EE 461

Suggested Solutions to Homework 7

1. **Using Calculus, show what happens in the simplified Harris-Todaro Model to unemployment when rural wage increases.**

   Using Harris-Todaro model, the equation is

   $$\frac{wL_u}{L-L_r} = m \Rightarrow L_r = L - \tfrac{w}{m} L_u.$$

   Now using unemployment equation, one gets

   $$Un = L - L_u - L_r = L - L_u - \left(L - \tfrac{w}{m} L_u\right)$$
   $$= \left(\tfrac{w}{m} - 1\right) L_u.$$

   Differentiating with respect to rural wages yields

   $$\frac{dUn}{dm} = -\frac{w}{m^2} L_u < 0.$$

   Therefore, if rural wages increase, urban unemployment decreases.

2. **Now modify the Harris-Todaro Model such that the urban area has an informal sector, which people can always work and earn a fixed wage of, *x*. The workers in the informal sector is not counted towards "employed" persons, thus are considered unemployed.**

   a. **Even if *x* < *m*, the rural wage, will people still migrate from rural to urban area?**

      Yes. As long as the following condition holds, people will continue to migrate

      $$\left(\tfrac{L_u}{L-L_r}\right) w + \left(\tfrac{L-L_u-L_r}{L-L_r}\right) x \geq m.$$

      The equilibrium will be reached at equality, after L_r adjusted.

   b. **Using calculus, show what happens to unemployment when the informal sector wage rises.**

      There is a typo in the question. Since the informal and the rural sector absorb all surplus labor force, there is no unemployment, and hence the correct technical answer would be zero effect.

      The question should have asked "show what happens to rural employment." In that case, rewrite the equation above as follows. At equilibrium,

      $$\left(\tfrac{L_u}{L-L_r}\right) w + \left(\tfrac{L-L_u-L_r}{L-L_r}\right) x = m$$
      $$L_u w + \left(L - L_u - L_r\right) x = \left(L - L_r\right) m$$
      $$L_u \left(w - x\right) + \left(L - L_r\right) x = \left(L - L_r\right) m$$
      $$L_u \left(w - x\right) = \left(L - L_r\right)\left(m - x\right)$$
      $$L_r = L - \tfrac{(w-x)}{(m-x)} L_u.$$

      If w>m>x, then implication of the model is similar to before: *a rise in urban job increases urban unemployment*. Now, you can verify that $\frac{dL_r}{dx} = -\left(\frac{w-m}{(m-x)^2}\right) L_u < 0.$

For those who assumed that informal labor is counted as urban unemployment, then this also gives you the answer that informal sector's wage increases unemployment.

c. **Discuss some implication of what you learn about informal sector in the urban area (keep it brief as usual).**

   Informal sector draws more rural-urban migration, by lifting expected income in the urban area. These informal laborers may often times accept job at a much lower pay than any other sectors, but people will still remain in that sector. This is in contrast to our usual understanding of labor market that people go wherever the wage is highest. Apparently, in this model, informal laborers could have migrated back to the rural area and earn higher wage, but they did not.

3. **Why do you think the developed economies have more urban areas than developing economies? (Again, keep it within half a page or so, or shorter)**

   Because of the expansion of infrastructures in developed economies, the urban area can expand much wider. In addition, due to distribution of infrastructure investment, more urban areas can appear away from the "first city." However, since developing government moves much slower to economic growth, we see a lot of infrastructure investment being dumped into the capital city area and very little elsewhere.