

Chapter 13. Quantitative

1. A union has N members and is deciding what wage to demand from firms. The union wishes to maximize its utility function, given by $U = N_u \omega_u + (N - N_u) \omega_n$, where N_u is the number of workers employed in the unionized sector, ω_u is the wage paid in the unionized sector, and ω_n is the wage paid in the non-union sector. Assume all union members who are not employed in the unionized sector gain employment in the non-unionized sector until a union job becomes available. In addition, aggregate labor demand is $L^d = 200 - 4\omega$ in the unionized sector.
 - (a) If $N = 175$, how many union members are employed in the unionized sector if the union insists upon $\omega_u = 20$? What if $\omega_u = 15$?
 - (b) If the union is deciding between $\omega_u = 15$ and $\omega_u = 20$, which will the union prefer if $\omega_n = 10$? What if $\omega_n = 15$?
2. In an economy, there are two sectors: one unionized and the other non-unionized. Aggregate labor demand is $L^d = 150 - 5\omega$ in the unionized sector, while labor demand is $L^d = 225 - 20\omega$ in the non-unionized sector. Labor supply is $L^s = 75 + 5\omega$ in the non-unionized sector. Under the current union contract, the union wage (ω_u) is \$10/hour and there are 100 workers in the union sector.
 - (a) What is the equilibrium level of employment and wages in the non-union sector? What is the relative wage advantage (R) for unions?
 - (b) As the current union contract expires, the union votes to increase its wage demand to $\omega' = 15$. How many union workers lose their jobs?
 - (c) The workers who lose their union jobs move to the non-union sector (as their reservation wages are all well below the wage in the non-union sector). What is the new equilibrium wage in the uncovered sector? What is relative wage advantage (R) for unions?
3. Suppose major league baseball players and owners agree to impose a salary cap on teams, but cannot agree on the actual salary cap. (A salary cap is the maximum cumulative salary teams are allowed to pay their players in a given season.) The players go on strike and have a resistance curve given by $SC = 70 + 0.3s - 0.1s^2$, where SC is the salary cap (in millions) and s is the length of the strike (in weeks). The owners of the baseball teams have a concession schedule given by $SC = 50 + 0.5s$. According to Hicks' simplest strike model, determine the length of the strike and the salary cap that will be agreed upon. [Hint: Recall the quadratic formula. If $ax^2 + bx + c = 0$, then $x = (-b \pm \sqrt{b^2 - 4ac}) / 2a$.]
4. Unions in two different industries confront employers with identical concession schedules, given by $\omega = 25 + s$, where ω is the percentage wage increase and s is the strike length in weeks. However, in one industry, workers had been paid higher wages in the past (and were

therefore able to accumulate personal savings). As a result, the union's resistance curve in the high-paying industry is $\omega = 50 - s$, whereas it is $\omega = 50 - 2s$ in the low-paying industry.

- (a) Graph the concession and resistance curves on one graph.
 - (b) Calculate the expected outcome in each industry according to Hicks' simplest strike model.
5. Consider an economy containing a union and non-union sector. In the union sector, $L^d = 50 - 2\omega$ and $L^s = -15 + 8\omega$. In the non-union sector, $L^d = 60 - 4\omega$ and $L^s = -44 + 12\omega$.
- (a) Calculate the initial equilibrium wage and employment in each sector assuming the union imposes no demands on the firms in the union sector.
 - (b) If the union insists on a wage of \$10/hour, how many union workers will lose their jobs?
 - (c) Assume the percentage of unemployed union workers who decide to seek employment in the non-union sector depends (negatively) on level of unemployment benefits they could otherwise collect. In particular, assume that the percentage of unemployed union workers moving to the non-union sector is given by $p = 1 - RR$, where RR is the replacement rate under the unemployment insurance (UI) system. [Note: The replacement rate is the percentage of one's former salary that is replaced through the UI system. This is discussed further in Chapter 15.] Calculate the new wage and level of employment in each sector, as well as the relative wage advantage (R), if the union insists on a wage of \$10 and (i) $RR = 0$ and (ii) $RR = 3/7$? Assume all union workers who do seek employment in the non-union sector are willing to work for any non-union wage (as long as it is greater than zero).