Midterm #2 Solutions

100B, FALL 2005 – C. JONES

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(1) (a) i. Unemployment Rate $= 1 - \frac{\text{Employment}}{LF}$

$= 1 - \frac{150}{200}$

$= \boxed{25\%}$ or $1/4$.

ii. Okun's Law

$\text{Gap} = -2 \times (u - \bar{u})$

$= -2 \times (25 - 10)$

$= -2 \times 15\%$

$= \boxed{-30\%}$

(b) $MV = PY \Rightarrow g_m + g_V = g_P + g_Y$

$10\% + g_V = 5\% + 2\%$

$\Rightarrow \boxed{g_V = -3\%}$ Velocity must be falling @ 3% per year.

(c) Fisher Eqn: $i = r + \pi$

Nominal Interest Rate = Real Int. Rate + Inflation Rate

Arbitrage argument

- Put money in bank $\Rightarrow$ earn i
- Buy machine $\Rightarrow$ earn MPK $= r$ + capital gain on price $= \pi$

These must yield the same return.

(d) $pdv = \frac{\$1 \text{ million}}{(1.07)^5}$

Acc to PIH, consumption rises by the flow value of this

$\Rightarrow$ $\boxed{\Delta C = \frac{i'}{1+i} \times pdv}$ where $i' = .07$ and pdv is above.

(or okay to leave as $i' \times pdv$).

- C rises immediately by this amount and remains constant after that at the higher level.

~~(e) AD Curve: $Gap_t = \bar{a} - \bar{b}\bar{m}(\pi_t - \bar{\pi})$~~

~~Derived from IS + MPR~~

IS: $Gap_t = \bar{a} - \bar{b}(R_t - \bar{r})$

MPR: $R_t - \bar{r} = \bar{m}(\pi_t - \bar{\pi})$

Omitted from theorem

$\uparrow \pi \Rightarrow$ MRR dictates tighter money / higher nom. interest rate $\Rightarrow$ higher real rate (b/c of sticky inflation) $\Rightarrow$ lower output gap (b/c investment declines)

(2) The IS Curve

(a) Eqn (1) is $G_t/\bar{Y}_t = \bar{a}_g - \bar{J}\,Gap_t$

The standard model in class has $\bar{J} = 0$.

Here, G_t responds to gap: during a recession, $\uparrow G_t$

" " boom, $\downarrow G_t$

This is a way of introducing automatic stabilizers into the model (like unemployment insurance, e.g.)

(b) Derive the IS curve:

$$Y_t = C_t + I_t + G_t$$

$$\Rightarrow \frac{Y_t}{\bar{Y}_t} = \frac{C_t}{\bar{Y}_t} + \frac{I_t}{\bar{Y}_t} + \frac{G_t}{\bar{Y}_t}$$

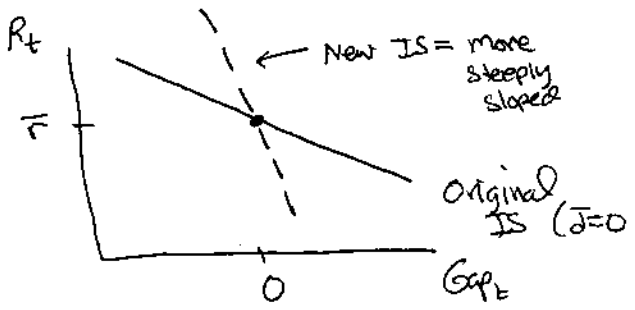
$$= \bar{a}_c + \bar{a}_i - \bar{b}(R_t - \bar{r}) + \bar{a}_g - \bar{d} \cdot Gap_t$$

$$\Rightarrow Gap_t = \frac{Y_t}{\bar{Y}_t} - 1 = \underbrace{\bar{a}_c + \bar{a}_i + \bar{a}_g - 1}_{\equiv \bar{a}} - \bar{b}(R_t - \bar{r}) - \bar{d} \cdot Gap_t$$

$$Gap_t(1+\bar{d}) = \bar{a} - \bar{b}(R_t - \bar{r})$$

$$\boxed{Gap_t = \frac{\bar{a} - \bar{b}(R_t - \bar{r})}{1+\bar{d}}}$$

(c)



$$R_t - \bar{r} = -\left(\frac{1+\bar{d}}{\bar{b}}\right) Gap_t + \bar{a}$$

A given change in R_t has a smaller effect on the output gap.

Why? Automatic stabilizers in fiscal policy automatically buffer the economy from changes in interest rates. (ie. $\uparrow G_t$ when a recession occurs.)

③ Hurricane Katrina in the AS/AD Model

Key elements:

(a) Initial Shocks from Hurricane:

1. $\uparrow \bar{o}$: Higher oil/gas prices = inflation shock
2. $\downarrow \bar{a}_c \Rightarrow \downarrow \bar{a}$: Destruction of wealth $\Rightarrow$ ↓ consumption (PIH) (* Not entirely clear, see page 7)
3. $\downarrow K, \downarrow L \Rightarrow \downarrow \bar{Y}_t$ and $\downarrow Y_t$

Productive capacity is destroyed, reducing both potential and actual output (no net effect on Gap_t from this channel, though).

(b) Response to hurricane

1. Rebuilding boom: $\uparrow \bar{a}_i$ (possibly $\uparrow \bar{r}$ = MPK)

Investment boom to rebuild the destroyed capital

2. Government purchases/aid $\Rightarrow \uparrow \bar{a}_g$ and $\uparrow \bar{a}_c$ somewhat

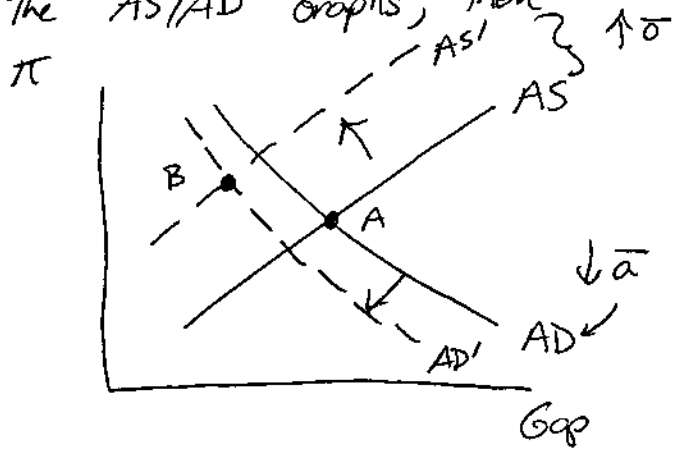
Note: Typically the $\uparrow \bar{a}$ from the response is larger than $\downarrow \bar{a}$ from the shock (to rebuild) $\Rightarrow$ Boom.

Does this mean better off?

Of course not! Both Y_t and $\bar{Y}_t$ are substantially lower than before.

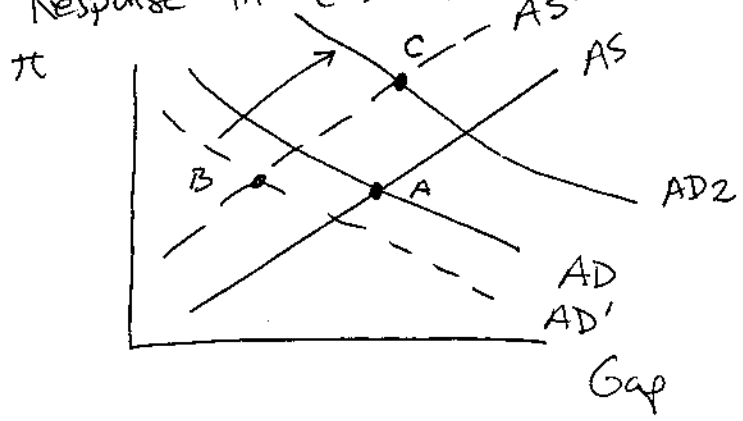
$\Rightarrow$ Inflation is a concern both directly ($\uparrow \bar{o}$) and b/c of $\uparrow Gap$.

- In the AS/AD Graphs, then



(a) Hurricane Impact

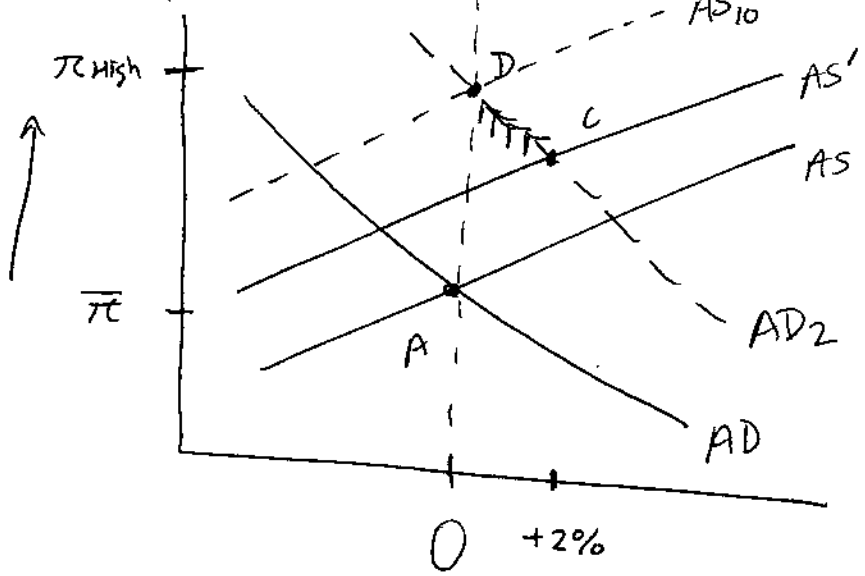
Then Response in (b) above



↑ā ⇒ B → C

Note: (C) could feature Gap > 0 ⇒ AS adjusts upward to point D below.

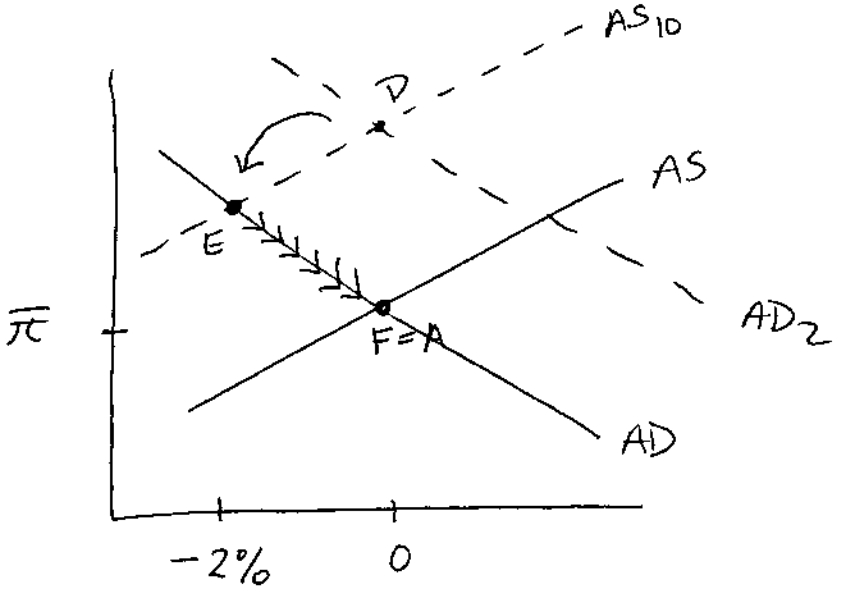
- Then PC ⇒ Gap > 0 leads to ↑π even more



Potential for lots of inflation

Rebuilding boom can create more inflation beyond the inflation shock.

- Economy stays at $\underline{P}$ until the AD shocks are over and $\underline{a}$ returns to zero $\Rightarrow$ shift back AD curve!

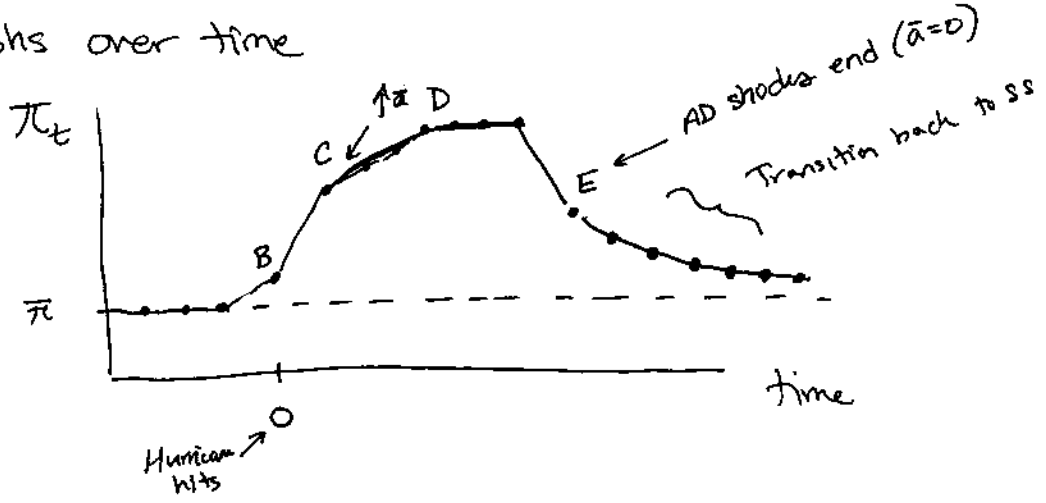


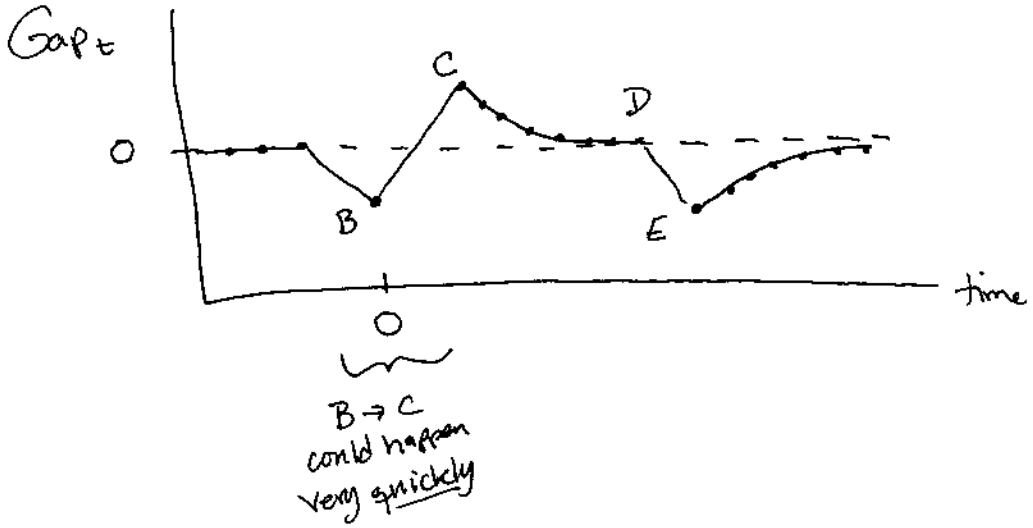
Recession follows the rebuilding boom, bringing the economy back to original steady state at $\pi = \bar{\pi}$ and $Gap = 0$.

- Note well: This general problem shows that inflation is a concern following such a shock
  - One reason why Greenspan continued to increase the FF rate at the last meeting.

(In practice, the rise in oil prices has proved mostly temporary and oil prices/gas prices are close to normal again.)

- Graphs over time





Other answers are possible, especially regarding timing (e.g. A → B → C).

- Also, one could make the case that $\bar{a}$ never decreases in this problem (e.g. that point B has a positive rather than negative Gap). Why? The hurricane destroys capital and jobs ⇒ $\downarrow \bar{Y}_t$. People are poorer, so consumption falls as well. But which falls by more? C_t or $\bar{Y}_t$? Consumption smoothing (PIH) might imply that $\bar{Y}_t$ falls by more than C_t ⇒ $C_t/\bar{Y}_t \equiv \bar{a}_C$ actually rises.