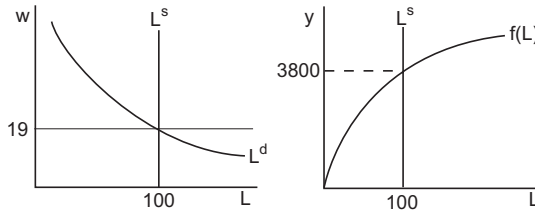ECON 110, Prof. Hogendorn

Problem Set 8 Answers

1. *Botswana_a.*

   (a) Labor demand can be found quickly by remembering that $pMP_L = w$, so
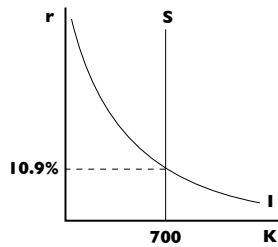
   $$190L^{-1/2} = w \Rightarrow L^{1/2} = \frac{190}{w} \Rightarrow L^D(w) = \frac{36100}{w^2}$$

   Then setting labor demand equal to labor supply gives us:

   $$L^D(w) = L^S \Rightarrow \frac{36100}{w^2} = 100 \Rightarrow w = 19$$

   (b) Government spending and taxes are the same, so government saving is zero. Thus, capital market equilibrium occurs where private saving, S^P equals $I : \frac{7630}{r} = 700 \Rightarrow r = 10.9\%$

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

   $$175L^{-1/2} = w \Rightarrow L^{1/2} = \frac{175}{w} \Rightarrow L^D(w) = \frac{30625}{w^2}$$

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Then setting labor demand equal to labor supply gives us:

$$L^D(w) = L^S \Rightarrow \frac{30625}{w^2} = 100 \Rightarrow w = 17.5$$

So real wages fall to 17.5 and output falls to $f(100) = 3500$.

(d) The government is still spending $25\% \cdot 3800 = 950$ but is only collecting taxes of $25\% \cdot 3500 = 875$. Thus it is running a deficit of 75, which raises the equilibrium real interest rate to 22%.

(On a graph, there should be a vertical line for government saving at -75 and a vertical line for total saving at 625. The investment demand is the same.)

(e) The neoclassical model says that the lower private investment will lead to less capital deepening and therefore slower economic growth. A counter-argument is that in the midst of its problems, government spending is needed to stabilize education, healthcare, and so forth, and that these provide more improvements to the production function than private capital.

2. *GrowingChina_a.*

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

$$\frac{2}{3} \cdot Ah^{2/3}L^{-1/3}K1/3 = w$$
$$\frac{2}{3} \cdot 3.33L^{-1/3}7291/3 = w$$
$$20L^{-1/3} = w \Rightarrow L^d(w) = \left(\frac{20}{w}\right)^3$$

Setting $L^d = L^s = 1000$ gives an equilibrium real wage of $w = 2$.
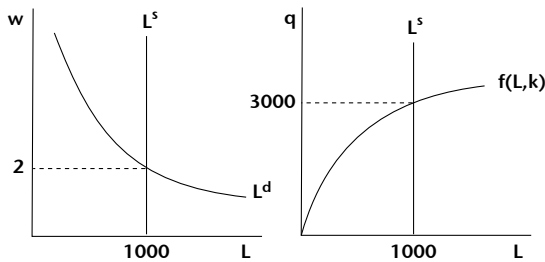
(b) The total costs of the firm are $wL = 2 \cdot 1000 = 2000$. The total revenues are $py = 1 \cdot f(1000, 729) = 3000$. Thus the profits, paid as dividends, are 1000. The firm's output is 3000.

Workers earn total wages of $wL = 2000$ and total dividends of 1000. Their total consumption of rice is thus 3000, so there is equilibrium. Output per worker is 3.

(c) L^d is the same as before, but now setting $L^d = L^s = 1728$, gives an equilibrium real wage of $w = 1.67$. Firm output is $f(1728) = 4326$, and output per worker is 2.5.

The output per worker falls because the marginal product of labor falls. Even though the additional workers produce (and consume) more, their addition on the margin is less than before. The economy is running into decreasing returns to labor and thus into a possible Malthusian trap.

(d) An increase in A is an increase in total factor productivity, sometimes simply called technology. It would increase the marginal products of both labor and capital, thus raising the wage and output per worker.

An increase in K is called capital deepening. This raises the marginal product of labor (though it lowers the marginal product of capital) and thus raises wages. Each worker has more capital to work with.

An increase in h is called human capital formation. Although it does not change the degree of diminishing returns to *skill-adjusted* hours of labor, it does increase the marginal product of each generic hour of labor.

3. *SW25.3_a.* We know that the amount of currency is unchanged; Bob has less currency but the bank has more in vault cash (note that when the money was underground, it was still in the money supply; that is, it was still currency outstanding – it was just underground.) To find

deposits, we can use the fact that required reserves must be 5% of deposits. When Bob deposits his $100,000, the bank makes an entry on the liability side of its balance sheet representing the deposit. There must be a matching entry of $100,000 on the asset side. This entry is made in the bank's reserves. At this point, the bank is holding excess reserves since there was an entry of $100,000 but the bank is only required to hold 5% of Bob's deposit, or $5,000. The bank can lend out the rest. When banks lend they create further deposits, and we can determine the total change in deposits after the money multiplier goes to work within the banking system. Use the formula new reserves/0.05 = total increase in money supply, thus $\frac{\$100,000}{0.05} = \$2,000,000$.

If Bob only deposits $95,000, then the original change in reserves is $95,000 not $100,000. From the above formula $\frac{\$95,000}{0.05} = \$1,900,000$. But if Bob spends the $5,000 in cash, then the person or firm he gives it to may put it in their bank account, and then the money multiplier will start to work anyway.

4. *AIG_a.*

   (a) Subtracting $50 from assets also requires subtracting $50 from net worth:

Assets	Liabilities
$400 financial securities	$913 general liabilites
	$38 government loan
~~$622~~ $572 other assets	~~$71~~ $21 net worth
~~$1022~~ $972	~~$1022~~ $972

   (b) Now the financial securites fall in value to $360 and the liability side is bigger. As a result, net worth has to fall to −$54 to balance the balance sheet.

Assets	Liabilities
~~$400~~ $360 financial securities	$913 general liabilites
	$38 government loan
	$35 credit default swaps
$572 other assets	~~$21~~ −$54 net worth
~~$972~~ $932	~~$972~~ $932

(c) This part of the government bailout adds $50 in cash to the asset side. The corresponding change in the liability side is a $50 increase in net worth.

Assets	Liabilities
$360 financial securities	$913 general liabilites
$50 cash	$38 government loan
	$35 credit default swaps
$572 other assets	~~−$54~~ −$4 net worth
~~$932~~ $982	~~$932~~ $982

(d) On the asset side, AIG got new cash from both parts of the government plan, $60 and $40, but they used up $35 of it paying off the credit default swaps. On the liability side, they have a new government loan, new net worth, and they got rid of the liability. On the whole, net worth is now positive again.

Assets	Liabilities
$360 financial securities	$913 general liabilites
$50 cash	$38 government loan
+$60+$40−$35 cash	~~$35 credit default swaps~~
	$60 government loan
$572 other assets	~~−$4~~ $36 net worth
~~$982~~ $1047	~~$932~~ $982