Feb 5, 2013

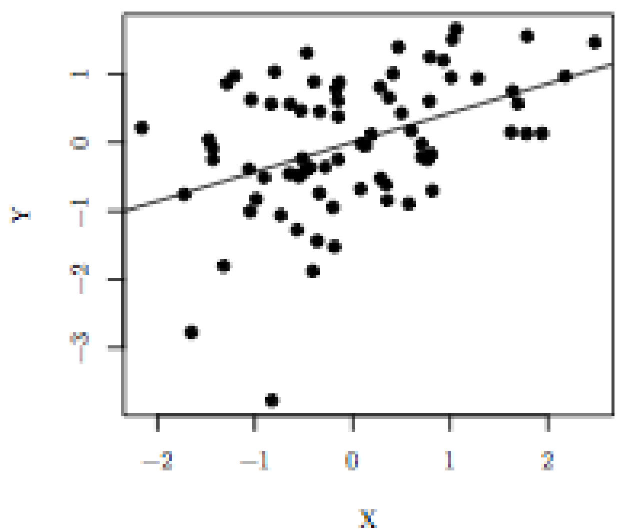
1 Theoretical Tools Continued

1. Advanced question Chap 2. Num 11 pg 59 (see End of Notes)
2. Supply and Demand - draw graphs with elastic and inelastic D and S. Describe CS and PS.

2 Empirical Tools

2.1 Best fitting Line

Figure 1: Intro Idea: Best Fitting Line



Assuming a regression line of the following form:

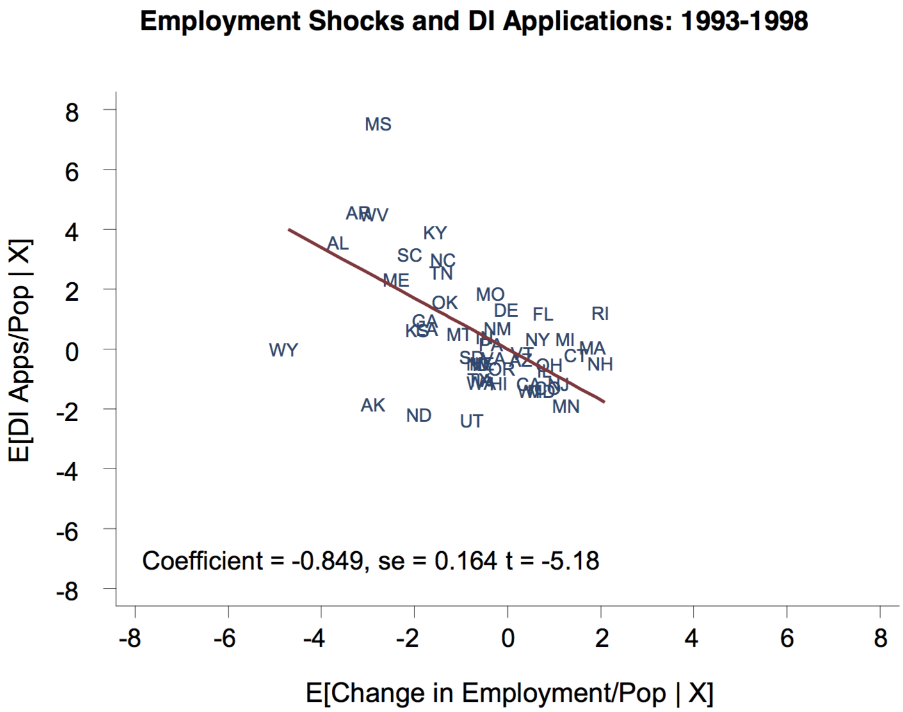
$$y_i = \hat{\beta}_0 + \hat{\beta}_1 x_i + e_i \tag{1}$$

The line minimizes the sum of the squared vertical distances:

$$\min_{b_0, b_1} \sum_i (y_i - (b_0 + b_1 x_i))^2 \tag{2}$$

2.2 DI insurance Example

Figure 2: Disability Insurance and Labor Market Strength



2.3 Preliminaries

1. Expectations

$$\mathbb{E}(Y) = Y_1 \times Prob_1 + Y_2 \times Prob_2 + ... + Y_j \times Prob_j \tag{3}$$

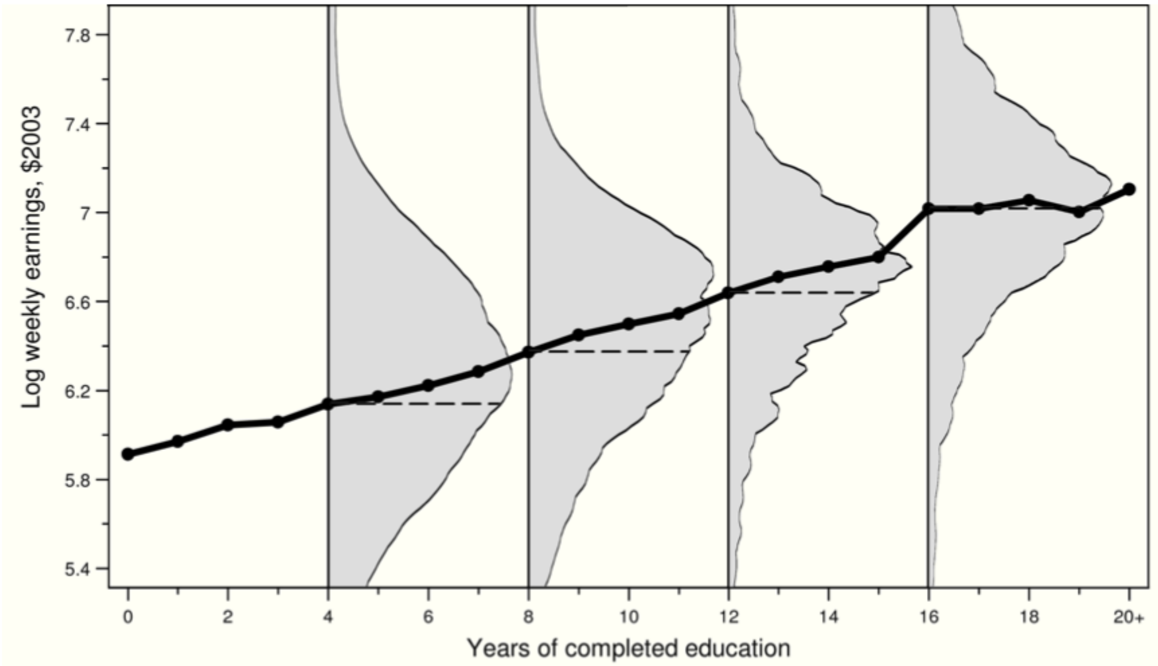
2. Variance

$$Var(Y) = \mathbb{E}[Y - \mu_y]^2 \tag{4}$$

3. Covariance

$$Cov(X, Y) = \mathbb{E}[X - \mu_x][Y - \mu_y] \tag{5}$$

2.4 Another view of regression: CEF



2.5 Linear Model

- Decomposition

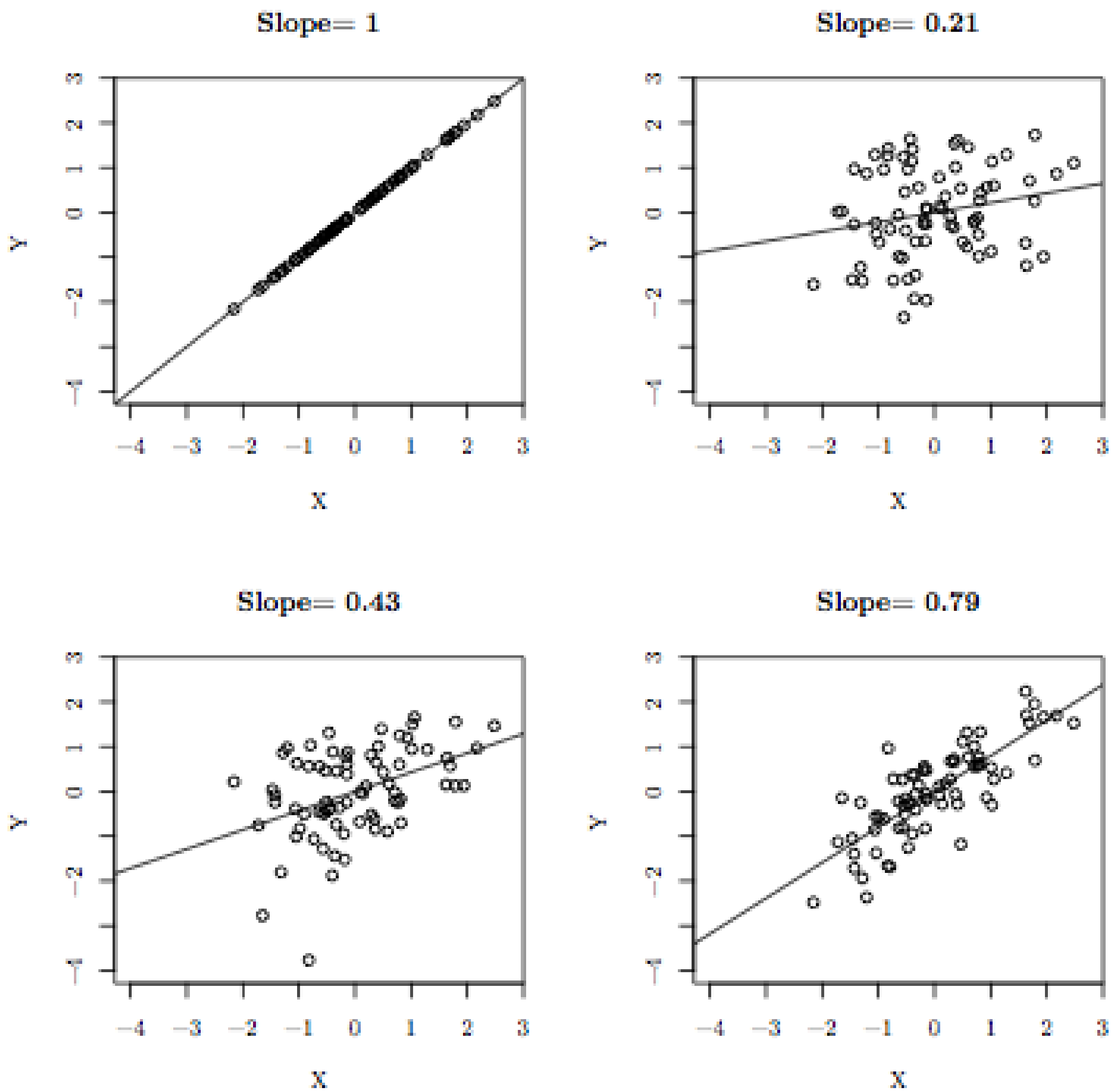
$$y_i = \mathbb{E}[y_i|x_i] + \underbrace{(y_i - \mathbb{E}[y_i|x_i])}_{\equiv \epsilon_i} \tag{6}$$

$$= \beta_0 + \beta_1 x_i + \epsilon_i \tag{7}$$

- Example: Height by gender

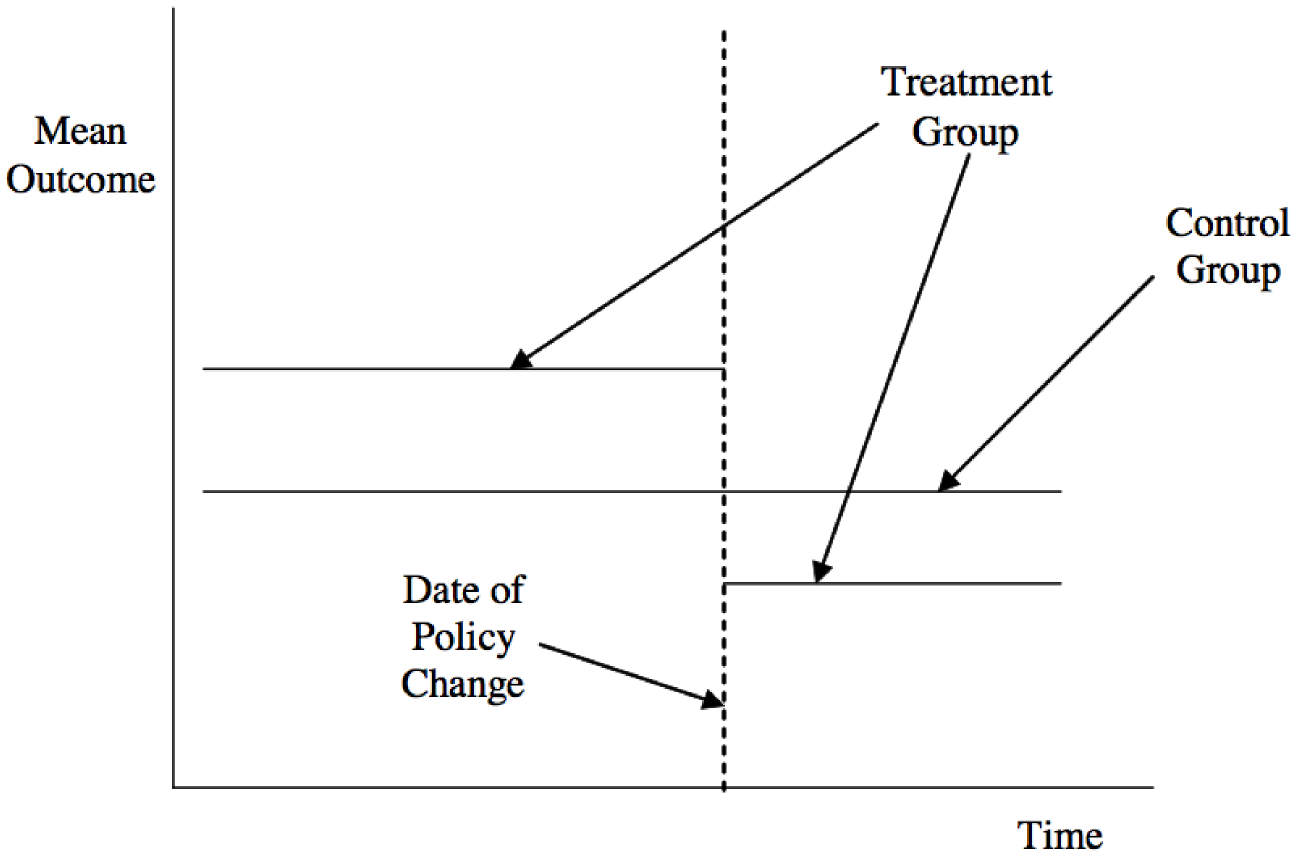
2.6 Correlation: $\rho_{xy} = \frac{Cov(x,y)}{\sigma_x \sigma_y}$

What is β_1? $\beta_1 = \frac{Cov(x,y)}{Var(x)} = \rho_{xy}\frac{\sigma_y}{\sigma_x}$


Slope= 1
Slope= 0.21
Slope= 0.43
Slope= 0.79
X
Y

2.7 Dif in Dif

Effect = [After-Before]$_{Treatment}$ $- [After - Before]_{Control}$



2.8 Dif in Dif Example Gruber(2000)

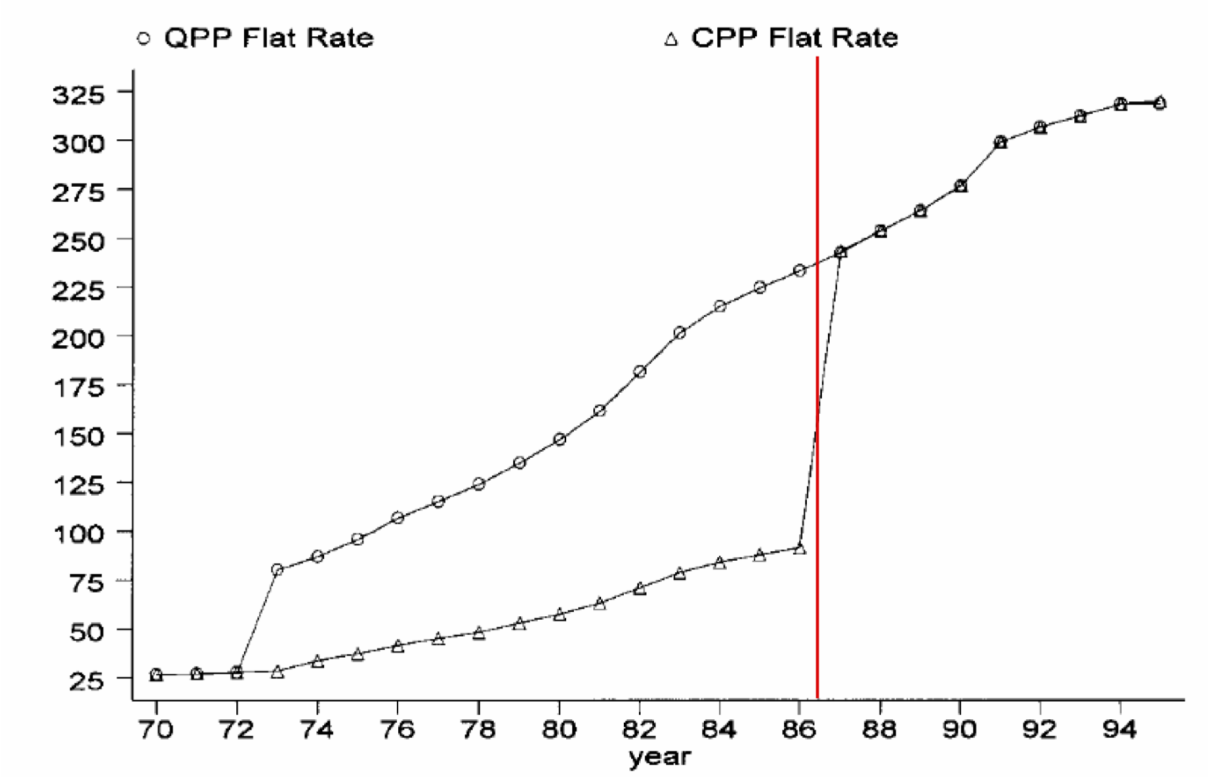


FIG. 1.—Flat-rate portion in Quebec and the rest of Canada

2.9 Table of Diff-in-Diff from Gruber

TABLE 1
MEANS

	CPP		QPP		DIFERENCE IN DIFFERENCE
	Before (1)	After (2)	Before (3)	After (4)	(5)
Benefits	5,134	7,776	6,878	7,852	1,668 (17)
Replacement rate	.245	.328	.336	.331	.088 (.003)
Not employed last week	.200	.217	.256	.246	.027 (.013)
Married?	.856	.856	.817	.841	−.024
Any kids < 17?	.367	.351	.354	.336	.002
Less than 9 years of education	.303	.274	.454	.421	.004

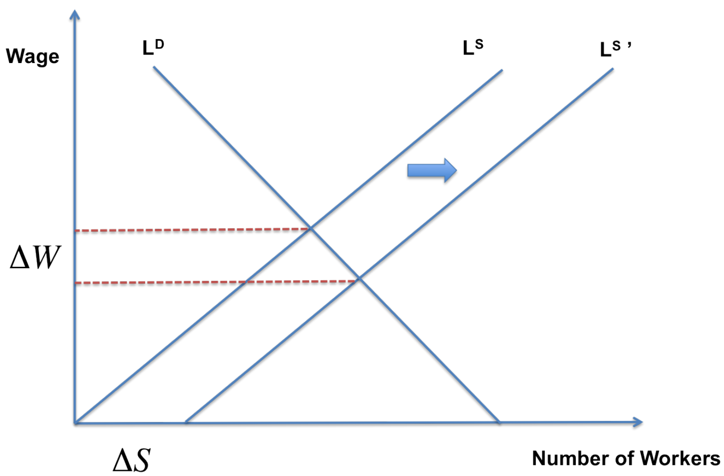
2.10 Regression Output

```
. regress earnings school, robust

      Source |       SS       df       MS              Number of obs =  409435
-------------+------------------------------           F(  1,409433) =49118.25
       Model | 22631.4793       1  22631.4793           Prob > F      =  0.0000
    Residual |  188648.31 409433  .460755019           R-squared     =  0.1071
-------------+------------------------------           Adj R-squared =  0.1071
       Total | 211279.789 409434   .51602893           Root MSE      =  .67879
-------------+------------------------------------------------------------------
             |               Robust                       Old Fashioned
    earnings |      Coef.   Std. Err.      t               Std. Err.         t
-------------+------------------------------------------------------------------
      school |   .0674387    .0003447    195.63             .0003043    221.63
      const. |   5.835761    .0045507   1282.39             .0040043   1457.38
--------------------------------------------------------------------------------
```

3 Connecting Theory to Data: Immigration Example

What is the effect of immigrants on natives' wages?



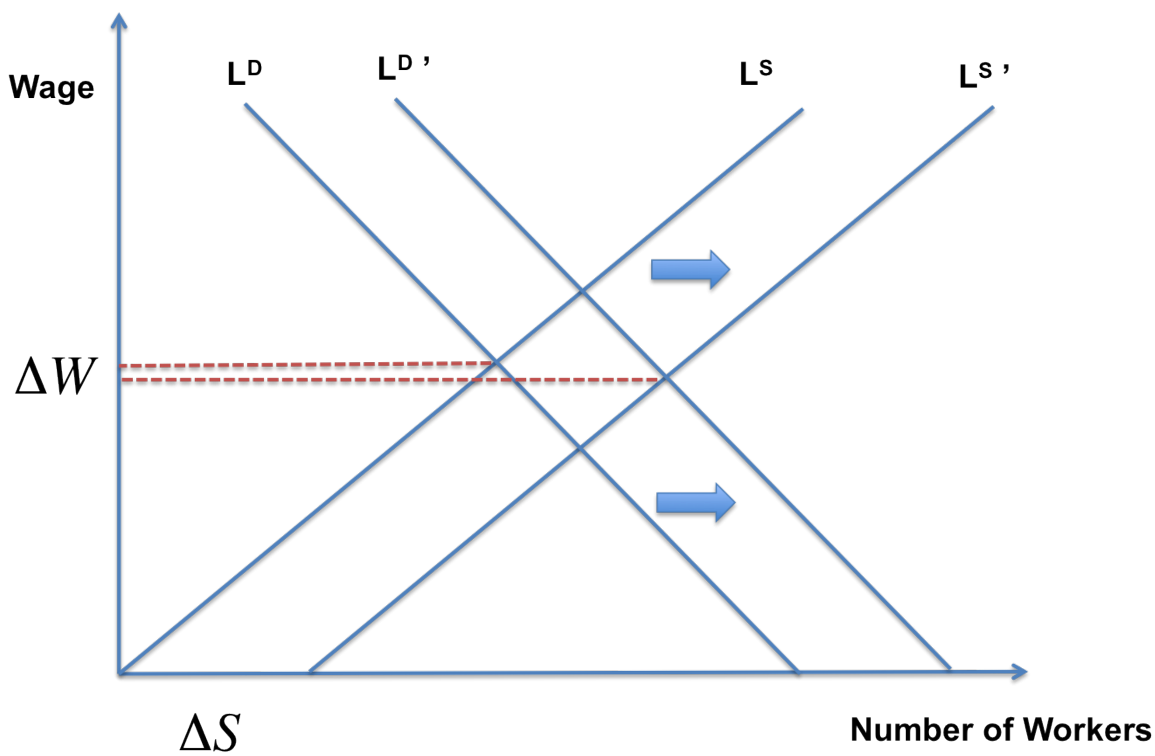
Regression:

$$\Delta W = \alpha + \beta \Delta S + \epsilon \tag{8}$$

Questions to consider

1. How do we define the labor market? How "big" is ΔS?
   - Skill Groups?
   - Local labor markets?
2. Does Demand shift right as well?
   - Local demand for goods and services $\implies$ Higher L^D
   - Constant $\frac{K}{L}$ Ratio $\implies$ Higher L^D
   - Trade theory $\implies$ Higher L^D
3. What would have happened to wages otherwise?

What is the effect of immigrants on natives' wages?



Wage
L^D
L^{D} '
L^S
L^{S} '
ΔW
ΔS
Number of Workers

Figure 3: Consumer & Producer Surplus

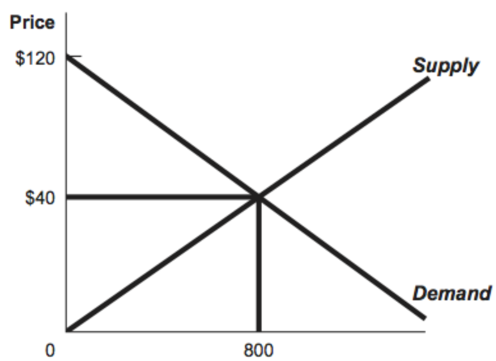
Consider a free market with demand equal to *Q* = 1,200 – 10*P* and supply equal to *Q* = 20*P*.

a. What is the value of consumer surplus? What is the value of producer surplus?

The first step is to find the equilibrium price and quantity by setting quantity demanded equal to quantity supplied. Recall that the condition for equilibrium is that it is the price at which these quantities are equal.

From $Q = 1{,}200 - 10P$ and $Q = 20P$, substitute: $1{,}200 - 10P = 20P$.
Adding $10P$ to each side of the equation yields $1{,}200 = 30P$.
Dividing both sides by 30 yields $P = 40$. If $Q = 20P$, then in equilibrium
$Q = 20(40) = 800$.

Consumer and producer surplus are determined by finding the areas of triangles; area is equal to ½ the base times the height.



The vertical intercept is the price at which quantity demanded is zero: $0 = 1{,}200 - 10P$. This solves to 120.

Consumer surplus = ½ (800)(120 – 40) = ½ (800)(80) = 32,000.
Producer surplus = ½ (800)(40) = 16,000.
Total surplus = 48,000.