The short run, recessions

Jones 11.8 a) $$\frac{Y_t}{\bar{Y}_t} = \frac{C_t}{\bar{Y}_t} + \frac{I_t}{\bar{Y}_t} + \frac{G_t}{\bar{Y}_t} - \frac{IM_t}{\bar{Y}_t} + \frac{EX_t}{\bar{Y}_t} = \tilde{Y}_t + 1$$

$$\therefore \tilde{Y}_t = \bar{a}_c + \bar{a}_i - \bar{b}_i(R_t - \bar{r}) + \bar{a}_g - \bar{a}_{im} - \bar{n}\tilde{Y}_t + \bar{a}_{ex} - 1$$

add $\bar{n}\tilde{Y}_t$ to both sides; take out a factor of $\tilde{Y}_t$ so LHS = $\tilde{Y}_t(1+\bar{n})$

$$\tilde{Y}_t = \frac{1}{1+\bar{n}} \cdot \left(\bar{a} - \bar{b}(R_t - \bar{r})\right)$$

where $\bar{a} := \bar{a}_c + \bar{a}_i + \bar{a}_g - \bar{a}_{im} + \bar{a}_{ex} - 1$; $\bar{b} := \bar{b}_i$

b) Assuming $\bar{n} > 0$, $1+\bar{n} > 1$ so this multiplier makes the value of $\tilde{Y}_t$ smaller for any given AD shock compared to not having it. The parameter $\bar{n}$ affects $\tilde{Y}_t$ because it controls the size of the rise in imports when $\tilde{Y}_t$ is larger which in turn causes national income to decline (ceteris paribus). This countering effect from higher imports explains why, overall, $\tilde{Y}$ increases by a smaller amount from an positive AD shock through $\bar{a}$ – the increase in demand is tempered somewhat by an increase in imports and thus decrease in net exports. GOOD

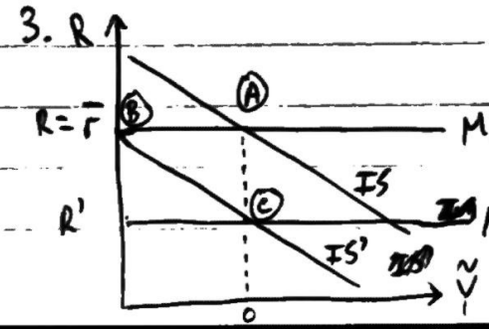
Supply + demand shocks

1. Taking an economy with production function $\bar{Y}_t = \bar{A}_t \bar{K}_t^{\alpha} \bar{L}_t^{1-\alpha}$, a $\bar{A}_t$ increase in productivity is reflected in the value of $\bar{A}_t$ increasing. This means that potential output increases, but actual output also does, by the same factor $\Delta\bar{A}/\bar{A}$. Hence, there is no change to the output gap $\tilde{Y}$, assuming that MP_K is not increased by the technology, and e.g. excitement doesn't create a +ve AD shock.

- show the Solow diagram
- link to IS & $\bar{r}$ IMPK

2. There would be a reduction in the capital stock K_t. Diminishing marginal returns from capital mean that the marginal product of capital MP_K now increases. So, by the IS curve $\tilde{Y} = \bar{a} - \bar{b}(R_t - \bar{r})$, short-run output will increase driven by a boom in investment. This fits with the transition dynamics of the Solow model, where a reduction of capital stock below the steady-state level results in +ve net investment and a short-term period of growth in output.

In an exam you'd definitely want to sketch the Solow diagram

3. 

China's actual net exports will fall as a share of its potential output, so $\bar{a}$ in $\tilde{Y} = \bar{a} - \bar{b}(R_t - \bar{r})$ becomes -ve for a -ve IS shock. There's a downturn; -ve $\tilde{Y}$ as economy moves from A to B. Then CB cuts rates from $\bar{r}$ to R' to stabilise economy, with output returning to potential.

$$\tilde{Y} = \bar{a} - \bar{b}(R_t - \bar{r})$$

Jones 12.6 a) Cut rates as $a_c \downarrow$ so $\bar{a} \downarrow$ so -ve output gap.

b) $\bar{r} \uparrow$ so $\tilde{Y} \uparrow$ so raise rates (so that $R_t = \bar{r}$)

c) $a_{nx} \uparrow$ so $\bar{a} \uparrow$ so raise rates as +ve $\tilde{Y}$

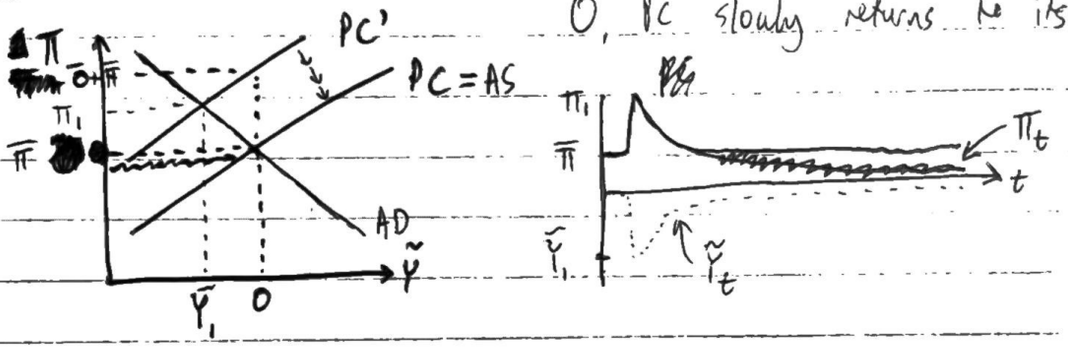
d) $a_{nx} \downarrow$ so cut rates for opposite reason to above

e) If $\bar{r}$ unchanged, no effect on $\tilde{Y}$, but probably $\bar{r} \uparrow$ so raise rates such that $R_t = \bar{r}$

f) $a_i \downarrow$ so $\bar{a} \downarrow$; cut rates to counteract -ve $\tilde{Y}$. ✓

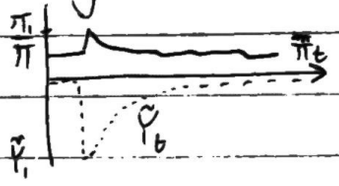
12.8 a) From the Phillips curve, we have $\pi_t = \pi_{t-1} + \bar{\nu}\tilde{Y}_t + \bar{o}$

In period 0, $\pi_0 = \bar{\pi}$ and $\tilde{Y}_0 = 0$. But in period 1, $\bar{o} > 0$. So in period 1, $\pi_t > \bar{\pi}$ i.e. inflation increases above target, and PC shifts upwards for all levels of $\tilde{Y}$. Then after $\bar{o}$ returns to 0, PC slowly returns to its original position.



b) Since this is a supply shock, the appropriate response depends on the CB loss function. If they dislike inflation deviations the most, they should raise rates to move the AD curve downwards. If they care relatively more about output gap, they should cut rates to stimulate the economy. However, to avoid making higher inflation permanent, they may decide to raise rates. We'd see lower peak inflation but greater magnitude $\tilde{Y}$.

(really also depends on expectations)



11.3 IS: $\tilde{Y}_t = \bar{a} - \bar{b}(R_t - \bar{r})$

a) $\bar{a} \uparrow$ as $\bar{a}_i \uparrow$ so IS curve shifts outward, i.e. output higher for all real interest rate values. (It's conceivable that more investment pushes down $\bar{r} = MP_K$ which would push IS inwards but this is likely an extremely small effect compared to $\bar{a} \uparrow$)

b) $\bar{a} \uparrow$ as $\bar{a}_{nx} \uparrow$ since exports rise as a share of potential output. So $\tilde{Y}_t > 0$

c) $\bar{a} \downarrow$ as $\bar{a}_{nx} \downarrow$ as imports rise so $\tilde{Y}_t < 0$

d) $\bar{a} \downarrow$ as $\bar{a}_c \downarrow$ since house sales fall, and also equity in homes reduces so people are worse off and may cut consumption further. $\tilde{Y}_t < 0$ ✓

Past papers 4a) By having a track record of targeting a specific inflation rate, and being transparent about that target and the policy decisions they'll make to maintain it, investors and consumers will believe more that the CB actually will make changes to keep inflation there, which in turn anchors inflation at the target by rational expectations. Also, easier to assess CB credibility as we can simply compare π to target.

b) IS: $\tilde{Y}_t = \bar{a} - \bar{b}(R_t - \bar{r})$ PC: $\pi_t = \pi_{t-1} + \bar{\nu}\tilde{Y}_t + \bar{o}_t$

If $\pi_{t-1} = \bar{\pi}$ and also $\pi_t = \bar{\pi}$, then $\bar{\pi} = \bar{\pi} + \bar{\nu}\tilde{Y}_t + \bar{o}_t$. Don't assume this!

~~there are supply shocks, it is impossible to maintain~~ Assuming if $\bar{o}_t = 0$ i.e. no supply shock

then since $\bar{\nu} \neq 0$, $\tilde{Y}_t = 0$, in which case $\bar{a} = 0$

and since $\bar{b} \neq 0$, $R_t = \bar{r}$. By the Fisher equation, $R_t = i_t - \pi_t$, so $i_t = \bar{r} + \bar{\pi}$. But there may be demand or supply shocks.

~~So $\tilde{Y}_t = 0$, $\bar{\nu}$, from PC.~~ If there's only a demand shock $\bar{a} \neq 0$, the CB would set $R_t = \frac{\bar{a}}{\bar{b}} + \bar{r}$ keeping $\tilde{Y}_t = 0$. With a supply shock $\bar{o}_t \neq 0$, then $\tilde{Y}_t = -\frac{\bar{o}_t}{\bar{\nu}}$

and then $R_t = \left(\bar{a} + \frac{\bar{o}_t}{\bar{\nu}}\right) \cdot \frac{1}{\bar{b}} + \bar{r}$ $i_t = \left(\bar{a} + \frac{\bar{o}_t}{\bar{\nu}}\right) \cdot \frac{1}{\bar{b}} + \bar{r} + \bar{\pi}$

c) If there's a true demand shock only, the CB can raise rates and keep $\pi_t = \bar{\pi}$ whilst also holding $\tilde{Y}_t = 0$ by the divine coincidence. With a true supply shock, raising rates to maintain π_t on target would lead to the largest -ve $\tilde{Y}$ possible. In R_t $\bar{a}$ refers to demand shocks & $\bar{o}_t$ to supply cost shocks, so the CB needs to consider the proportionate effects of these

d) From PC we can substitute in MPR to IS to get AD:

$\tilde{Y}_t = \bar{a} - \bar{b}\bar{m}(\pi_t - \bar{\pi})$ and PC is AS: $\pi_t = \pi_{t-1} + \bar{\nu}\tilde{Y}_t + \bar{o}_t$

When $\pi_{t-1} = \bar{\pi}$, then substituting AD into AS:

$$\pi_t = \bar{\pi} + \bar{\nu}\left(\bar{a} - \bar{b}\bar{m}(\pi_t - \bar{\pi})\right) + \bar{o}_t$$

$$\pi_t - \bar{\pi} = \left(\bar{\nu}\bar{a} + \bar{o}_t\right) \cdot \frac{1}{1 + \bar{\nu}\bar{b}\bar{m}} \qquad 1 + \nu b m - b m \nu$$

and so then $\tilde{Y}_t = \bar{a} - \bar{b}\bar{m}\left(\bar{\nu}\bar{a} + \bar{o}_t\right) \cdot \frac{1}{1 + \bar{\nu}\bar{b}\bar{m}}$

$$= \frac{1}{1 + \bar{\nu}\bar{b}\bar{m}}\bar{a} - \bar{b}\bar{m}\bar{o}_t \cdot \frac{1}{1 + \bar{\nu}\bar{b}\bar{m}}$$

e) $\tilde{Y}_t$ is much more volatile for supply shocks in the first case, but always 0 for demand shocks, whereas it is never 0 in the second case following

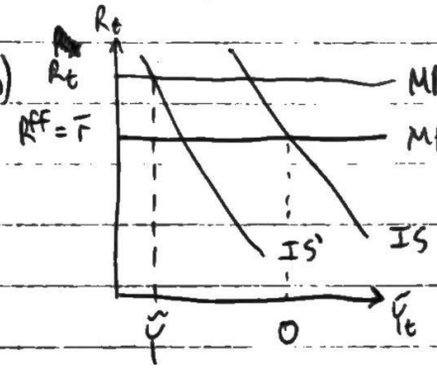
a shock, unless the CB sets the i_t policy parameter α_π to ∞

f) If there are only demand shocks. Because faced by a supply shock, forcing $\pi_t = \bar{\pi}$ cannot be optimal for a CB whose mandate / loss function includes output gap, as it leads to the worst possible decrease in output.

interesting! where does this "look like" in reality?

5a) It will increase due to financial frictions. The risk involved in lending goes up, so to maintain the same risk-adjusted return, banks will increase borrowing costs to businesses. $R_t = R_t^{ff} + f$ where R_t^{ff} is CB friction-free rate and f = friction.

b)



c) Cut rate by a large amount to deal with both AD shock, and also financial frictions.

(cared illustrate this with simple manipulation of $R_t = R_t^{ff} + f$)

d) Zero lower bound on nominal rates: frictions may mean R_t is high even when $i_t \approx 0$. By Fisher's equation $R_t = i_t - \pi_t$, with inflation low or negative due to weak demand, we get a high real rate. This depresses investment further and means there may be a deflationary spiral.

e) - Forward guidance: commit to low future nominal rates, to push up inflation now
- Liquidity provision: buy risky assets in exchange for safe ones from banks
- QE: print money to buy gov't bonds, reducing yields and so i_t

Missing deflation

Essay plan

- State Phillips curve equation: $\pi_t = \pi_{t-1} + \bar \nu \tilde Y_t + o_t$
- Draw graph with AS/AD model and show dynamics of AS movement following a negative AD shock
    - Would expect there to be a large deflation at first
    - And inflation negative for a while as PC adjusts due to adaptive expectations
    - It's also surprising there was not a spike in inflation above target when there was the recovery
    - If we model AD as returning to original position in one time period, then you expect to see high inflation which gradually reduces to target as AS slowly shifts back to its original position
- Our linear model of the Phillips curve may be a misleading simplification
    - As Harding, Linde and Trabandt (2022) show, a boomerang-shaped PC fits the data better
- Central banks used unconventional MP during the crisis which may have affected inflation
    - In particular, forward guidance of low future nominal interest rates may have helped anchor rational inflation expectations nearer to the CB target, preventing inflation from falling low for a long time
- It might be that wages in particular were prevented from falling by a significant amount due to minimum wage laws, and companies decided not to fire workers because of costs of re-recruiting people after the end of the crisis
- Potentially contemporaneous supply shocks could have pushed the PC leftwards faster, leading to little deflation. Indeed, this is what Kara and Pirzada (2019) suggest
- As for the lack of high inflation when the economy recovered, this can be explained by a drawn-out recovery in which AD gradually moves back to its original position, as well as rational inflation expectations
    - It makes sense that consumer confidence recovers slowly rather than immediately after a crisis, rather than immediately
    - Illustrate with diagram