Chapter 15. Quantitative

1. (a) An increase in the supply of unskilled labor shifts the Ls curve out, resulting in (i) a lower equilibrium wage and (ii) a higher level of employment. A decrease in the supply of skilled labor shifts the Ls curve in, resulting in (i) a higher equilibrium wage and (ii) a lower level of employment. Since the wage for skilled labor is now even higher and the wage for unskilled labor is now even lower, wage inequality must have increased. See Figure 14.3.
(b) An increase in the demand for skilled labor shifts the Ld curve out, resulting in (i) a higher equilibrium wage and (ii) a higher level of employment. A decrease in the demand for unskilled labor shifts the Ld curve in, resulting in (i) a lower equilibrium wage and (ii) a lower level of employment. Since the wage for skilled labor is now even higher and the wage for unskilled labor is now even lower, wage inequality must have increased.

2. (a) Setting Ls = Ld in each market implies
\[ -10 + 20w = 170 - 10w \]
\[ 30w = 180 \]
\[ \Rightarrow w^*u = 6 \]
\[ \Rightarrow L^*u = 110 \]
for the unskilled, and
\[ -40 + 20w = 235 - 5w \]
\[ 25w = 275 \]
\[ \Rightarrow w^*s = 11 \]
\[ \Rightarrow L^*s = 180 \]
for the skilled.
(b) Now, setting Ls = Ld in each market implies
\[ -10 + 20w = 140 - 10w \]
\[ 30w = 150 \]
\[ \Rightarrow w^0u = 5 \]
\[ \Rightarrow L^0u = 90 \]
for the unskilled, and
\[ -40 + 20w = 285 - 5w \]
\[ 25w = 325 \]
\[ \Rightarrow w^0s = 13 \]
\[ \Rightarrow L^0s = 220 \]
for the skilled.
(c) Both before and after the change in labor demands, workers in the unskilled constitute more than 20% of the workers (before: 110/290 = 37.9%; after: 90/310 = 29.0%). Thus, in each case, \( w^*u \) is the wage at the 20th percentile of the wage distribution, and \( w^*s \) is the wage at the 80th percentile of the wage distribution. As a result, the percentage change in the 80:20 ratio is
\[ \% \Delta 80 : 20 = \left( \frac{13}{5} \right) - \left( \frac{11}{6} \right) = \frac{41.8}{11/6} \]

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4. The variance in each year is equal to 
\[ \text{Var}(y) = \frac{1}{5} \times (16 + 4 + 0 + 4 + 16) = 40/5 = 8. \]
In 2001, \[ \text{Var}(y) = \frac{1}{5} \times (64 + 16 + 0 + 16 + 64) = 160/5 = 32. \] Thus, while the incomes in 2001 represent two times each income from 2000, the variance increases four fold. The coefficient of variation \( CV = \frac{\sqrt{\text{Var}}}{\text{y}} \). In 2000, \[ CV = \frac{\sqrt{8}}{6} = 2 \frac{\sqrt{2}}{3}. \] In 2001, \[ CV = \frac{\sqrt{32}}{12} = 4 \frac{\sqrt{2}}{12} = \frac{\sqrt{2}}{3}. \] The CV is unchanged across the two years.

2000: 80:20 ratio = 81,960/17,955 = 4.56; 90:10 ratio = 111,602/10,600 = 10.53.
\[ \Rightarrow 80:20 \text{ ratio increased by } (4.56-3.98)/3.98 = 14.6\%; 90:10 \text{ ratio increased by } (10.53-9.10)/9.10 = 15.7\%. \]