Compensating Wage Differentials and Utility[1]
In-Class Problem[2]

Let's assume that we have a worker (consumer) whose utility preference is a function of annual income (Y), risk (R), and daily leisure (L_E) and for whom the preference can be stated as $U = \frac{\sqrt{Y}\sqrt{L_E}}{\sqrt[3]{R}}$. This worker, we'll call him Justin, earns \$120,000 as a mid-level executive. He has a job in which he experiences a lot of stress from certain working conditions such that his risk can be measured as 10 (which is somewhat high), and his leisure is equal to 6 ½ hours per day. He has no income bearing endowments.

a) **What is Justin's current level of utility?**

$$U = \frac{\sqrt{Y}\sqrt{L_E}}{\sqrt[3]{R}} = \frac{\sqrt{120{,}000}\sqrt{6.5}}{\sqrt[3]{10}} = \frac{346.41 * 2.55}{2.15} = 410.86$$

b) **If Justin were offered a job elsewhere that allowed him to have 8 hours of daily leisure and only face a risk factor of 8, how much might he require to be paid in order to accept the position (assume all factors other than income, risk and leisure are held constant).**

To determine this we need to rewrite the utility equation such that it normalizes on income (Y):

$$U = \frac{\sqrt{Y}\sqrt{L_E}}{\sqrt[3]{R}}$$
$$\sqrt{Y} = \frac{U\sqrt[3]{R}}{\sqrt{L_E}}$$

Then solve for Y

$$Y = \left(\frac{U\sqrt[3]{R}}{\sqrt{L_E}}\right)^2 = \left(\frac{U\sqrt[3]{R}}{\sqrt{L_E}}\right)^2 = \left(\frac{410.86 * \sqrt[3]{8}}{\sqrt{8}}\right)^2 = \left(\frac{410.86 * 2}{2.83}\right)^2 = 84{,}202.50$$

c) Describe the compensating wage differential revealed in this discussion. Your answer should include that the compensating wage differential is, what is being compensated for, and what does this relationship (equation) tell us about how this worker values each of the three inputs (wage, leisure, and risk).

We tend to discuss compensating wage differentials in terms of a per hour amount, though that's not always the case. In this case, we'll assume that this worker puts in the same number of hours every day, 5 days a week, 52 weeks a year.

$$\frac{\$120{,}000}{2470} = W_1 = \$48.58$$

$$\frac{\$84{,}202.50}{2080} = W_2 = \$40.48$$

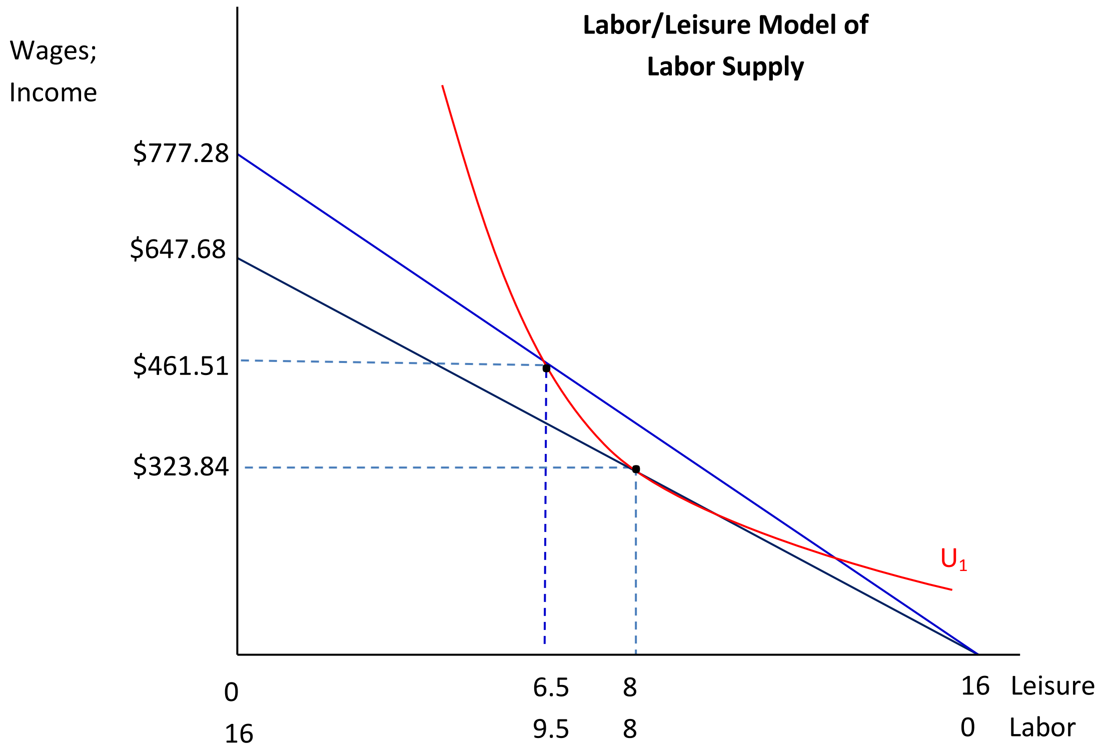
$$W_2 - W_1 = \$40.48 - \$48.58 = -\$8.10 = CWD$$

The CWD is the difference in wage, in this case, hourly wage. What is being compensated for is the increase in leisure time and decrease in workplace risk. Notice that as risk rises utility falls, and as income and leisure rises utility increases. If Justin takes this particular job, we know that he prefers less money, less risk and more leisure time.

[1] This problem is intended to present an abbreviated discussion of the included economic concepts and is not intended to be a full or complete representation of them or the underlying economic foundations from which they are built.

[2] This In-Class Problem was developed by Rick Haskell (rick.haskell@utah.edu), Ph.D. Student, Department of Economics, College of Social and Behavioral Sciences, The University of Utah, Salt Lake City, Utah (2014).

d) Given the information at your disposal, provide a complete Labor/Leisure Model of Labor Supply, including some graphic representation of the worker's tastes and preferences. You can assume the worker puts in the same number of hours each day, 5 days a week, for 52 weeks of the year.



e) Given the information at your disposal, provide a model including representations of the worker indifference and firm isoprofit curves.