ECO 601-001 Problem Set #9 KEY Fall 2004

1.

9.4 Total cost = $C = .25q^2 = .25(q_A + q_L)^2$

$q_A = 100 - 2P_A$ $q_L = 100 - 4P_L$

$P_A = 50 - q_A/2$ $P_L = 25 - q_L/4$

$R_A = P_A q_A = 50q_A - q_A^2/2$ $R_L = P_L q_L = 25q_L - q_L^2/4$

$MR_A = 50 - q_A$ $MR_L = 25 - q_L/2$

$MC_A = .5(q_A + q_L)$ $MC_L = .5(q_A + q_L)$

Set $MR_A = MC_A$ and $MR_L = MC_L$

$50 - q_A = .5q_A + .5q_L$ $25 - \frac{q_L}{2} = .5q_A + .5q_L$

Solving these simultaneously gives

$q_A = 30$ $P_A = 35$

$q_L = 10$ $P_L = 22.5$ $\pi = 1050 + 225 - 400 = 875$

2.

10.5 a. $Q_D = 2{,}600{,}000 - 200{,}000P$

In the long run, $P = \$3$, so $Q_S = Q_D = 2{,}600{,}000 - 200{,}000(3) = 2{,}000{,}000$.

Since $Q_S = 2{,}000{,}000$ bushels, there are $\frac{2000000 \text{ bushels}}{1000 \text{ bushels/farm}} = 2000$ farms

b. $Q_S = Q_D = 3{,}200{,}000 - 200{,}000P$

In the short run, $Q_S = 2{,}000{,}000$, so $2{,}000{,}000 = 3{,}200{,}000 - 200{,}000P$

$1{,}200{,}000 = 200{,}000P$ $P = \$6$/bushel

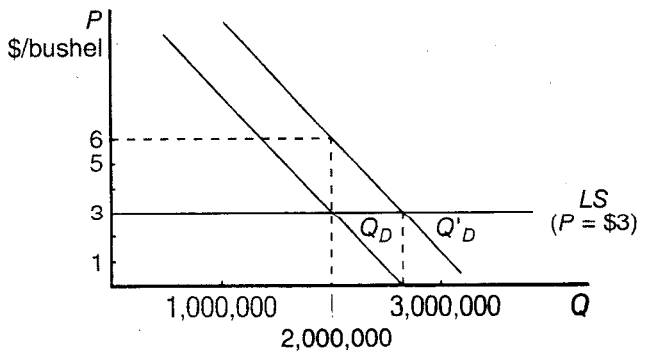
$\pi = q(P - AC) = 1000(6 - 3) = 3000$

c. $P = \$3$/bushel in the long run.

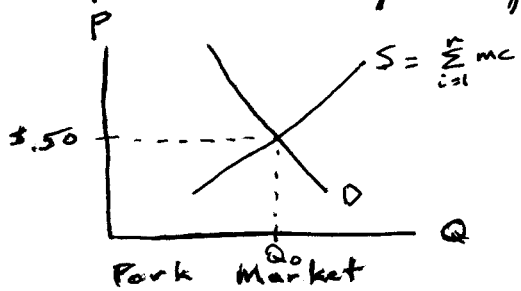
$Q_S = Q_D = 3{,}200{,}000 - 200{,}000(3) = 2{,}600{,}000$ bushels

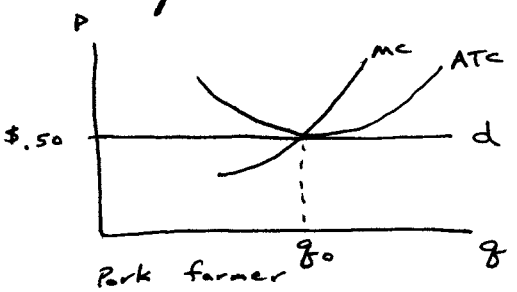
There will be $\frac{2{,}600{,}000 \text{ bushels}}{1000 \text{ bushels/farm}} = 2{,}600$ farms.

d.



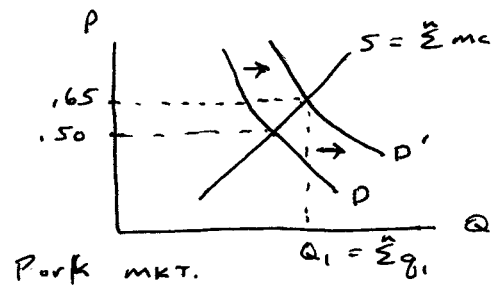
3. (a) Pork industry in pre-Atkins period:

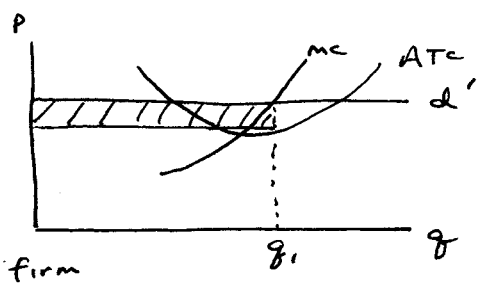




Market price initially is $.50. Typical farmer produces q_0 hogs, and market output = $\sum_{i=1}^{n} q_0 = Q_0$. Zero economic profit, so no net entry or exit.

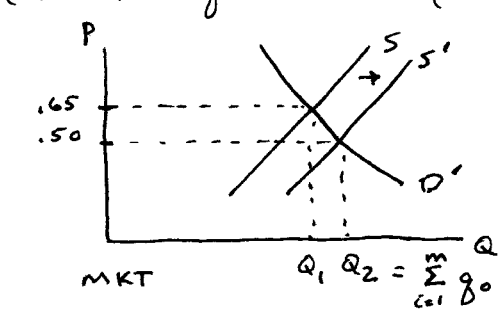
(b) Atkins diet craze takes over:

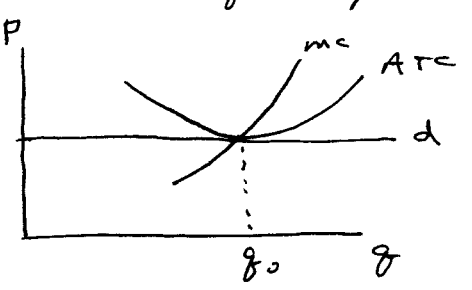




Increase in demand for pork drives hog prices up to $.65 in the short run. Typical farmer increases output to q_1 and market output is Q_1. Farmers earn positive economic profits in the short run. Number of farmers = n.

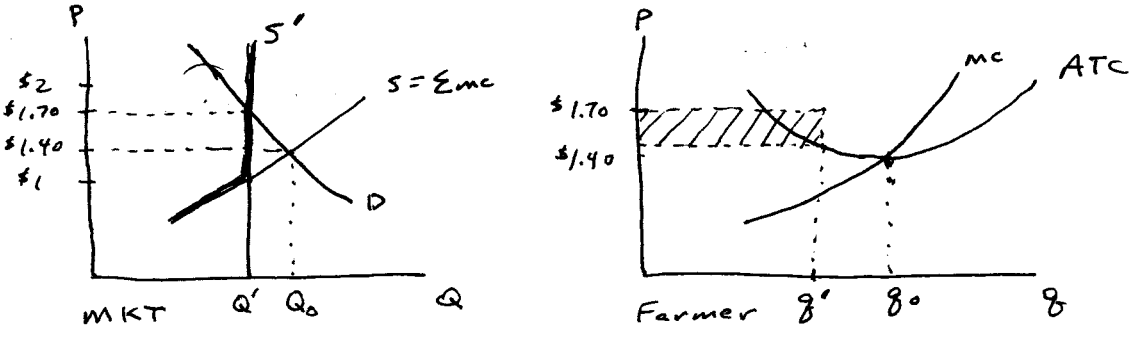
(c) The future: (assuming demand shift is permanent)





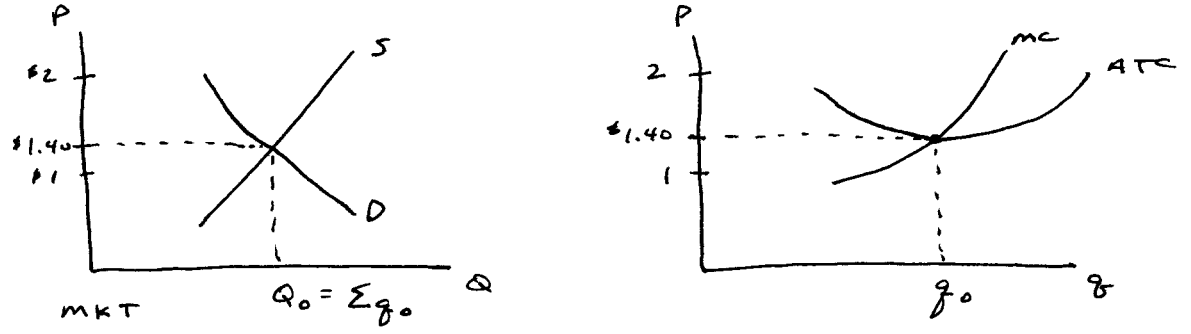
Economic profit attracts entry. Number of firms increases from n to m, shifting market supply curve to S'. Price falls, eventually returning to $.50 when enough firms have entered. At that point economic profit = 0.

4. (a) Current situation:



Quota system reduces market output from Q_0 to Q'. This causes market price to rise to \$1.70. Farmer grows q', which is the limit he can grow under the quota system. If unconstrained, the farmer would like to grow more tobacco. At price = \$1.70 and output = q', farmer earns positive economic profit. Market supply in absence of quota system would be S. With quota system in place it is S'.

(b) Long-run equilibrium after quota system is disbanded:



Quota system is disbanded. Farmers expand output and market price falls. When price falls to level of minimum ATC, farmers earn zero economic profit. LR equilibrium is characterized by P = min ATC and $\Sigma q_0 = Q_0$, where the number of farmers is just sufficient to produce the market output.