ECON 110, Professor Hogendorn

Problem Set 8 Answers

1. *OldGermans_a.*

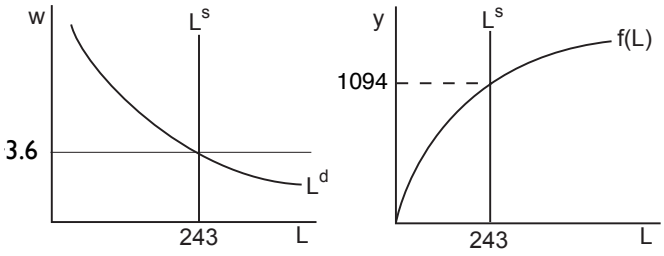
   (a) We can find labor demand using $pMP_L = w$, so,

   $$\frac{4}{5} \cdot \frac{54}{4} L^{-1/5} = w \Rightarrow L^d = \left(\frac{54}{5w}\right)^5$$

   Setting $L^d = L^s = 243$ gives equilibrium real wage $w = 3.6$.

   (b) The total costs of the firm are $wL = 3.6 \cdot 243 = 874.8$. The total revenues are $py = 1 \cdot f(243) = 1094$. Thus the profits, paid as dividends, are 219. The firm's output is 1094.

   Workers earn total wages of $wL = 874.8$ and total dividends of 219. Their total consumption of beer is thus 1094, so there is equilibrium. 80% of the workers' income is from wages, and 20% from dividends.



   (c) L^d is the same as before, but now setting $L^d = L^s = 198$, gives an equilibrium real wage of $w = 3.75$. Firm output is $f(198) = 928$, of which the total costs are $wL = 742.5$ and the dividends are 185.5.

   Workers' wages plus dividends sum to 928, all of which they consume, so there is equilibrium in the goods market.

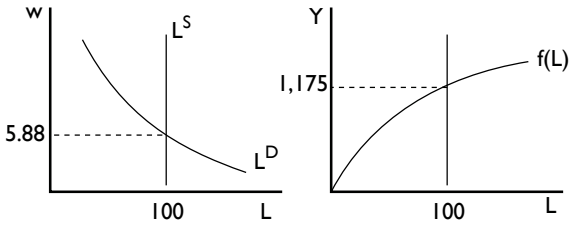
2. *Botswana_a.*

(a) Labor demand can be found quickly by remembering that $pMP_L = w$, so

$$58.75L^{-1/2} = w \Rightarrow L^{1/2} = \frac{58.75}{w} \Rightarrow L^D(w) = \frac{3,451.56}{w^2}$$

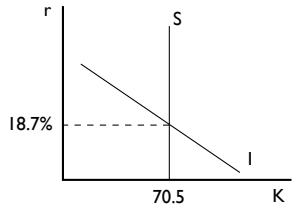
Then setting labor demand equal to labor supply gives us:

$$L^D(w) = L^S \Rightarrow \frac{3,451.56}{w^2} = 100 \Rightarrow w = 5.88$$

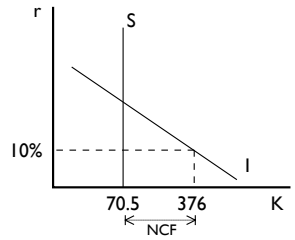


(b) Government spends 33% and collects taxes of 34%, so government saving is 1% of GDP, or 11.75 million. Private saving is 5%, or 58.75 million. Thus, national saving is $S = 70.5$. Capital market equilibrium occurs where $I = S$:

$$728 - 3520r = 70.5 \Rightarrow r = 18.7\%$$



(c) Private and government savings are the same as above, and the investment demand curve is also the same. The only difference is that there is a world real interest rate that is lower than the crossing point of these curves. It allows Botswana to invest $I(10\%) = 728 - 3520 \times 0.10 = 376$, implying a capital inflow of $I - S = 376 - 70.5 = 305.5$.



(d) Firm output is 1175, wages are 5.88, and labor demanded is 100, so firm profits are $\pi = 1175 - 5.88 \times 100 = 587$ which equals dividend income. Wage income is $wL = 5.88 \times 100 = 588$. Thus, national income is $NI = 1175$. We know what

$$NI = C + S_P + T = C + 58.75 + (34\% \times 1175) \Rightarrow C = 716.75$$

Now on the output side, we know that

$$Y = C + I + G + NX = 716.75 + 376 + (33\% \times 1175) + NX$$

If we set this equal to income 1175, we must have $NX = -305.5$. Note this checks out, it's the negative of net capital flows.

(e) We have to find the new labor curve:

$$51.9L^{-1/2} = w \Rightarrow L^{1/2} = \frac{51.9}{w} \Rightarrow L^D(w) = \frac{2693.61}{w^2}$$

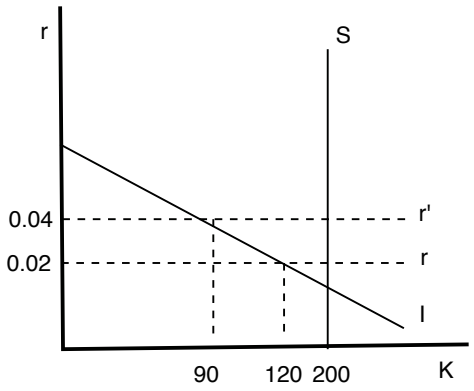
Then setting labor demand equal to labor supply gives us:

$$L^D(w) = L^S \Rightarrow \frac{2693.61}{w^2} = 100 \Rightarrow w = 5.19$$

So real wages fall to 5.19.

3. *RateSpread_a.* Consider a small country in the global economy. There is a world real interest rate of 2%, i.e. $r = 0.02$. This country has perfectly inelastic domestic savings of 100 dollars. The demand for investment in this country is $I = 150 - 1000r$.

(a) At $r = 0.02$, the investment demand is $I(0.02) = 150 - 1000 \times 0.02 = 120$. Thus the diagram is



(b) At the new interest rate, $I(0.04) = 150 - 1000 \times 0.04 = 90$. Thus even more capital now flows out of the country.

(c) It makes sense that the original coupon rate was 5%, because that's 2% for the real interest rate plus 3% for the inflation rate. The instability has now increased the risk of this country, so the yield on the bond should rise to 7%. The price is equal to the present discounted value of the stream of coupon payments plus the return of face value at maturity, where the discount rate is the yield. For the yield to go up, the price must come down.