ECON 110, Prof. Hogendorn

# Problem Set 9 Answers

1. *OldGermansSave_a.*

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

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

   Setting $L^d = L^s = 243$ gives an equilibrium real wage of $w = 3.6$.
   The total costs of the firm are $wL = 3.6 \cdot 243 = 874.8$. The total revenues are $py = 1 \cdot f(243) = 1093.5$. Thus the profits, paid as dividends, are 218.7. The firm's output is 1093.5.

   Workers earn total wages of $wL = 874.8$ and total dividends of 218.7. Their total consumption of beer is thus $1093.5 - 100 = 993.5$, and the remaining 100 beers are saved, so there is equilibrium.
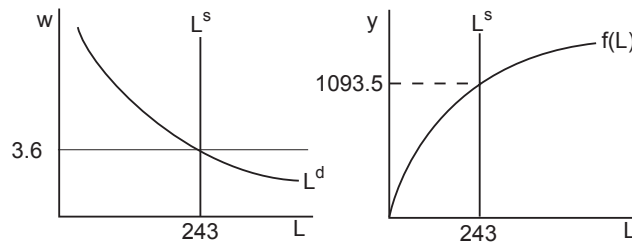
   (b) The equilibrium real interest rate is found by setting

   $$I = S \Rightarrow \frac{1200}{r} = 100 \Rightarrow r = 12\%$$

r   S

12% ┄┄┄┄┄┄┄

I

100   K=beer
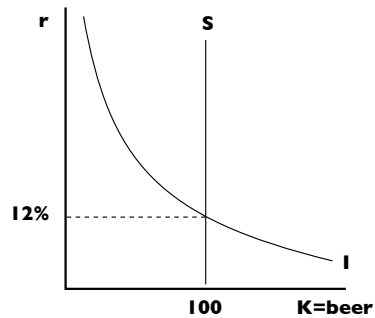
(c) The higher savings reduces the real interest rate:

$$I = S \Rightarrow \frac{1200}{r} = 110 \Rightarrow r = 10.9\%$$

(d) Consumption of beers falls to $1093.5 - 100 - 60 = 933.5$. Private savings stays the same at 100. Government spending is 80, so $T - G = -20$, i.e. the government runs a deficit. National saving is then $100 - 20 = 80$. The real interest rate rises to

$$I = S \Rightarrow \frac{1200}{r} = 80 \Rightarrow r = 15\%$$

Note that the government deficit fully crowds out private investment, which falls from 100 to 80.
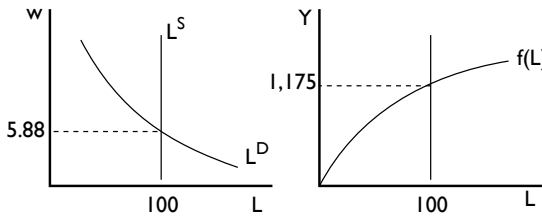
2. *Botswana_a.*

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

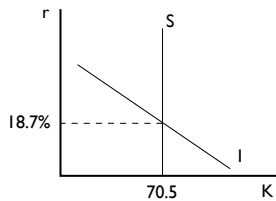$$58.75L^{-1/2} = w \Rightarrow L^{1/2} = \frac{58.75}{w} \Rightarrow L^D(w) = \frac{3,451.56}{w^2}$$

   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 $S^N = 70.5$. Capital market equilibrium occurs where $I = S^N$:

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

   (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 $I - S = 376 - 70.5 = 305.5$.
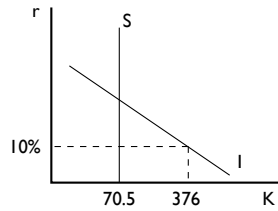
(d) Firm output is 1175, wages are 5.88, and labor demanded is 100, so firm profits are $\pi = 1175 - 5.88{\times}100 = 587$ which equals dividend income. Wage income is $wL = 5.88{\times}100 = 588$. Thus, total income is $Y^D = 1175$. We know what

$$Y^D = C + S^P + T = C + 58.75 + 399.5 \Rightarrow C = 716.75$$

Now on the output side, we know that

$$Y = C + I + G + NX = 716.75 + 376 + 387.75 + NX$$

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.

(f) When people consume healthcare, there are positive externalities to others. Partly this comes through the positive social interactions of healthy people, and partly it comes through the buildup of immunity to diseases in the population. The result is that the marginal social benefit curve is higher than the private demand curve. That means that at the free-marked equilibrium, social benefit is higher than social cost, and more healthcare should be provided.

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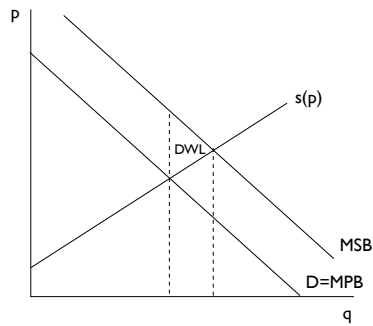
3. *AIG_a.*

   (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~~ $1047