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ECON110-02

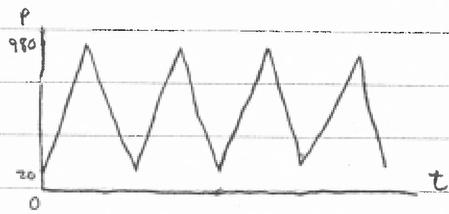
✓+

Chapter 11 Problem Set

great work

1. $D = q_t = 1000 - 20p_t$, $S_t = 20p_{t-1}$

We can tell by the model that the price of wheat will fluctuate rapidly. If the price in year $t-1 = \$1$, farmers will plant enough to produce $q_t = 20$ of wheat. $p_t = 50 - \frac{q_t}{20}$, so this would increase the price in year t to 49 — and thus the quantity demanded to 20. The next year, farmers would plant $(20 \times 49) = 980$ wheat, lowering p_t to 1 and the quantity demanded to 980. p_{t-1} the following year would equal 1, and the cycle would continue. The graph of this model would be the sawtooth graph, though with a constant amplitude:



$$q_t = S_t$$
$$1000 - 20p_t = 20p_{t-1}$$
$$20p_t = 1000 - 20p_{t-1}$$
$$p = 50 - p_{t-1}$$

1st order linear difference equation!

Although the price fluctuates, demand adjusts each year so that the market clears — the quantity supplied is equal to the quantity demanded. Thus, this is a stable model.

✓ 2*. Price $= 4 - q/50$ (q = consumption and excludes speculative purchases)

140 bushels in a good year; 40 in a bad year

The more the speculator purchases, the higher the price will be. (If the speculator purchases all 140 bushels, $p = \$4$; if he purchases none, $p = \$1.20$.) While the speculator wants the price to be low in good years, he wants it to be high in bad years. ($p_{bad} = 4 - \frac{q+40}{50}$, since the farm will produce 40 bushels in addition to the speculator's sellings.)

Revenue $= p_2 q$, cost $= p_1 q$ $\quad$ q = quantity purchased by speculators

$$p_2 = 4 - \frac{q+40}{50}, \quad p_1 = 4 - \frac{140-q}{50}$$

$$\text{Profit} = \pi = \left(4 - \frac{q+40}{50} - 4 + \frac{140-q}{50}\right)q = \left(\frac{140-q-q-40}{50}\right)q = \frac{-2q^2 + 100q}{50} = \frac{100q}{50} - \frac{2q^2}{50} = 2q - q^2/25$$

$$\pi_{max} = 2 - \frac{2q}{25} = 0$$

$$2 = \frac{2q}{25}$$

$$50 = 2q$$

$\boxed{q = 25}$ $\left(\frac{d^2\pi}{dq^2} = -2/25 < 0\right.$, so we know this is a maximum$\left.\right)$

$C(q) = \$42.50$, $R(q) = \$67.50$, $\pi(q) = \$25$

↳ $p = \$1.70$ $\quad$ ↳ $p = \$2.70$

3. $\dot{p} = \left(\frac{0.0012}{u - 0.03}\right) - 0.02$

a) $u = 4\%$ $\quad \dot{p} = \left(\frac{0.0012}{0.04 - 0.03}\right) - 0.02 = \left(\frac{0.0012}{0.01}\right) - 0.02 = 0.12 - 0.02 = 0.1 \boxed{= 10\%}$

b) NIRU = u when $\dot{p} = 0$

$0 = \left(\frac{0.0012}{u - 0.03}\right) - 0.02$

$0.02 = \frac{0.0012}{u - 0.03}$

$0.02u - 0.0006 = 0.0012$

$0.02u = 0.0018$

$u = .09 \boxed{= 9\%}$

4. $\dot{p} = \left(\frac{0.0012}{u - 0.03}\right) - 0.02 + \hat{\dot{p}}$ $\quad \hat{\dot{p}}$ = expected rate of inflation

a) NAIRU = u when $\dot{p} = 0$ and $\hat{\dot{p}} = 0$

$0 = \left(\frac{0.0012}{u - 0.03}\right) - 0.02 + 0$

we know from #3 that $u = 0.09 \boxed{= 9\%}$

b) Econoland's Phillips curve (#4) takes into account expected inflation, which can shift the Phillips curve to the left or right. (Increases in productivity can shift the Phillips curve to the left, while decreases in productivity can shift it to the right.) Simpleland's Phillips curve, however, is independent of changes in expected inflation, suggesting that it cannot shift (and thus its NIRU cannot change, while the NAIRU in Econoland can change).