Principles of Economics

Macroeconomics

Summing Up the Income-Expenditure Framework II

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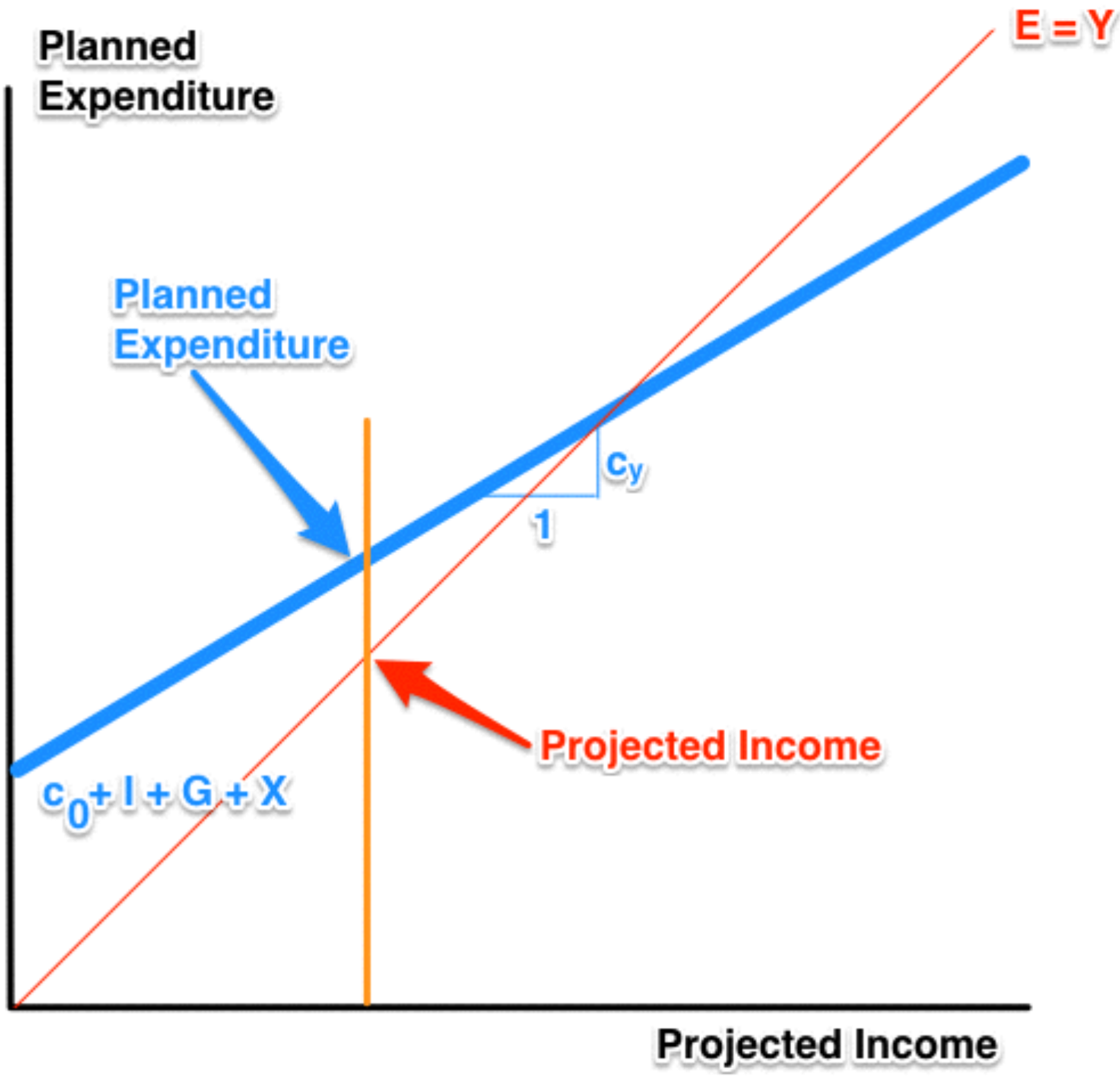
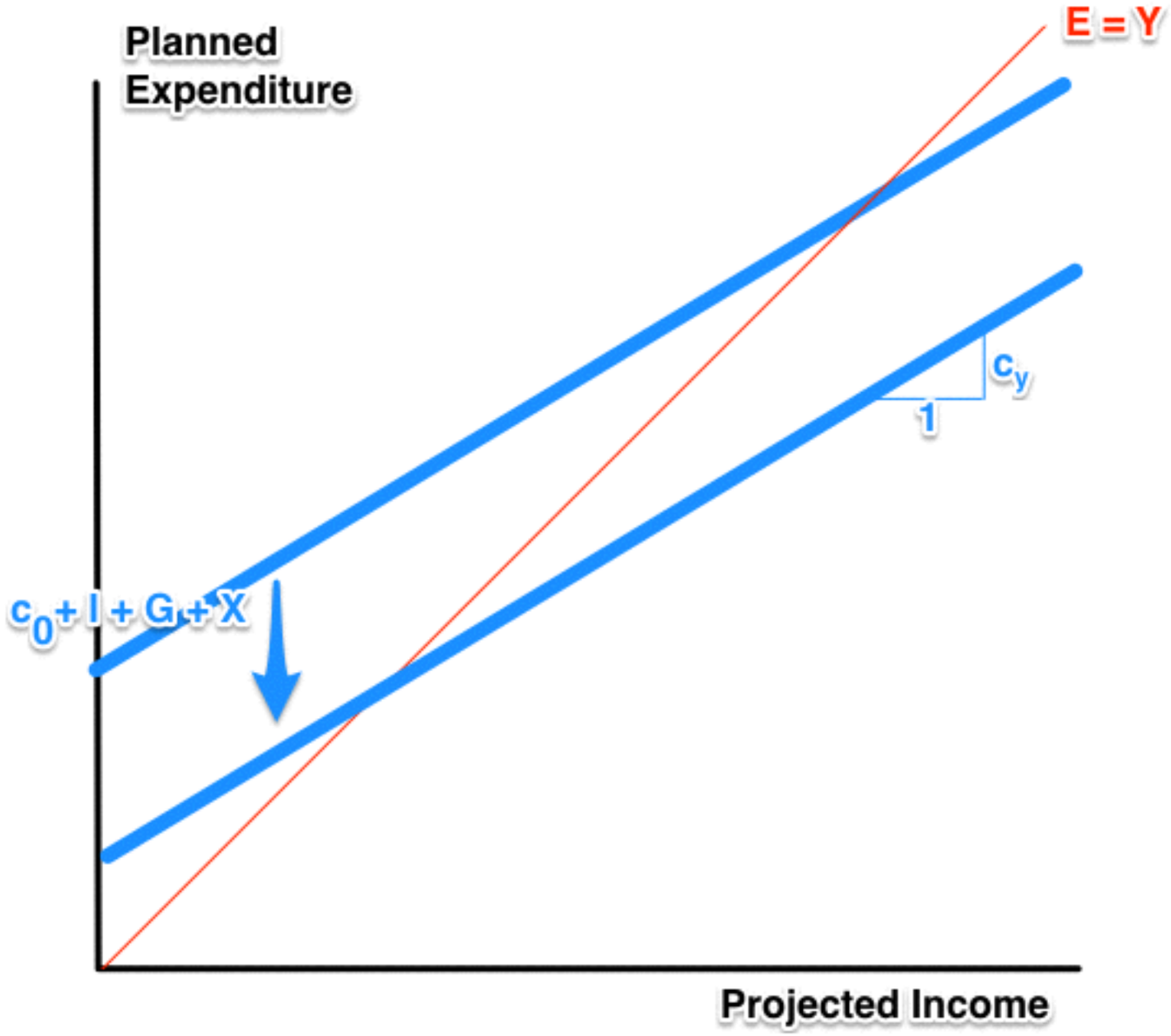
When Planned Expenditure Falls Below Projected Income

- People are planning to spend less than they earn…
- Inventories are unexpectedly growing…
- Employers find sales unexpectedly low—so their incomes are down



Gentlebeings, to Your iClickers…

- Suppose we have:
  - $E = C + I + G + X$
  - $C = c_0 + c_y(Y - T)$
  - $c_y = 0.5$
  - c_0 falls by \$1T while I, G, X, T remain unchanged
- What happens to the equilibrium level of Y at which Y = E (substitute any numbers in for I, G, X, T, and initial c_0. It doesn't matter)?
  - A. It falls by \$2T. B. It falls by \$1T. C. It falls by 0.5T. D. You cannot tell from the information given. E. None of the above

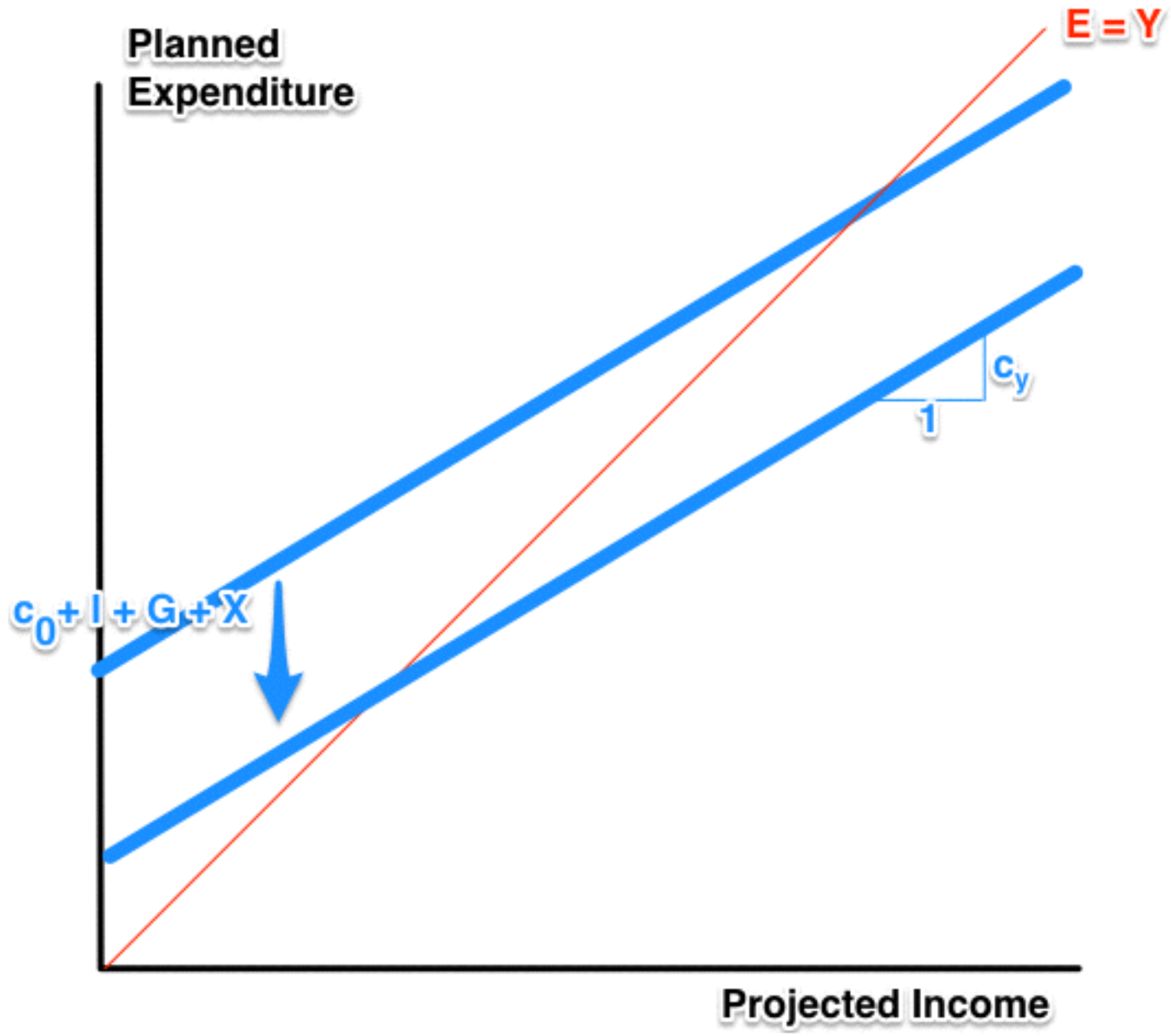


Gentlebeings, to Your iClickers…: Answer

- Suppose we have: E = C + I + G + X; C = $c_0 + c_y(Y - T)$; c_y =0.5; c_0 falls by $1T while I, G, X, T remain unchanged

- What happens to the equilibrium level of Y at which Y = E (substitute any numbers in for I, G, X, T, and initial c_0. It doesn't matter)? A. It falls by $2T. B. It falls by $1T. C. It falls by $0.5T. D. You cannot tell from the information given. E. None of the above

- **The answer I am looking for is A: falls by $2T**



Gentlebeings, to Your iClickers…: Answer II

- Suppose we have: E = C + I + G + X; C = c_0 + c_y(Y - T); c_y = 0.0; c_0 falls by \$1T while I, G, X, T remain unchanged

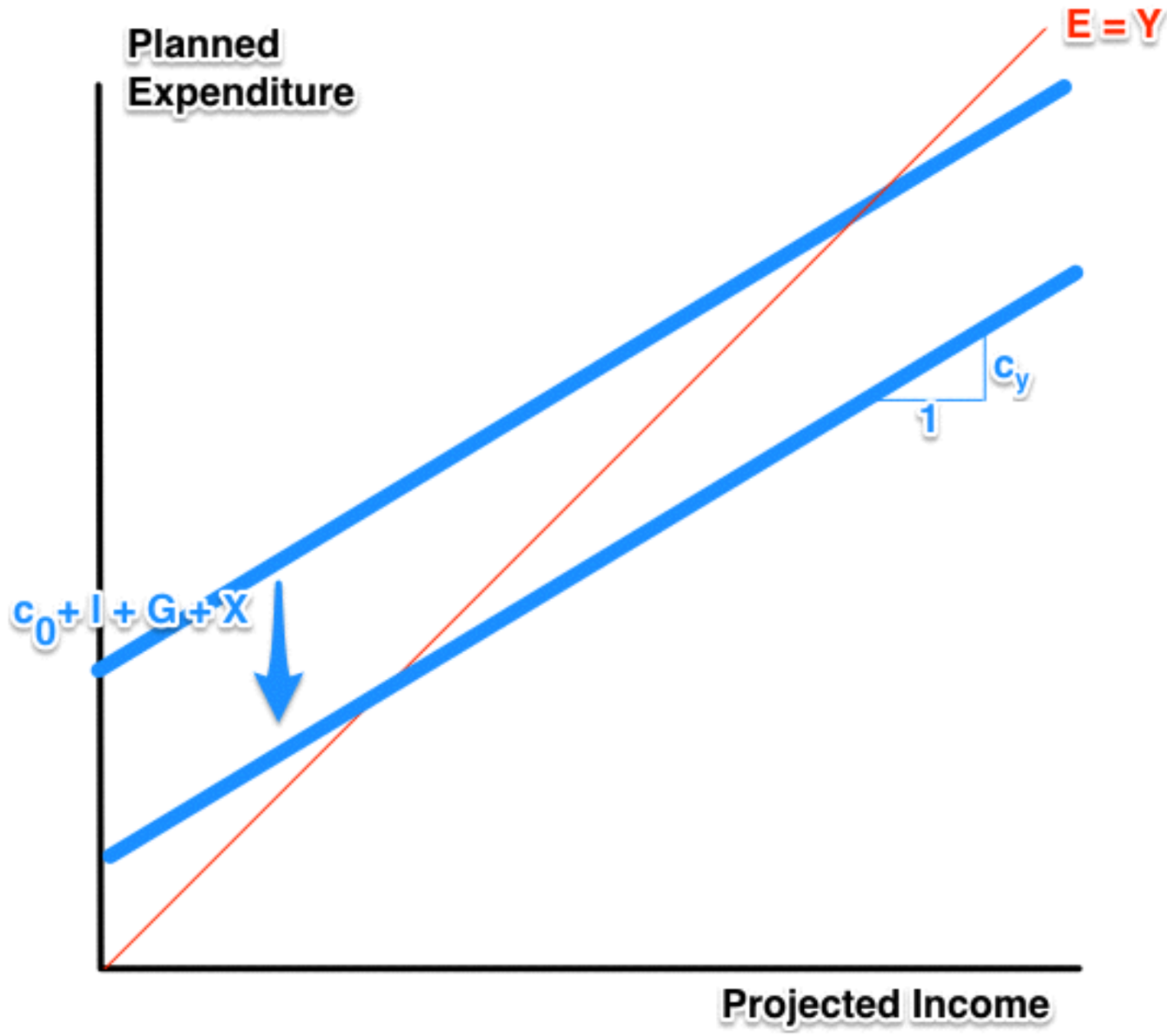
- What happens to the equilibrium level of Y at which Y = E (substitute any numbers in for I, G, X, T, and initial c_0. It doesn't matter)? A. It falls by \$2T. B. It falls by \$1T. C. It falls by \$0.5T. D. It falls by \$1.5T. E. None of the above

- **The answer I am looking for is B: falls by \$2T**

- **The fall in c_0 opens up a \$1T gap between planned expenditure and projected income.**

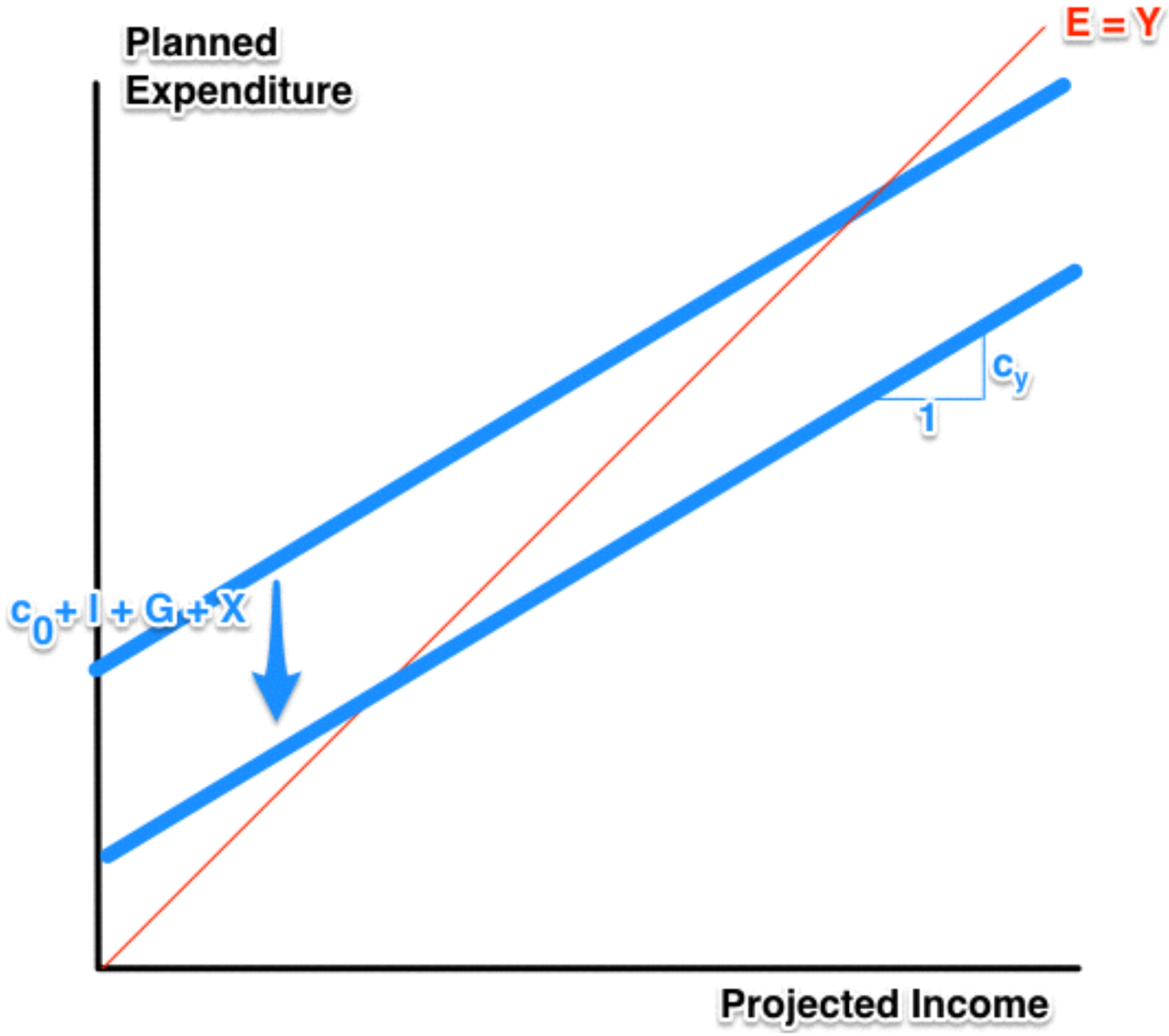
- **Each \$1T reduction in income reduces income by \$1T, and reduces planned expenditure by \$0.5T**

- **So each \$1T reduction in income reduces desired money hoarding by \$0.5T**



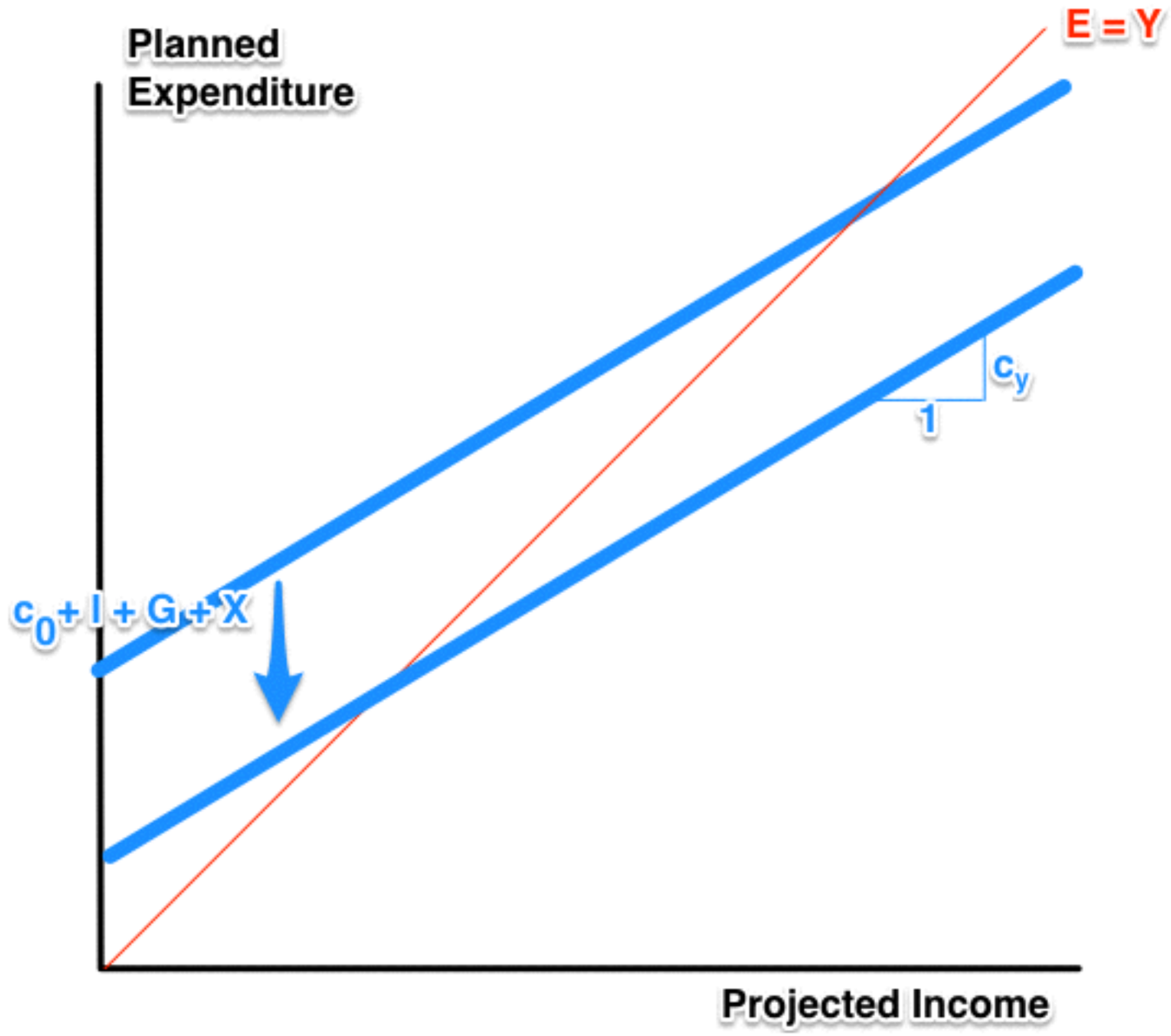
Gentlebeings, to Your iClickers…

- Suppose we have:
  - $E = C + I + G + X$
  - $C = c_0 + c_y(Y - T)$; $c_y = 0.75$
  - c_0 falls by \$1T while I, G, X, T remain unchanged
- What happens to the equilibrium level of Y at which Y = E (substitute any numbers in for I, G, X, T, and initial c_0. It doesn't matter)?
  - A. It falls by \$2T
  - B. It falls by \$1T
  - C. It falls by \$0.5T
  - D. It falls by \$1.5T
  - E. None of the above



Gentlebeings, to Your iClickers: Answer

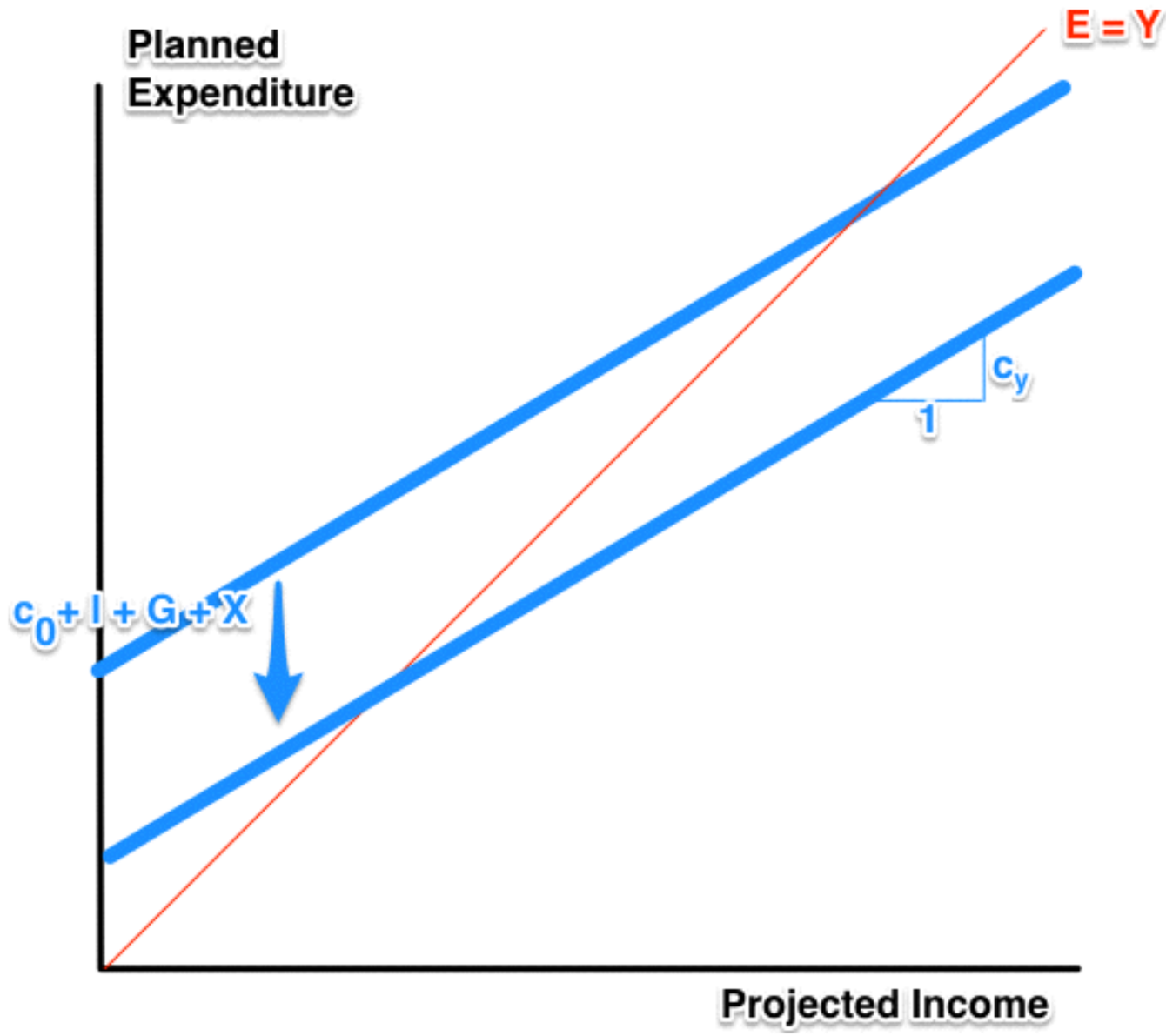
- Suppose we have:
  - $E = C + I + G + X$
  - $C = c_0 + c_y(Y - T)$; $c_y = 0.75$
  - c_0 falls by \$1T while I, G, X, T remain unchanged
- What happens to the equilibrium level of Y at which Y = E (substitute any numbers in for I, G, X, T, and initial c_0. It doesn't matter)?
  - A. It falls by \$2T. B. It falls by \$1T. C. It falls by \$0.5T. D. It falls by \$1.5T. E. None of the above
- **The answer I am looking for is E**
- **I get that equilibrium Y = E falls by \$4T**



Gentlebeings, to Your iClickers: Answer II

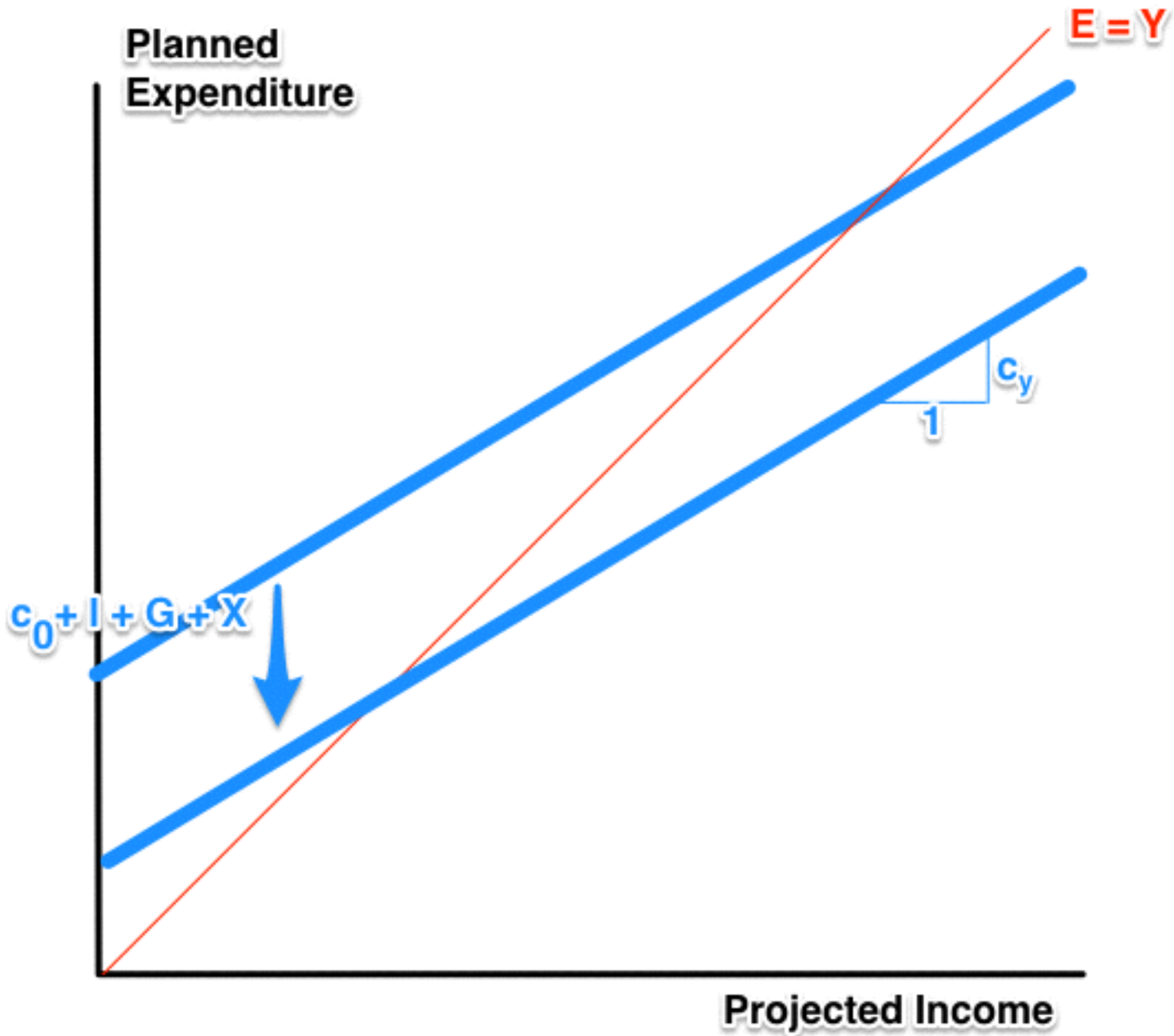
- Suppose we have:
  - E = C + I + G + X; C = $c_0 + c_y(Y - T)$; $c_y = 0.75$; c_0 falls by \$1T while I, G, X, T remain unchanged
- What happens to the equilibrium level of Y at which Y = E (substitute any numbers in for I, G, X, T, and initial c_0. It doesn't matter)? A. It falls by \$2T. B. It falls by \$1T. C. It falls by \$0.5T. D. It falls by \$1.5T. E. None of the above

- **The answer I am looking for is E**
- **I get that equilibrium Y = E falls by \$4T**
- **The fall in c_0 creates a \$1T gap between planned expenditure E and projected income Y…**
- **Each \$1T fall in projected income Y produces an \$0.75T fall in planned expenditure**
- **Each \$1T fall in projected income produces a \$0.25T reduction in desired money accumulation**
- **To balance E and Y—to reduce desired money accumulation to 0—requires a \$4T reduction in Y**



What Is the Pattern Here?: The Multiplier μ

- Suppose we have:
  - $E = C + I + G + X$; $C = c_0 + c_y(Y - T)$; c_0 falls by \$1T while I, G, X, T remain unchanged
  - $c_y = 0.75$; $\mu = 4$
  - $c_y = 0.5$; $\mu = 2$
  - $c_y = 0.3333$; $\mu = 1.5$
  - $c_y = 0$; $\mu = 1$
  - **$\mu = 1/(1 - c_y)$**



Boosting and Shrinking Planned Expenditure: The Money View

- The "money" view of a downturn:
    - Planned expenditure fell short of projected income because people wanted to build up their stocks of money…
    - And so incomes fell…
        - And incomes kept falling until people felt so poor that they forgot about wanting to build up their stocks of money…
        - And there the economy sits, with lots of unemployment and idle factories
- This suggests an obvious way to restore employment to full employment, reduce unemployment, and restore production to potential output
- PRINT SOME MONEY TO MAKE PEOPLE HAPPY WITH THE (NEW, LARGER) MONEY HOLDINGS THEY HAVE!

Boosting and Shrinking Planned Expenditure: The Spending View

- People in aggregate want to spend less than their incomes: they want to "deleverage"
    - Planned expenditure falls short of projected income…
    - And so incomes fell…
    - And incomes kept falling until planned expenditure was once more equal to projected income…
    - And there the economy sits, with lots of unemployment and idle factories
- This suggests an obvious way to restore employment to full employment, reduce unemployment, and restore production to potential output
- INDUCE SOMEBODY TO LEVERAGE UP SO THAT EACH GIVEN LEVEL OF INCOME IS ASSOCIATED WITH A HIGHER LEVEL OF PLANNED EXPENDITURE!

Money and Interest Rates

- Reconciling the “spending” and the “money” views?
- You cannot change people’s desires to build up or draw down their money holdings without also changing their planned expenditure…
- You cannot change people’s planned expenditure without also changing people’s desires to build up or draw down their money holdings…
- The Keynesian-Monetarist wars of the 1930s-1980s…

Interest Rates and Spending

- $Y = \mu[c_0 + (G - c_y T) + (c_w W + I + X)]$
- All these last three terms depend on r: $(c_w W + I + X)$
  - Lower r—print more money—and get more planned expenditure
  - Raise G—have the government spend more—and get more planned expenditure
  - Lower T—get households more disposable income—and get more planned expenditure
- $Y = \mu[c_0 + (G - c_y T) + (c_w W + I)(r) + X(\varepsilon(r))]$
- $Y = \mu[c_0 + (G - c_y T) + (c_w W + I + X)(r)]$

Interest Rates and Spending II

- $Y = \mu[c_0 + (G - c_yT) + (c_wW + I + X)(r)]$
- r: the real interest rate:
  - r = i (the current interest rate) + E(Δi) (expected change in interest rates) + ρ (the risk premium) - E(π) (expected inflation)
- Federal Reserve & financial markets determine r

Wealth and Interest Rates

- Stocks pay dividends D; dividends D grow at rate g
- Choice: (i) hold on to your stocks this year and collect dividends; (ii) sell your stocks and invest in risky bonds paying r
- Options:
  - Hold stocks: D + W(1 + g)
  - Invest in bonds: W(1 + r)

Ladies and Gentlemen, to Your iClickers

- What will financial markets do when faced with this choice: hold stocks and get D + W(1 + g) or invest in bonds and get W(1 + r)?
  - A. Everyone will hold stocks, and so D + W(1+g) < W(1+r)
  - B. Everyone will sell their stocks and buy bonds, and so D + W(1+g) > W(1+r)
  - C. When it looks as though D + W(1+g) < W(1+r), people will sell stocks and push stock prices down, and so D + W(1+g) = W(1+r)
  - D. None of the above
  - E. You can’t really say

Ladies and Gentlemen, to Your iClickers: Answer

- What will financial markets do when faced with this choice: hold stocks and get D + W(1 + g) or invest in bonds and get W(1 + r)?

  - A. Everyone will hold stocks, and so D + W(1+g) < W(1+r). B. Everyone will sell their stocks and buy bonds, and so D + W(1+g) > W(1+r). **C. When it looks as though D + W(1+g) < W(1+r), people will sell stocks and push stock prices down, and so D + W(1+g) = W(1+r).** D. None of the above. E. You can't really say

- **I am looking for (C). This is an *arbitrage* argument—that if D + W(1+g) ≠ W(1+r) there is easy money to be made, at least if you have nerves of steel**

Ladies and Gentlemen, to Your iClickers

- If D + W(1 + g) = W(1 + r), then:
  - A. W = D/r
  - B. W = D + gW - rW
  - C. W = D/(r - g)
  - D. W = D(r - g)
  - E. None of the above

Ladies and Gentlemen, to Your iClickers: Answer

- If D + W(1 + g) = W(1 + r), then:
  - A. W = D/r. B. W = D + gW - rW. **C. W = D/(r - g)**. D. W = D(r - g). E. None of the above

- **I am looking for (C). This is a present-value relationship…**
  - **MFE: arbitrage, present value, option value…**

Ladies and Gentlemen, to Your iClickers: Answer II

- If D + W(1 + g) = W(1 + r), then:
  - A. W = D/r. B. W = D + gW - rW. **C. W = D/(r - g)**. D. W = D(r - g). E. None of the above

- **W = D/(r-g)**

- **W = [D/r][1/(1-(g/r))]**

Ladies and Gentlemen, to Your iClickers: Answer III

- If D + W(1 + g) = W(1 + r), then:
  - A. W = D/r. B. W = D + gW - rW. **C. W = D/(r - g)**. D. W = D(r - g). E. None of the above
- **W = D/(r-g)**
- **W = [D/r][1/(1-(g/r))]**
- 1/(1-x)
- 1 + x/(1-x)
- 1+ x + x^2/(1-x)
- …
- 1 + x + x^2 + x^3 + x^4 + x^5 + x^6 + x^7 + x^8 + x^9 +…

Ladies and Gentlemen, to Your iClickers: Answer IV

- If D + W(1 + g) = W(1 + r), then:
  - A. W = D/r. B. W = D + gW - rW. **C. W = D/(r - g)**. D. W = D(r - g). E. None of the above

- **W = D/(r-g)**
- **W = [D/r][1/(1-(g/r))]**
- **W = [D/r][1 + g/r] = D/r + Dg/r^2**

Foreign-Exchange Market

- In foreign currency markets:
  - Borrow to invest in dollars and earn r - r* per unit invested over the next year
  - Run the risk that there is a chance ϕ that the dollar will fall back to its fundamental value in the next year and you will lose ε-ε*
  - Another arbitrage relationship:
    - Stay where you are (and run no risks but earn no premium returns)
    - Or have expected value: (r - r*) - ϕ(ε-ε*)

Ladies and Gentlemen, to Your iClickers

- In foreign currency markets: (i) Stay where you are (and run no risks but earn no premium returns). (ii) Have expected value: $(r - r^*) - \phi(\varepsilon-\varepsilon^*)$. What will ε be?

  - A. $\varepsilon = \varepsilon^* - (r - r^*)\phi$
  - B. $\varepsilon = \varepsilon^* + (r - r^*)/\phi$
  - C. $\varepsilon = \varepsilon^* - (r - r^*)/\phi$
  - D. None of the above
  - E. You cannot determine it from the information given

Ladies and Gentlemen, to Your iClickers: Answer

- In foreign currency markets: (i) Stay where you are (and run no risks but earn no premium returns). (ii) Have expected value: $(r - r^*) - \phi(\varepsilon-\varepsilon^*)$. What will ε be?

  - A. $\varepsilon = \varepsilon^* - (r - r^*)\phi$. **B. $\varepsilon = \varepsilon^* + (r - r^*)/\phi$.** C. $\varepsilon = \varepsilon^* - (r - r^*)/\phi$. D. None of the above. E. You cannot determine it from the information given.

- **I am looking for (B)…**

Investment and Interest Rates

- Build a factory at cost K and earn profits Pr
- Choice: (i) Build a factory this year; (ii) Keep hold of your cash and invest in risky bonds paying r
- Options:
  - Build a factory: Pr + K
  - Invest in bonds: K(1 + r)

Investment and Interest Rates II

- What will business investment committees do when faced with this choice: build a factory and get Pr + K or invest in bonds and get K(1 + r)?

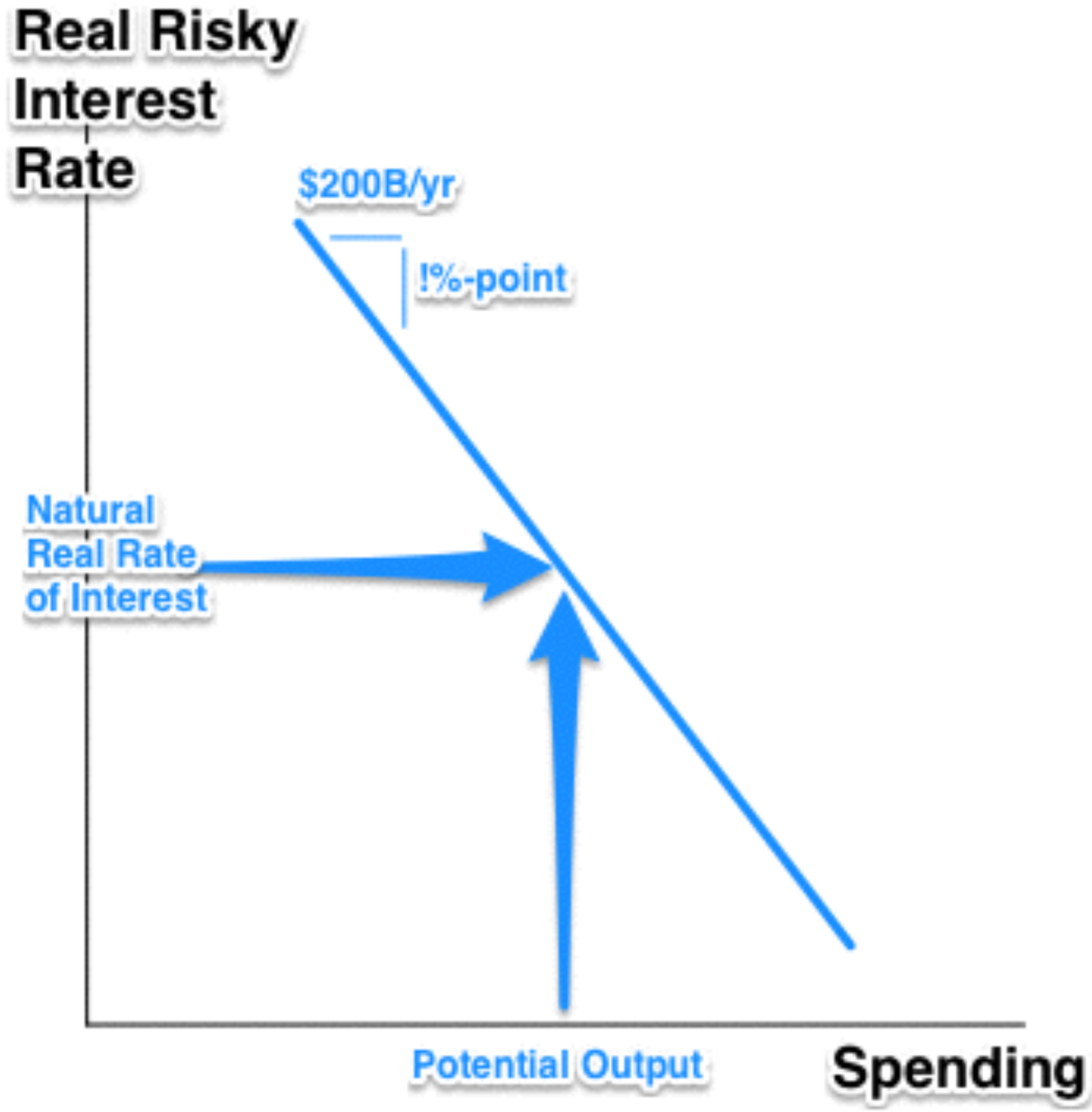
- Another arbitrage argument:
  - Factory is better if Pr/K > r
- Many different factory projects. The lower is r, the more of them look worthwhile

Interest Rates, Wealth, Exchange Rates, Exports, Business Investment and Spending

- Rule of thumb: in the U.S. today, boost the (risky) real interest rate r by 1%-point…
  - And reduce exports by $50 billion/year
  - And reduce household consumption spending by $50 billion/year
  - And reduce business investment spending by $200 billion/year

Interest Rates, Wealth, Exchange Rates, Exports, Business Investment and Spending

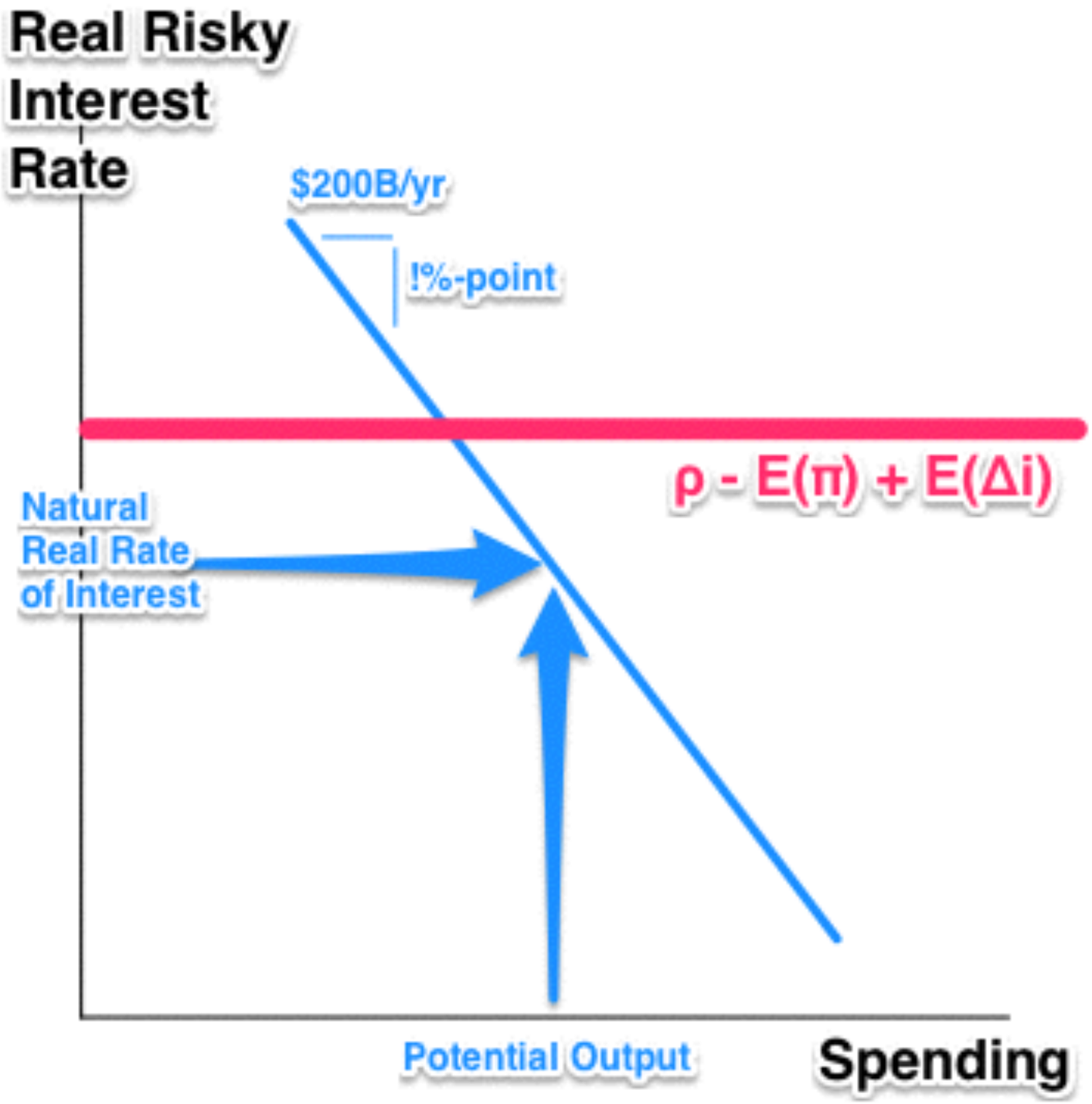
- The “Investment-Savings” Curve
  - Slope = -$200B/yr/%-pt
  - The “natural real” risky rate of interest
    - Full employment/potential output
    - Quantity of money at which people are happy holding the cash there is at full employment
    - Spending = Income at full employment



Liquidity Trap

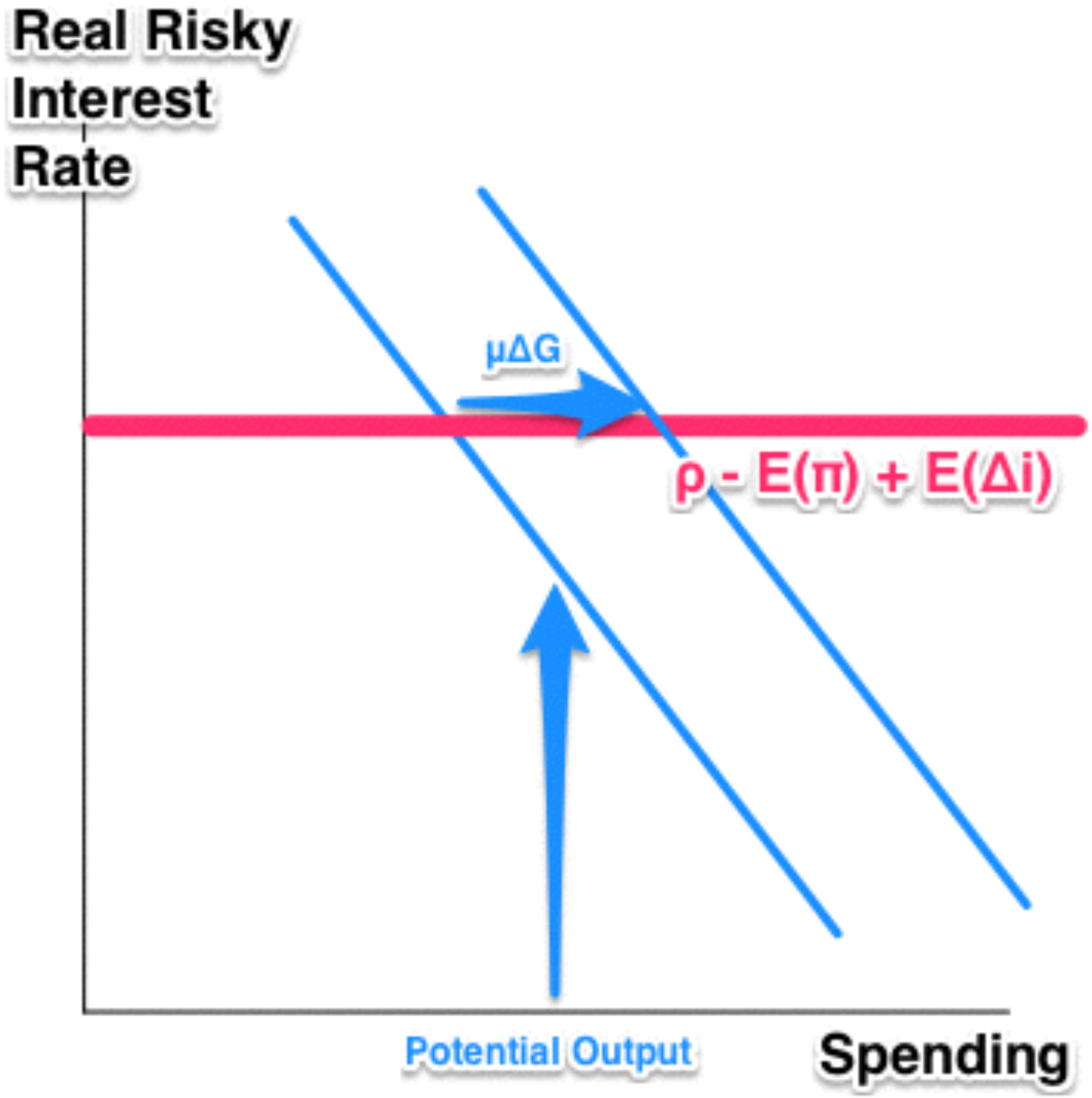
- The "Investment-Savings" Curve gone wrong:

- The Federal Reserve finds that it cannot push the real risky interest rate r low enough to generate full employment



But in a Liquidity Trap You Could Still Boost G

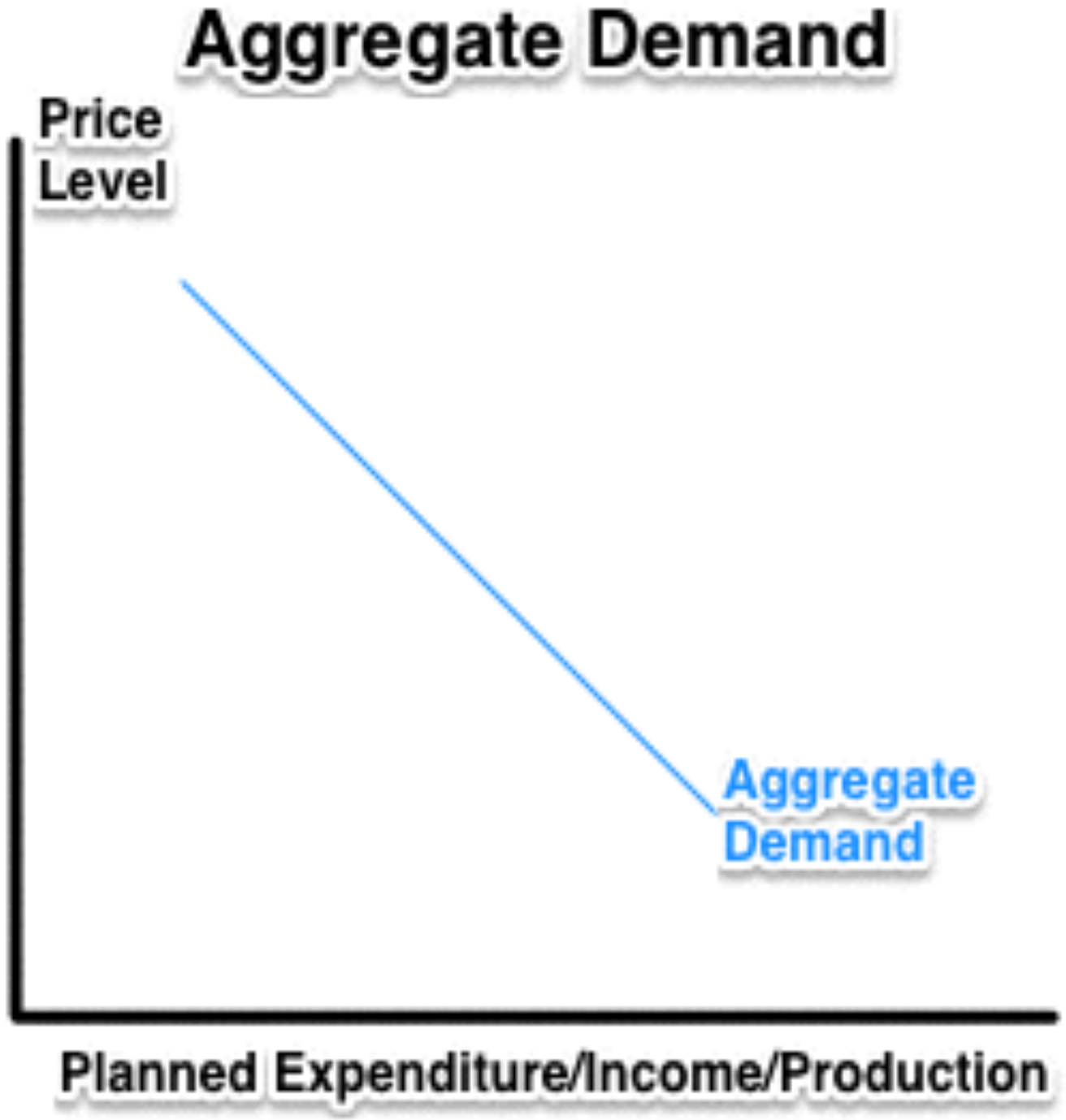
- The "Investment-Savings" Curve gone wrong:
  - Monetary policy is ineffective, but not so for fiscal policy
  - Or you could find some way to lower the interest rate floor…



Aggregate Demand

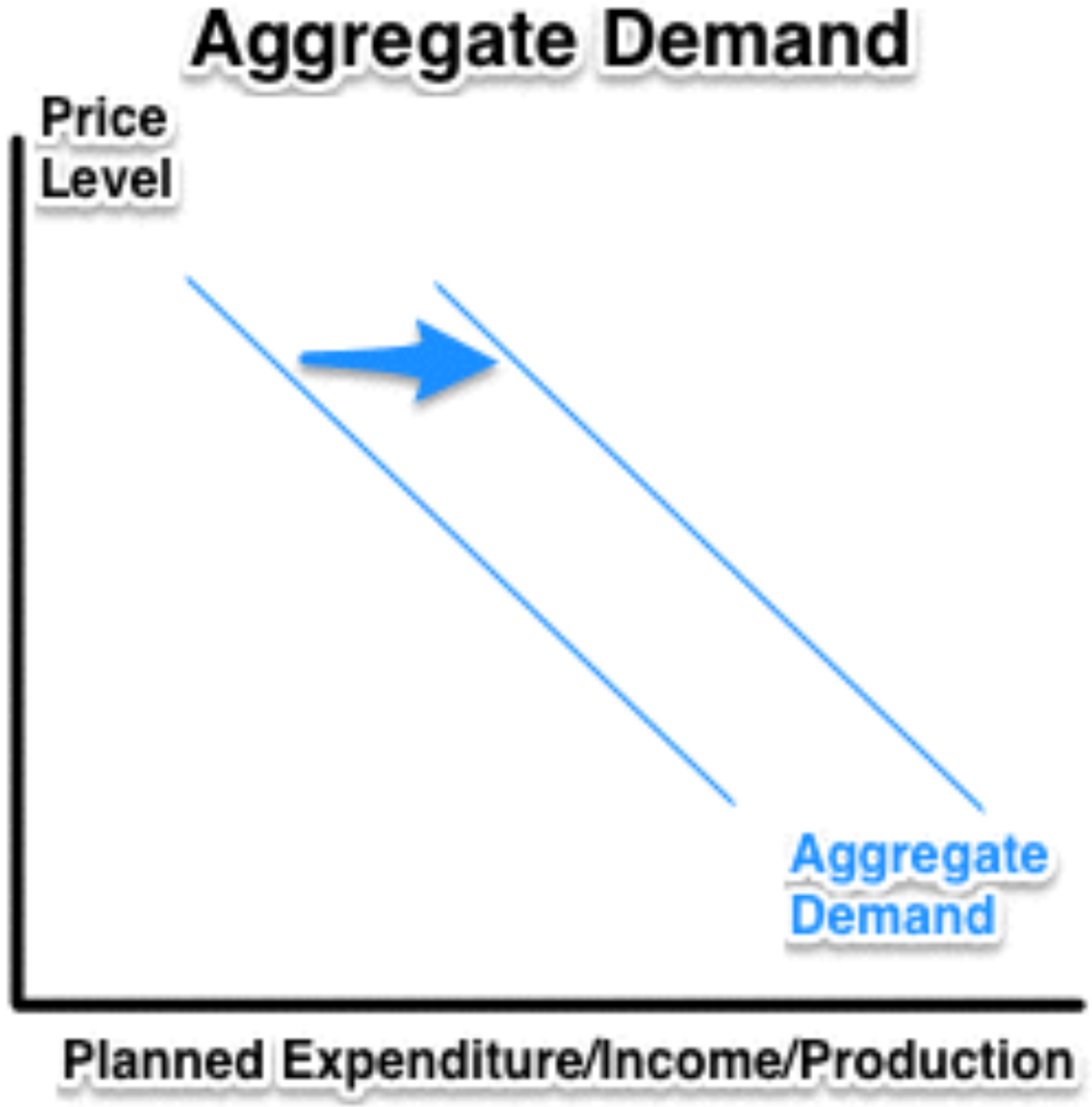
- The economy in macroeconomic equilibrium with E = Y

- Your spending buys more stuff…



What Moves Output?

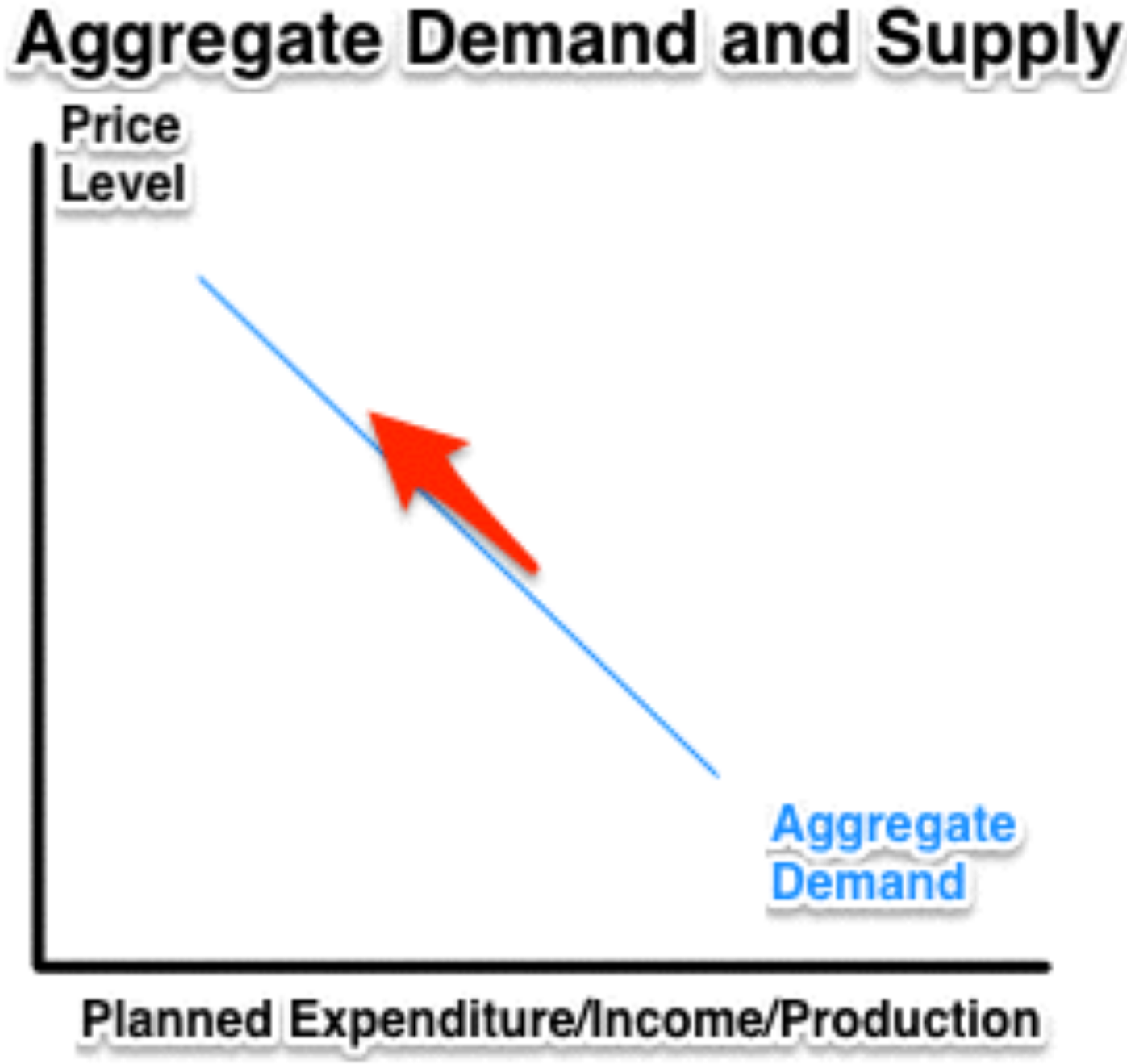
- The economy in equilibrium:
  - $E = \mu[c_0 + (G - c_yT) + (c_wW + I + X)(r)]$
- Shifting the aggregate demand curve out:
  - monetary policy that reduces r
  - Fiscal policy that increases G/cuts T
  - Changes in private-sector spending propensities
- Shifting the aggregate demand curve in…



What Moves Output? II

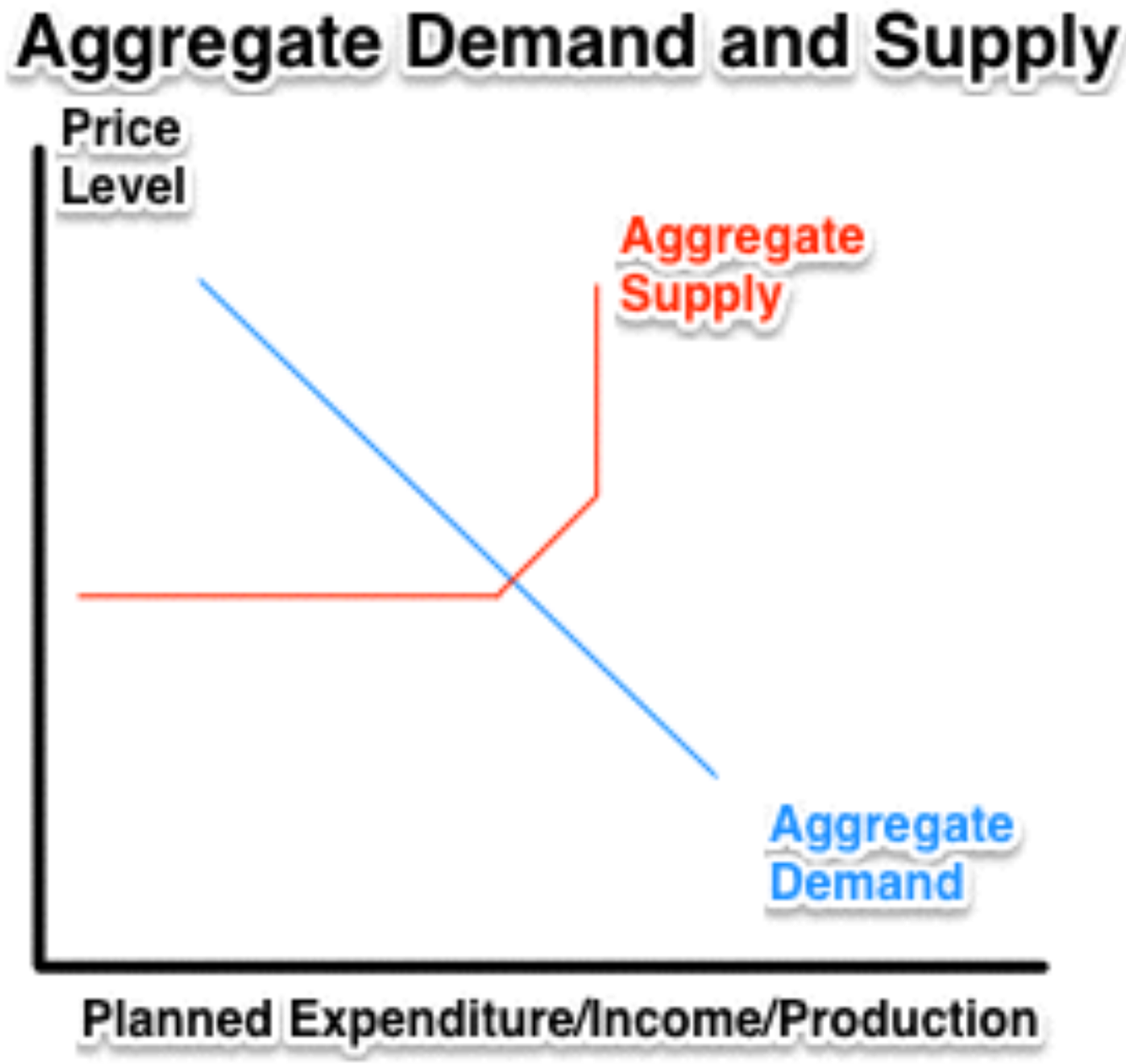
- Movements along the aggregate demand curve

- Supply shocks



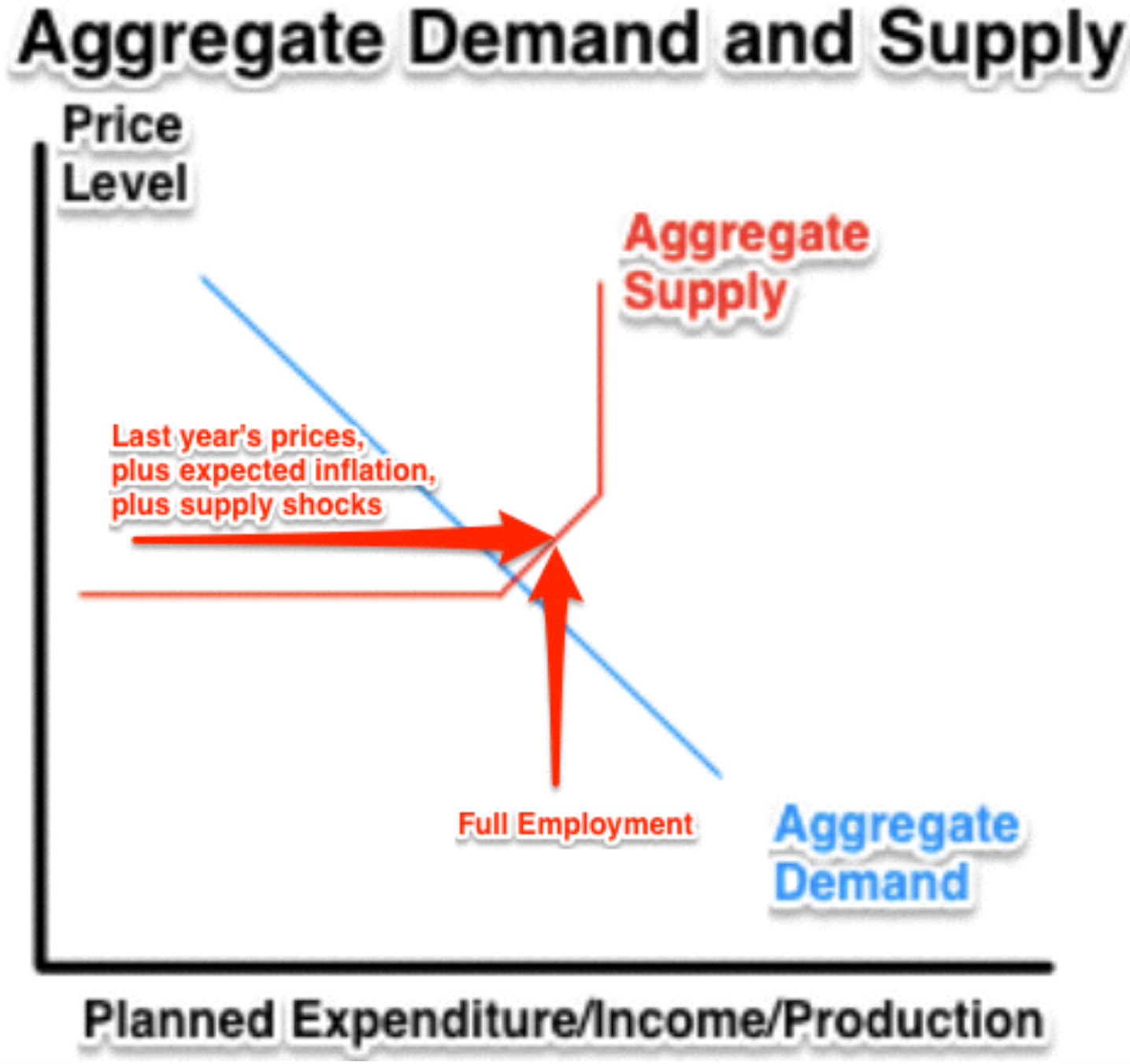
Our Aggregate Supply Curve

- Three regions:
  - A long, flat region—people really do not like their wages cut
  - An upward-sloping region
  - And a region in which the economy is already working flat-out



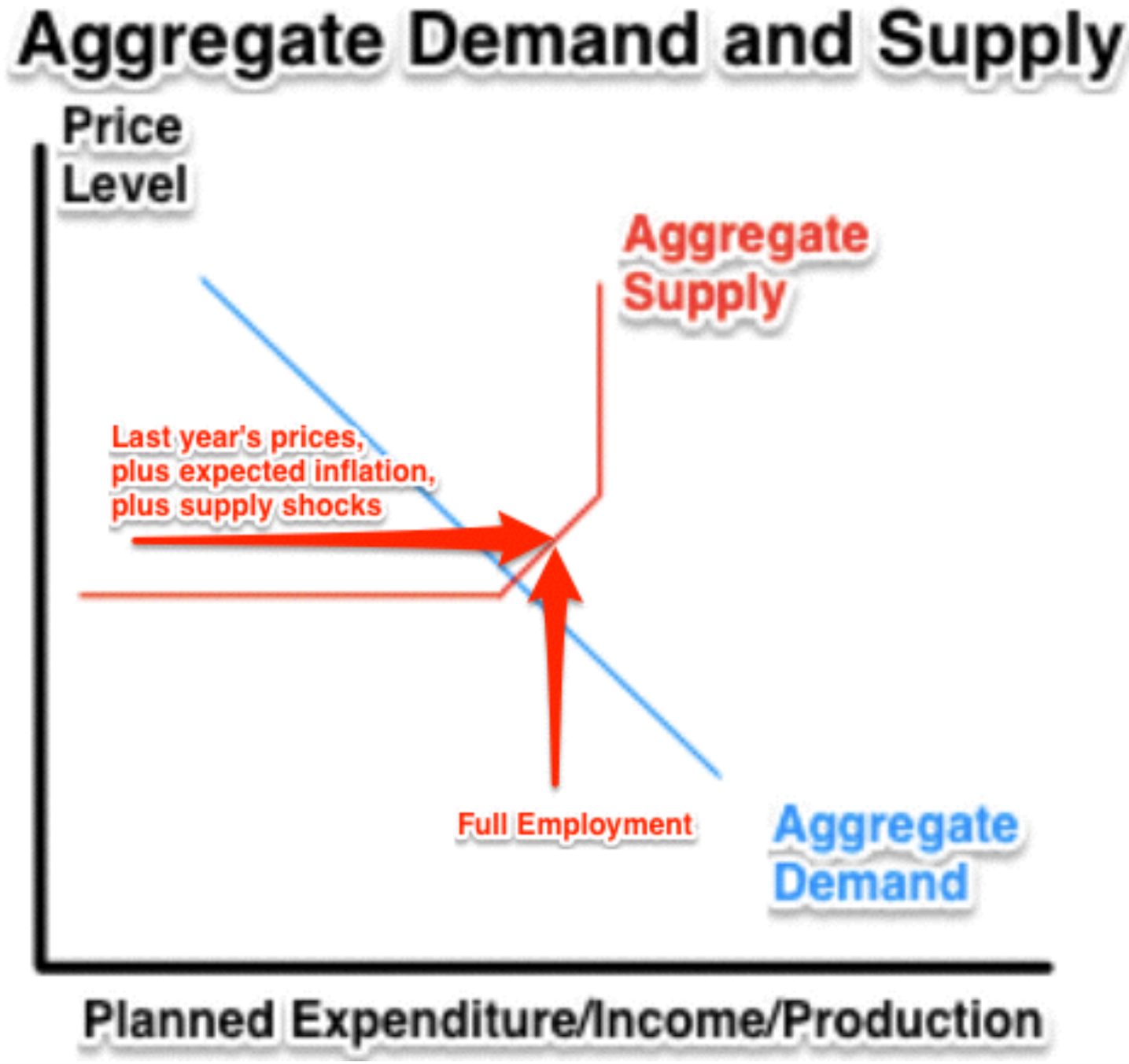
Our Aggregate Supply Curve II

- Where is the aggregate supply curve?
  - Full employment
  - Last year's prices
  - Expected inflation



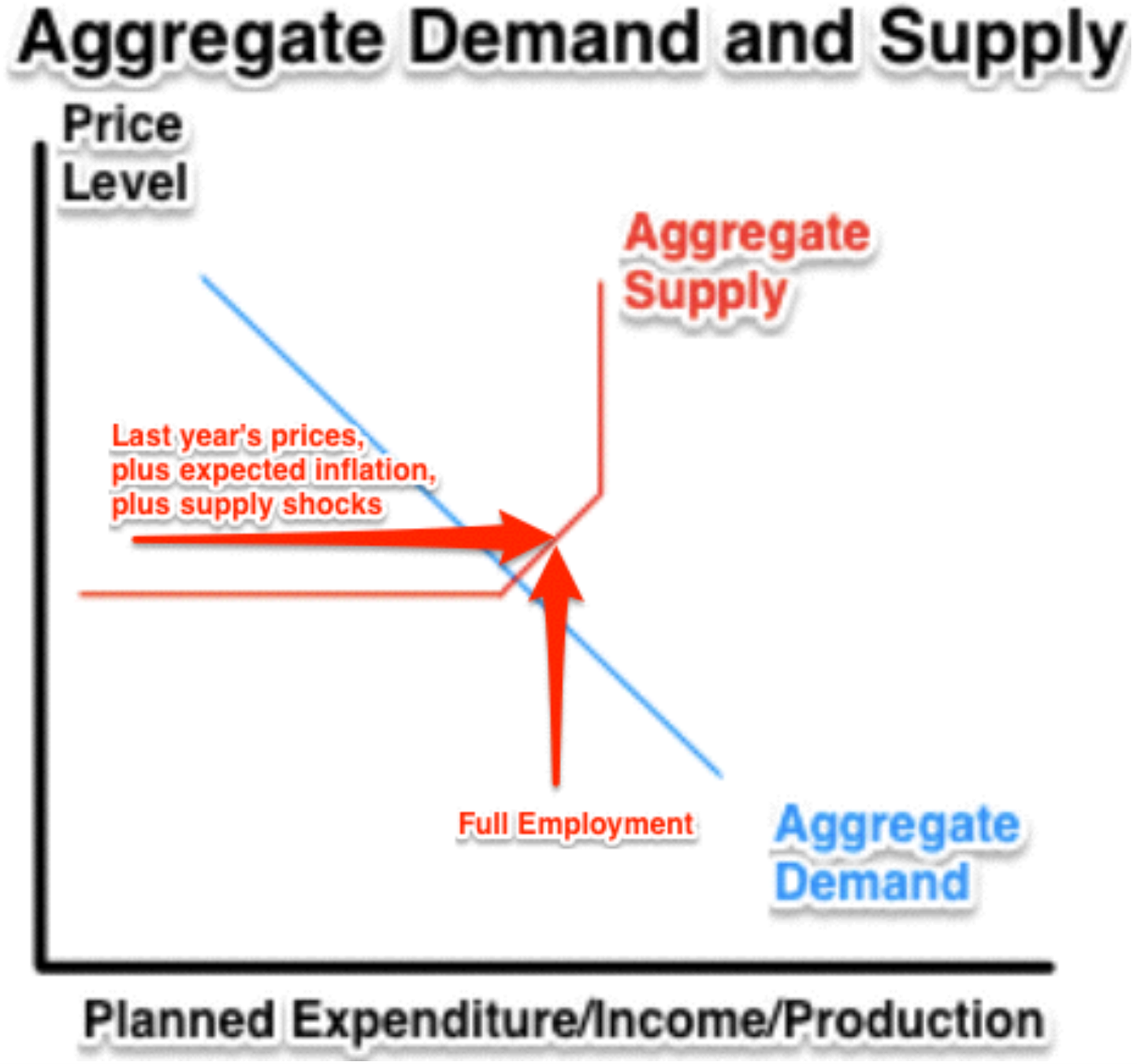
Our Aggregate Supply Curve III

- Where is the aggregate supply curve?
  - Full employment
  - Last year's prices
  - Expected inflation



The Evolution of Aggregate Supply

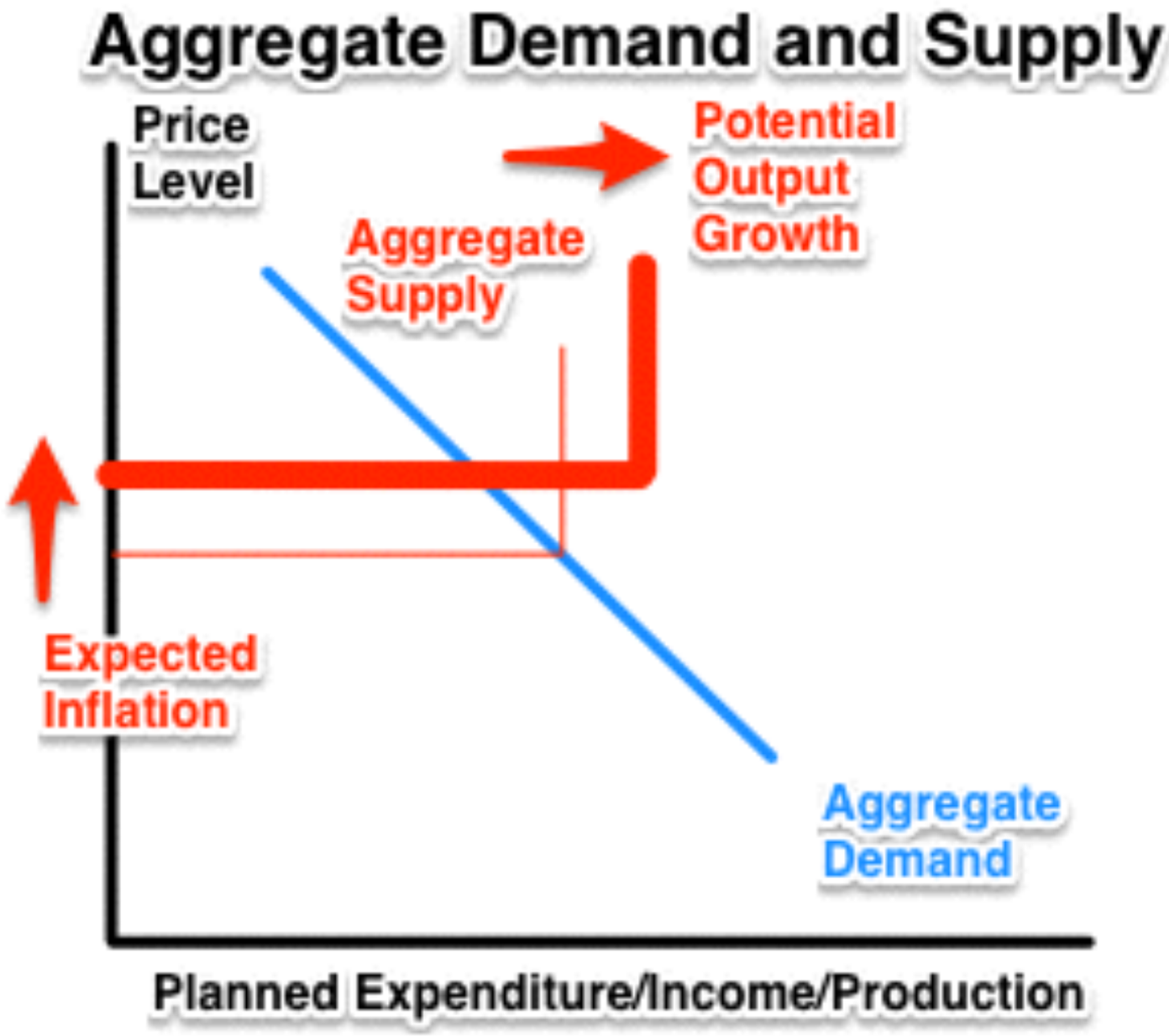
- Start from last year's situation…



The Evolution of Aggregate Supply II

- Start from last year's situation…

- Add on:
  - Expected inflation
  - Supply shocks (if any)
  - Growth in potential output



Determinants of Shifting Aggregate Supply

- Where do “supply shocks” come from?
- What determines expected inflation?
- What determines the growth of potential output?

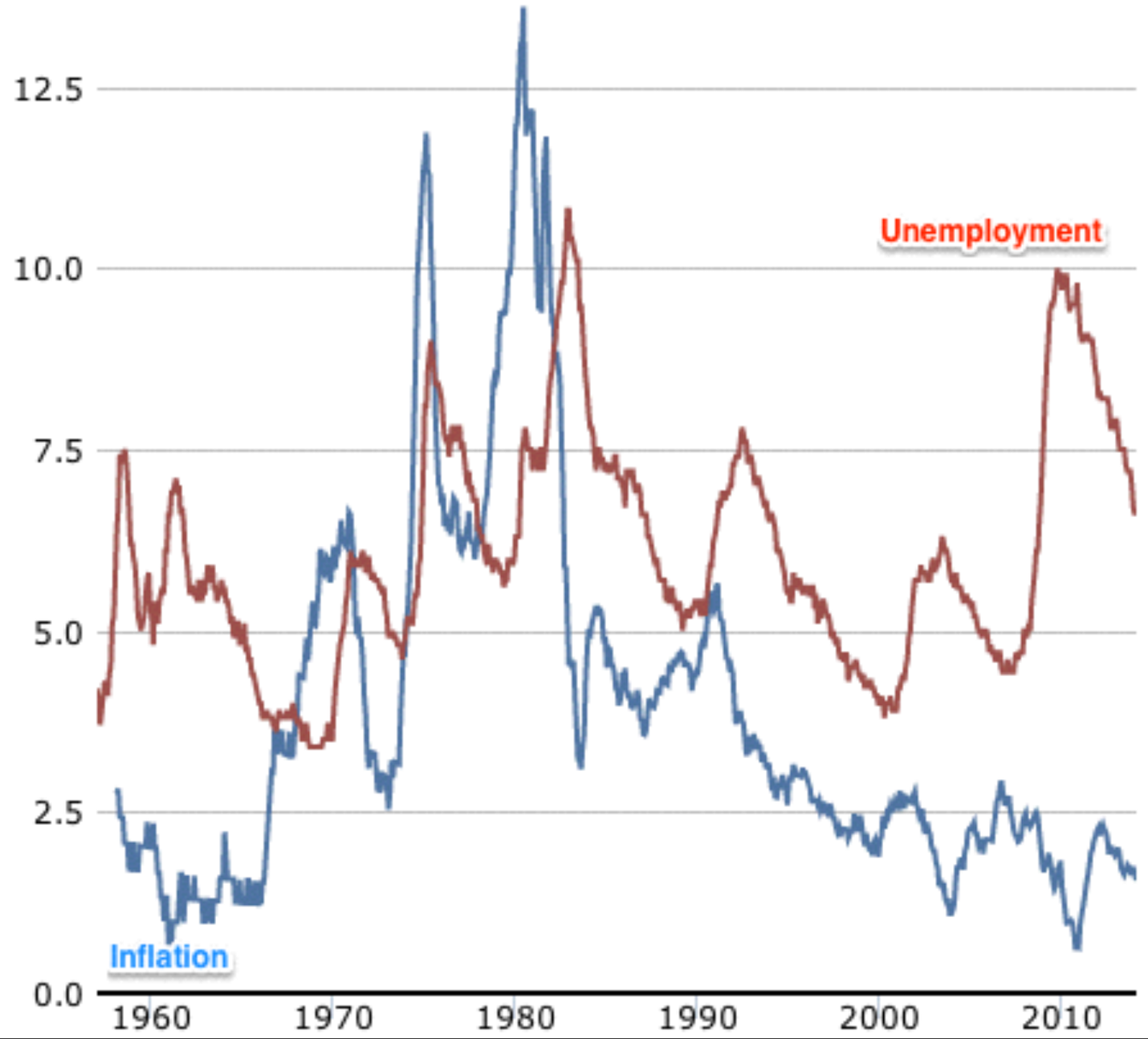
Determinants of Shifting Aggregate Supply II

- Where do “supply shocks” come from?
    - Middle-Eastern wars, mostly
- What determines expected inflation?
    - Static
    - Adaptive
    - “Rational”
- What determines the growth of potential output?
    - Investment
    - Technological progress
    - Other shifts in economic efficiency

The Phillips Curve

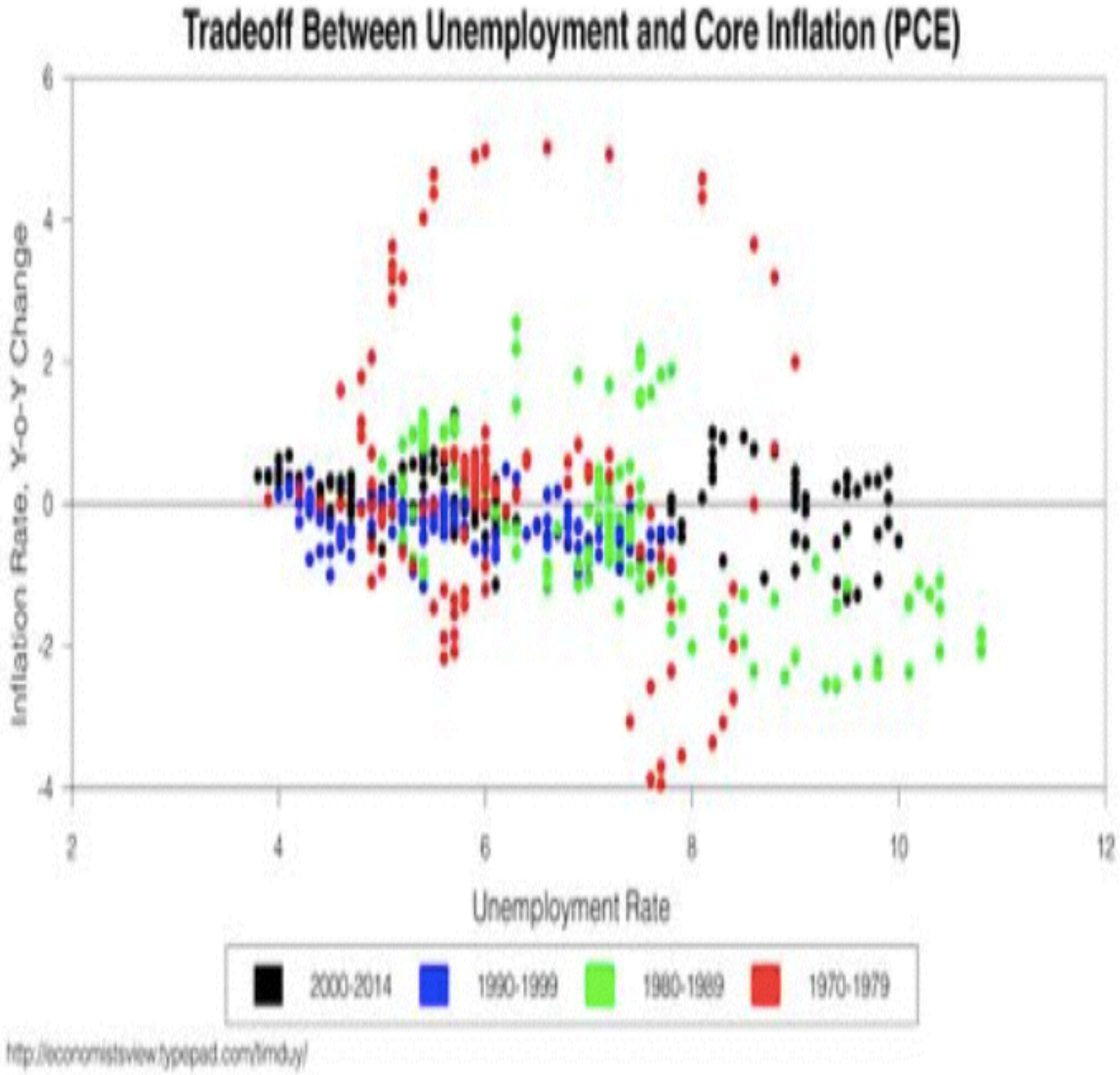
- When unemployment is high AD is to the left —and we should see inflation less than expected inflation plus supply shocks

- When unemployment is low AD is to the right—and we should see inflation less than expected inflation plus supply shocks



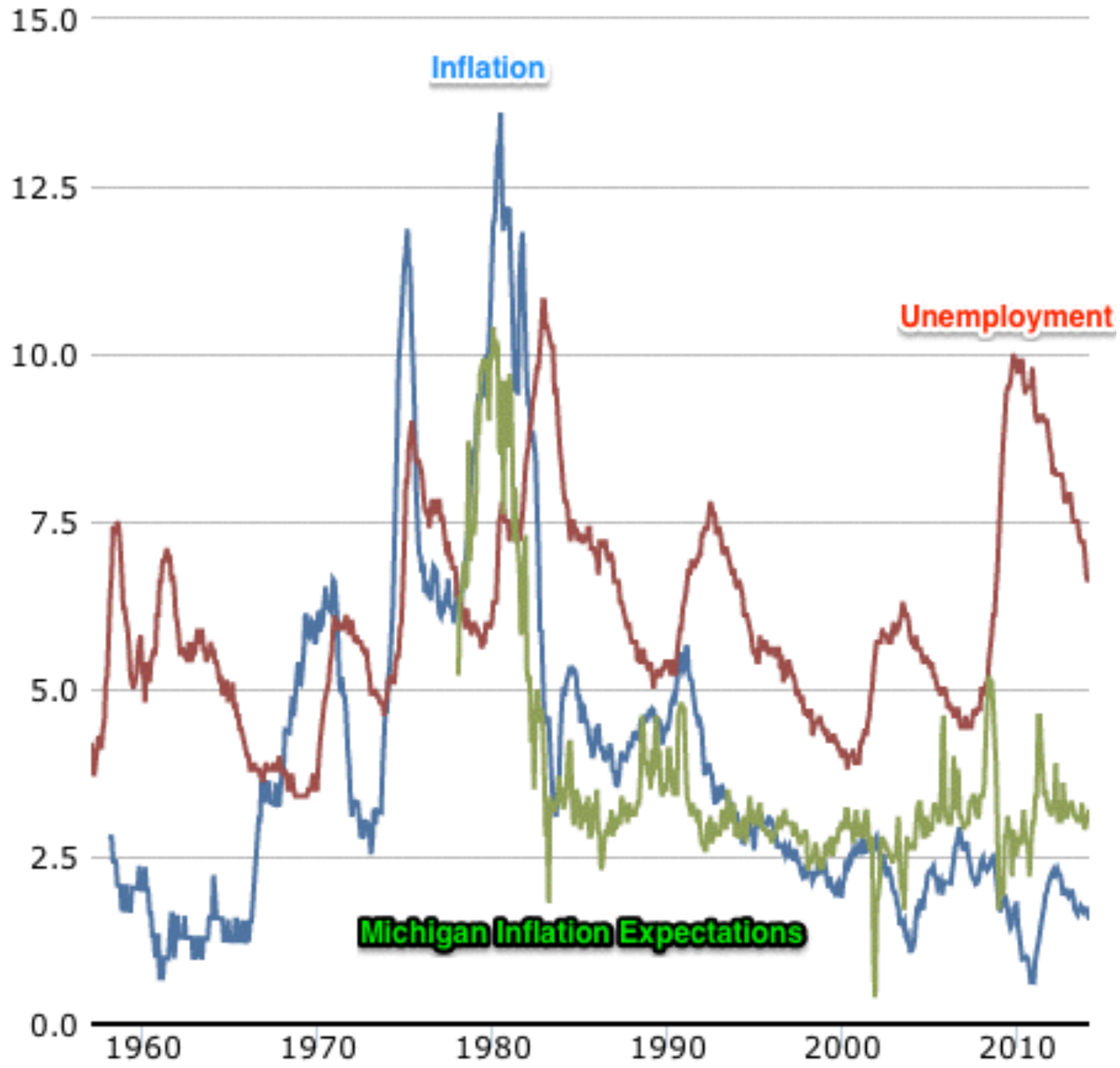
The Phillips Curve II

- Since 2000 (black) there has been very little change in inflation
- In the 1990s periods of unemployment < 5% see inflation creep up; periods of unemployment > 7% see inflation ebb
- In the 1980s (green) we see substantial deceleration of inflation when unemployment > 7%
- The 1970s (red) are all over the place



The Phillips Curve III

- What determines inflation "expectations"?
  - What's just happened to gasoline prices
  - Higher-than-expected inflation raises expectations
  - Falling inflation/high unemployment tends to lower them…



Okun's Law

- Production (relative to the full-employment "potential output" level)
- Unemployment (relative to the natural rate)
- A 2-to-1 relationship