Short Run:
AS-AD and Stabilization Policy

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Read: Mishkin 12-13

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Outline of Talk

Learning Objectives

Where we are so far

- **AD**: An *even more convenient representation* of IS-MP-PC with systematic or conventional monetary policy
  - With conventional MP, we can combine the IS curve and the MP curve to get AD curve. Thus AD is not just "aggregate demand":
    - It summarizes product market equilibrium (aggregate demand equal supply) *and* MP behavior!
    - These two conditions imply a downward sloping AD restriction on the outcomes for (Y_t, π_t)!

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- **AS:** Phillips Curve (PC) can be reinterpreted as an aggregate supply (AS) curve.
  - This summarizes firms pricing behavior in response to demand conditions dictating their supply of products, which in turn affects their labor hiring conditions and profit margin.
    - What about capital? In the short run's one period, capital is a fixed factor.
  - AD and AS curves represent an intuitive version of the short-run model that describes the evolution of the economy in a single graph.

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What's new #1

Applying the theory: Using the AS-AD model to analyse different events over the business cycle.

- supply-side shocks
- demand-side shocks
- policy changes

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What's new #2

Empirical plausibility of theory:

- Does the (IS-PC-MP) AS-AD model fit the facts?
  - is the *simple MPR* empirically/quantitatively plausible?
  - does the overall model predict factual *inflation-output loops* observed in the business cycle?

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What's new #3

Praxis: How does modern monetary policy actually behave, in the real world?

- Why do we model policy behaviour as some MP *rule* that must be followed?
  - What if people have *rational expectations?* What is it?
  - Importance of rules versus discretion if people's expectations are forward-looking.
  - Managing (rational) expectations and monetary policy—-inflation targeting.

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Questions of interest

- The AS/AD curves are static, one-period snapshots of what would be a sequence of short run events over time.
- How to study *dynamics* of *inflation* and *short run output*/unemployment when:
  - an exogenous (supply-side) inflation shock hits
  - an exogenous (demand-side) shock hits
  - an exogenous shift to monetary policy
- What should central banks do if expectations are not adaptive, but "sophisticated"? In the real world, businesses (especially financial markets) are very clued-in! Not completely naive in expectations.

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Overall IS-MP-PC model

- **IS curve:**

$$Y_t = \bar{a} - \bar{b} \cdot r_t$$

- **MP curve/rule:**

$$r_t = \bar{r} + \lambda \cdot \pi_t$$

- **(Naive expectations) Phillips Curve ($\pi_t^e := \pi_{t-1}$):**

$$\pi_t - \pi_{t-1} = -\omega(u_t - \bar{u}_t) + \bar{\rho}_t$$

- **Okun's law:**

$$u_t - \bar{u}_t = -\frac{1}{2}(Y_t - \bar{Y}_t)$$

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Re-expressed as AS-AD model

AD curve: Combined IS-MP-Monetary-Policy Rule is:

$$\pi_t = -\frac{1}{\bar{b}\lambda} Y_t + \frac{\bar{a} - \bar{b}\bar{r}}{\bar{b}\lambda}$$

AS curve: *is* Phillips Curve + Okun:

$$\pi_t = \pi_{t-1} + \underbrace{\frac{\omega}{2}}_{\equiv\lambda} (Y_t - \bar{Y}_t) + \bar{\rho}_t; \qquad \omega > 0, \bar{\rho} \gtreqless 0.$$

Two relations, AS and AD, that can be graphed in (Y, π)-space.
Know How to Derive: What shifts AS? What shifts AD?

Background

AS-AD

Checkpoint!

- The vertical axis represents inflation.
- The horizontal axis represents short-run output.
- The AS curve slopes upward
  - implication of price-setting behavior of firms embodied in the Phillips curve
- The AD curve slopes downward
  - Due to the response of policymakers to inflation.
  - derived from IS and MP.

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The AD-AS Representation

Applications

Event 1: Supply-side Inflation Shock

Applications

Event #1: An inflation shock, $t = 1$

- **Date 0:** Suppose (without loss of generality) the economy begins in steady state $(Y_0, \pi_0) = (\bar{Y}, \bar{\pi})$, where we set $\bar{\pi} = 0$. Point a.
  - $\bar{\rho}_0 = 0$!
- **Date 1:** ... economy is hit with a one-time increase in the price of oil.
  - **Origin of shock:** the exogenous variable at date $t = 1$: $\bar{\rho}_1 > 0$
  - ...
  - ... is positive for *one period*

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- **Transmission mechanism**:
  - Given price level P_0 and inflation expectations $\pi_1^e = \pi_0$ are fixed at date $t = 1$, ...
  - Cost-push inflation shock $\bar{\rho}_1 > 0$ forces producers to raise price level P_1. (Why? Economic story ...)
  - Shows up in actual inflation via AS relation:

$$\pi_1 = \pi_0 + \gamma(Y_1 - \bar{Y}) + \bar{\rho};$$

  - The AS0 curve will shift up to AS1 as a result. Movement up along AD curve to point b at outcome (Y_1, π_1).
    - Why?
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- **Result in one period:**
  - Real economic activity $(Y_0 \searrow Y_1)$ and $(u_0 \nearrow u_1)$ [Deduce by Okun's Law]
  - accompanied by rising inflation $(\pi_0 \nearrow \pi_1)$.

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Event #1: An inflation shock, $t = 1$

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Event #1: After the shock, $t = 2$

Note that in Date 2:

- $\bar{\rho}_2 = 0$ (and forevermore ...)

Two pieces of clues:

- Inflation expectations at date $t = 2$ is still higher than actual inflation originally.

$$\pi_2^e = \pi_1 > \pi_1^e = \pi_0 = \bar{\pi}.$$

- Actual inflation is now

$$\begin{aligned} \pi_2 &= \pi_1 + \lambda(Y_2 - \bar{Y}) + 0 \\ &< \pi_1 \end{aligned}$$

since $Y_2 < \bar{Y}$! In words: since at date $t = 2$, products are demanded *and* produced below its long run capacity, firms are lowering their prices in the aggregate. So the growth in price level slows down.

- Geometrically, AS2 must have been shift down from AS1.

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Event #1: Transition dynamics, $t \geq 2$

High inflation created by the oil shock

$\Downarrow$

Raises expected inflation above long run rate

$\Downarrow$

One-off shock: inflation expectation adjust downwards, adapting slowly. Slows the adjustment of the AS curve back to its initial position

$\Downarrow$

Inflation slowly falls.

$\Downarrow$

Eventually the model will return to its original steady state.

Applications

Event #1: Transition dynamics, $t = 2$

Applications

Event #1: Transition dynamics, $t = 3$

Applications

Event #1: Transition dynamics, $t \geq 1$

- In the absence of any more shocks, dynamics is governed by our long run model (e.g. Solow-Swan type dynamics).
- Movement of the AS curve follows the principle of transition dynamics.
- Transition Dynamics:
  - Movement back to the steady state is fastest when the economy is furthest from its steady state.

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  - Movement back to the steady state is fastest when the economy is furthest from its steady state.

Applications

Event #1: Transition dynamics, $t \geq 1$

- In the absence of any more shocks, dynamics is governed by our long run model (e.g. Solow-Swan type dynamics).
- Movement of the AS curve follows the principle of transition dynamics.
- Transition Dynamics:
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Event #1: Summary

In summary, the impact of a price shock

- raises inflation directly.
- Even a single period shock raises expected inflation.
- Inflation remains higher for a longer period of time.
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Event 2: Disinflation

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- The AD curve Shifts down. Why?
  - The new MP rule calls for an increase in interest rates

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- When actual output equals potential output, the new steady state is at the new target rate of inflation.
  - So AS shifts down
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Event 3: Demand-side Shock

Applications

Event #3: Positive AD shock

- Example:
  - net export demand boom, $\bar{NX}$
  - rise in consumer sentiments about the long term income/consumption, $\bar{C}$
  - and etc. ... anything in the composite $\bar{a}$ term in IS. (Think about other sources of AD shock ...)

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Model implies: When plotting inflation on the vertical axis and output on the horizontal axis ...

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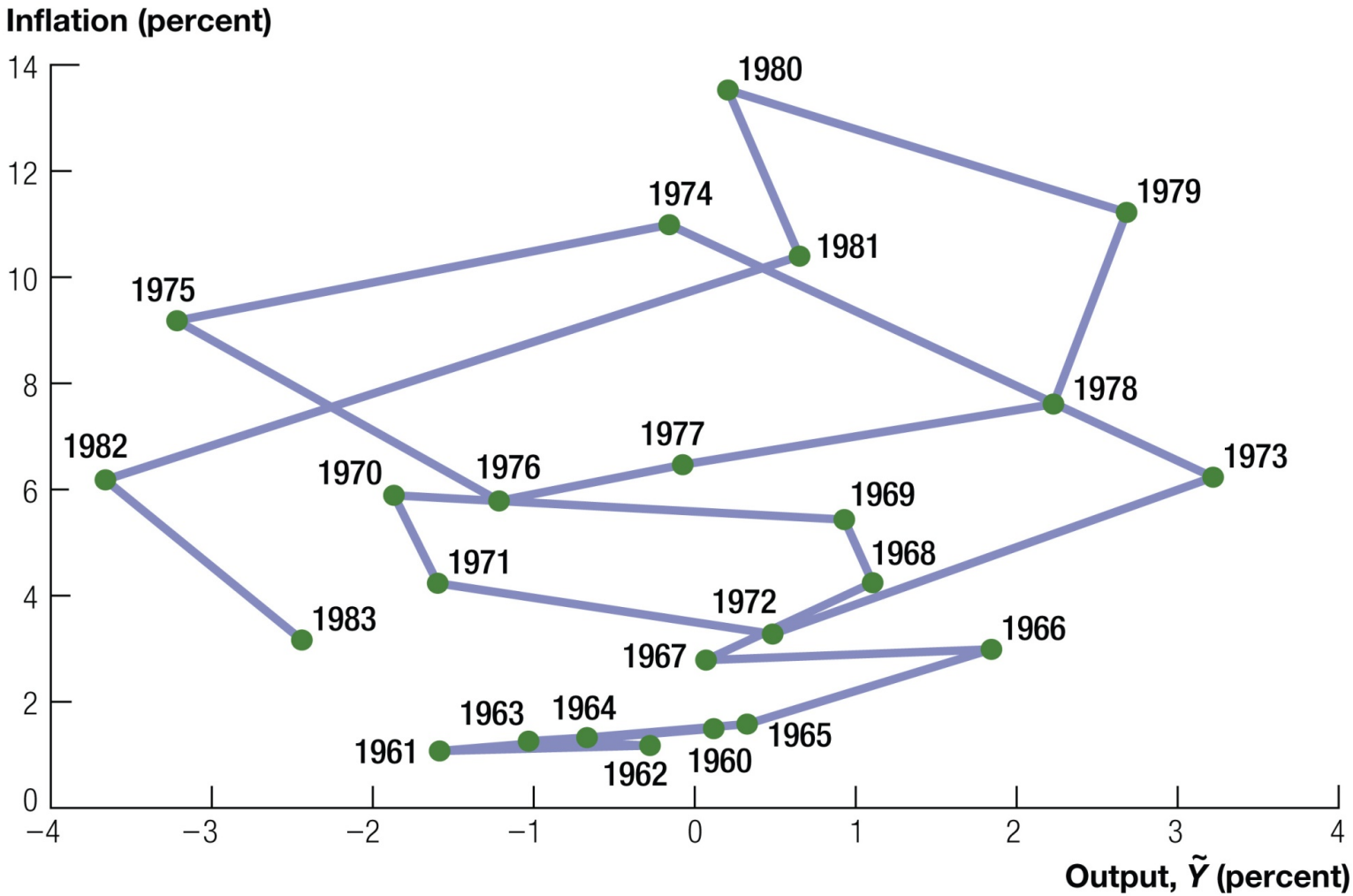

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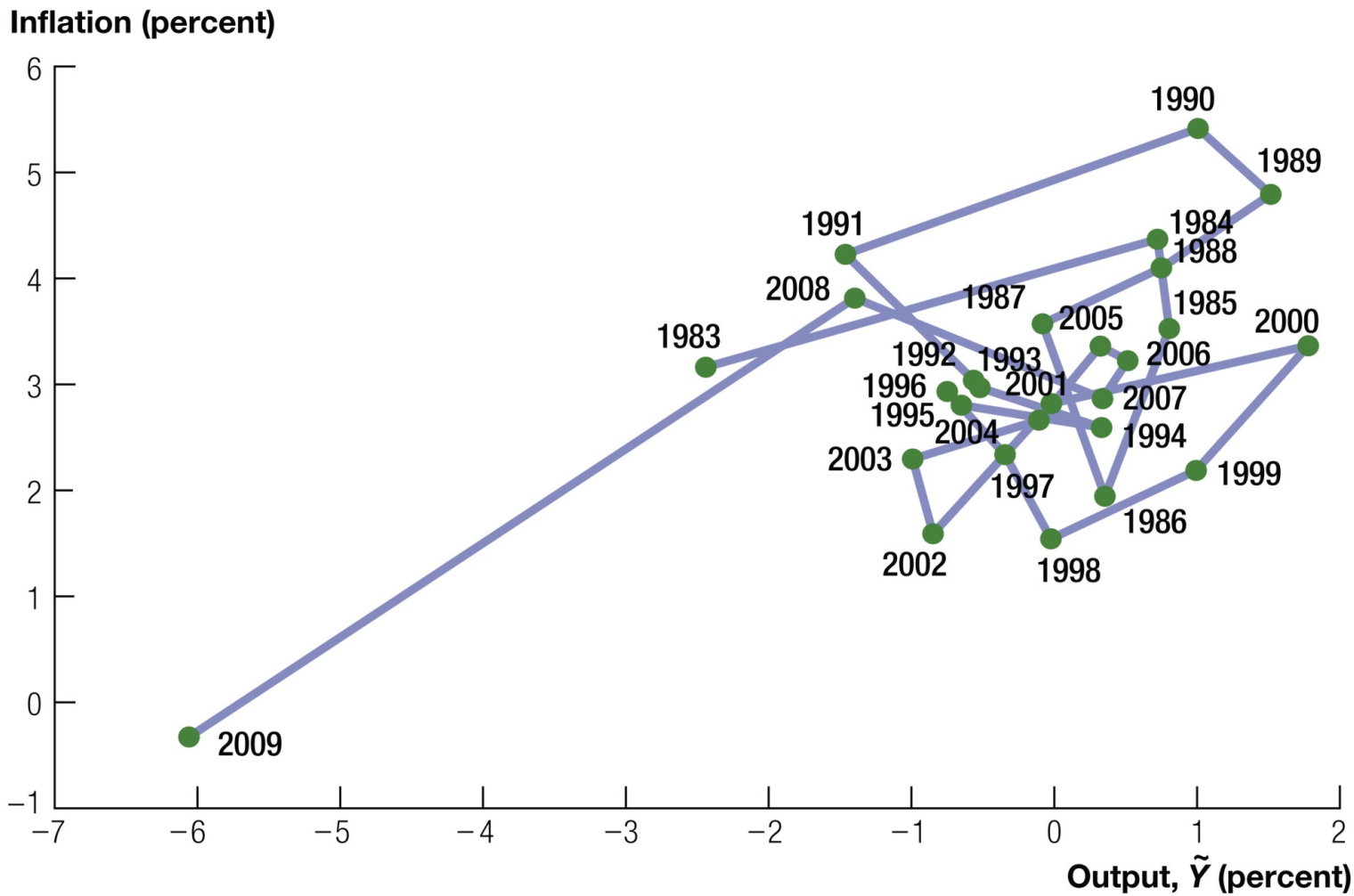

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- The short-run model captures many features of monetary policy.
- Central banks are now more explicit about policies and targets.
- More sophisticated monetary policy rules that use short-run output create results similar to the simpler model.
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Modern Monetary Policy

Great Moderation

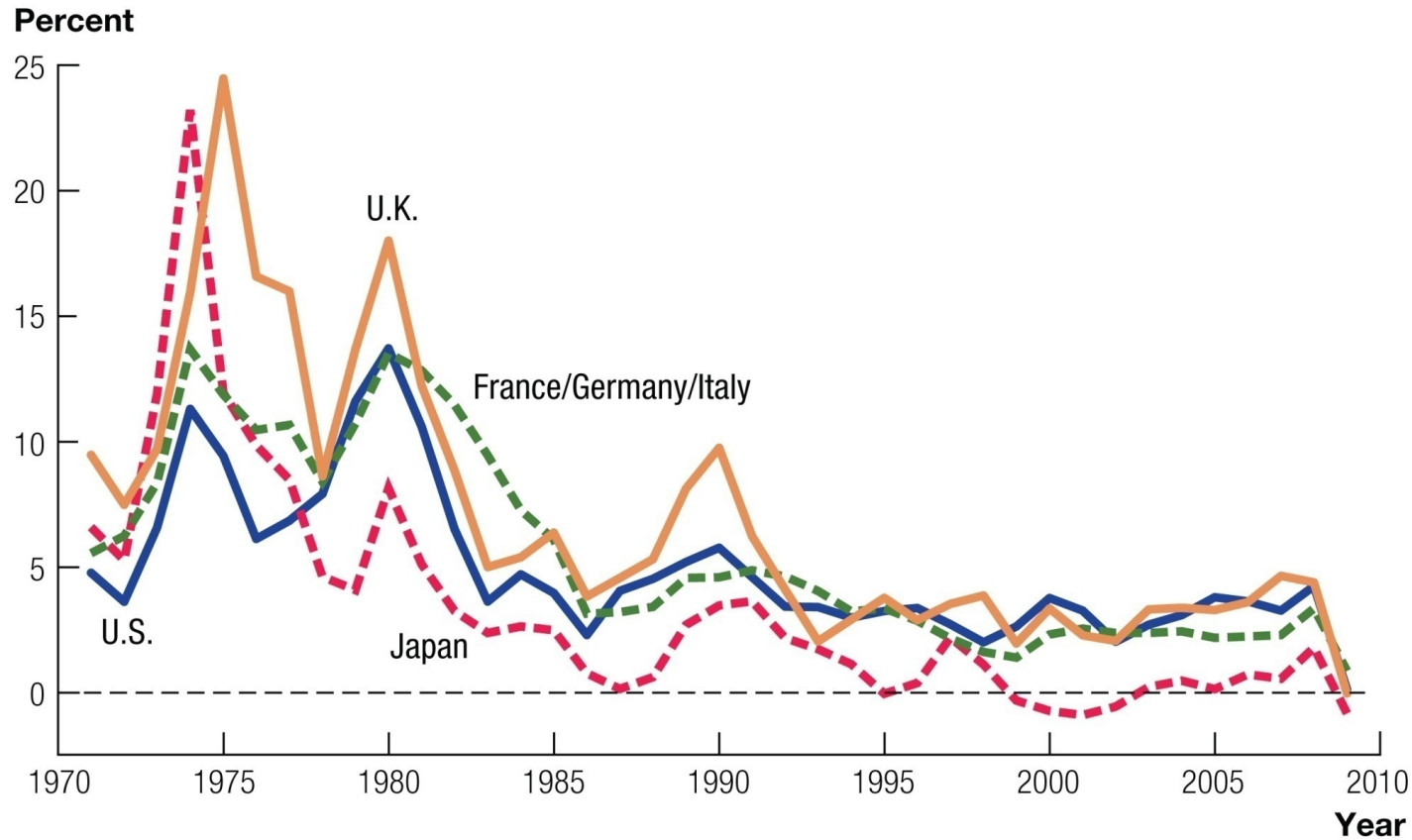

FIGURE 13.19 **Inflation in the OECD, 1970–2009**

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- **Question:** Is there any benefit to sticking to a systematic policy?
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Application in monetary policy:

- Central bank announces a policy path. Given policy, MP implies an induced inflation path.
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"*When a door opens not to your knock, consider your reputation.*"

Arab proverb

Mantra:

- If you use discretion, you end up hurting the ones you love.
- If you can't commit, you must forfeit.
- A Folk theorem: To sustain commitment, one must have good reputation. A good reputation requires great "patience"—policymaker has to care about future outcomes and payoffs almost as much as her immediate payoff.

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To understand this, we need to modify our AS-AD model.

- Rewrite AS (or PC) curve as

$$\pi_t = \pi_t^e + \lambda(Y_t - \bar{Y}) + \bar{\rho}.$$

  - In this world people are not naïve. Now

$$\pi_t^e := \mathbb{E}\{\pi_t | \Omega_t\}$$

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Modern Monetary Policy

Managing expectations in AS-AD

To understand this, we need to modify our AS-AD model.

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Managing expectations in AS-AD: perfect foresight expectations

Special case

- A special case is perfect foresight!

$$\pi_t^e := \mathbb{E}\left\{\pi_t | \Omega_t\right\} = \pi_t$$

  - conditional forecast coincides with actual outcome in the future.

- We'll use this special case for illustrative purposes.

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The real world is not so stark ...

Australian National University

Modern Monetary Policy

Managing expectations in AS-AD: perfect foresight

- Assume *credible* monetary policy
  - central bank knows people know that there is no incentive to deviate from announced policy
  - central bank can *commit* to said plan
- If the central bank lowers the inflation target $\bar{\pi}$ *(and therefore raises* $\bar{r}$*) credibly*
  - The AD curve shifts down (Recall why?)
- If expectations adjust immediately and people use all information,
  - the AS curve shifts down immediately to the new target.

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Costless disinflation policy under perfect foresight expectations ...

Modern Monetary Policy

Managing expectations in AS-AD: perfect foresight

- **Punchline:**
  - If the central bank can *commit* ...
    - it can *control or anchor expectations of inflation* ...
  - Then inflation can be kept low without undergoing recessions.
- **Practice:**
  - harder to manage or anchor expectations
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Managing expectations in AS-AD: in practice

How do we implement Kydland and Prescott's original idea?

- Rules, credible commitment trump discretion or lack of commitment.

In practice: *inflation targets*

- In many countries, central banks have an explicit target rate of inflation that they seek to apply over the medium horizon.
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  - May make it easier for central banks to stimulate output

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In practice: *Constrained discretion*

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Summary

- IS-PC ...
- A model of behavior describing how monetary policy is determined: MP
- Monetary policy can be thought of a determined by a contigency plan.
- In general, contingency plans can be modelled as some function mapping from the state of the decision environment to the decision-maker's policy instrument.
- We assumed a simple monetary policy rule that is a lean-against-the-wind rule in terms of i_t responses to inflation gaps.
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... with your loved ones over dinner tonight

Key words:

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- AS and AD shocks
- rational expectations; perfect foresight example
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