

Monetary policy, AD/AS

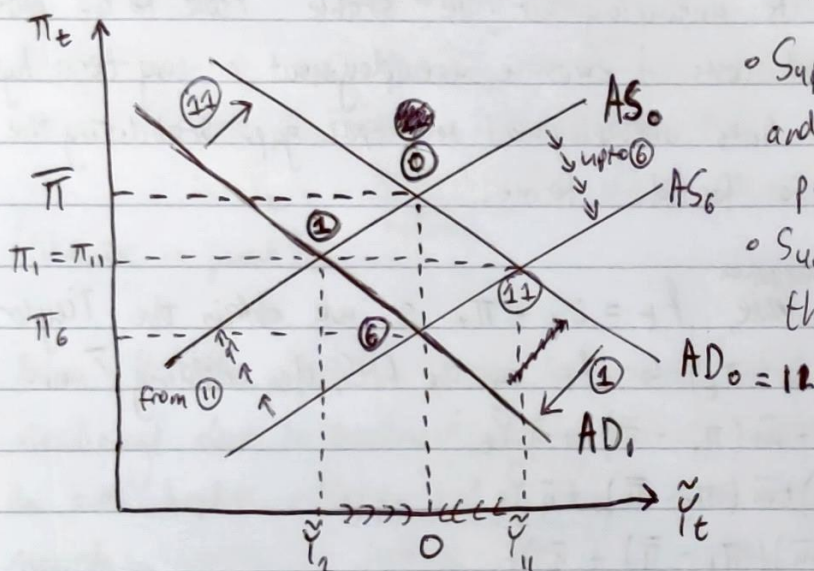
Jones 13.5. The national income identity gives that $Y_t = C_t + I_t + G_t + NX_t$

- A decline in foreign demand for US goods means that the NX_t term decreases. This has an effect on the output gap, as shown by the IS equation:

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

Where $\bar{a} := \bar{a}_c + \bar{a}_i + \bar{a}_g + \bar{a}_{nx} - 1$ and $\bar{a}_{nx} := \frac{NX_t}{Y_t}$

- Since net exports as a share of potential output falls, \bar{a}_{nx} decreases, \bar{a} falls below 0, and there is a negative output gap.



- Suppose the shock lasts 10 periods; and AD returns to its original position in $t=11$.
- Suppose also that AS adjusts such that $\tilde{Y}_6 = 0$.

- The economy immediately moves from the position marked ⑥ to ② when AD falls at the start of period ①
 - The inflation rate falls below target
 - There's a negative output gap; unemployment rises.
- In subsequent periods, the AS curve responds by adaptive expectations.

(also, there could be effects of CB response to recession in Europe + Japan on the US economy, if rate cuts abroad make the US rate relatively higher, so \$ appreciates, RER rises, and US exports fall further with an even bigger -ve AD shock)

AS: $\pi_t = \pi_{t-1} + \lambda \tilde{Y}_t$. Firms expect lower future inflation, and the AS curve moves downwards gradually, and output gap moves towards 0. Eventually, say by period ⑥, AS has moved such that the economy is operating at its potential output ^{with natural unemployment rate}, but with a lower ^{inflation} rate than initially.

When the AD shock ends, e.g. in period ⑪, AS will be slow to adjust back to its original position. So, while this is happening, the economy will have a positive ^{but diminishing} output gap and increasing (but below target) inflation. Eventually $\pi_t = \bar{\pi}$ and $\tilde{Y}_t = 0$, back to steady state as less USD demanded to buy their exports.

We might also see a decline in the nominal \$ exchange rate leading to a depreciation in the short-term RER, which could in turn mitigate some of the negative AD effect, if other countries increase their demand for now relatively cheaper US exports.

Generalised MPR

1. We have IS: $\tilde{Y}_t = \bar{a} - \bar{b}(R_t - \bar{r})$ so substituting in for $(R_t - \bar{r})$ with MPR: $\tilde{Y}_t = \bar{a} - \bar{b}(\bar{m}(\pi_t - \bar{\pi}) + \bar{n}\tilde{Y}_t)$
 $\therefore \tilde{Y}_t(1 + \bar{b}\bar{n}) = \bar{a} - \bar{b}\bar{m}(\pi_t - \bar{\pi})$

so AD: $\tilde{Y}_t = \hat{a} - \hat{b}\bar{m}(\pi_t - \bar{\pi})$ where $\hat{a} := \frac{\bar{a}}{1 + \bar{b}\bar{n}}$, $\hat{b} := \frac{\bar{b}}{1 + \bar{b}\bar{n}}$ (nicely used from lectures!)

which is qualitatively identical to the single-mandate AD curve, just with different quantitative values depending on the weight given by the CB to minimising the output gap. This may make sense for MP when a country wishes to keep its unemployment rate stable close to the natural level e.g. to avoid the social costs of excessive unemployment or long-term hysteresis effects. Since Okun's law links unemployment to output gap, stabilising the latter also helps do so for the former.

Effectively you have a CB with a dual mandate

Taylor Rule 2i. Using the Fisher ^{equation} $R_t = i_t - \pi_t$ so we obtain the Taylor Rule by substituting in $(i_t - \pi_t)$ for R_t on the LMS, then adding \bar{r} and $\bar{\pi}$ to both sides

ii. $i_t = \bar{r} + \pi_t + \bar{m}(\pi_t - \bar{\pi}) + \bar{n}\tilde{Y}_t$
 $= \bar{r}(\bar{\pi} + \pi_t) + \bar{m}(\pi_t - \bar{\pi}) + \bar{n}\tilde{Y}_t$
 $= \bar{r} + (1 + \bar{m})(\pi_t - \bar{\pi}) + \bar{n}\tilde{Y}_t$

Ignoring the dual-mandate $\bar{n}\tilde{Y}_t$ term for the moment, the nominal rate ^{it} deviates from the long-run rate $\bar{r} = \bar{r} + \bar{\pi}$ when $(\pi_t - \bar{\pi}) \neq 0$. The effect of inflation deviations on the nominal rate $\frac{\partial i}{\partial (\pi_t - \bar{\pi})} = (1 + \bar{m})$. If nominal rates were to move by less than one-for-one with inflation deviations, then $\bar{m} < 0$. But from the MPR $R_t - \bar{r} = \bar{m}(\pi_t - \bar{\pi}) + \bar{n}\tilde{Y}_t$, having $\bar{m} < 0$ would mean that the CB responds to above-target inflation by cutting the real interest rate, since $\frac{\partial R_t}{\partial (\pi_t - \bar{\pi})} = \bar{m} < 0$. This would be destabilising MP, since lower ^{real} rates boost investment, increase \tilde{Y}_t , and push up π_t more.

Good - very carefully explained (again, making excellent use of lectures!)

Jones 3.16 a) With the economy starting in steady state, from AS: $\pi_t = \pi_{t-1} + \gamma\tilde{Y}_t + \bar{o}_0$, we have $\pi_1 = \bar{\pi} + 0 + \bar{o}_0 = \bar{\pi} + \bar{o}_0$. From AD: $\tilde{Y}_t = \bar{a} - \bar{b}\bar{m}(\pi_t - \bar{\pi})$, $\tilde{Y}_0 = 0 - \bar{b}\bar{m}(\bar{\pi} - \bar{\pi})$ where $\pi_1 = \bar{\pi} + \bar{o}_0$ so $\tilde{Y}_1 = -\bar{b}\bar{m}\bar{o}_0$.

b)

Year	1
\tilde{Y}_t	
π_t	4%

c)

Jones 3.16 a) Starting in the steady state, where $\pi_0 = \bar{\pi}$, $\tilde{y}_0 = 0$, we have $\bar{a} = 0$
 AS: $\pi_t = \bar{\pi} + \bar{v} \tilde{y}_t + \bar{o}_0$ and AD: $\tilde{y}_t = -\bar{b} \bar{m} (\pi_t - \bar{\pi})$
 Substituting, $\tilde{y}_t = -\bar{b} \bar{m} (\bar{\pi} + \bar{v} \tilde{y}_t + \bar{o}_0 - \bar{\pi})$ so $\tilde{y}_t (1 + \bar{b} \bar{m} \bar{v}) = -\bar{b} \bar{m} \bar{o}_0$
 $\therefore \tilde{y}_t = -\frac{\bar{b} \bar{m} \bar{o}_0}{1 + \bar{b} \bar{m} \bar{v}}$ and $\pi_t = \bar{\pi} - \frac{\bar{v} \bar{b} \bar{m} \bar{o}_0}{1 + \bar{b} \bar{m} \bar{v}} + \bar{o}_0$

b) I believe we also need to know \bar{m} , which we can suppose = $\frac{1}{2}$.

t	1	2	3
π_t	3.78%	3.58%	3.40%
\tilde{y}_t	-0.44%	-0.40%	-0.35%

In period 2, $\pi_2 = \pi_1 + \bar{v} \tilde{y}_2$ and $\tilde{y}_2 = -\bar{b} \bar{m} (\pi_2 - \bar{\pi})$

so $\tilde{y}_2 (1 + \bar{b} \bar{m} \bar{v}) = -\bar{b} \bar{m} (\pi_1 - \bar{\pi})$

$$\therefore \tilde{y}_2 = -\frac{\bar{b} \bar{m} (\pi_1 - \bar{\pi})}{1 + \bar{b} \bar{m} \bar{v}} \text{ and } \pi_2 = \pi_1 - \bar{v} \frac{\bar{b} \bar{m} (\pi_1 - \bar{\pi})}{1 + \bar{b} \bar{m} \bar{v}}$$

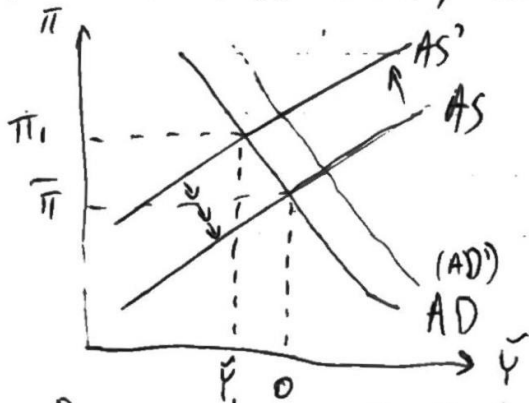
(likewise in period 3.)

c) Even after the shock to prices has passed, inflation remains above-target (though declining) due to backward-looking expectations. The cost-push supply shock leads to both higher inflation and a negative output gap. The effect of stabilising monetary policy via interest rate cuts means that inflation does not increase by as much as the size of the cost shock, even in the first period.

13.16a) The first shock can be seen as a cost-push supply shock, due to political tensions (e.g. conflicts between Israel + Lebanon; sanctions on Iran; etc) reducing supply at all price levels.

The second is a negative demand shock due to the lasting effects of the economy being in recession: firms invest less and so demand for energy (hence oil) falls significantly.

b) For the first shock, overall inflation rises and output falls.



leads the economy to contract and by the Phillips Curve, prices will fall gradually as AS shifts back with adaptive expectations.

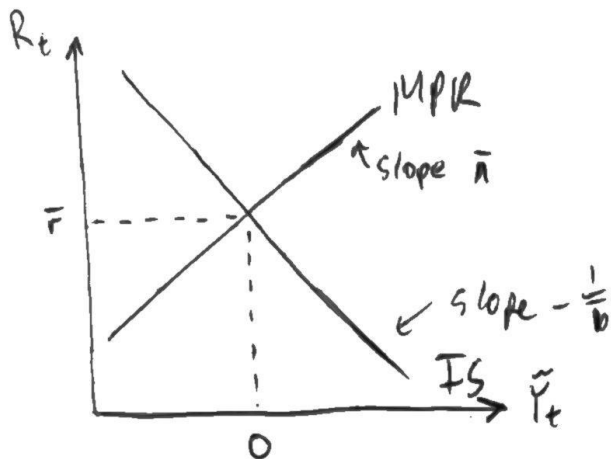
It's possible there was also a true AD shock contributing to price rises. (AD'). In this case, output may not fall, but prices would rise significantly. (I think it's less likely than the AS shock)

Dynamics of second shock the same as those explained for 13.5

Line explicitly to \bar{o}_0 in the PC/AS equation

make sure you can carefully explain this AND show it

13.11a)



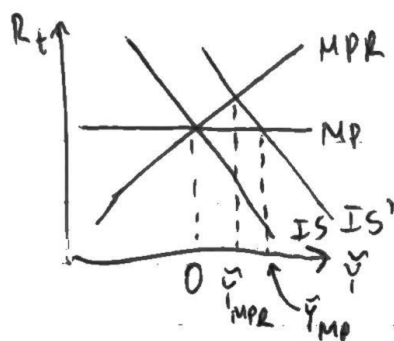
$$IS: \tilde{Y}_t = \bar{a} - \bar{b} (R_t - \bar{r})$$

$$MPR: R_t = \bar{a} \tilde{Y}_t + \bar{r}$$

Solving simultaneously,

$$\tilde{Y}_t = \frac{\bar{a}}{1 + \bar{b}\bar{a}} \text{ and } R_t = \frac{\bar{a}\bar{a}}{1 + \bar{b}\bar{a}} + \bar{r}$$

- b) For a given aggregate demand shock, the change in output is smaller in the IS-MPR diagram than IS-MP (assuming the CB does not change their rate in response to the shock).



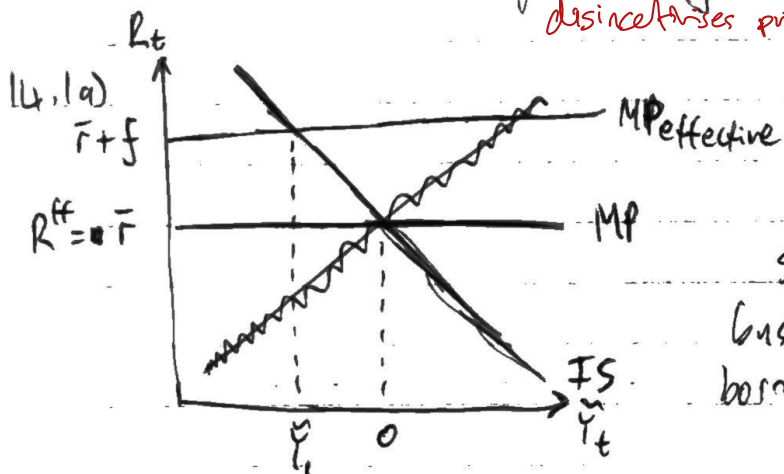
The real rate increases in the MPR diagram as a response to the AD shock, whereas it remains fixed in MP diagram. This means there's a stabilising effect on the economy and output deviates from potential by less.

- c) Recall that the IS curve has the dependency on real rates because of an assumption made about business investment:

$$\frac{I}{Y} = \bar{a}_i - \bar{b}_i (R_t - \bar{r}), \text{ since } \bar{r} = MPK \text{ in a market economy.}$$

So, when the government launches a fiscal stimulus, this heats up the economy, raises real rates, and thus crowds out business investment, because the costs of borrowing are increased for everyone.

which disincentivises private sector borrowing for investment.



Effective real rate charged to private businesses rises by 2pp above central bank risk-free base rate. So the economy's output shrinks as businesses invest less, due to higher borrowing costs.

(Recall explicitly that $R_t = R^{\text{ff}} + f$)

- b) CB should cut their risk-free rate R^{ff} by an amount equal to financial friction f , i.e. 2pp, to counteract the effect of friction. Then, there will be no overall effect on the output which would otherwise fall.

This is an excellent point - please do share it in class.

(This assumes frictions are independent of CB decisions, which is unlikely: if the CB cuts rates, banks may see this as a signal that the economy is precarious, and f increases. Still, so long as f doesn't rise by more than the R^f cut, there'd be a stabilising effect on output, if not perfectly so).

c) There's a ≈ 0 lower bound on nominal rates, because otherwise individuals ^{and commercial banks} will withdraw their savings and hold cash. By the Fisher equation, $R_t = i_t - \pi_t$, so assuming the financial crisis does not lead to a rise in inflation from 2%, real rates cannot go below $\approx -2\%$. (If the crisis is triggered by a -ve AD shock, inflation would in fact fall, so the limitation would be stricter). So, the CB can't cut R^f by 6pp.

d) Unconventional MP: liquidity provision (buy risky assets in exchange for safe ones to reassure commercial banks to keep lending without too large a risk premium); QE to directly influence long-term real rates and reduce them by lowering bond yields (via an increase in price, due to printing money + buying them).

May also need fiscal policy and/or changes to regulation

Essays

What caused the global financial crisis?

Briefly summarize Taylor's main argument and Bernanke's response. Discuss which of the two thesis you find most convincing and why.

Carefully & efficiently summarized

Taylor's main argument is that overly loose monetary policy by the Federal Reserve in the early 2000s (what he refers to as "excesses") was the key cause of the housing bubble and thus the financial crisis. Bernanke responds by arguing that the Fed's monetary policy was reasonable given economic conditions at the time and their mandated goals, and that their monetary policy was in fact in line with a more nuanced version of the Taylor rule. I argue that Bernanke's argument that the crisis was primarily caused by poor regulation and a savings glut is the more convincing.

Taylor's argument:

1. The Fed's interest rate decisions from 2002-2006 deviated significantly from what the Taylor rule would have prescribed – and also previous norms around monetary policy such as during the post-80s Great Moderation – providing excessive monetary stimulus.
 - a. Motivated by fear of deflation that had plagued Japan in 1990s
2. Counterfactual simulations suggest the housing boom and bust would have been much more muted if the Fed had followed the Taylor rule.
 - a. i.e. monetary policy was not successful at achieving its goal of stabilising business cycle fluctuations
3. The savings glut hypothesis, that high demand for safe assets pushed down US interest rates (rather than loose MP), is not supported by evidence
 - a. Whilst outside the US, countries had net savings, there was no global savings glut because the US was running a current account deficit
4. Evidence across countries shows a strong correlation between loose monetary policy and the size of housing booms. (although this doesn't rule out the role of confounding factors)
5. Fiscal and monetary responses to the crisis were misdirected and prolonged it
 - a. The Fed misdiagnosed financial friction and the potential collapse of interbank lending markets as due to liquidity issues, when in fact they were due to counterparty risk
 - b. Economic stimulus provided to households failed to cause consumption to increase significantly, as predicted by the permanent income hypothesis
 - c. The cut in interest rates was too large, and appears to have caused oil prices to rise
6. In general, there was a lack of transparency on how policymakers would respond to the evolving crisis, and this uncertainty meant that commercial banks could not manage risk appropriately

Bernanke's argument:

I would bring in Bernanke's view here that if we consider PCE inflation - then deflation looked much more likely than in the CPI case used in the Taylor rule

Note that Bernanke also concluded somewhat differently - what could we draw from this?

(True - but I think we should be thinking about general imbalances & where the surplus were held)

(or correlated with?)

1. The Fed was appropriately responding to disinflationary risks and high unemployment during the post-2001 recovery
 - a. By providing forward guidance on low rates into the future, the Fed aimed to increase current inflation, and safeguard against hitting the zero lower bound
2. The Fed's deviation from the Taylor rule is significantly smaller when different sensitivity parameters are chosen, and it may be that these different parameters are in fact more appropriate
3. In any case, it is not prudent to set monetary policy based purely on current inflation (as the standard Taylor rule suggests), because in some circumstances inflation can be predicted to be temporary with high confidence
 - a. Since the effects of monetary policy changes are felt after a lag, there would be no point changing monetary
4. Although monetary policy may have contributed to the US housing bubble, only a small proportion of the price increases seen can be attributed to low interest rates.
 - a. In particular, when macroeconomic conditions and the ~~F~~ederal ~~F~~unds ~~R~~ate are used to back-forecast house prices based on historical data, they predict much smaller price rises than were actually realised. This suggests other factors were at work
5. The relationship between looser-than-Taylor policy and housing booms is actually weak, and statistically insignificant once a larger set of countries are considered
6. Capital inflows and a savings glut can successfully explain house price appreciation within countries (can you explain how + why?)
 - a. And since loose monetary policy reduces capital inflows, it is implausible that this is a channel through which policy caused the housing bubble
7. A regulatory approach aimed at enforcing better mortgage lending practices would have been more effective than broad interest rate hikes for containing the housing bubble

I find Bernanke's arguments more convincing than Taylor's for a few key reasons:

1. The use of forecast inflation rather than current inflation in policy rules makes more sense given the lags in how monetary policy affects the economy. Taylor's criticism using rules based only on current inflation seems misguided and not applicable in practice, especially given the difficulties policymakers have in obtaining accurate real-time data about the current state of the economy and what potential output is. (I agree)
2. Bernanke provides statistical model evidence showing the magnitude of the house price increases was very difficult to explain by the historical relationships with interest rates and monetary policy alone. There had to be other, more important drivers. *also really important*
3. The cross-country evidence Bernanke cites showing little correlation between easy monetary policy and house price booms across countries further undermines Taylor's monetary policy-centric view, and is more statistically robust than Taylor's smaller sample size analysis.
4. It is clear that had it not been for lax regulation, the housing price bubble would not have happened. Whilst banks were making rational, profit-maximising decisions given the macroeconomic environment (and implicit insurance by the state), action by regulators *Also need to consider that regulators simply hadn't caught up with the financial mortgage innovations that had taken place*
And credit rating agencies

to prevent risky lending practices could have avoided the proliferation of subprime loans.

5. Bernanke acknowledges the potential roles of international capital flows and saving/investment imbalances as factors behind low long-term interest rates. Although Taylor is right that there was no global savings glut, that is immaterial given that the effects of the housing boom and financial crisis were felt most keenly in the US and Europe, where there were indeed large capital inflows.

This is pretty persuasive. We'll consider some other, broader (methodological) issues in class

'The current state of the European economy'

Briefly summarize the state of the European economy in the past few years. What has happened to inflation, real GDP growth, and unemployment? How has the European Central Bank (ECB) set monetary policy in response to the developments in the economy?

- State of the economy
 - High inflation following 2020 (oil price shocks & Russia-Ukraine war, recovery from Covid)
 - Demonstrate with AS/AD model why both the cost-push supply shock and recovery from a negative AD shock would lead to above-target inflation, due to Philips curve and adaptive expectations ✓ *Good*
 - Sharp contraction in output during Covid lockdowns, with a recession; real GDP growth seen after restrictions lifted
 - Explain why look at real GDP as opposed to nominal, particularly in a context with high inflation
 - Unemployment
 - Okun's law and why you would expect unemployment to rise during a recession like Covid, but in fact it didn't
 - Government policy like furlough schemes incentivised keeping people employed by reducing the cost to employers
 - Historically low unemployment after Covid, but employment / population ratio not particularly high due to individuals dropping out of labour markets ✓
 - Explain how the different figures are calculated ✓
- MP response
 - ECB lowered interest rates during the pandemic
 - They also used unconventional policies because rates were already low after cuts following the global financial crisis, and the zero lower bound was present
 - Liquidity provision through pandemic emergency purchase programme, to avoid financial market frictions affecting the transmission of MP
 - Tightening of policy once Covid lockdowns ended and inflation appeared to become persistent – reduced asset purchases and raised interest rates
 - Also less use of quantitative easing which drives down borrowing costs by reducing bond yields
 - Forward guidance to manage rational expectations and anchor inflation close to target

*Also want us
look a bit
further back to
look at broader
ECB issues
(i.e. how size fits all ~
monetary policy)*