Economics 601 GianCarlo Moschini
Microeconomic Analysis I Fall 2008

REMINDER: The **Midterm** exam is set for **Wednesday, October 22**, 5:00 - 7:00 pm, room 272 Heady.

Problem Set No. 6 Due by: Friday, October 17

6.1 EV and CV with quasilinear preferences

Consider the case when preferences are quasi-linear with respect to good x_1. Suppose that income stays constant at w, and that the price of x_1 also stays constant (for simplicity you may put $p_1 = 1$). Consider now a change in prices from vector p^0 to vector p'. Show that, in this case, the equivalent variation and compensating variation measures are the same, i.e., $EV = CV$.

6.2 Welfare change measures

Joe Sixpack has utility function:

$$U(x_1, x_2) = \left(\sqrt{x_1} + \sqrt{x_2}\right)^2.$$

Joe's monthly stipend (his entire income) is $w = 2{,}640$ and prices are $p_1 = p_2 = 2$. His boss is planning on sending him to another town where $p_1 = 3/2$ and $p_2 = 4$. The boss offers no raise in pay. Joe, who is already financially distressed but who has taken Economics 601, complaints bitterly, arguing that such a move would be as bad as a cut in pay equal to A. Joe also says that he won't mind moving if he gets a pay raise equal to at least B.

(a) Compute the amount A. How does this relate to the EV and/or CV measures we have studied?

(b) Compute the amount B. How does this relate to the EV and/or CV measures we have studied?

6.3 EV and multiple price changes

Consider a consumer's problem that involves three goods, and suppose that the Marshallian demand functions for the first two goods can be written as:

$$x_1(p, w) = \alpha_1 + \beta_1 \frac{p_1}{p_3} + \gamma_1 \frac{p_2}{p_3}$$

$$x_2(p, w) = \alpha_2 + \gamma_2 \frac{p_1}{p_3} + \beta_2 \frac{p_2}{p_3}$$

Because we will analyze changes in the first two prices only, for simplicity put $p_3 = 1$ (i.e., the third good is treated as the "*numeraire*").

(a) Explain why utility maximization implies $\gamma_1 = \gamma_2$. What other restrictions on the parameters $(\alpha_i, \beta_i, \gamma_i)$ does utility maximization imply?

(b) For the time being, however, ignore the restriction in (a) and suppose that $\gamma_1 \neq \gamma_2$. Consider the price change from $p^0 = (1,1,1)$ to $p^1 \equiv (2,2,1)$. Compute the Equivalent Variation (EV) associated with this price change by integrating under the appropriate demand functions. Specifically, because we have two prices changing, compute EV for two distinct paths: (i) from $(1,1,1)$ to $(2,1,1)$ to $(2,2,1)$; and (ii) from $(1,1,1)$ to $(1,2,1)$ to $(2,2,1)$. Show that the two measures are the same (i.e., the result is "path independent") if only if the condition $\gamma_1 = \gamma_2$ holds.

(c) For the remainder of this problem, assume $\gamma_1 = \gamma_2 \equiv \gamma$. Let EV denote the welfare change associated with the full price change from $(1,1,1)$ to $(2,2,1)$; let EV_1 denote the welfare change associated with the individual price change of the first good, from $(1,1,1)$ to $(2,1,1)$; and let EV_2 denote the welfare change associated with the individual price change of the second good, from $(1,1,1)$ to $(1,2,1)$. Compute EV, EV_1 and EV_2, and show that in general $EV \neq EV_1 + EV_2$. Recalling that the Equivalent Variation can be illustrated as an area under the appropriate demand function, provide a graphical illustration of the result $EV \neq EV_1 + EV_2$.