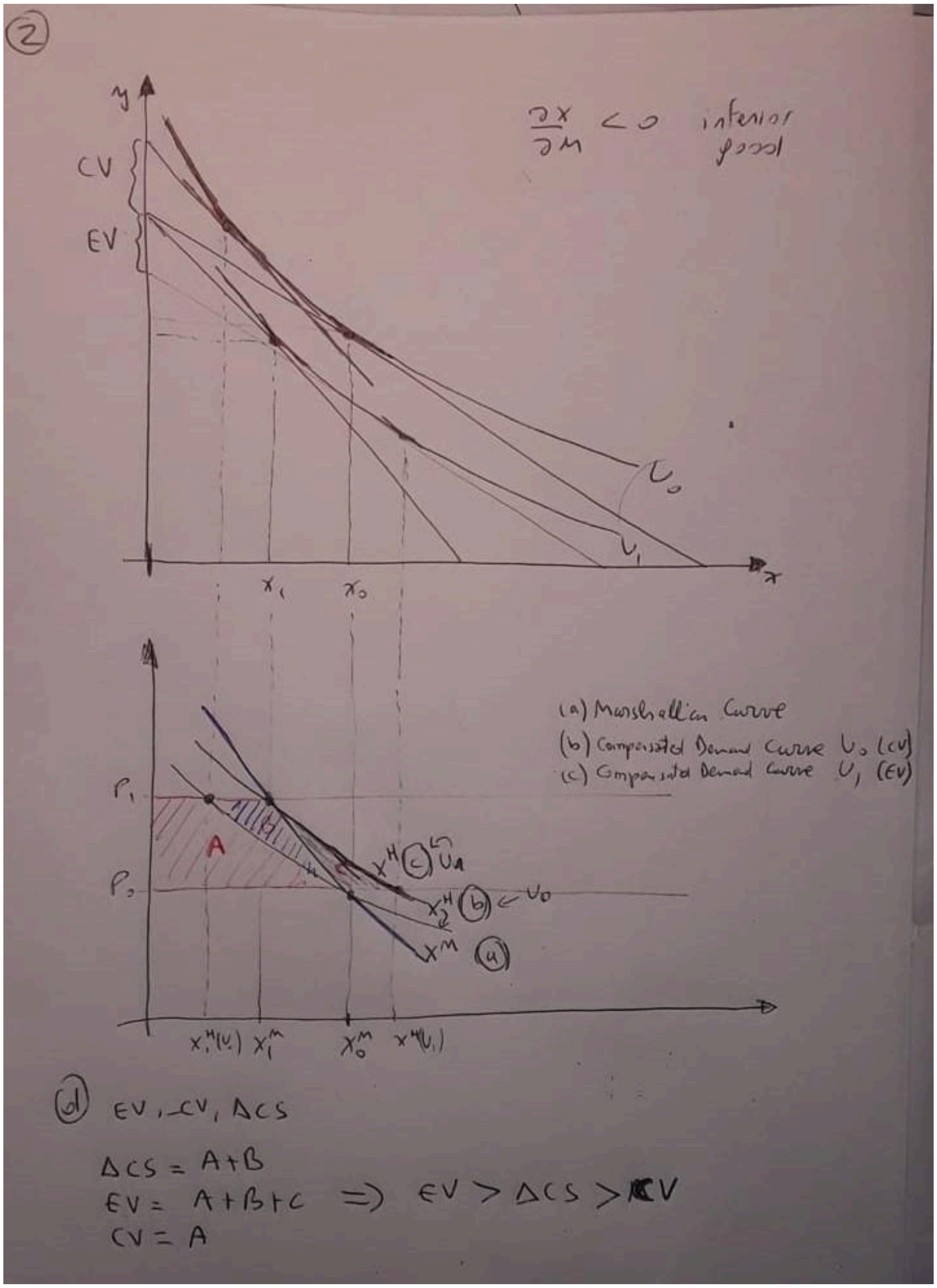
2 - Illustration of Compensating and Equivalent Variation of price increase of and inferior Good

a. **Marshallian demand curve**

b. **Compensated demand (U0) (Compensation Variation)**

c. **Compensated demand (U1) (Equivalent Variation)**

d. **Comparison CV, EV and ΔCS**



3 - CV EV and ΔCS provide similar monetary values. Slutsky Equation

Slutzky Equation:

$$\frac{\partial X^M}{\partial Px} = \frac{\partial X^H}{\partial Px} - X\frac{\partial X}{\partial M}$$

Analyzing Slutzky equation, the effect of price on Marshallian demand can be decomposed in the compensated effect to keep utility level constant plus the income effect of taking away an amount from consumer to cause get the utility that it would arrive changing the price.

a. The change in consumer surplus is represented in the Marshallian derivative
b. The compensation variation is represented by the Hicksian derivative
c. Equivalent effect can be observed in the product of demanded quantity by the income effect.

It is evident that when there is no income effect, i.e., $\frac{\partial X}{\partial M} = 0$ the three measures will be identical. Hence, the less the income effect on some good X, the more similar will be the monetary values of ΔCS, CV, and EV.