# Computational Methods in Macroeconomics:

## Old and New Keyesian Macro

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# Outline

# Learning Objectives

By the end of this lecture, you will be able to:

- Understand the historical context and evolution of Keynesian economics
- Analyze the static IS-LM model and its policy implications
- Identify key limitations of traditional Keynesian models (liquidity trap, interest-inelastic investment)
- Compare and contrast Old Keynesian and New Keynesian approaches
- Evaluate the role of monetary and fiscal policy in macroeconomic stabilization

# Introduction: The Debt Challenge

**Key Question:** How do countries manage unsustainable debt burdens?
We'll explore:

- Internal vs. external debt challenges
- Historical approaches to debt reduction
- The "original sin" problem in emerging markets
- Policy implications for debt sustainability

# Internal Debt: Domestic Solutions

**The Problem:**

- Debt accumulation requires eventual repayment
- Domestic debt held primarily by domestic banks

**Historical Solutions:**

- *Deposit confiscation/freeze:* Directly reducing bank deposits
- *Currency conversion:* Creating new currency and converting old deposits at unfavorable exchange rates
- *Examples:* Brazil and Mexico

**Note:** Extreme measures with major distributional consequences

# External Debt: The "Original Sin" Problem

**What is "Original Sin"?**

- External debt denominated in foreign currency (typically USD)
- Interest rates reference dollar-denominated risk-free rates
- Countries cannot print foreign currency to service debt

**Interest Rate Structure:**

- Historical: LIBOR + risk premium (50-200+ basis points)
- Current: SOFR replaced LIBOR after manipulation scandals

**Root Cause:** Trade deficits driven by saving-investment imbalances

# Policy Implications: The Savings Dilemma

**Economic Logic:**

$$\text{Current Account Deficit} = \text{Investment} - \text{Domestic Savings}$$

**To reduce external debt, increase domestic savings**

**Policy Options:**

- Consumption taxes (VAT, sales taxes)
- Social Security reform

**Political Reality:**

- Both measures are politically unpopular
- Short-term costs vs. long-term benefits problem
- Example: U.S. faces persistent trade deficits

# Section Overview

**This section covers:**

- Keynes's controversial legacy
- Debates about government intervention
- Classical vs. Keynesian perspectives
- The evolution of economic thought

# Keynes's Controversial Legacy I

**Historical Significance:**

- One of the most influential—and controversial—economists of the 20th century
- Viewed as either economic savior or enabler of reckless spending

**The Interpretation Problem:**

- Keynes never wrote down explicit mathematical models
- Result: Endless debates about "what Keynes really meant"
- Different schools claim different interpretations

**Common Interpretation:**

- Advocate of government intervention to correct market failures

# Keynes's Controversial Legacy II

**Alternative Interpretation (Alan Meltzer):**

- Early Keynes (pre-Depression): Advocated policy rules
- Later Keynes (post-WWII): Returned to rule-based policies
- Middle period: Emergency interventionism

**The Keynes Paradox:**

> *Joan Robinson (1979): "When he [Keynes] dined in Washington with his converts, he told Austin Robinson the next day: 'I was the only non-Keynesian there'."*

*Context:* Keynes opposed proposals for deficit finance
**Question:** Should we care what Keynes "really meant"?

# Classical vs. Keynesian: Core Differences I

**Classical Tradition**

- Focus: *Stocks*
  - Money supply
  - Capital stock
  - Bond holdings
- Time horizon: *Long run*
- Key variable: Price level adjustment
- Mechanism: Markets self-correct through prices

**Keynesian Tradition**

- Focus: *Flows*
  - Consumption
  - Investment
  - Gov't spending
- Time horizon: *Short run*
- Key variable: Output/employment adjustment
- Mechanism: Sticky prices require intervention

# Classical vs. Keynesian: Core Differences II

**Why the Conflict?**

- Different policy instruments (money vs. government spending)
- Different time horizons (long-run vs. short-run)
- Fundamental disagreement on government intervention

**Classical View:**

- Markets return to full employment through price adjustment
- Government intervention distorts natural equilibrium

**Modern Perspective (Robert Solow):**

> *"I'm glad there is no Milton Friedman anywhere. Milton Friedmans are bad for economics and bad for society."*

*Recommended:* Jennifer Burns, *The Last Conservative* (2023)

# Section Overview: IS-LM Framework

**What you'll learn:**

- The basic IS-LM model structure
- How monetary and fiscal policy affect output
- Key limitations of the basic model
- Policy implications and debates

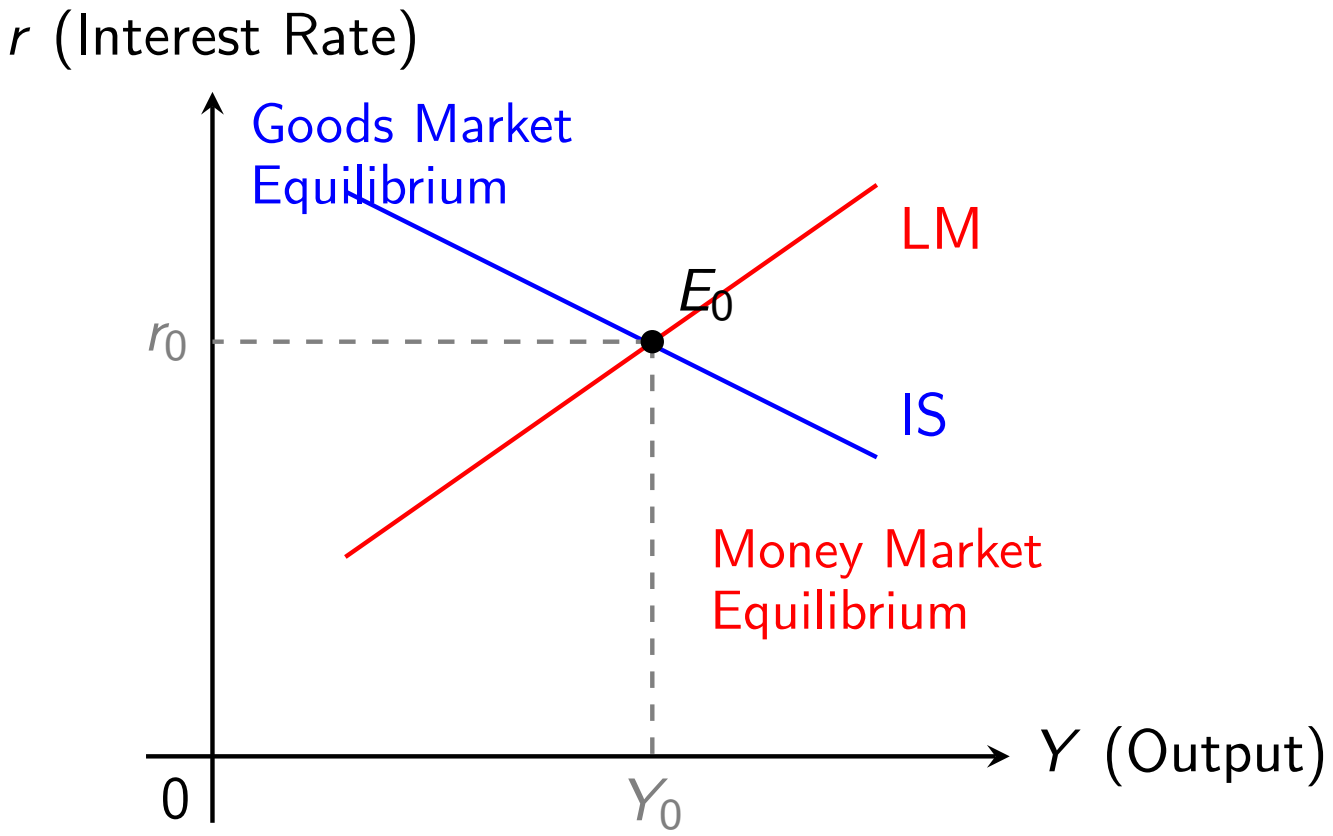
**Historical Note:** IS-LM is a diagrammatic *interpretation* of Keynes's General Theory, developed by Alvin Hansen and Sir John Hicks

# The Static IS-LM Model: Foundations

1. **Goods Market (IS):** $I(r) = S(Y)$ where $I_r < 0, S_Y > 0$
   - Investment negatively related to interest rate (higher $r$ reduces PV of returns)
   - Savings positively related to income
2. **Money Market (LM):** $\frac{M}{P} = L(Y, r)$ where $L_Y > 0, L_r < 0$
   - Money demand depends on income (transactions) and interest rate (opportunity cost)

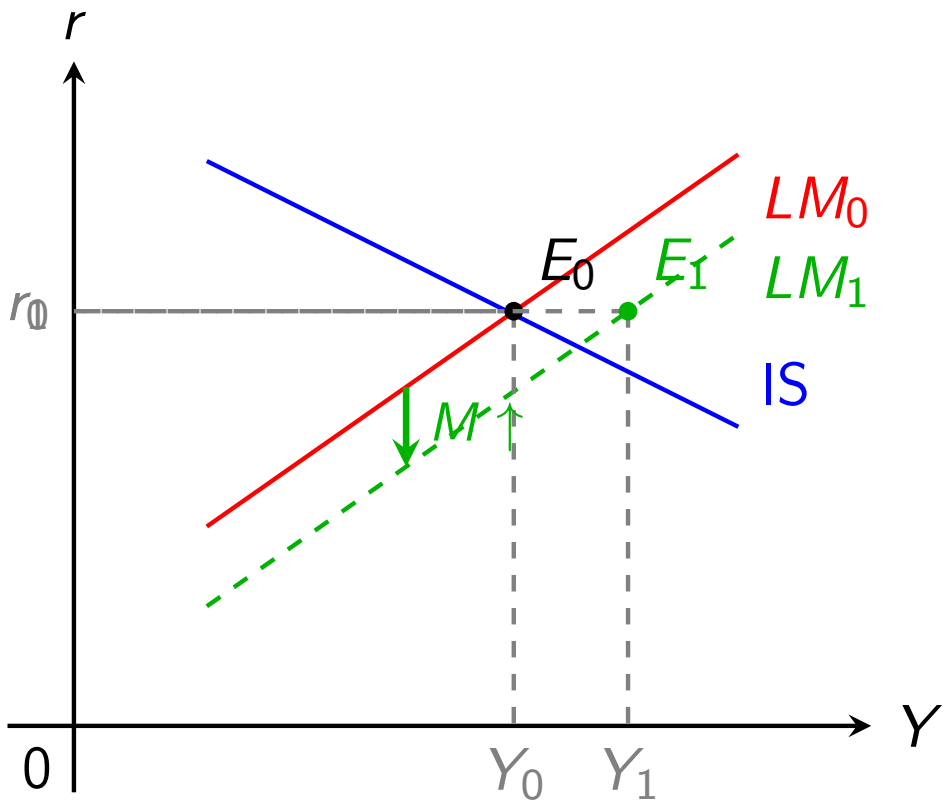
**Note:** By Walras' Law, bond market equilibrium is implicit

# Static IS-LM Diagram: Baseline Equilibrium



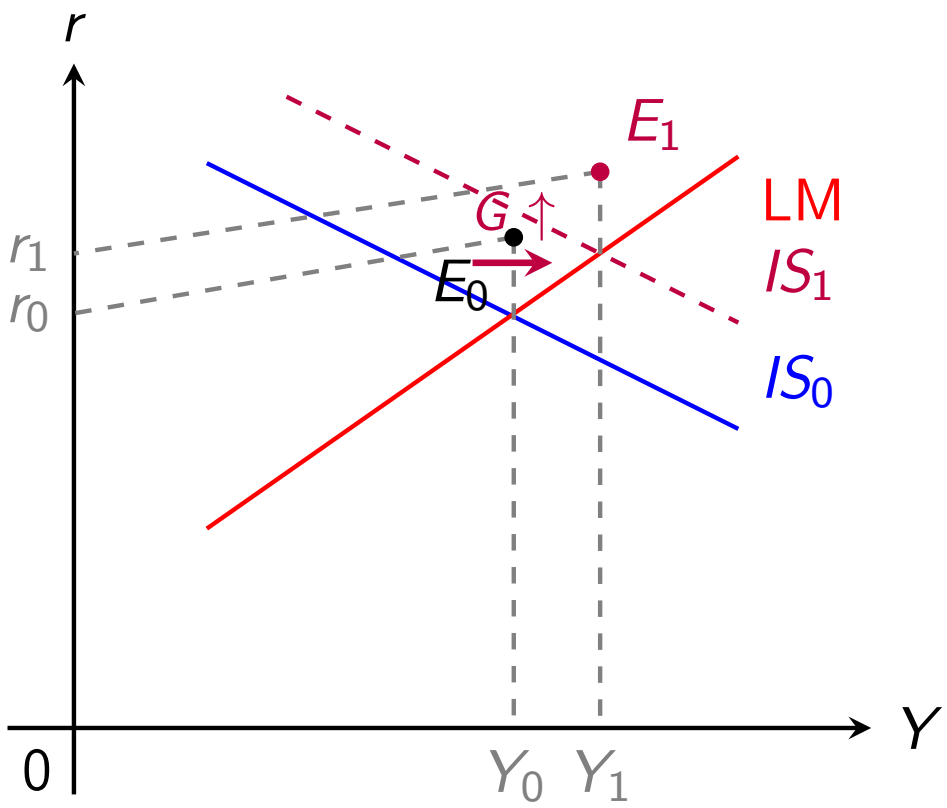

**Equilibrium** $(Y_0, r_0)$: Both markets clear simultaneously

# Monetary Expansion: Shifting the LM Curve




**Policy Effect:** Money supply increase ⇒ Lower interest rate, Higher output

# Fiscal Expansion: Shifting the IS Curve




**Policy Effect:** Government spending increase ⇒ Higher interest rate, Higher output

**Note:** "Crowding out" effect—higher $r$ partially offsets fiscal stimulus

# Comparing Policy Effects

**Monetary Expansion**

- ↑ Output increases
- ↓ Interest rate decreases
- ✓ No crowding out
- ✓ Lower borrowing costs

**Fiscal Expansion**

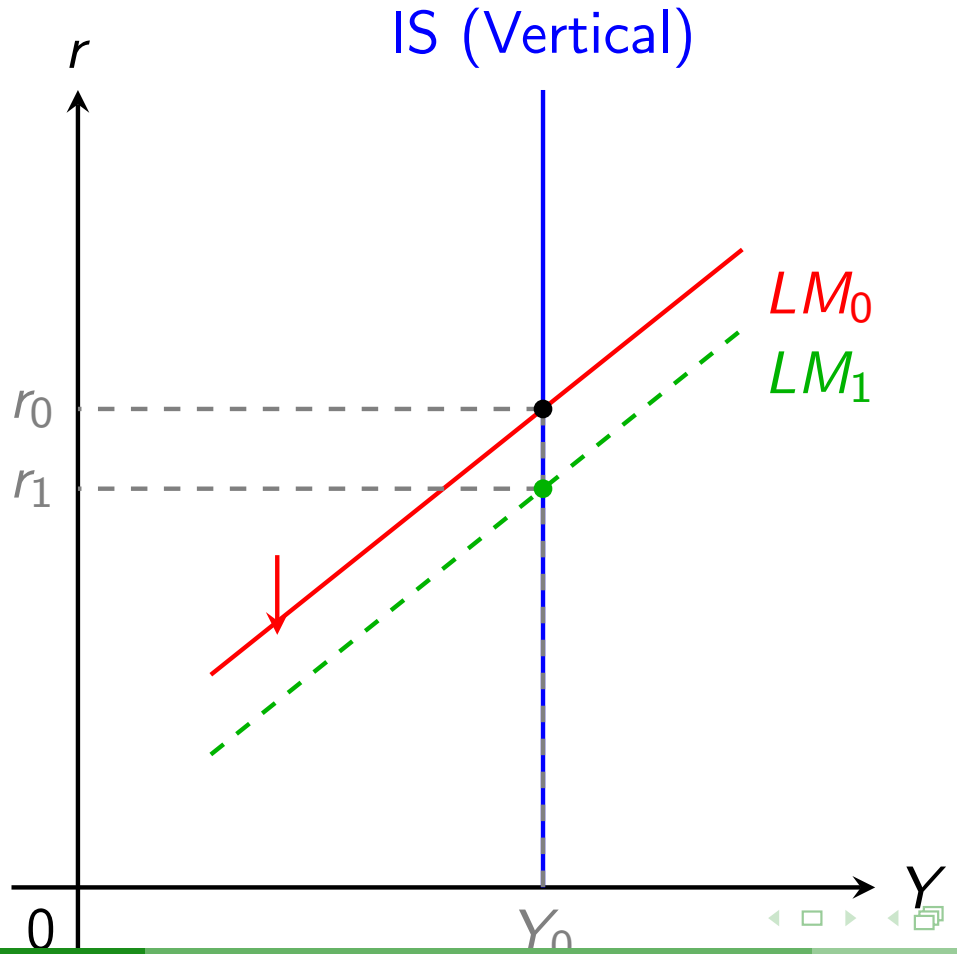
- ↑ Output increases
- ↑ Interest rate increases
- × Partial crowding out
- × Higher borrowing costs

**Classical View:**

- Use monetary policy (lower rates preferable)
- Falling prices increase $M/P$, shifting LM right—markets self-correct

# Keynesian Challenge 1: Interest-Inelastic Investment

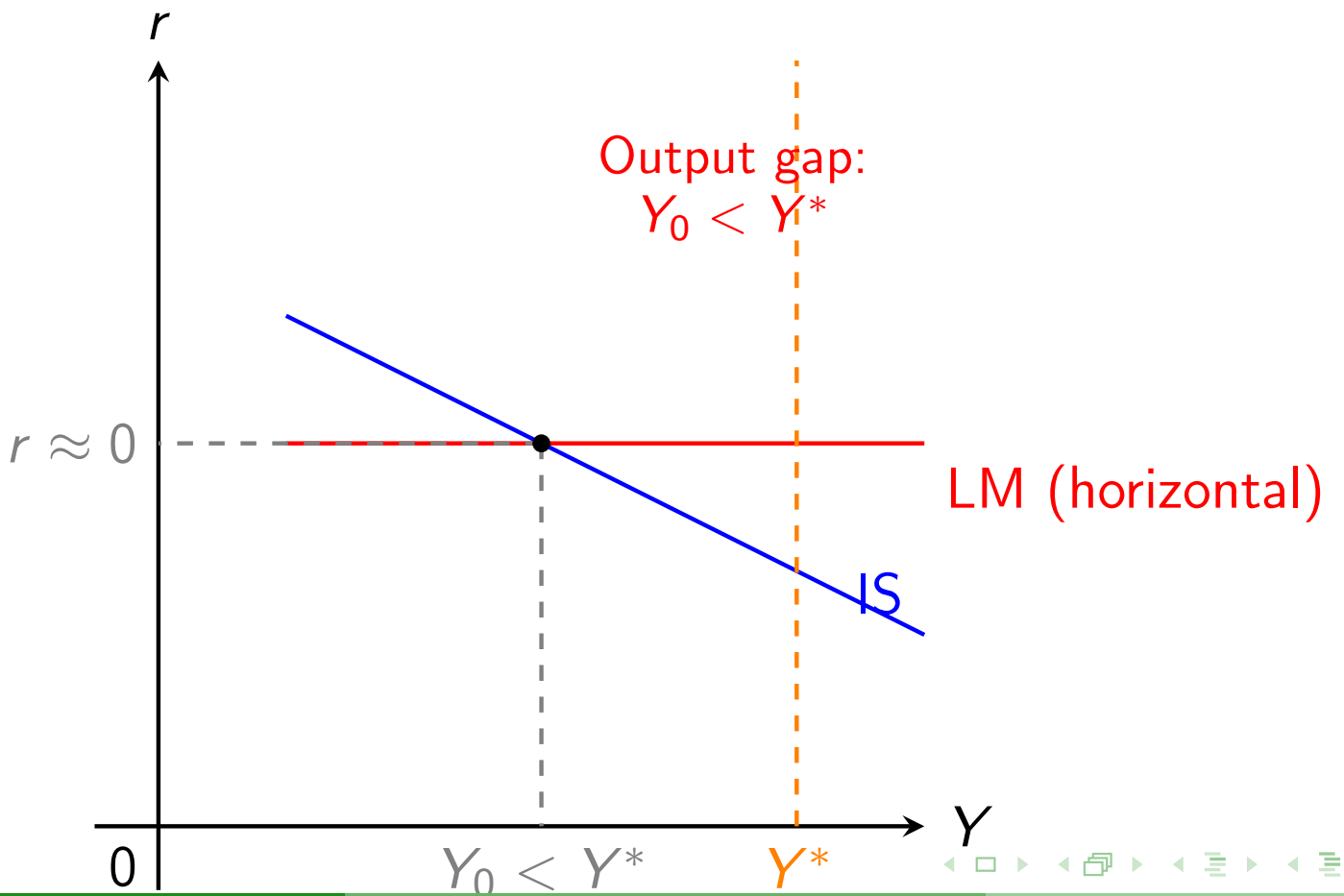
**Problem:** What if investment doesn't respond to interest rates?
*During severe recessions, extreme pessimism may make investment unresponsive to rate changes*



# Keynesian Challenge 2: The Liquidity Trap (Zero Lower Bound)

**Problem:** What if interest rates can't fall below zero?

*When rates approach zero, monetary policy loses effectiveness*



# Implications of the "Monkey Wrenches"

**Two Scenarios Where Monetary Policy Fails:**

1. **Zero Lower Bound (Liquidity Trap)**
   - Interest rates cannot fall below zero
   - Solution: Fiscal stimulus
2. **Interest-Inelastic Investment**
   - Extreme pessimism ("animal spirits")
   - Solution: Direct fiscal spending

**Key Assumption:** Interest rate is the primary transmission channel
**Missing:** No discussion of inflation or debt dynamics

# From Static to Dynamic: Motivation

**Limitations of Static IS-LM:**

- No time dimension—everything happens instantaneously
- No inflation dynamics
- No expectations formation
- Prices perfectly flexible or perfectly rigid

**New Keynesian Innovations:**

- Add time subscripts and dynamics
- Incorporate inflation and expectations
- Model gradual adjustment (sticky prices, sticky output)
- Distinguish nominal vs. real interest rates

# Simple Dynamic IS-LM Model: The Four Equations

1. **Money Demand (LM):**

$$m_t - p_t = \psi y_t - \theta i_t$$

2. **Aggregate Demand (IS):**

$$y_t^d = \beta_0 - \beta_1(i_t - \Delta p_t^e)$$

3. **Inflation (Phillips Curve):**

$$\Delta p_t = \mu(y_t - y_t^n)$$

4. **Output Adjustment:**

$$\Delta y_t = \nu(y_t^d - y_t)$$

**Key Innovation:** Prices now adjust gradually (with friction), not instantaneously

# Equation 1: Money Market

$$m_t - p_t = \psi y_t - \theta i_t$$

**Left:** Real money balances ($M/P$)
**Right:** Money demand depends on income $y_t$ (transactions) and interest rate $i_t$ (opportunity cost)
**Policy Choice:**

- Central bank sets *either* $m_t$ or $i_t$, not both
- Modern practice: Set interest rate

**Extends Quantity Theory:** Velocity varies with interest rate

# Equation 2: Aggregate Demand

$$y_t^d = \beta_0 - \beta_1(i_t - \Delta p_t^e)$$

**Components:**

- $\beta_0$: Autonomous demand (fiscal policy, confidence)
- $(i_t - \Delta p_t^e)$: Real interest rate
- $\beta_1 > 0$: Interest sensitivity

**Intuition:**

- Higher real rates $\Rightarrow$ More saving, less investment

**Key:** What matters is the *real* interest rate!

# Equation 3: Inflation (Phillips Curve)

$$\Delta p_t = \mu(y_t - y_t^n)$$

**Output gap** $(y_t - y_t^n)$ drives inflation, with sensitivity $\mu > 0$

**Interpretation:**

- $y_t = y_t^n$: Zero inflation (price stability)
- $y_t > y_t^n$: Positive inflation (overheating)
- $y_t < y_t^n$: Deflation (recession)

**Policy:** Control inflation by managing output gap

# Equation 4: Output Adjustment

$$\Delta y_t = \nu(y_t^d - y_t)$$

**Interpretation:** Output adjusts gradually toward demand

**Why Gradual?**

- Uncertainty: Is demand change temporary or permanent?
- Adjustment costs: Hiring/firing, capacity changes
- Information lags

**Result:** Creates dynamics and persistence

# The Complete Dynamic System

**Four Equations:**

$$\begin{cases} m_t - p_t = \psi y_t - \theta i_t \\ y_t^d = \beta_0 - \beta_1(i_t - \Delta p_t^e) \\ \Delta p_t = \mu(y_t - y_t^n) \\ \Delta y_t = \nu(y_t^d - y_t) \end{cases}$$

**Two Policy Regimes:**

1. Money supply targeting: Exogenous $m_t$
2. Interest rate targeting: Exogenous $i_t$

**Advances:** Time dimension, endogenous inflation, transition paths

# What's Still Missing?

**Model still omits:**

- **Debt dynamics:** No government budget constraint
- **Microfoundations:** Agents not explicitly optimizing
- **Expectations:** How is $\Delta p_t^e$ formed?
- **Supply shocks:** Model is demand-driven only

**Next:** Modern DSGE models address these issues

# Summary: Key Takeaways

1. **Historical Context:**
   - Keynesian economics remains controversial and influential
   - Classical vs. Keynesian debate centers on market self-correction
2. **Static IS-LM Model:**
   - Provides framework for analyzing monetary and fiscal policy
   - Two key limitations: liquidity trap and interest-inelastic investment
   - These justify Keynesian fiscal intervention
3. **Dynamic Extensions:**
   - New Keynesian models add time, inflation, and expectations
   - Better capture real-world adjustment processes
   - Still incomplete—need microfoundations and debt dynamics
4. **Policy Implications:**
   - Choice between rules and discretion remains unresolved
   - Effectiveness of policy depends on economic circumstances

# Questions for Reflection

1. Under what economic conditions is fiscal policy more effective than monetary policy?
2. How might expectations about future policy affect the IS-LM equilibrium?
3. What are the political economy constraints on using Keynesian policies?
4. How would you incorporate government debt into the dynamic IS-LM framework?
5. Can you think of historical episodes where the liquidity trap was relevant?

# Thank You!

Questions and Discussion

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