Agenda

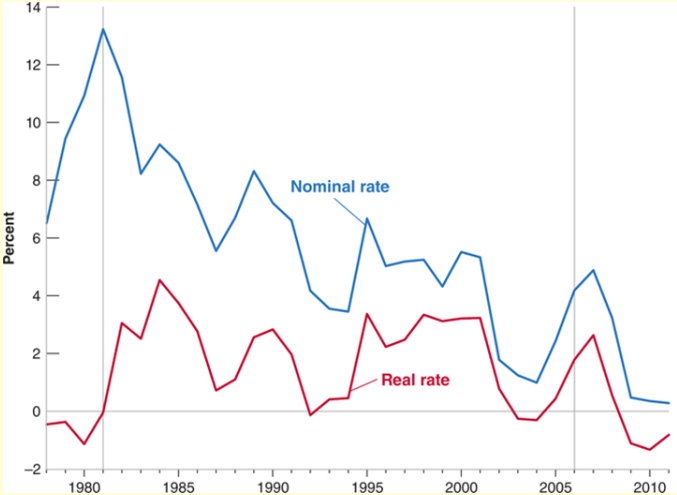
- The distinction between the *real* and the *nominal* interest rate.
- The role of expectations in financial markets.
- The role of expectations in consumption and investment decisions.
- Material: Blanchard, Chapters 14, 15, and 16.

Chapter 14

Nominal Vs Real Interest Rate

The real interest rate is equal to the nominal interest rate minus the expected inflation.

$$r_t = i_t - \pi^e_{t+1}$$



Source: Nominal interest rate is the 1-year Treasury bill in December of the previous year: Series TB1YR, Federal Reserve Economic Data (FRED) http://research.stlouisfed.org/fred2/ (Series TB6MS in December 2001, 2002, 2003, and 2004.) Expected inflation is the 12-month forecast of inflation from the December OECD Economic Outlook from the previous year.

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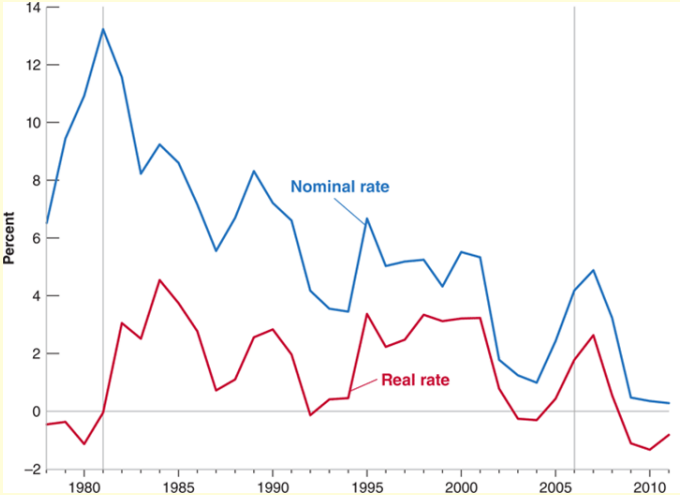

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- Nominal rate might be low, but we need to look at the real rate to check for economy's health.
- Aren't low rates and low inflation good for economy?

Why Deflation Can Be Devastating

Year	Unemployment Rate (%)	Output Growth Rate (%)	One-Year Nominal Interest Rate (%) i	Inflation Rate (%) π	One-Year Real Interest Rate (%) r
1929	3.2	−9.8	5.3	0.0	5.3
1930	8.7	−7.6	4.4	−2.5	6.9
1931	15.9	−14.7	3.1	−9.2	12.3
1932	23.6	−1.8	4.0	−10.8	14.8
1933	24.9	9.1	2.6	−5.2	7.8

- In 1933, the US economy was stuck in a **deflation trap**.
- Among other things, rising real rates led to worsening of the situation.

The *IS* – *LM* Model Revisited

- Investments and consumption are determined by the **real interest rates**.
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The *IS* – *LM* Model Revisited

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- The rate that the RBI announces is the **nominal interest rate**.
- Therefore, the impact of monetary policy on output depends upon how nominal rates affect real rates.

Money Growth, Inflation, and Interest Rate

Two key features: real or nominal; short or long run.

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The Short Run

- The feature of the model is: prices do not adjust quickly.
- People and firms do not revise their inflation expectations immediately.
- So, short-run monetary policy story is a happy story.

The Medium Run

The rate of inflation = the rate of money growth

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- Because inflation is equal to money growth, we get:

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- A 5% increase in money growth leads to a 5% rise in inflation and a 5% rise in nominal rates.
- This is known as the **Fisher hypothesis**.

The Short Run to the Medium Run

- $\downarrow$Interest Rate $\Rightarrow$ $\uparrow$Output

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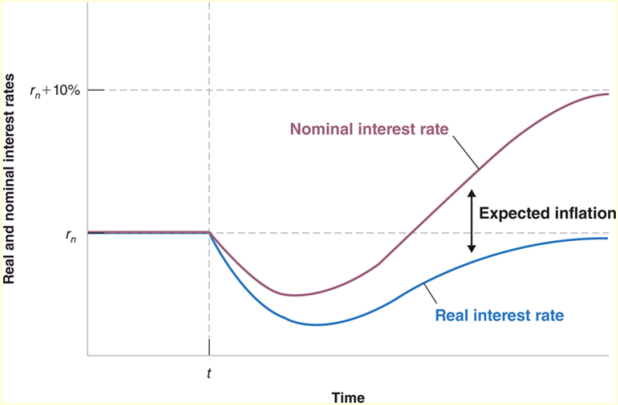
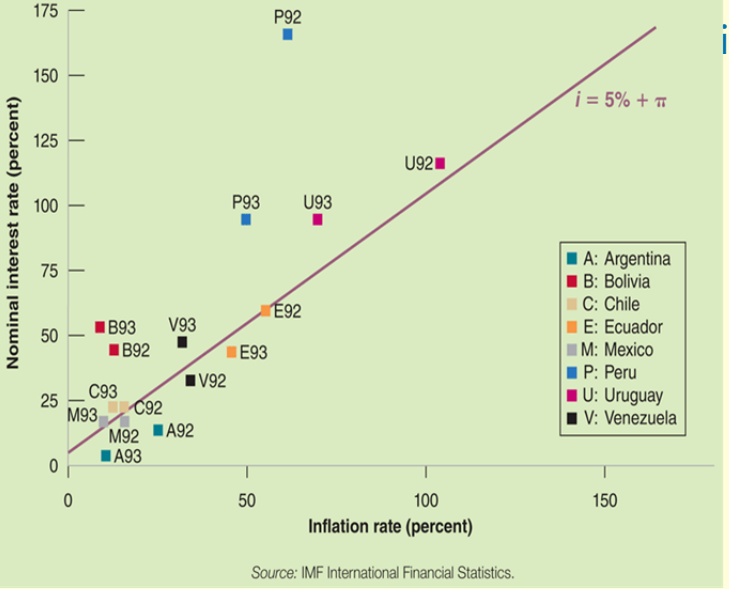


Nominal Inte ica



Source: IMF International Financial Statistics.

Expected Present Discounted Value

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- Example: Let $i = 0.1$, the weight on payment 20 years later will be 0.148.
- So, a payment of ₹1000 in 20 years will be worth ₹148.6 today.

Expected Present Discounted Value

A typical mortgage requires constant payment over a fixed time period.

- The present discounted value in today's rupees V_t

$$V_t = z\left[1 + \frac{1}{(1+i)} + \frac{1}{(1+i)^2} + \ldots\right]$$

Expected Present Discounted Value

A typical mortgage requires constant payment over a fixed time period.

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$$V_t = z\left[1 + \frac{1}{(1+i)} + \frac{1}{(1+i)^2} + \ldots\right]$$

- The above is a sum of a GP.

$$V_t = z\frac{1 - [1/(1+i)^n]}{1 - [1/(1+i)]}$$

- Example: interest rate = 5%, annual payment = ₹10,000, time = 20 years.

Expected Present Discounted Value

Constant Interest Rate and Payment Forever

- The present value would be

$$V_t = \frac{z}{i}$$

- Example: $i = 5\%$, $z = 100$.

Chapter 15

Bond Prices and Bond Yields

Bonds vary across two variables:

1. **Default Risk**
2. **Maturity**

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- **Yield:** The interest rate associated with the bond.
- Yield and maturity are tied together. We call it the **term structure of interest rates**.
- Let's think about
  1. *Bond prices*
  2. Examine the determinants of the yield curve.
  3. The relationship between short-term and long-term interest rates.

Bond Prices and Present Value

Two bonds: one-year and two-years.

- The price of one-year bond is

$$P_{1t} = \frac{100}{1 + i_{1t}}$$

- The price of two-years bond is

$$P_{2t} = \frac{100}{(1 + i_{1t})(1 + i_{2t})}$$

NOTE: Interest rate is nominal one.

Arbitrage and Bond Prices

- Assumption: Investors care about **expected returns**.
- Consequence: The two bonds must offer the same expected one-year returns.

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- If the above doesn't hold true, market for one bond will vanish.
- Arbitrage between the two bonds implies that the price of two years bond is the present value of the payment in two years.

$$P_{2t} = \frac{100}{(1 + i_{1t})(1 + i^{e}_{1t+1})}$$

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$$P_{2t} = \frac{100}{(1 + i_{2t})^2}$$

- Some maths later:

$$i_{2t} = \frac{1}{2}(i_{1t} + i^e_{1t+1})$$

The two year interest rate is the average of the current one year interest rate and next year's expected one-year interest rate.

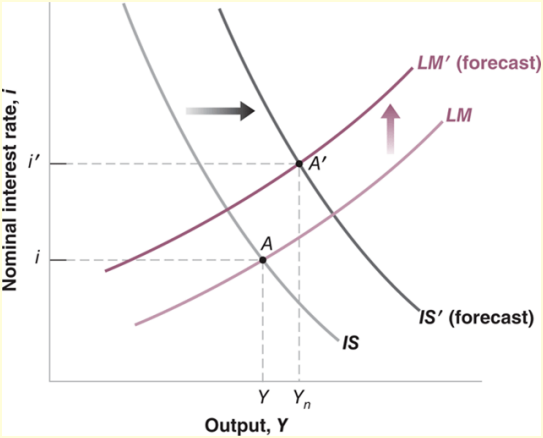
The Yield Curve

- Rearrange the interest rate equation to get

$$i^e_{1t+1} = 2i_{2t} - i_{1t}$$

- Let one year interest rate be 4% and two-year rate be 5%.
- The interest rate in one year's time are supposed to be up by 6%.

Expectations Versus Reality: US Circa 2001



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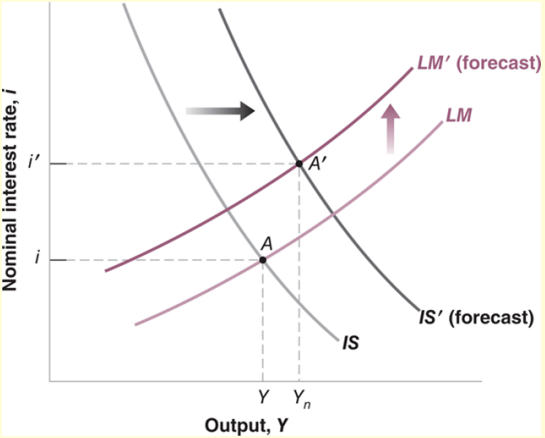

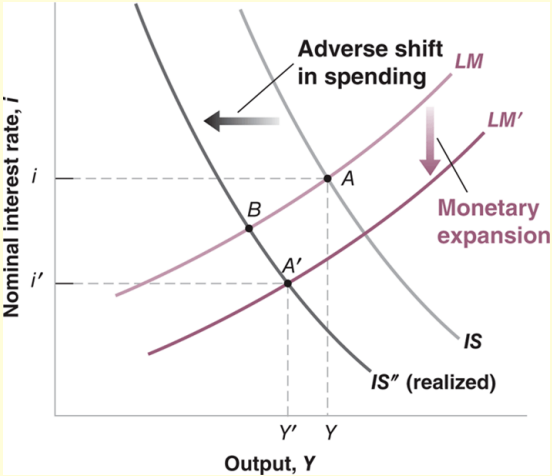

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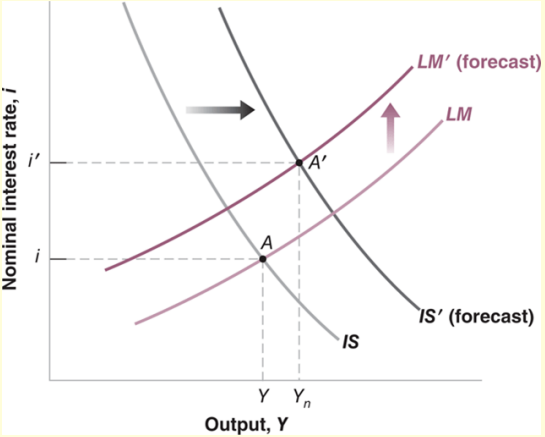

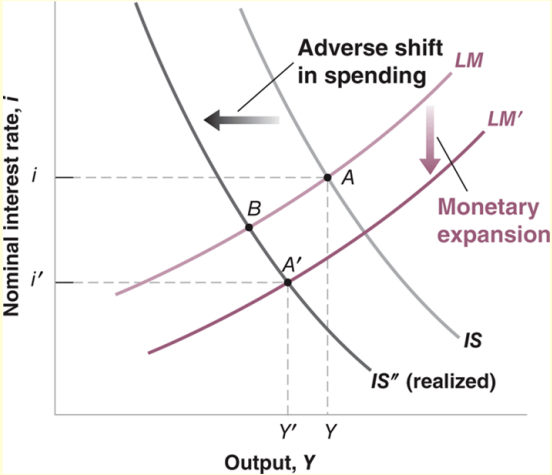

Try explaining the difference.


EXPECTATIONS
REALITY

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- How do stock prices respond to macro-policy?
- The real stock price is the present value of future dividends, discounted by interest rates.
- $\uparrow$`Future dividends` $\Rightarrow \uparrow$`real stock price`.
- $\uparrow$`Future expected real interest rates` $\Rightarrow \downarrow$`real stock prices`.

Stock Market and Monetary Policy

- Let there be an unexpected monetary expansion.
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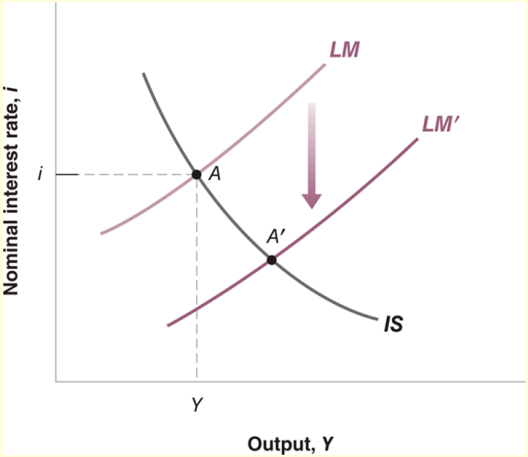

Stock Market and Consumer Spending

- Let there be rise in consumer spending.
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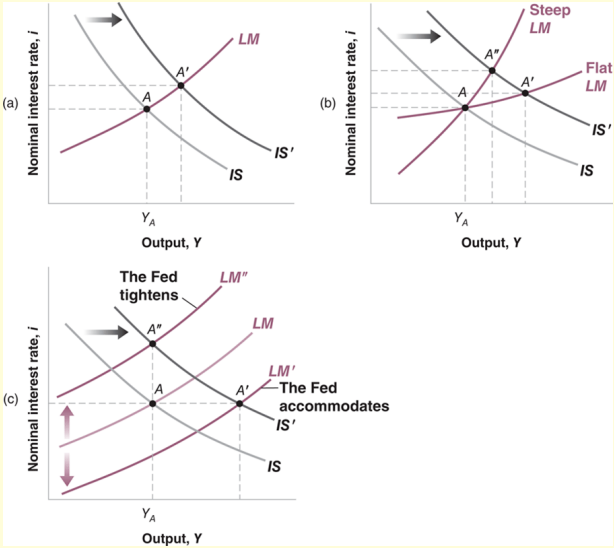

Risks, Bubbles, Fads

- In 1994 a Russian “financier” Sergei Mavrodi, created a company called MMM and proceeded to sell shares, promising shareholders a rate of return of at least 3,000% per year.
- This was an instant hit.
- The price of MMM shares increased from 1,600 rubles (then worth $1) to in February to 105,000 rubles (then worth $51) in July.
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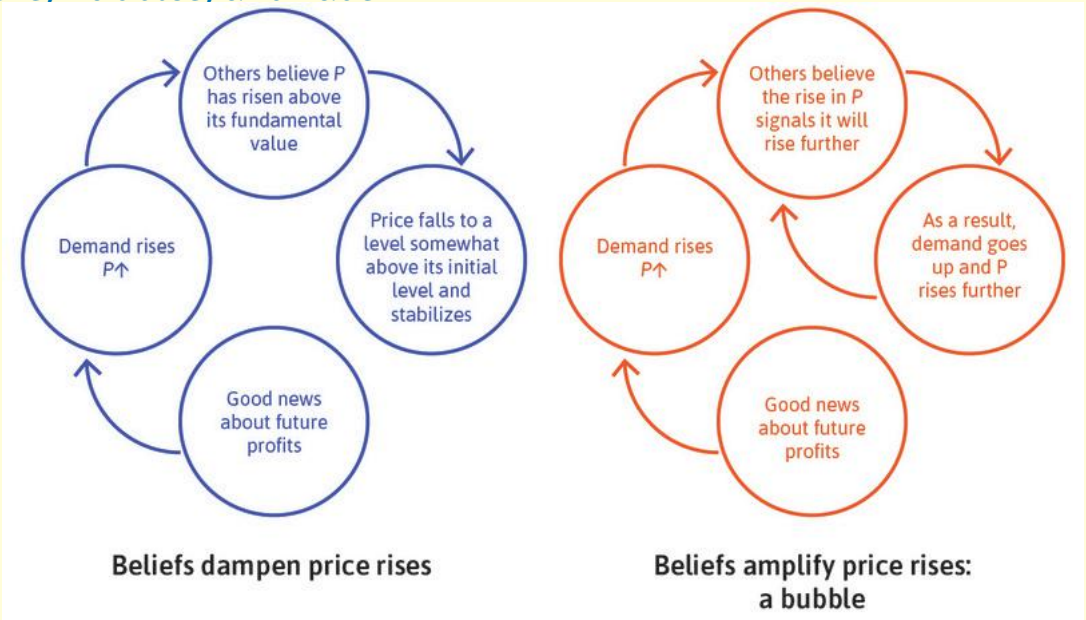
Risks, Bubbles, Fads

Three distinctive features of markets may give rise to bubbles:

1. *Resale value*: A person may buy a house both for the rental income and also to make gains by holding on to the house and reselling it later.
2. *Ease of trading*: You can switch between being a buyer and being a seller.
3. *Ease of borrowing to finance purchases*: If market participants can borrow to increase their demand for an asset that they believe will increase in price, well, we are staring at a possible bubble.

Risks, Bubbles, and Fads



Chapter 16

Agenda

- Embed expectations into consumption decision.
- Show that investments are function of expected interest rate.

Consumption

Consumption decision can take the following forms:

- $C_t = C(\text{total wealth}_t)$.
- $C_t = C(\text{total wealth}_t, Y_{Lt} - T_t)$.

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1. In order to compute future wealth, people form expectations about taxation, interest rate, etc.
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Implications:

1. There may not be a one-to-one correspondence in current income and consumption movements.
2. Consumption may rise even when there is no change in current income.

A Model of Consumption

- People like to consumption smooth
- Let initial wealth = W, R be number of working years, $Y_{Lt} - T_t$ is the annual income.
- Let there be L years in life.
- $C = \frac{W+R(Y_{Lt}-T_t)}{L}$

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- $C = \frac{W + R(Y_{Lt} - T_t)}{L}$
- $APC = \frac{C}{Y}$
- In short run, average propensity to consume falls when income rises.
- In long run, average propensity to consume doesn't change when income increases.

Investment

- Investments depend upon on the expected present value of future profits per unit capital.

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- Present value of expected profits

$$V(\Pi_t^e) = \frac{1}{1+r_t}\Pi_{t+1}^e + \frac{1}{(1+r_t)(1+r_{t+1}^e)}(1-\delta)\Pi_{t+2}^e$$

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- Under this assumption:

$$V(\Pi_t^e) = \frac{\Pi_t}{r+\delta}$$

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- In English: q is basically the ratio of market to book value.
- If $q < 1$, then don't invest.
- If $q > 1$, then invest.

Chapter 17

Agenda

- Bring expectation effects into $IS - LM$.
- Discuss monetary and fiscal policies.
- Material: Blanchard, Chapter 17.

Expectations and the *IS* Relation

- We define aggregate private spending as:

$$A(Y, T, r) = C(Y - T) + I(Y, r)$$

Expectations and the *IS* Relation

- We define aggregate private spending as:

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- Output now depends upon current and expected future parameters

$$Y = A(Y, T, r, Y^e, T^e, r^e) + G$$

Expectations and the *IS* Curve

- A fall in current interest rate does not have much impact on spending.
  - A fall in current interest rate doesn't shift the present value.
  - Firms are not likely to change their investment plans until the expectations shift.

- The multiplier is going to be smaller.

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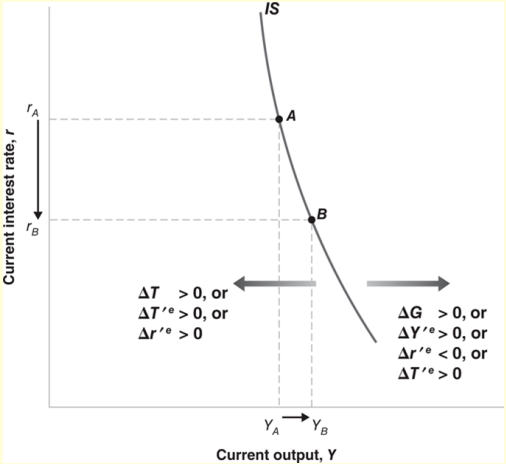

The *LM* Curve Revisited

- Decision to hold money is a myopic one.
  - Depends upon current income and current interest rate.
  - Doesn't depend upon future expected nominal interest rate.

- The multiplier is going to be smaller.

Expectations and the *IS* Curve

- *IS*:

$$Y = A(Y, T, r, Y^e, T^e, r^e) + G$$

- *LM*:

$$\frac{M}{P} = YL(r)$$

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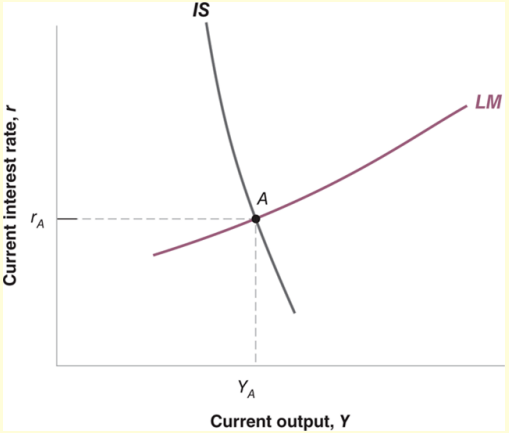

Monetary Policy Revisited

- Money supply goes up $\Rightarrow$ Output shift may be larger. Why?

Monetary Policy Revisited

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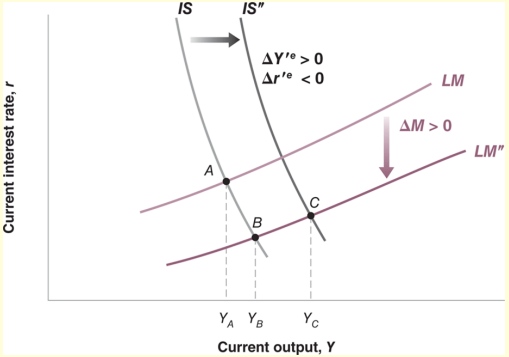

The Liquidity Trap, QE, and Expectations

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