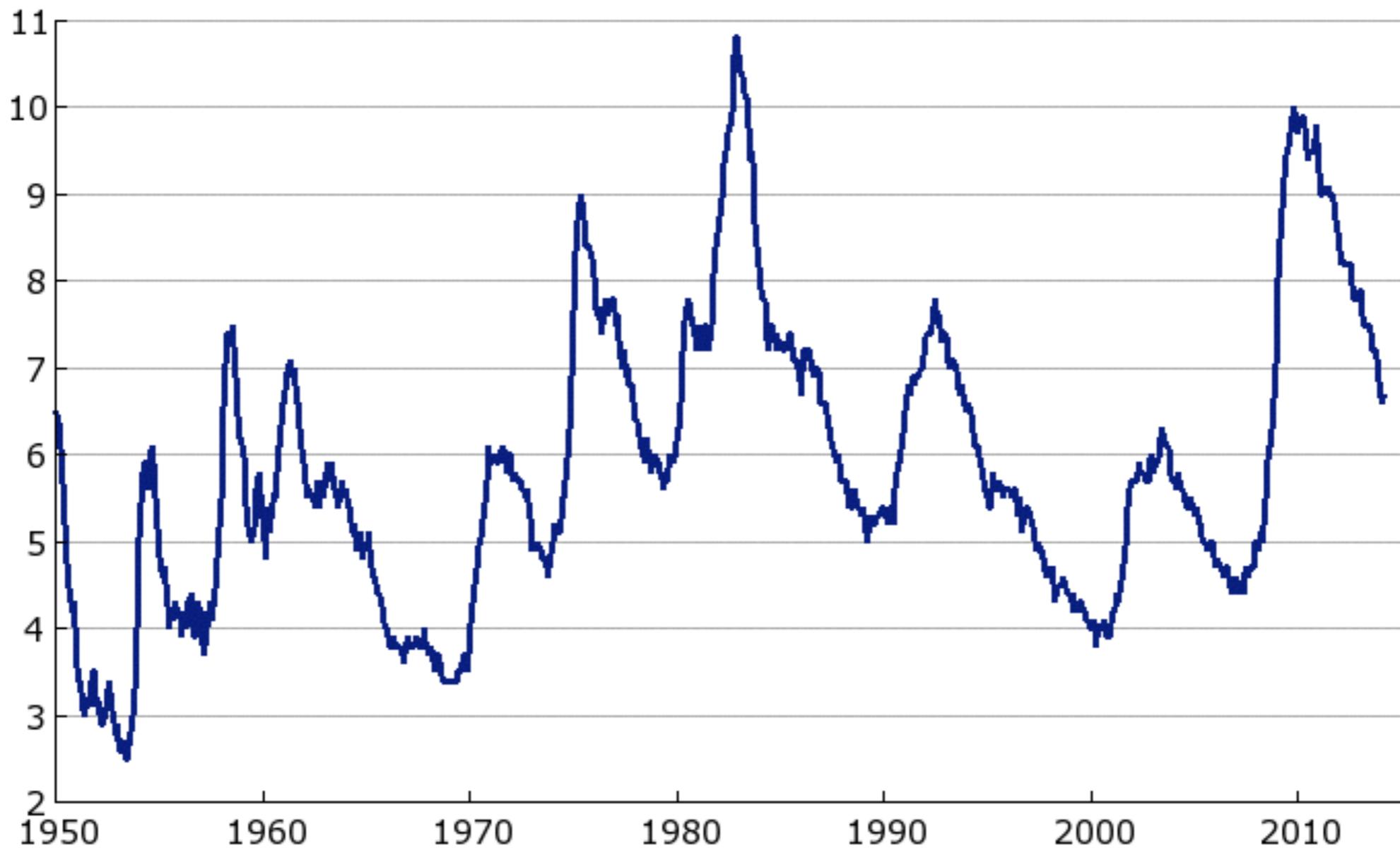Principles of Economics
Macroeconomics
Summing Up the Income-Expenditure Framework

J. Bradford DeLong
U.C. Berkeley

The "Business Cycle": Unemployment

Unemployment Rate

The "Business Cycle": Real GDP

Why the Business Cycle?

- None of these:

    - A "Great Forgetting"? (Edward Prescott)

    - A "Great Vacation"? (Casey Mulligan)

    - A "Great Rusting"?

    - A "Great Exhaustion" (of Resources, That Is)?

    - A "Great Cautioning"?

    - A "Great Overtaxing"?

    - A "Great Unionizing"?

Ladies and Gentlemen, to Your iClickers!

- Why do we have a "business cycle"?

  - A. When people in aggregate suddenly want to hold more cash, and when the Federal Reserve fails to supply that extra cash, cash money is in request, all other commodities are in disrepute, and there is a general glut, in which there is an excess supply of pretty much everything

  - B. When planned expenditure falls short of projected income in the economy, income, production, and employment all fall

  - C. When people think that they are too highly leveraged, and so when pretty much everybody in the economy wants to pay down their debts and make loans but next to nobody wants to take out loans or increase their debts, income, production, and employment all fine

  - D. All of the above.

  - E. There cannot be a demand-driven business cycle because Jean-Baptiste Say proved back in 1803 that supply creates its own demand

Ladies and Gentlemen, to Your iClickers!: Answer

- Why do we have a "business cycle"?

  - A. When people in aggregate suddenly want to hold more cash, and when the Federal Reserve fails to supply that extra cash, cash money is in request, all other commodities are in disrepute, and there is a general glut, in which there is an excess supply of pretty much everything. B. When planned expenditure falls short of projected income in the economy, income, production, and employment all fall. C. When people think that they are too highly leveraged, and so when pretty much everybody in the economy wants to pay down their debts and make loans but next to nobody wants to take out loans or increase their debts, income, production, and employment all fine. **D. All of the above..** E. There cannot be a demand-driven business cycle because Jean-Baptiste Say proved back in 1803 that supply creates its own demand

John Stuart Mill's 1829 Insight

- John Stuart Mill:

  - Those who have... affirmed that there was an excess of all commodities, never pretended that money was one.... Persons in general, at that particular time… liked better to possess money than any other commodity. Money, consequently, was in request, and all other commodities were in comparative disrepute….

  - The result is, that all [non-money] commodities… become unsaleable.... [A]s there may be a temporary excess of any one article considered separately, so may there of commodities generally, not in consequence of over-production, but of a want of commercial confidence…

- When people want to build up their money balances so that planned expenditure E is less than projected income Y, income (and production, and employment) fall

- When people want to drawdown their money balances so that planned expenditure E is greater than projected income Y, income (and production, and employment) rise

Why an Excess Demand for Money?

- You can tell something by looking at interest rates…

  - When there is a *shortage of cash prope*r, people are trying to sell everything else they have to raise cash—and so bond prices are low, which means interest rates are high

  - When there is a *shortage of assets perceived as safe*, people are holding cash because it is a safe place to store your wealth—and so *risky* bond prices are low, which means *risky* interest rates are high, but other safe assets than cash like government bonds will be highly prized too, which means safe interest rates will be low.

  - When there is a *shortage of investment opportunities,* all bonds will be highly prized, so all interest rates will be low—but stock prices will be low too because people are skeptical of future government profits

Ladies and Gentlemen, to Your iClickers

- If only wages were flexible downward—if only the price of money in terms of labor could rise rapidly when there is an excess demand for money—we wouldn't have a business cycle. True or false?

  - A. False: the key problem in a downturn is always a lack of trust and confidence, not a shortage of purchasing power in the form of cash which could be fixed by a general decline in wages and prices

  - B. True: it is the psychological fact that people really hate being dissed by having their wages cut that is the root cause of the business cycle.

  - C. False: if wages in money were to fall sharply, prices would fall too, and businesses with fixed nominal debts would go bankrupt in large numbers, pushing planned expenditure down even more.

  - D. True: it is only with the coming of unions that imposed wage rigidity on the economy that the business cycle started.

  - E. None of the above

Ladies and Gentlemen, to Your iClickers: Answer

- If only wages were flexible downward—if only the price of money in terms of labor could rise rapidly when there is an excess demand for money—we wouldn't have a business cycle. True or false?

  - A. False: the key problem in a downturn is always a lack of trust and confidence, not a shortage of purchasing power in the form of cash which could be fixed by a general decline in wages and prices. B. True: it is the psychological fact that people really hate being dissed by having their wages cut that is the root cause of the business cycle. **C. False: if wages in money were to fall sharply, prices would fall too, and businesses with fixed nominal debts would go bankrupt in large numbers, pushing planned expenditure down even more.** D. True: it is only with the coming of unions that imposed wage rigidity on the economy that the business cycle started. E. None of the above

- **(B) is Franco Modigliani (1944). (D) is von Mises and Hayek (and their modern epigones). (A) is true sometimes but not always—cf. 1982.**

Ladies and Gentlemen, to Your iClickers!

- What are the major components of planned expenditure?

  - A. Savings S, investment spending I, and the government deficit (G - T)

  - B. Consumption C, exports X, government purchases G, and investment spending I

  - C. Consumption C, savings S, and taxes T

  - D. Consumption C, taxes T, exports X, government purchases G, and investment spending I

  - E. None of the above

Ladies and Gentlemen, to Your iClickers!: Answer

- What are the major components of planned expenditure?

  - A. Savings S, investment spending I, and the government deficit (G - T). **B. Consumption C, exports X, government purchases G, and investment spending I.** C. Consumption C, savings S, and taxes T. D. Consumption C, taxes T, exports X, government purchases G, and investment spending I. E. None of the above

- **We are looking for (B): C, I, G, and X are the four components of planned expenditure**

# Ladies and Gentlemen, to Your iClickers!

- Why do we divide planned expenditure into the four components C, I, G, and X?

  - A. Because it is very hard to move workers from producing one kind of good or service to producing another, and so any disturbance to planned expenditure on any one of the four will produce a downturn

  - B. Because planned expenditure on each is determined by a different group of people acting on different motives, and so planned expenditure on each can and should be analyzed separately

  - C. Because that is the way the NIPA are set up, to make this distinction.

  - D. All of the above

  - E. None of the above

Ladies and Gentlemen, to Your iClickers!: Answer

- Why do we divide planned expenditure into the four components C, I, G, and X?

  - A. Because it is very hard to move workers from producing one kind of good or service to producing another, and so any disturbance to planned expenditure on any one of the four will produce a downturn. **B. Because planned expenditure on each is determined by a different group of people acting on different motives, and so planned expenditure on each can and should be analyzed separately.** C. Because that is the way the NIPA are set up, to make this distinction. D. All of the above. E. None of the above.

- (**A) is David Lillien, and is largely wrong. (C) is half-true—but we set up the NIPA this way for good reasons.**

Components of Spending

- Consumption spending by households

    - Sometimes consumption spending on domestically-produced goods

- Investment (spending by corporations building plant and installing equipment and purchasing inventories)

    - Sometimes we will want to distinguish between investment spending building houses and other investment spending

- Government purchases

    - Taxes and transfer payments don't count

- Exports

- These all add up to total spending E: $C + I + G + X = E$

    - Which is in equilibrium the same as total incomes or GDP Y: $E = Y$

The Real GDP Record

- Krugman and Wells talk about a "long run" or "classical" situation in which reductions in one kind of planned expenditure set in motion forces that boost another kind, and total planned expenditure is unaffected by reductions in one component
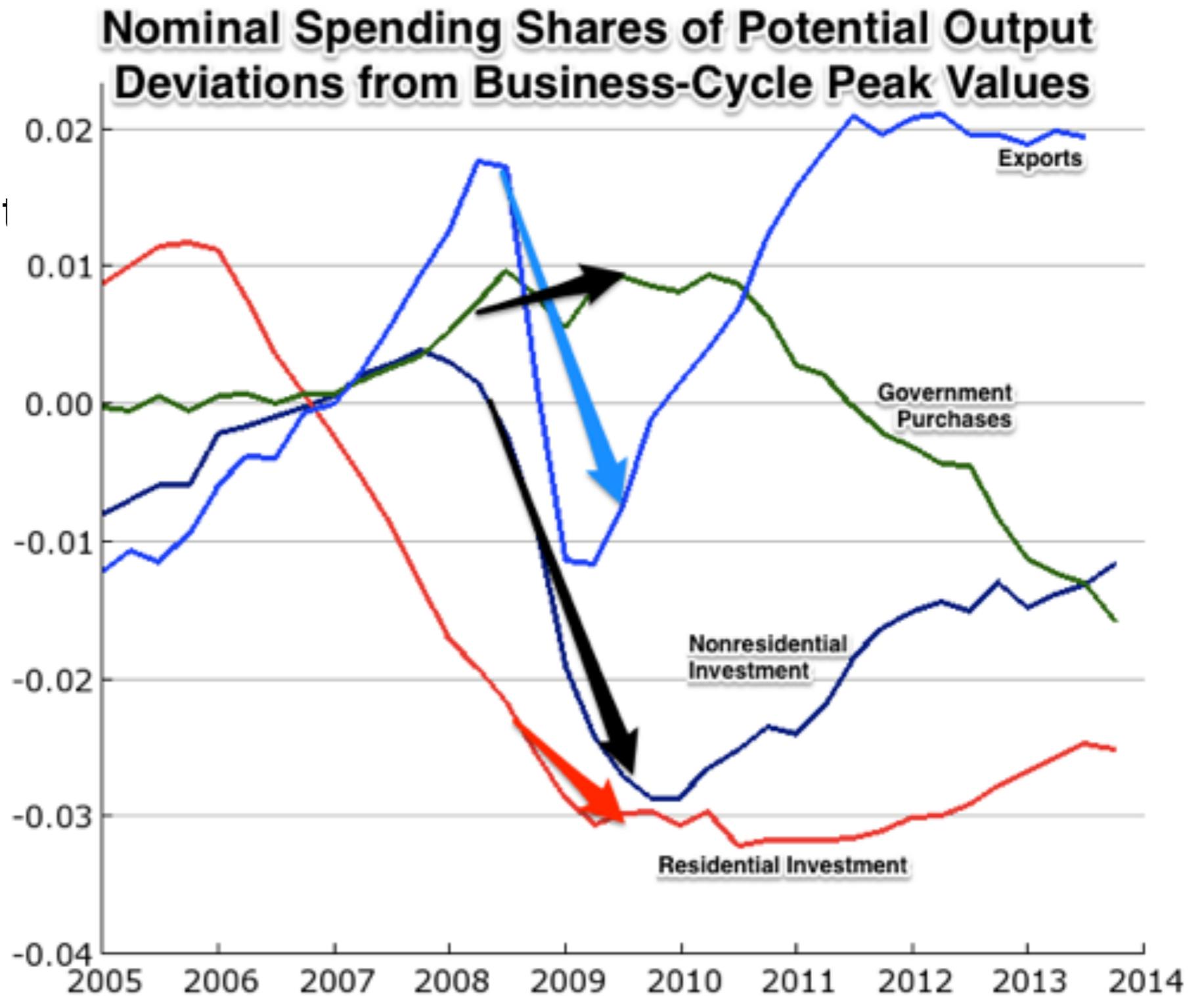- I think that this is very misleading…

Real GDP
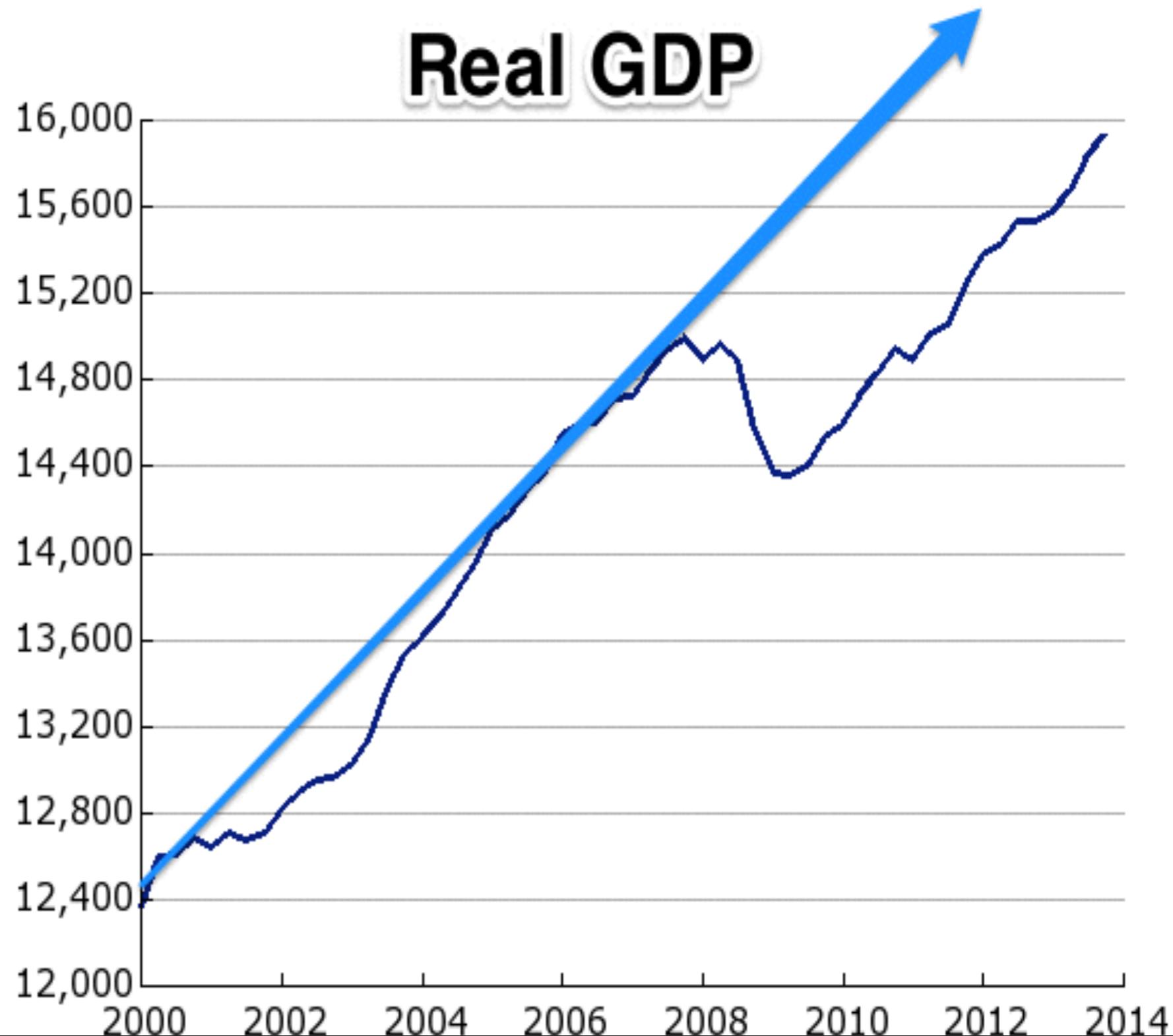
The Rebalancing

- Major components:
- +2.6%: Exports
- +0.8%: Government Purchases
- +0.5%: Nonresidential Investment
- −3.5%: Residential Investment
- **+0.4%: TOTAL**
- **People no longer want to finance housing construction, but they do want to spend their money somewhere**
- This is "short run"—it happens quickly—but it is "classical" and "full employment"
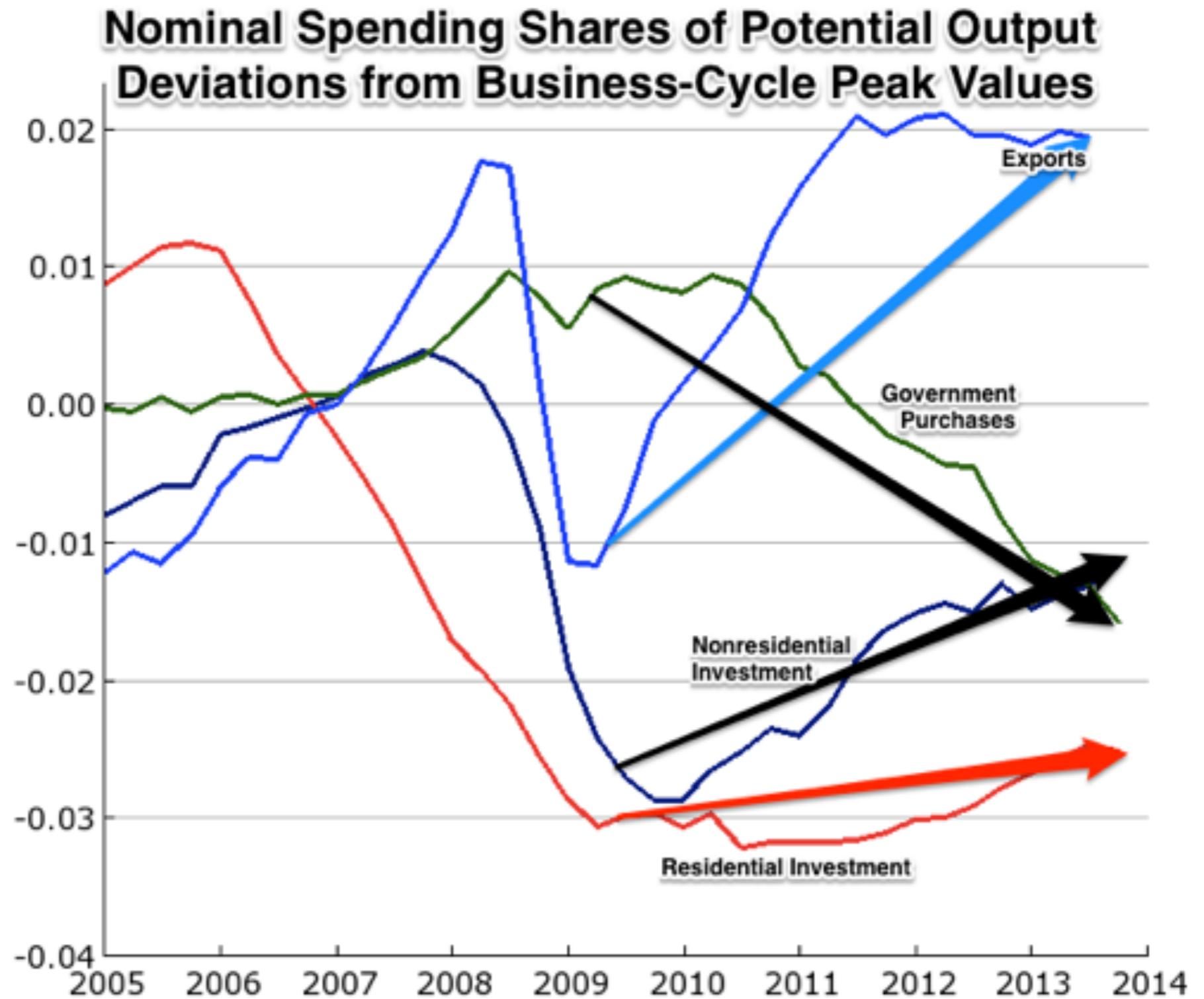

Nominal Spending Shares of Potential Output
Deviations from Business-Cycle Peak Values
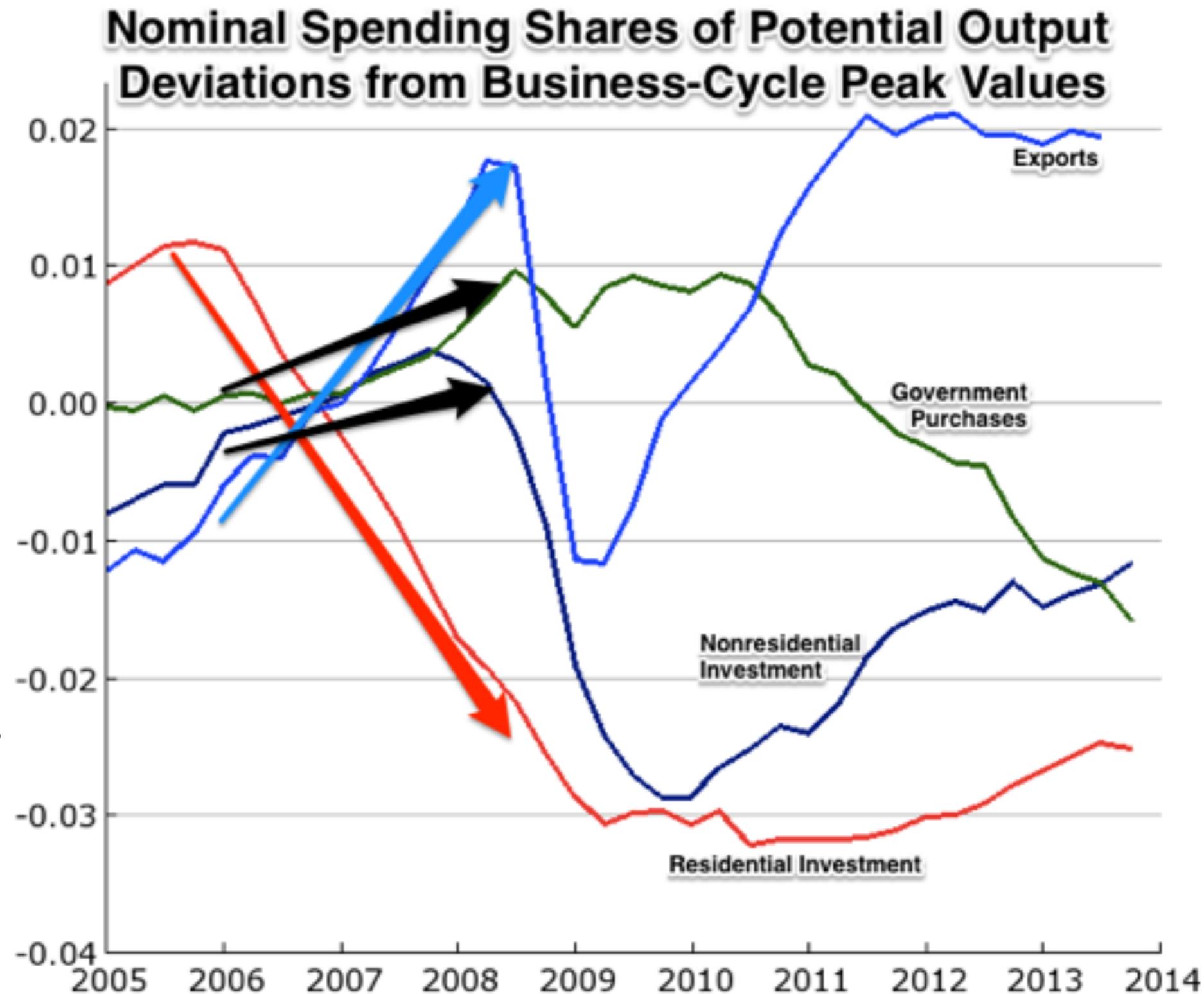
The Greater Crash

- −2.7%: Exports
- +0.3%: Government Purchases
- −2.7%: Nonresidential Investment
- −0.7%: Residential Investment
- **−5.8%: TOTAL**
- **People now want to build up their money balances…**

Nominal Spending Shares of Potential Output Deviations from Business-Cycle Peak Values

The Obama Stagnation

- +3.0%: Exports
- −2.3%: Government Purchases
- +1.7%: Nonresidential Investment
- +0.4%: Residential Investment
- +2.8%: TOTAL

Nominal Spending Shares of Potential Output Deviations from Business-Cycle Peak Values

Who Does What?

- C + I + G + X = E

  - C: households: taxes T, income Y, wealth W, expectations

  - I: businesses: real interest rates r, capacity utilitization, current profits, expected future profits

  - G: government

  - X: foreigners: exchange rate—value of home currency—ε, foreign variables

So Let's Set Up a Model…

- C + I + G + X = E :: components of aggregate demand

  - E = Y :: in equilibrium

- Components

  - $C = c_0 + c_y(Y - T) + c_w(W)$ :: households; $W = w_0 - w_r(r)$

  - $I = I_0 - I_r(r)$ :: businesses

  - G :: government (also T)

  - $X = X_0 - X_\varepsilon(\varepsilon)$ :: foreigners

    - $\varepsilon = \varepsilon_0 + \varepsilon_r(r)$

- Federal Reserve plus financial markets decide on r…

Gentlebeings, to Your iClickers!

- What tends to happen to planned expenditure E when projected income Y goes up?

  - A. It tends to rise

  - B. It tends to fall

  - C. You can't make general statements

  - D. Household consumption spending tends to rise, but government purchases tend to fall because taxes are cut.

  - E. None of the above

Gentlebeings, to Your iClickers!: Answer

- What tends to happen to planned expenditure when projected income goes up?

  - **A. It tends to rise.** B. It tends to fall. C. You can't make general statements. D. Household consumption spending tends to rise, but government purchases tend to fall because taxes are cut. E. None of the above

- **We are looking for (A)…**

Gentlebeings, to Your iClickers!

- What tends to happen to planned expenditure E when the real interest rate r goes up?

  - A. It tends to rise

  - B. It tends to fall

  - C. You can't make general statements

  - D. Investment spending tends to rise, but government purchases tend to fall because taxes are cut.

  - E. None of the above

Gentlebeings, to Your iClickers!: Answer

- What tends to happen to planned expenditure E when the real interest rate r goes up?

  - A. It tends to rise. **B. It tends to fall.** C. You can't make general statements. D. Investment spending tends to rise, but government purchases tend to fall because taxes are cut. E. None of the above

- **We are looking for (B): exports, business investment, and consumption spending channels**

Planned Expenditure as a Function of Projected Income

- $E = C + I + G + X$

  - C—determined by households: $C = c_0 + c_y(Y - T)$

- If we know other stuff (interest rates, etc.) we can determine what planned expenditure will be for each level of projected income
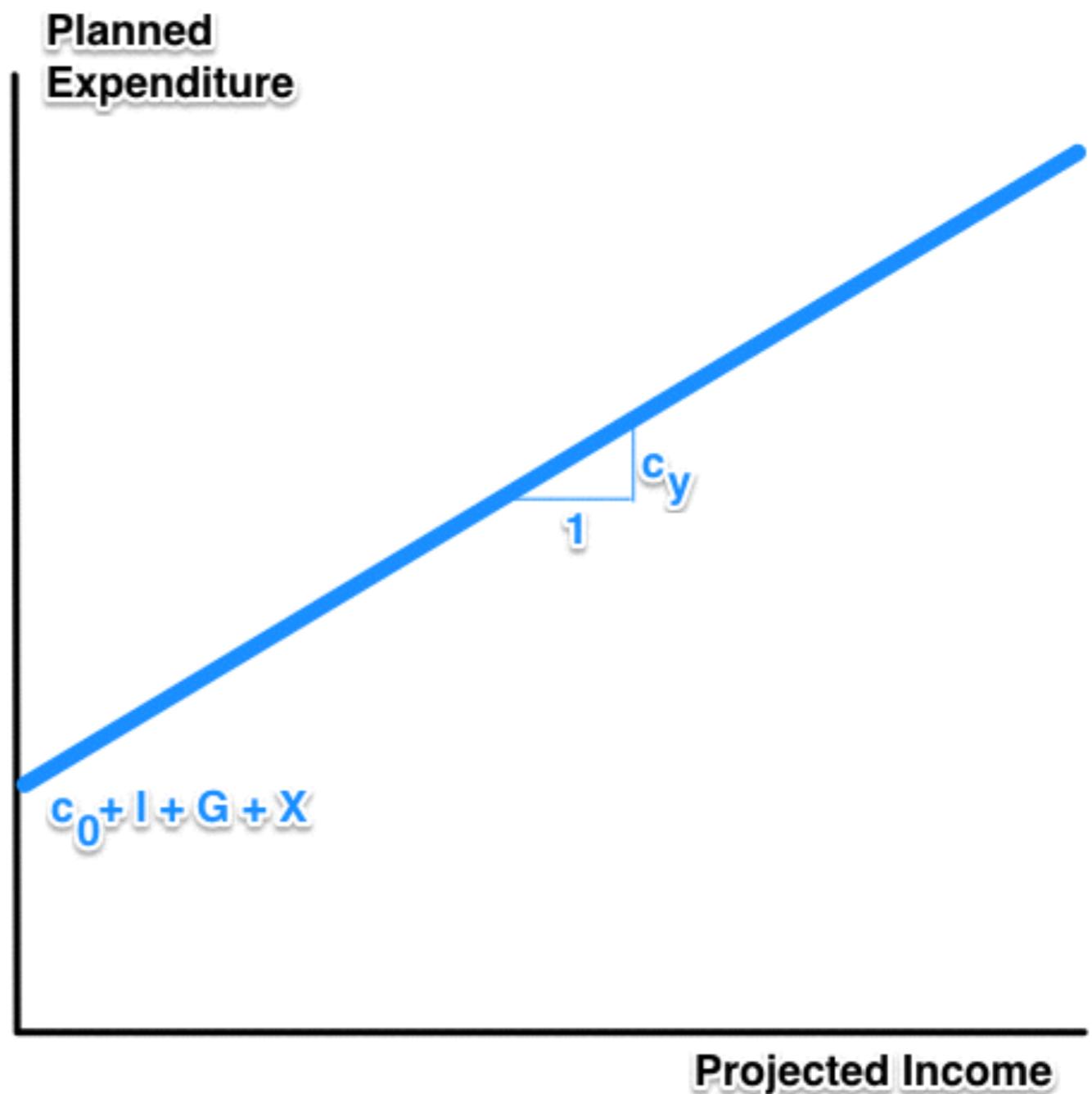
Planned Expenditure

c_y

1

$c_0 + I + G + X$

Projected Income
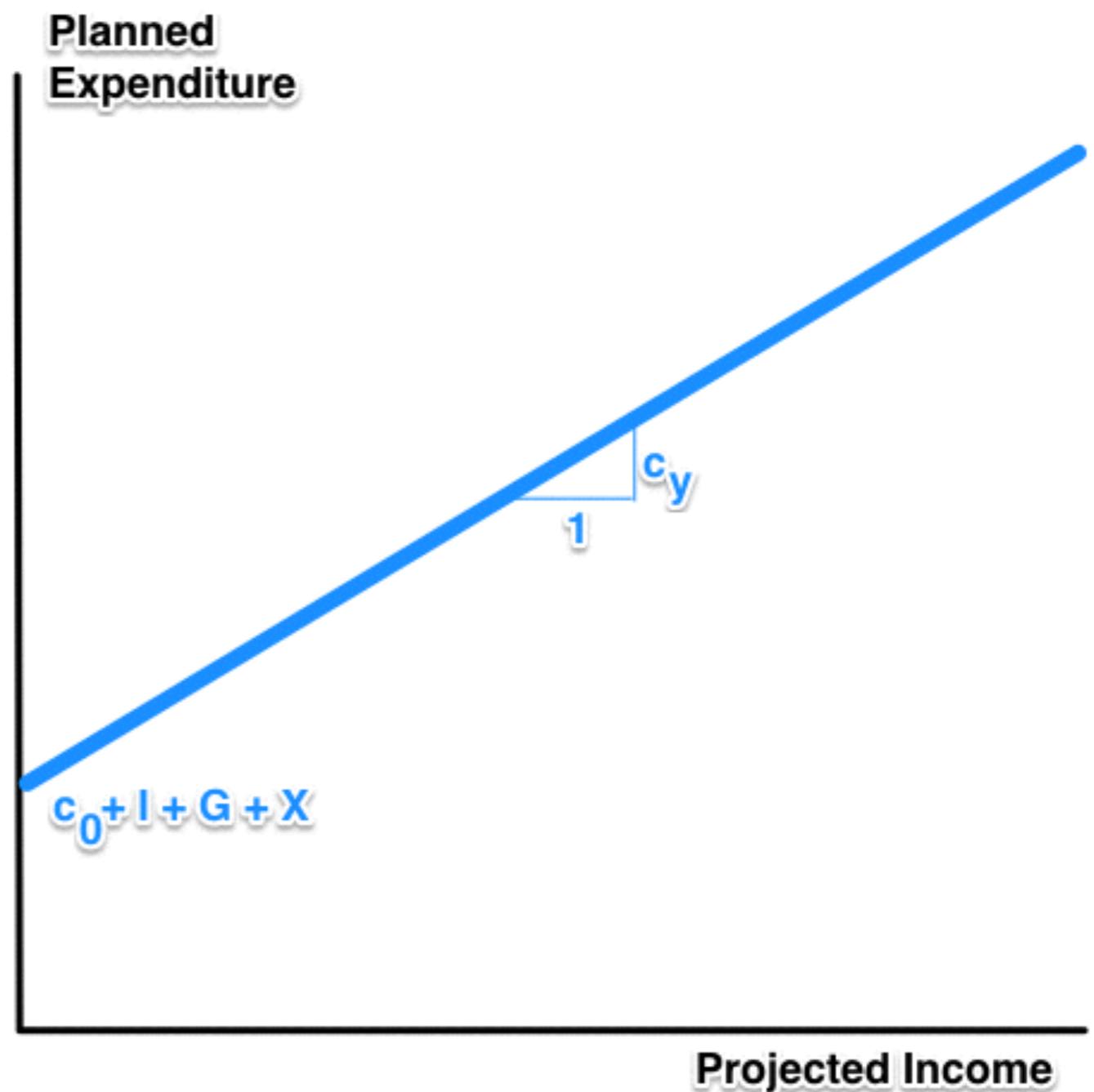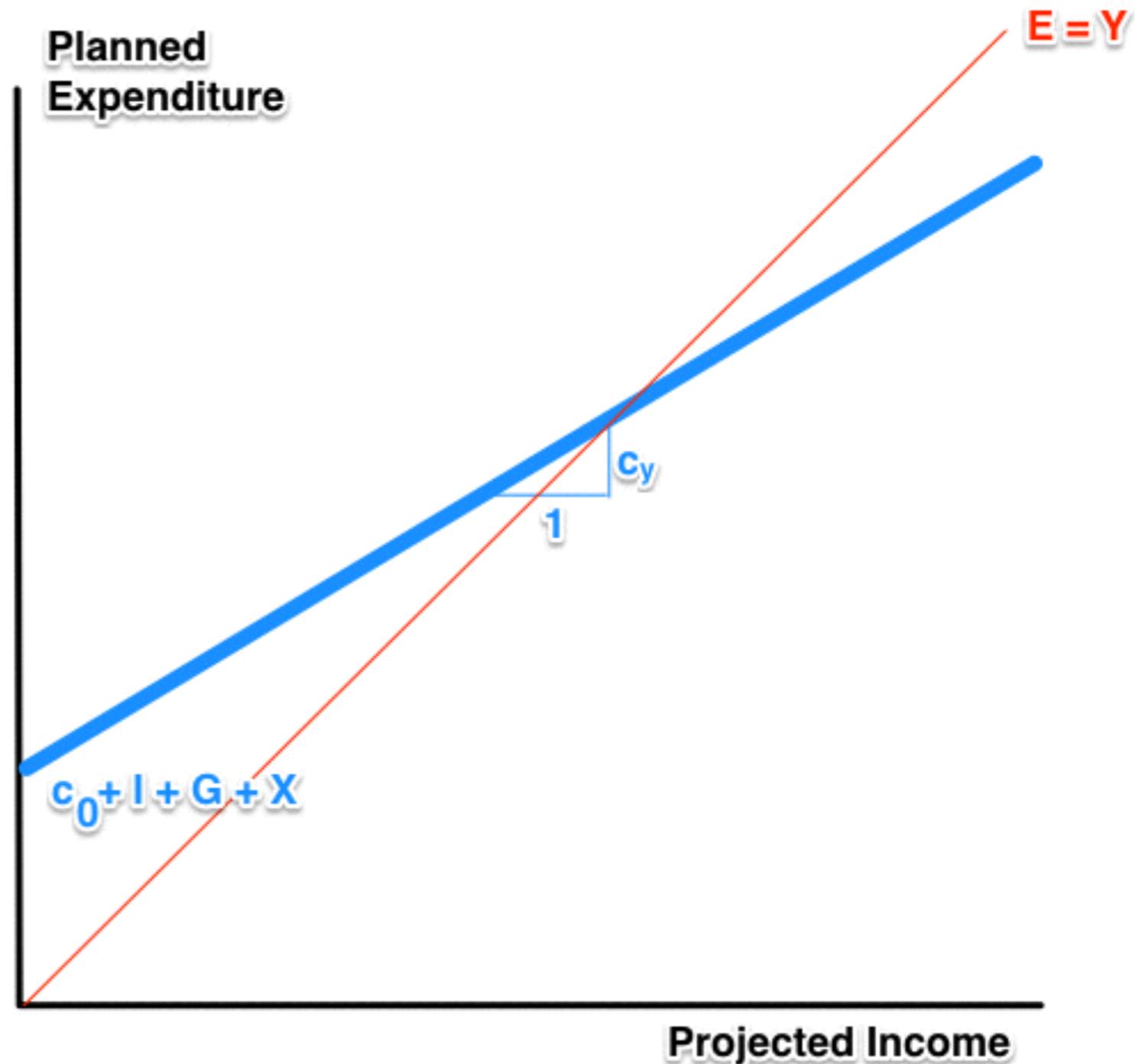
Gentlebeings, to Your iClickers…

- $E = C + I + G + X$

- $C = c_0 + c_y(Y - T)$

- If $c_0 = \$2T$, $c_y = 0.5$, $Y = \$18T$, $T = \$2T$, $G = \$3T$, $X = \$2T$, and $I = \$2T$, what is E?

  - A. $19.5T. B. $15T. C. $17.5T. D. $17T. E. None of the above

Planned Expenditure

c_y

1

$c_0 + I + G + X$
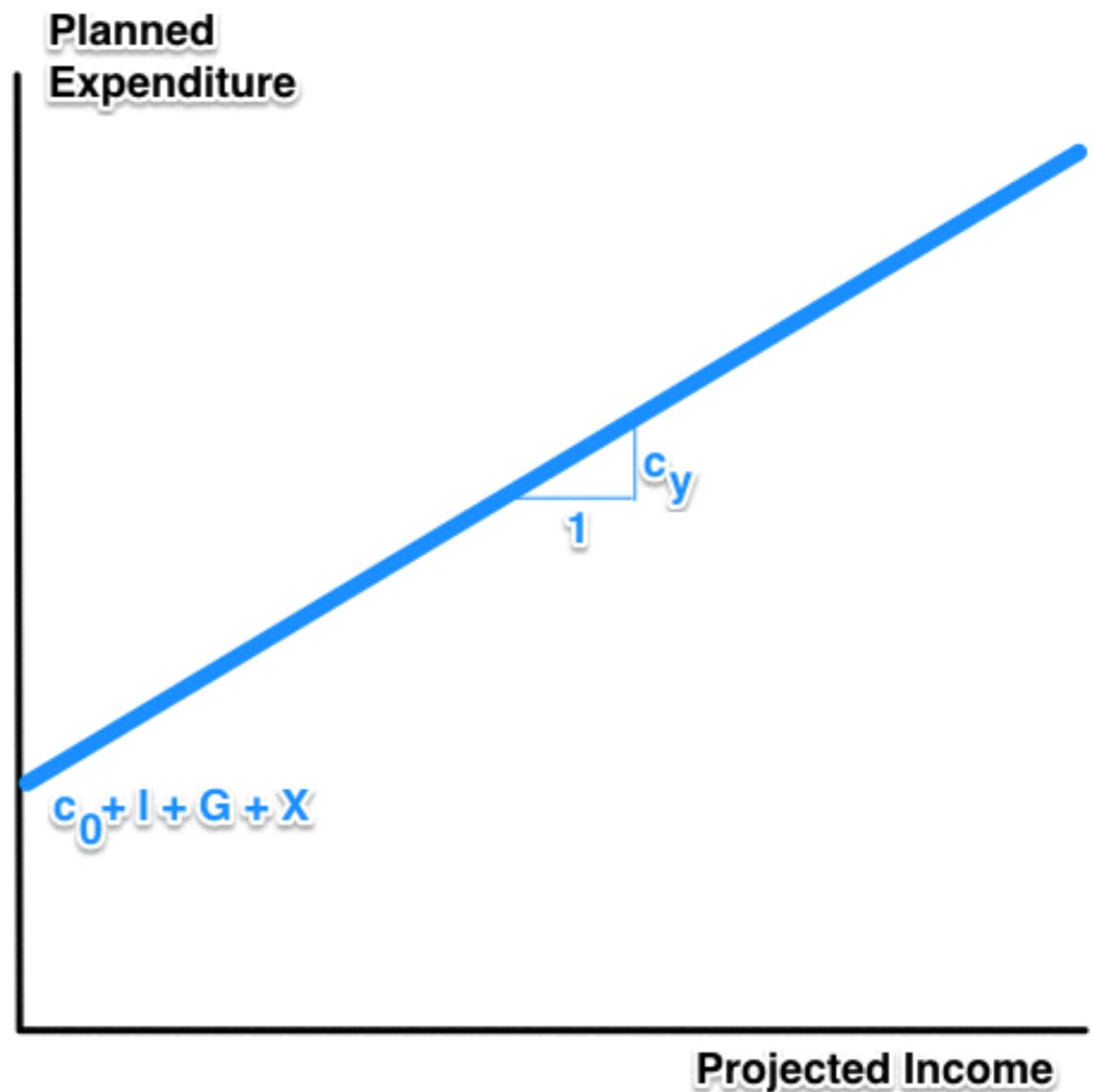
Projected Income

Gentlebeings, to Your iClickers…: Answer

- $E = C + I + G + X$

- $C = c_0 + c_y(Y - T)$

- If $c_0 = \$2T$, $c_y = 0.5$, $Y = \$18T$, $T = \$2T$, $G = \$3T$, $X = \$2T$, and $I = \$2T$, what is E?

  - A. $19.5T. B. $15T. C. $17.5T. **D. $17T.** E. None of the above

- **Looking for (D)**

Planned Expenditure
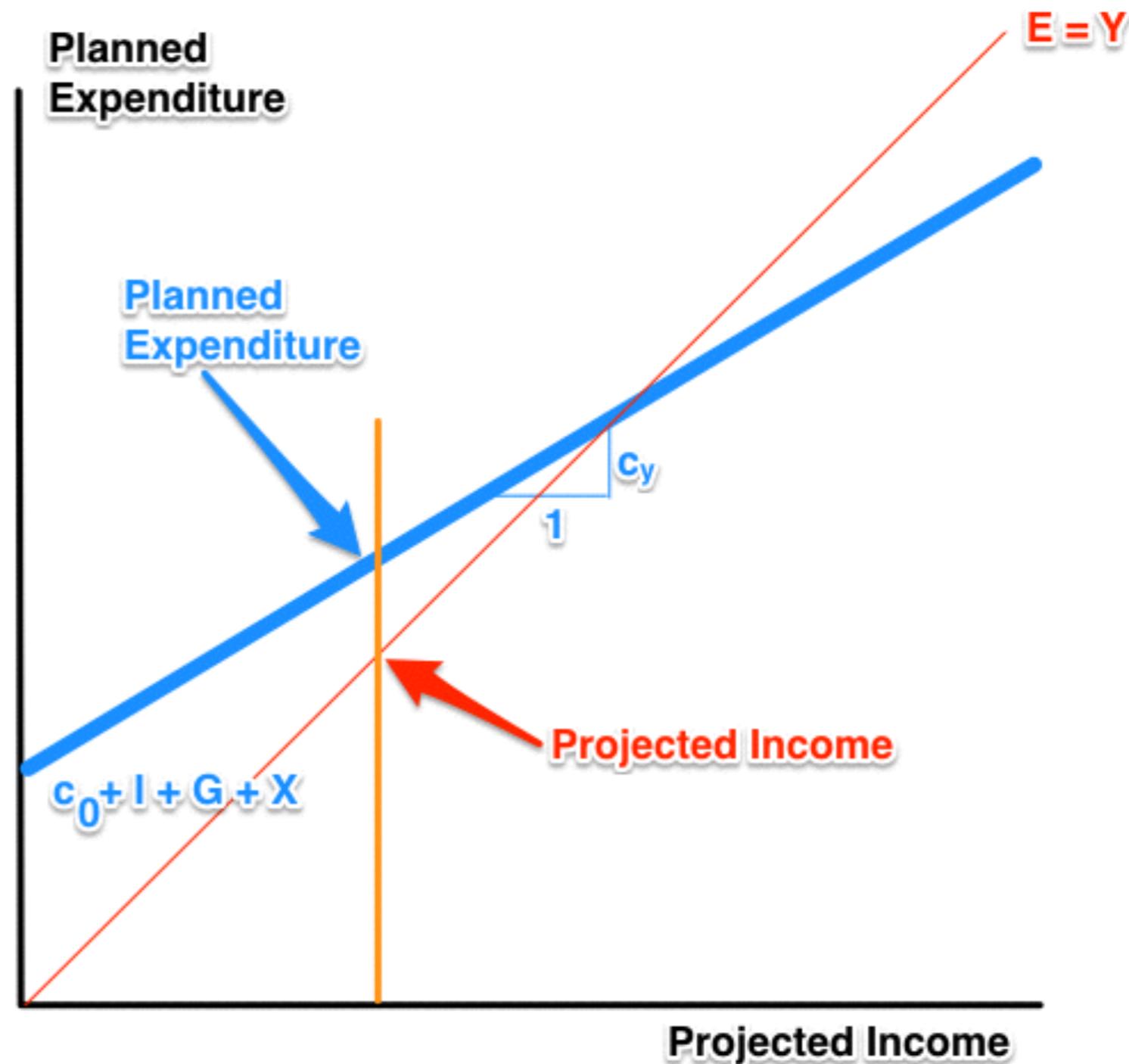
c_y

1

$c_0 + I + G + X$

Projected Income

Planned Expenditure Is Less than Projected Income. So What Happens?

- $E = C + I + G + X$

- $C = c_0 + c_y(Y - T)$

- If c_0 = \$2T, c_y = 0.5, Y = \$18T, T = \$2T, G = \$3T, X = \$2T, and I = \$2T, what is E?

  - A. \$19.5T. B. \$15T. C. \$17.5T. **D. \$17T.** E. None of the above

- **Looking for (D)**

- **E = \$17T**

- **Y = \$18T**

When Planned Expenditure Falls Below Projected Income II

- 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

Planned Expenditure
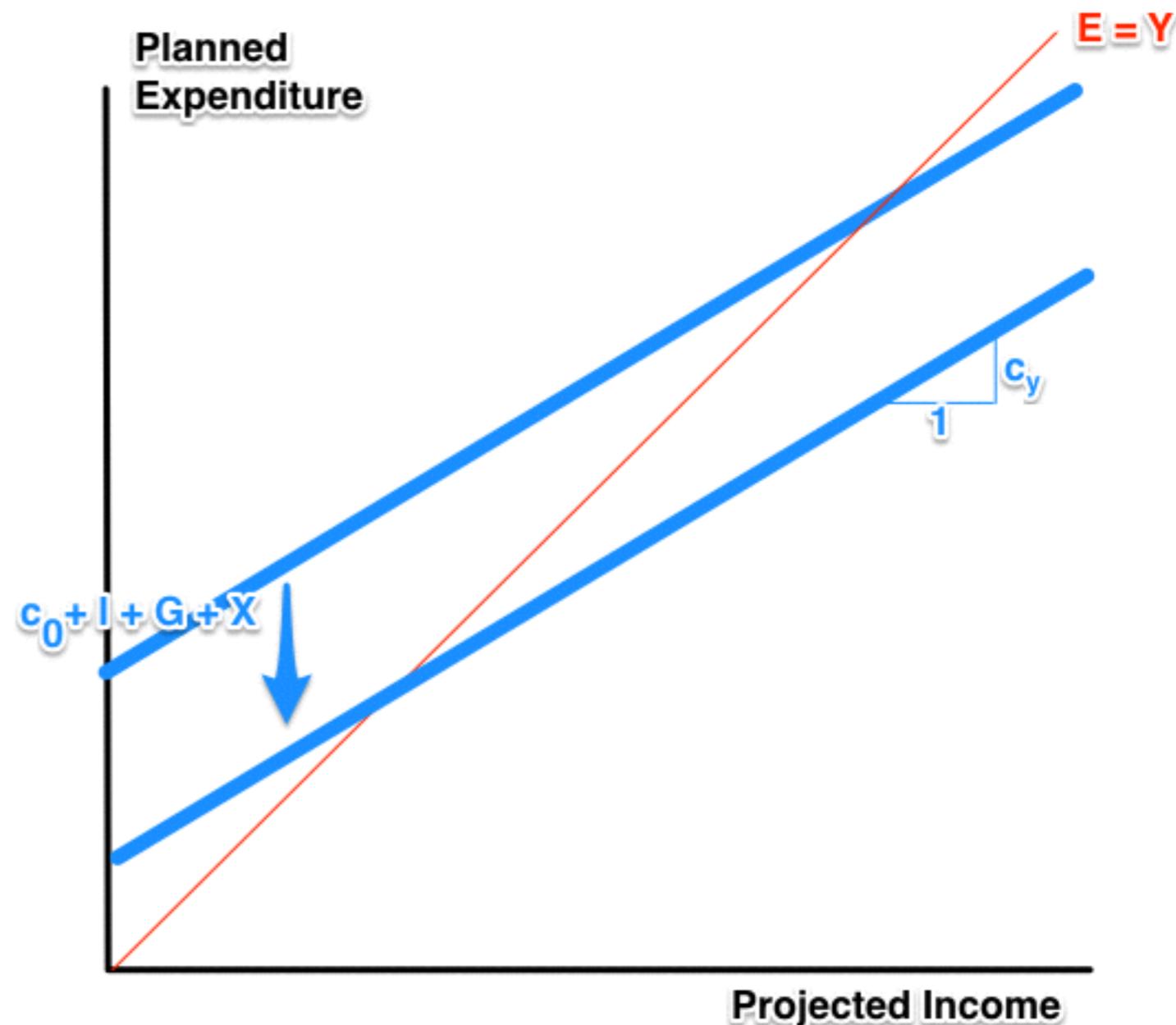
$E = Y$

c_y

1

$c_0 + I + G + X$

Projected Income
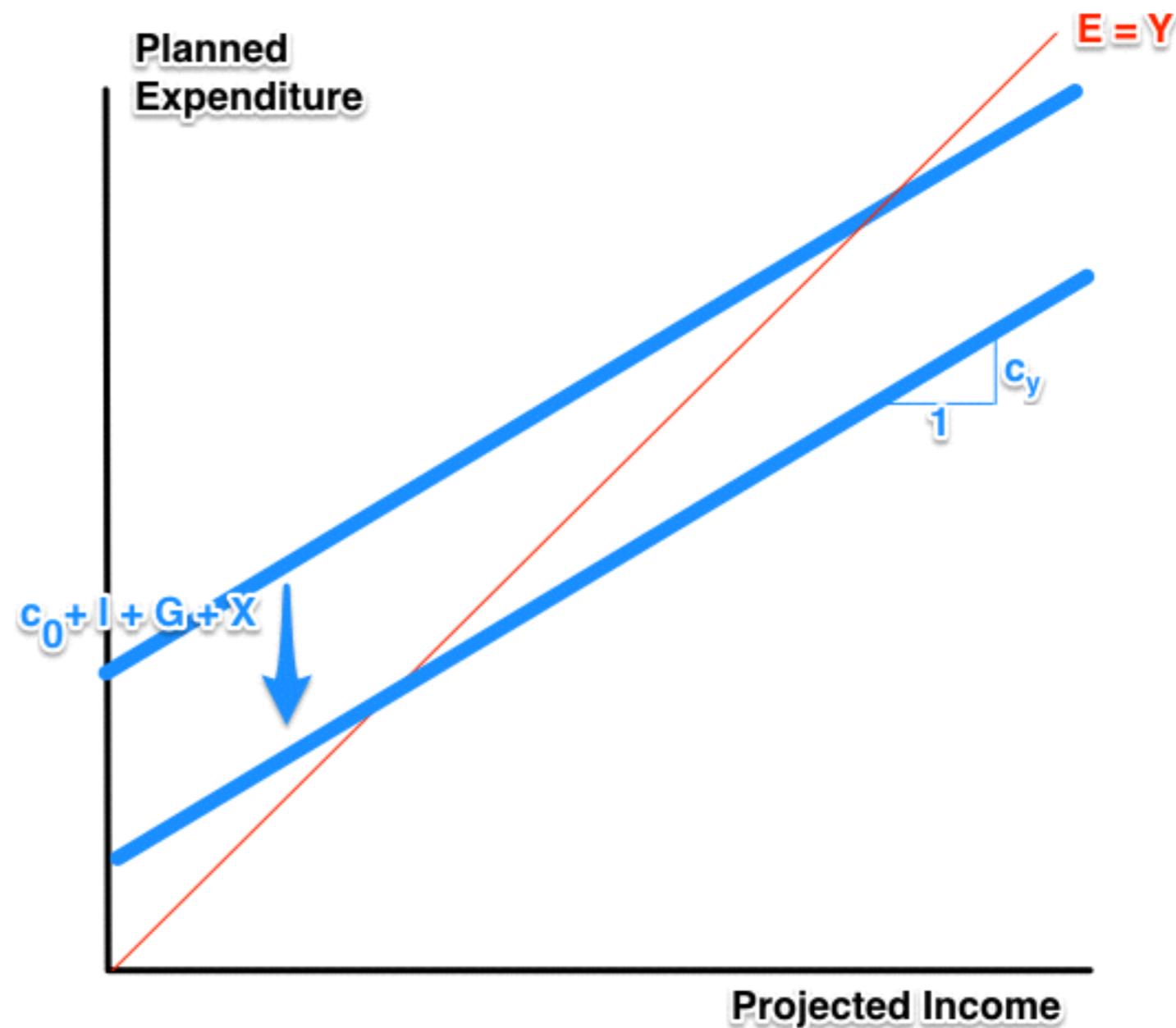
Gentlebeings, to Your iClickers…: Answer

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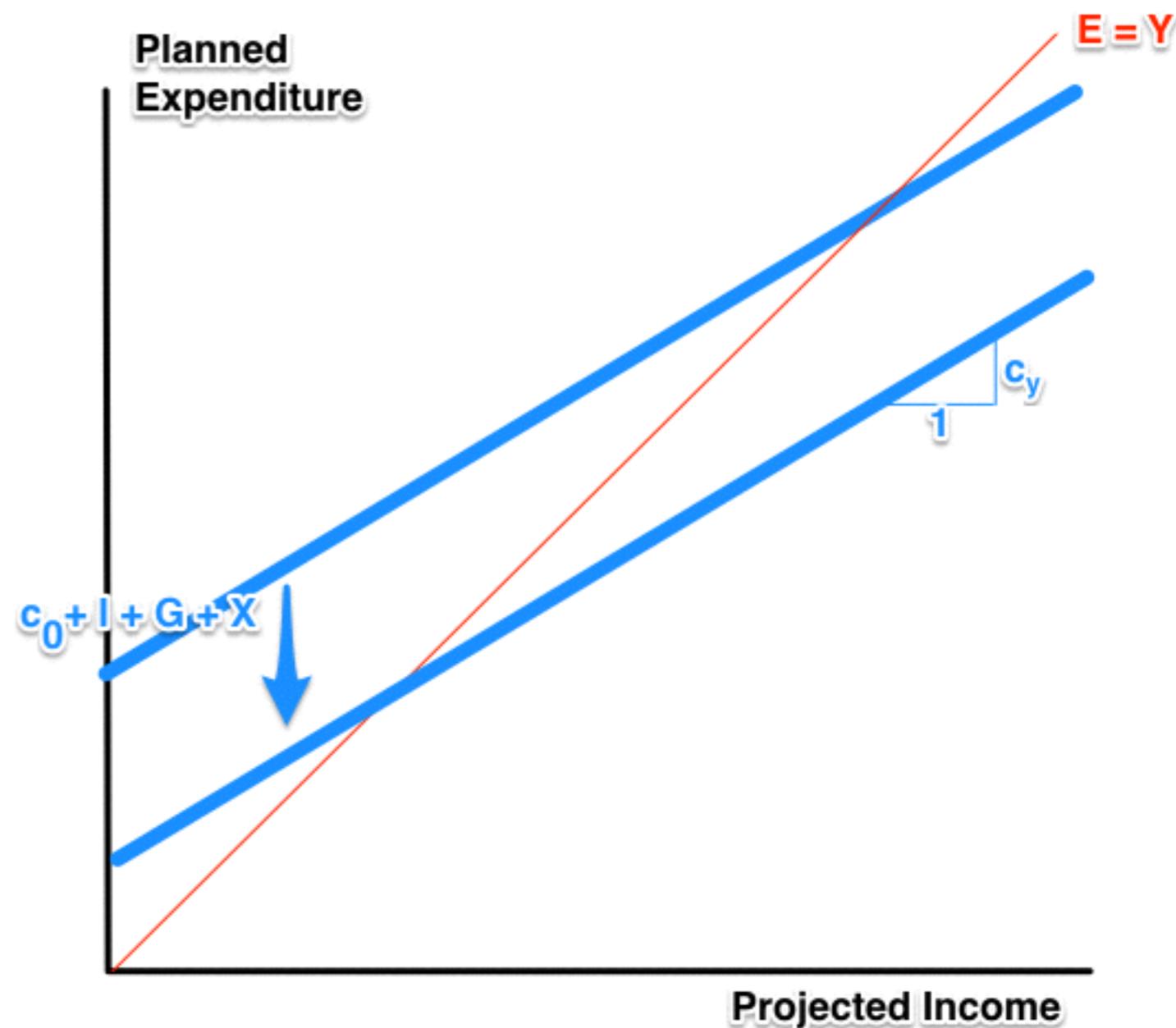
- **The answer I am looking for is A: falls by \$2T**

Planned Expenditure

$E = Y$

c_y

1

$c_0 + I + G + X$

Projected Income
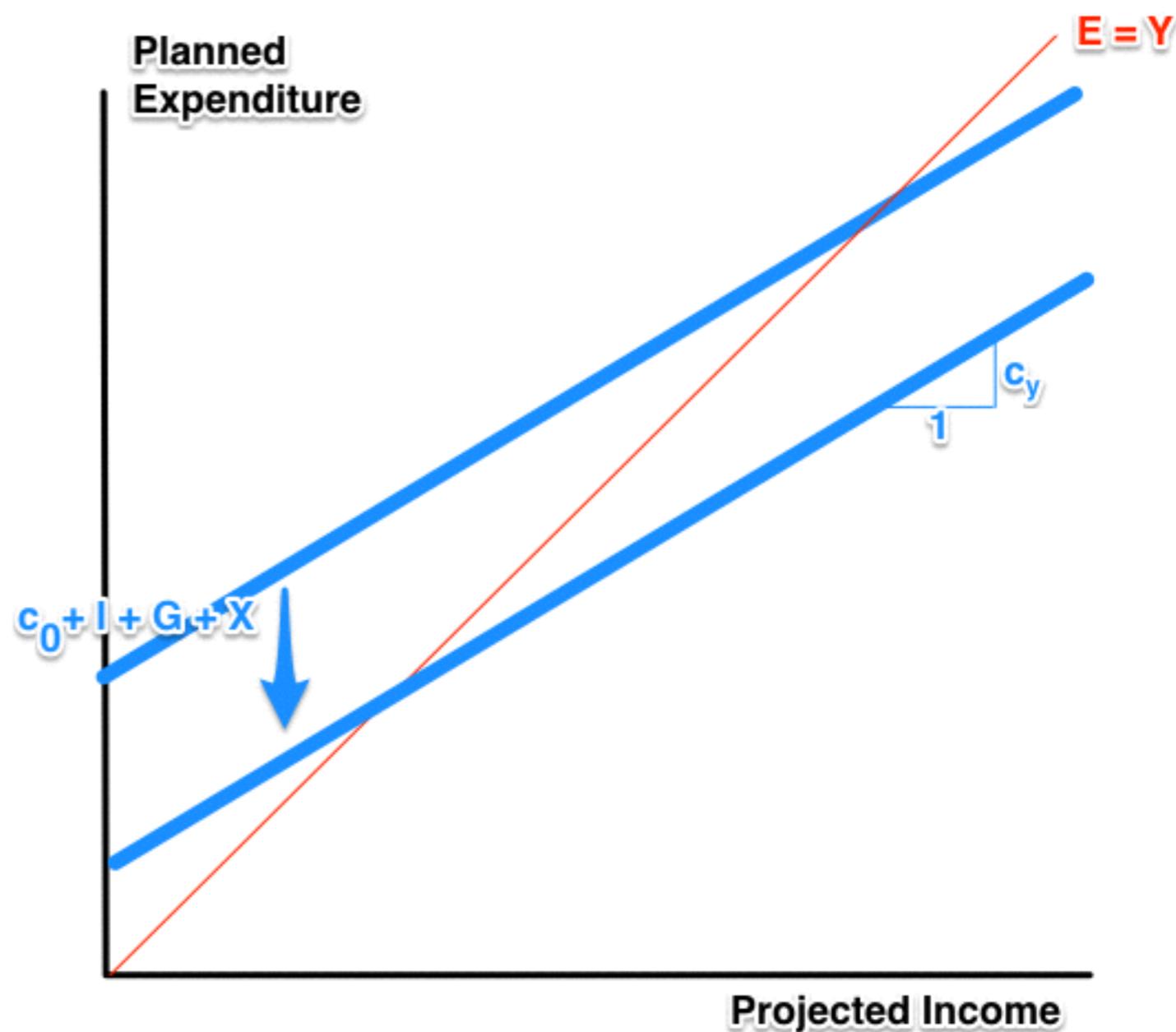
Gentlebeings, to Your iClickers…: Answer II

- 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**

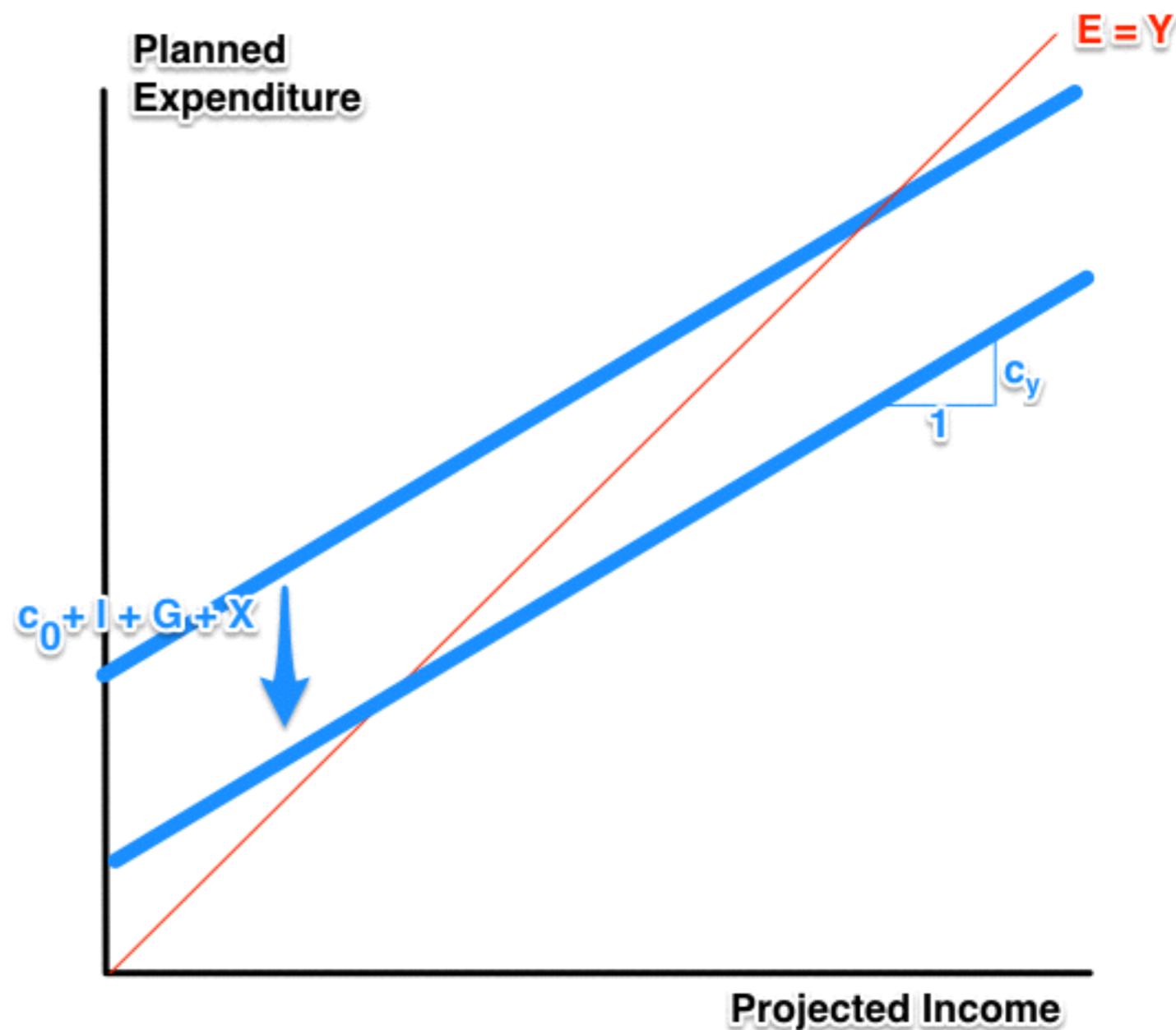- **So each \$1T reduction in income reduces desired money hoarding by \$0.5T**

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**

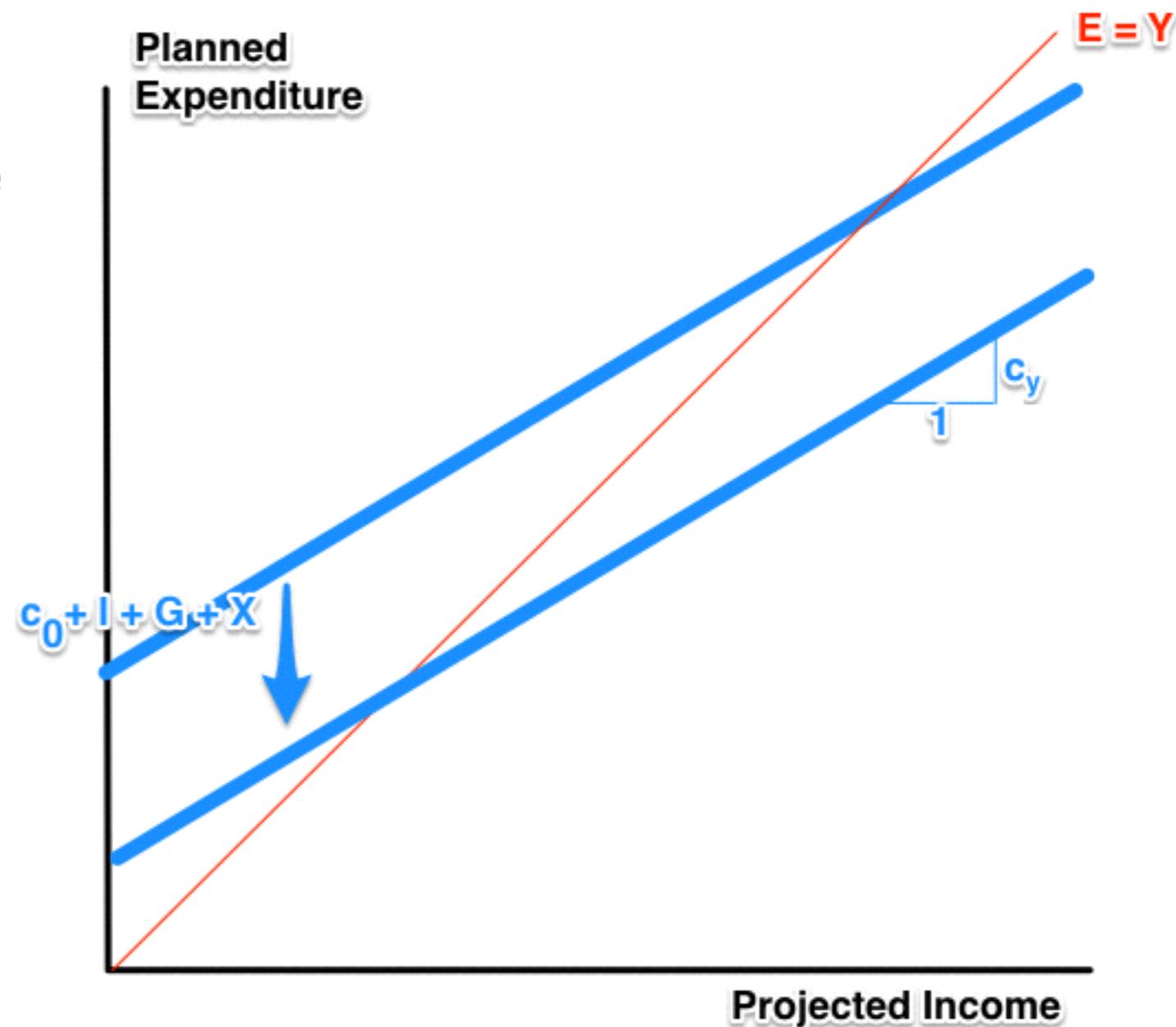Planned Expenditure

E = Y

c_y

1

$c_0 + I + G + X$

Projected Income
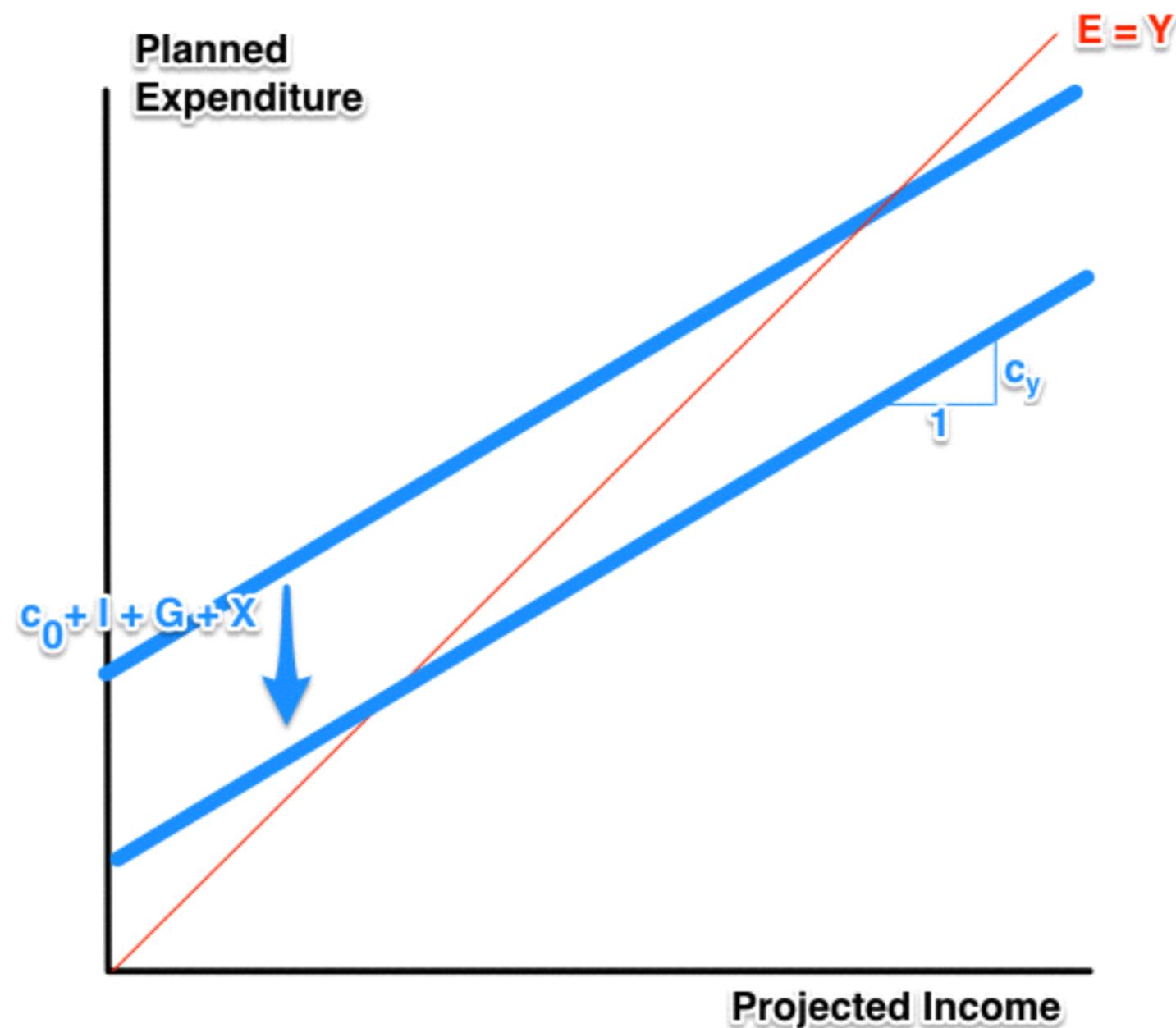
What Is the Pattern Here?

- 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

  - $c_y = 0.75$; $\mu = 4$

  - $c_y = 0.5$; $\mu = 2$
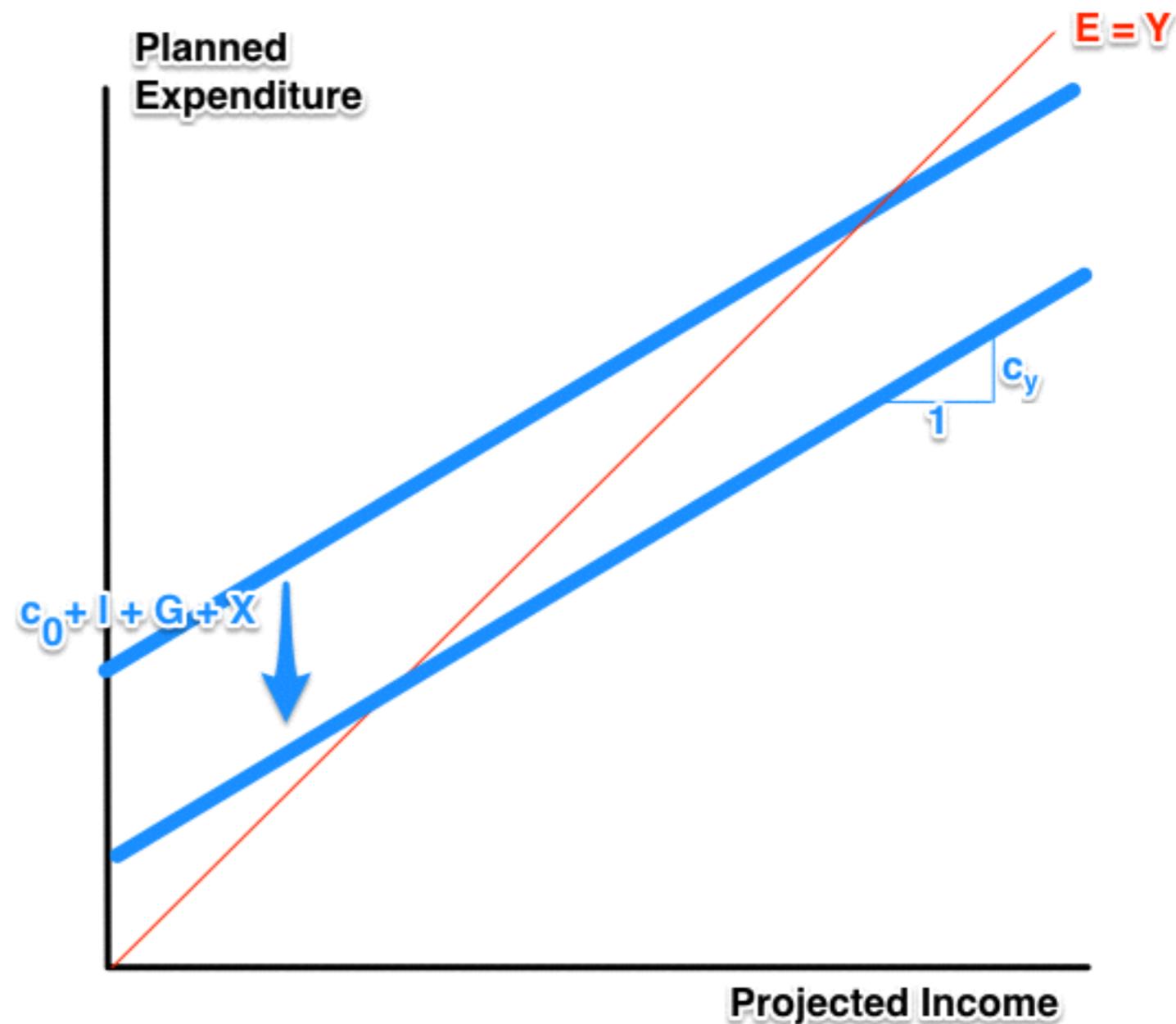
  - $c_y = 0.3333$; $\mu = 1.5$

  - $c_y = 0$; $\mu = 1$

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

  - $c_y = 0.75$; $\mu = 4$

  - $c_y = 0.5$; $\mu = 2$

  - $c_y = 0.3333$; $\mu = 1.5$

  - $c_y = 0$; $\mu = 1$

  - **$\mu = 1/(1 - c_y)$**

E = Y

Planned Expenditure

c_y

1

$c_0 + I + G + X$

Projected Income

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, Wealth, 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, Wealth, and Spending

- The economy in macroeconomic equilibrium with E = Y

- Your spending buys more stuff…

Aggregate Demand

Price Level

Aggregate Demand

Planned Expenditure/Income/Production
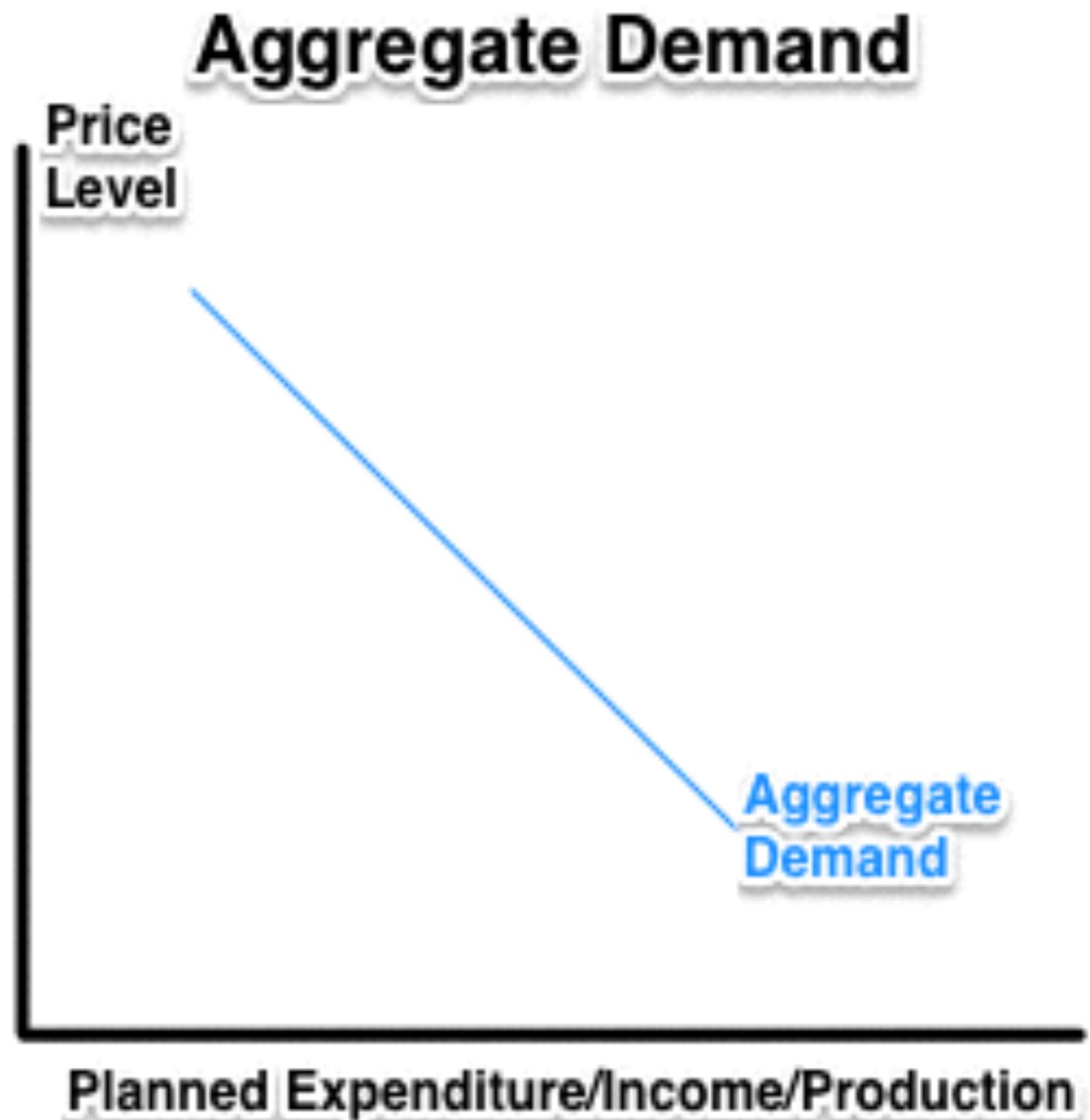
What Moves Output?

- 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…

Aggregate Demand

Price Level

Aggregate Demand

Planned Expenditure/Income/Production
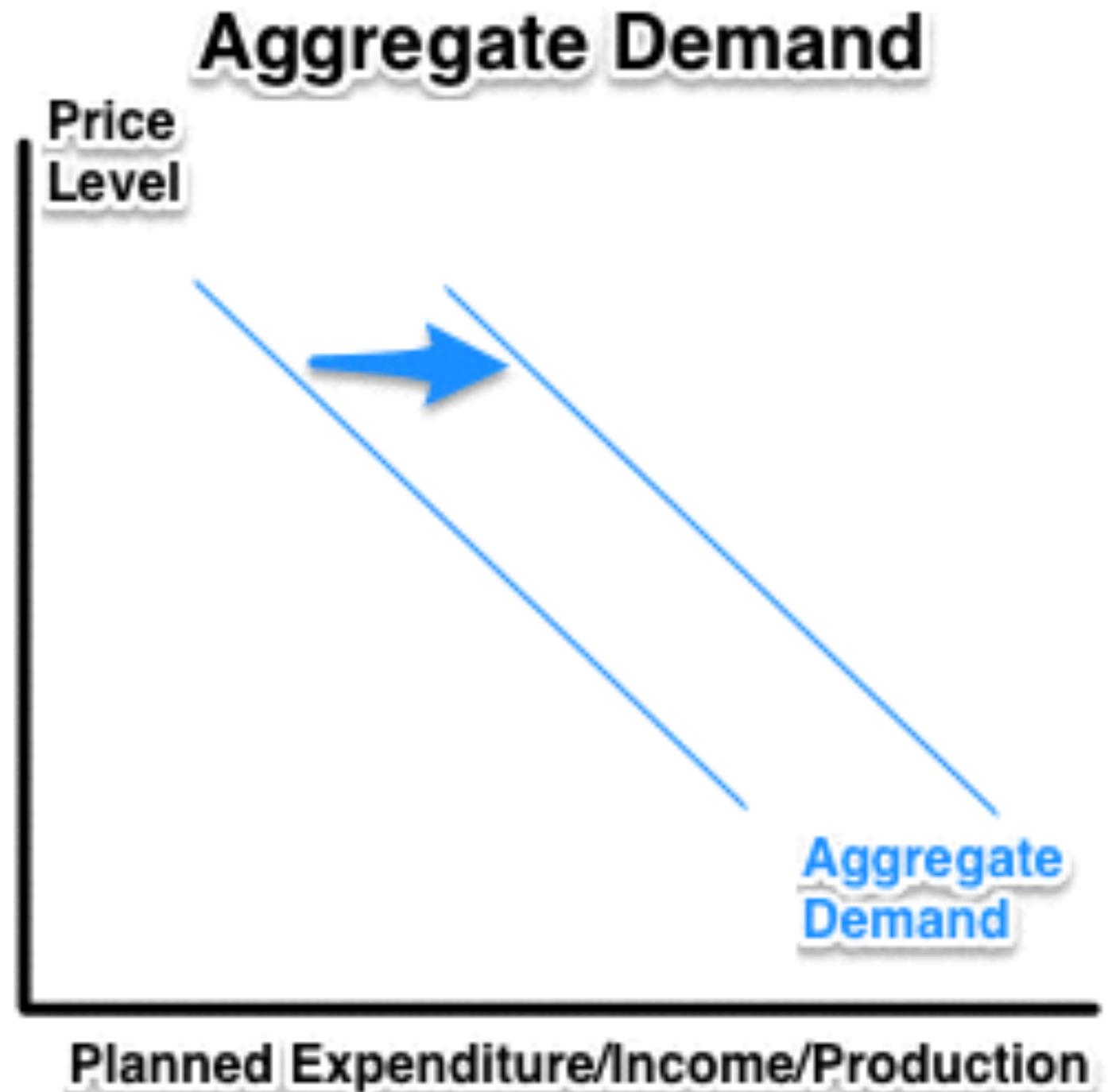
What Moves Output? II

- Movements along the aggregate demand curve

- Supply shocks

Aggregate Demand and Supply

Our Aggregate Supply Curve

- Three regions:

  - A long, flat region—people really do not like their wages cut

  - An upward-sloping region

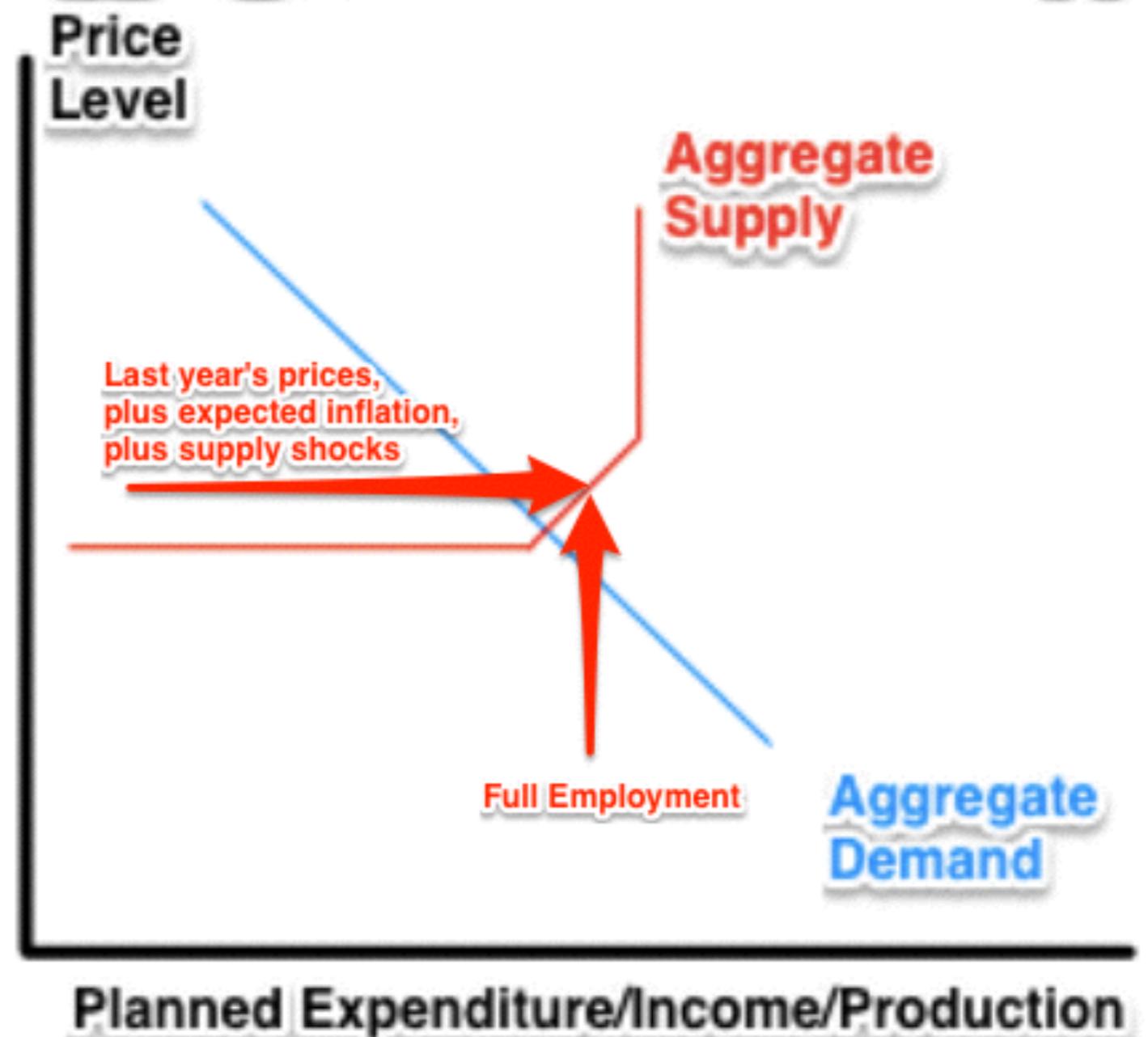 - And a region in which the economy is already working flat-out

Aggregate Demand and Supply

Price Level

Aggregate Supply

Aggregate Demand

Planned Expenditure/Income/Production
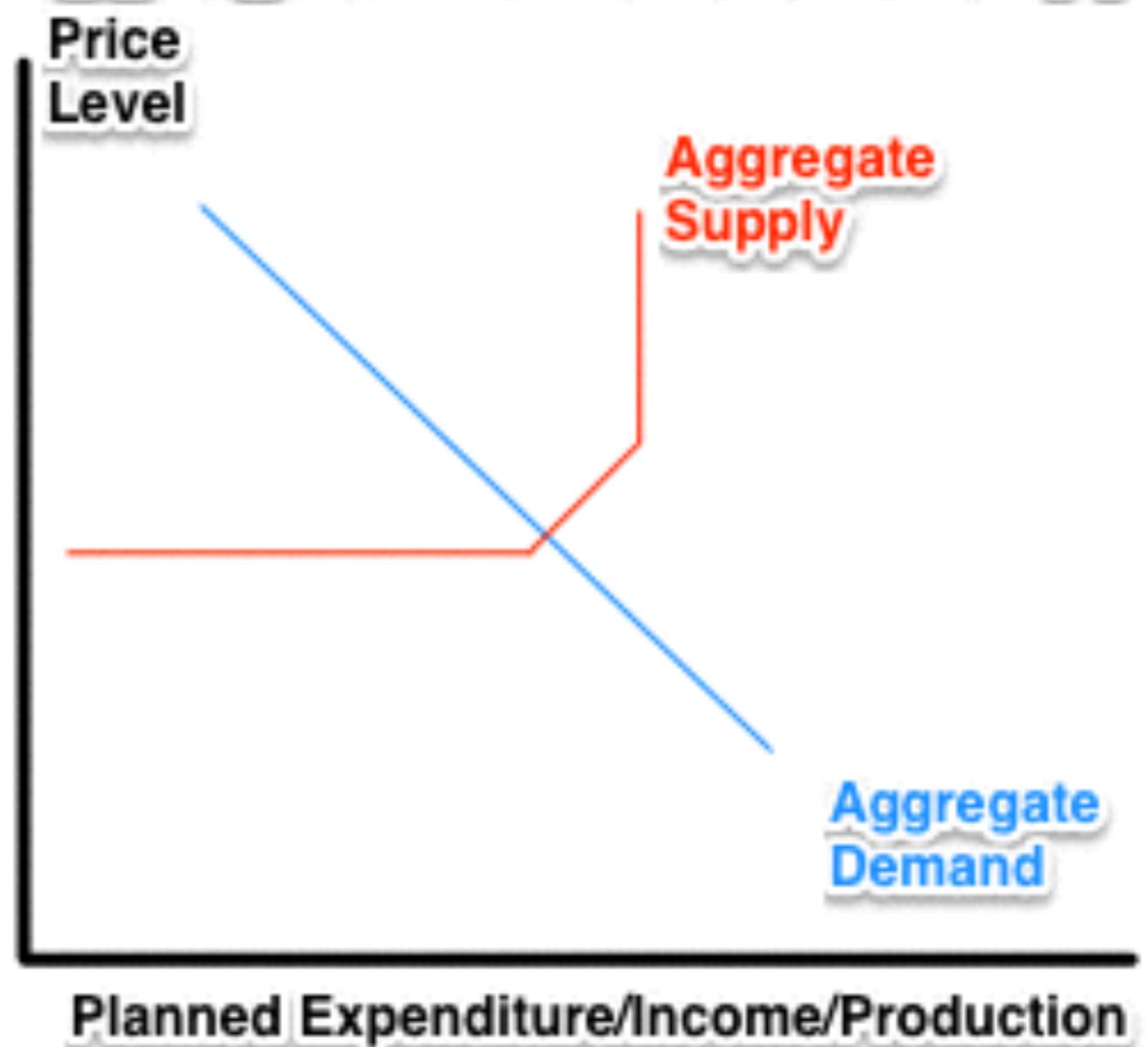
Our Aggregate Supply Curve II

- Where is the aggregate supply curve?

  - Full employment

  - Last year's prices

  - Expected inflation

Aggregate Demand and Supply

Price Level

Aggregate Supply

Last year's prices, plus expected inflation, plus supply shocks

Full Employment

Aggregate Demand

Planned Expenditure/Income/Production

Our Aggregate Supply Curve III

- Where is the aggregate supply curve?

  - Full employment

  - Last year's prices

  - Expected inflation

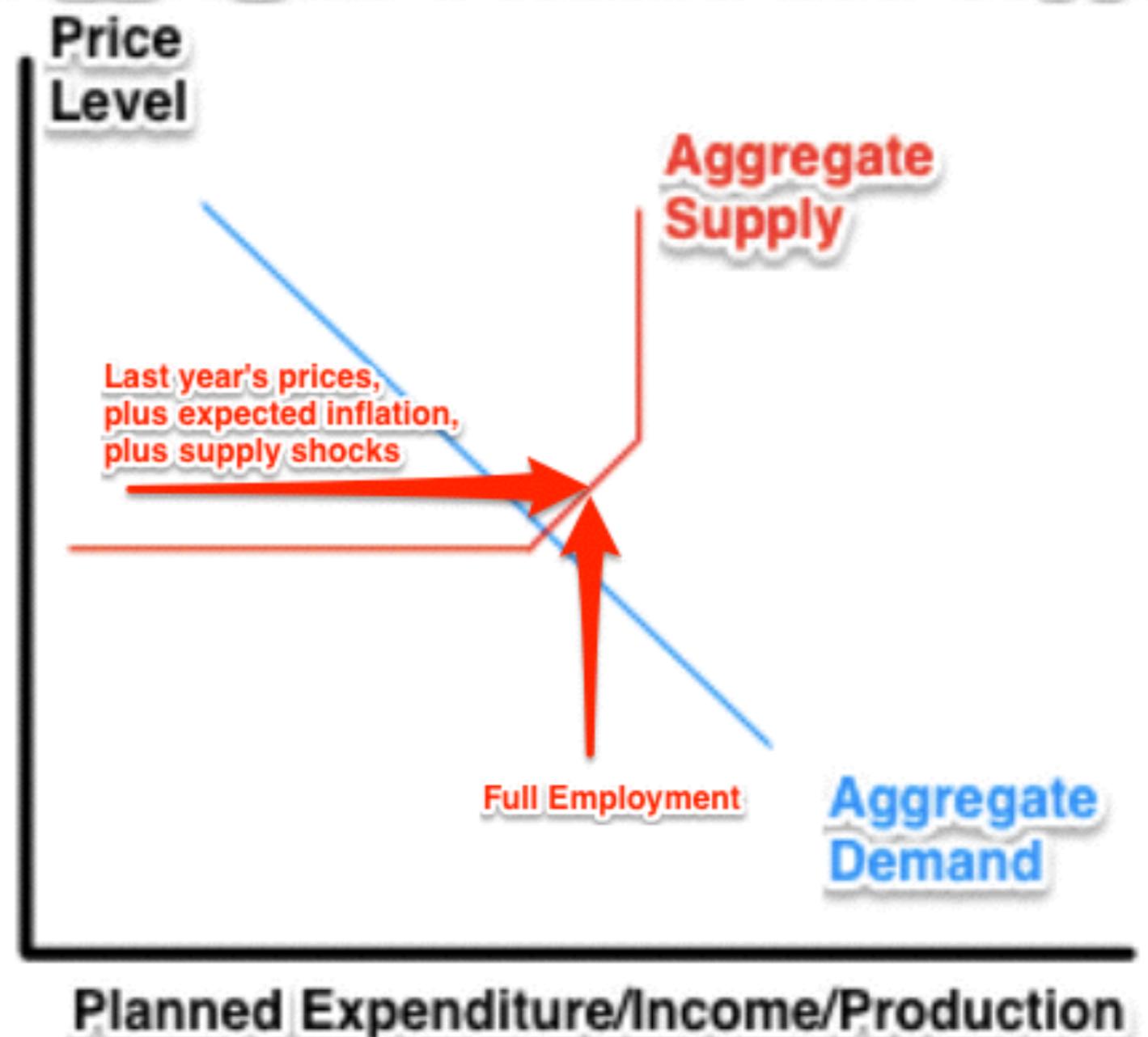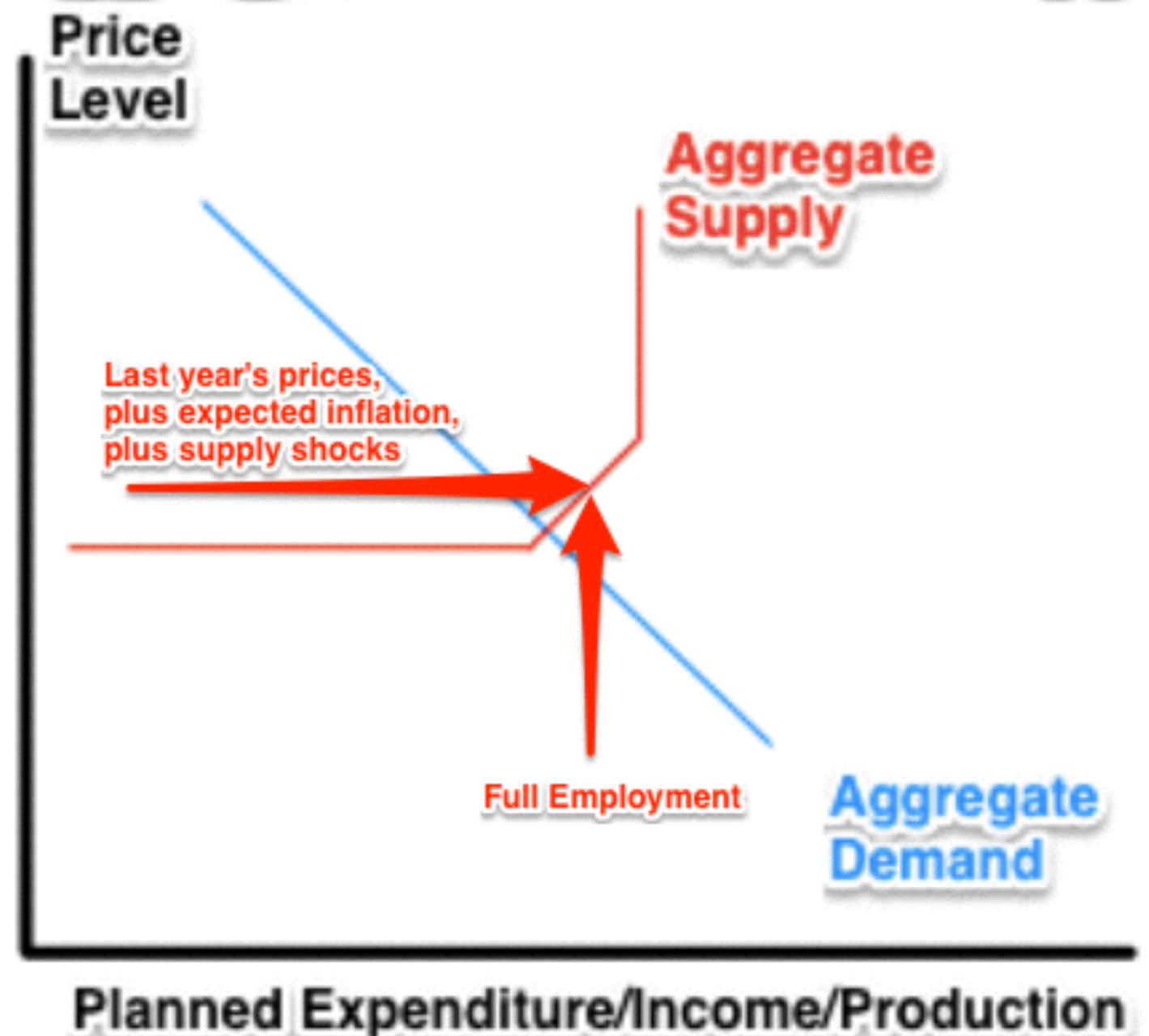**Aggregate Demand and Supply**

Price Level

Aggregate Supply

Last year's prices, plus expected inflation, plus supply shocks

Full Employment

Aggregate Demand

Planned Expenditure/Income/Production

The Evolution of Aggregate Supply

- Start from last year's situation…

Aggregate Demand and Supply

Price Level

Aggregate Supply

Last year's prices, plus expected inflation, plus supply shocks

Full Employment

Aggregate Demand

Planned Expenditure/Income/Production

The Evolution of Aggregate Supply II

- Start from last year's situation…

- Add on:

  - Expected inflation

  - Supply shocks (if any)

  - Growth in potential output

Aggregate Demand and Supply

Price Level

Potential Output Growth

Aggregate Supply

Expected Inflation

Aggregate Demand

Planned Expenditure/Income/Production
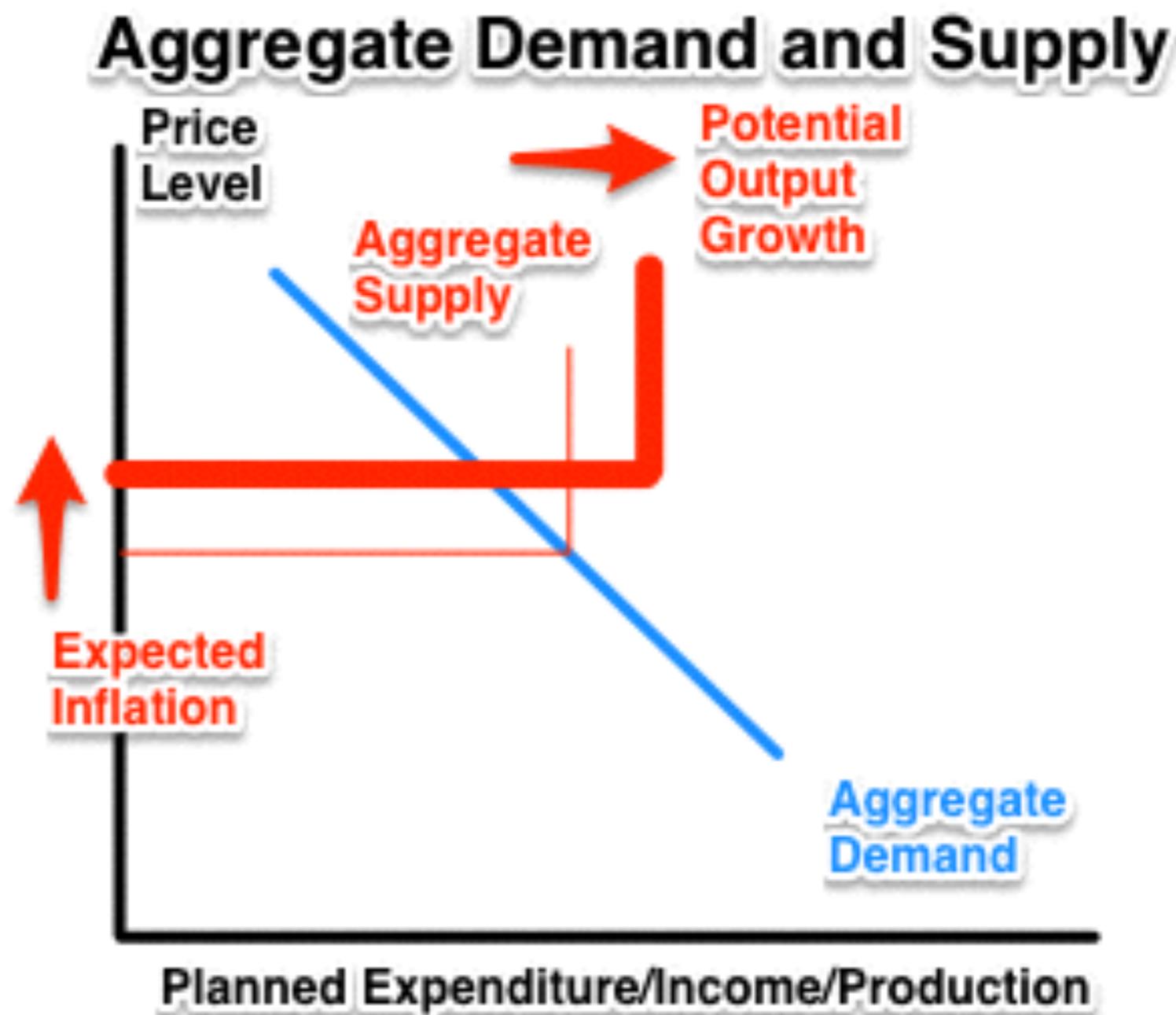
# Determinants of Shifting Aggregate Supply

- 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
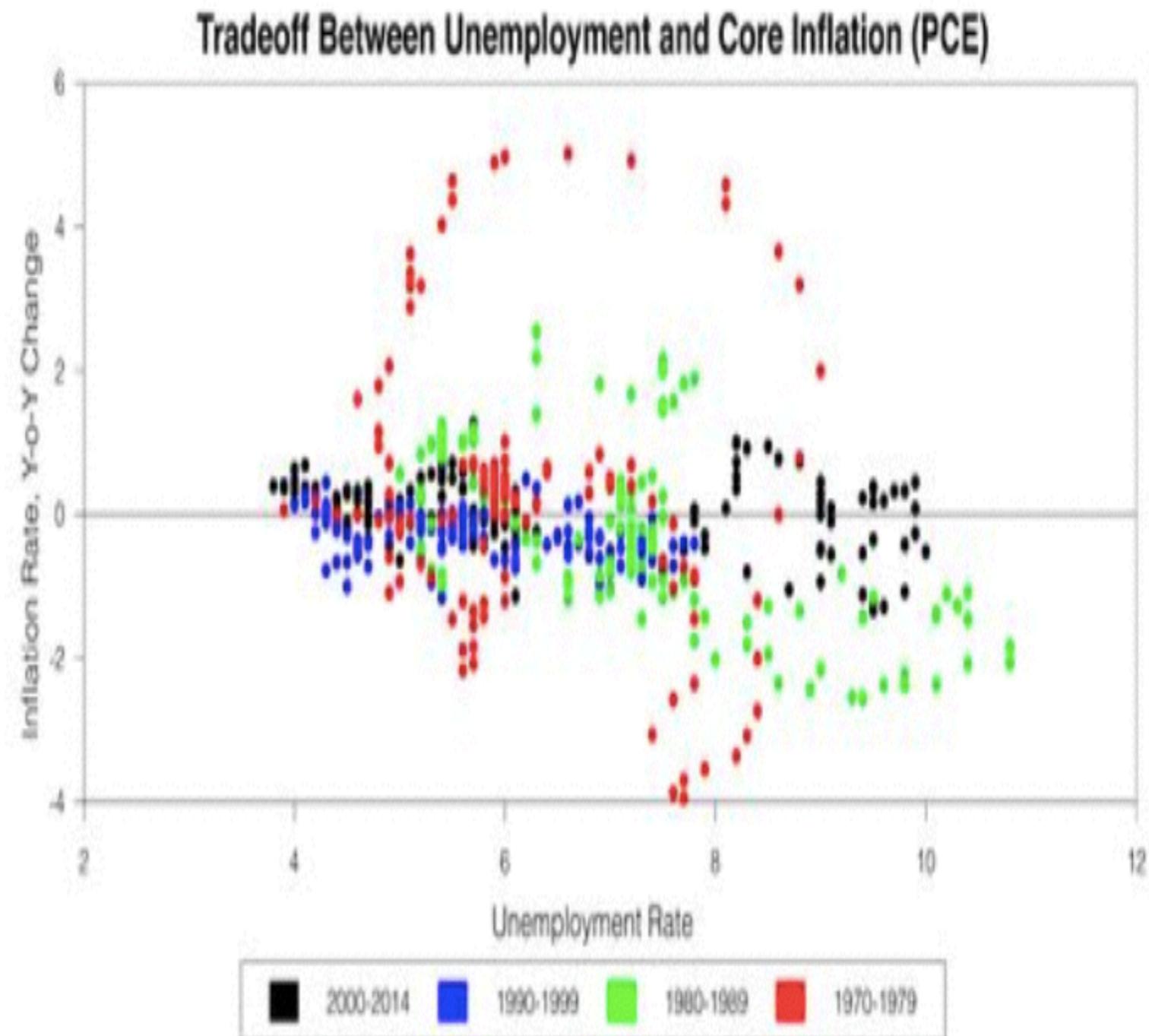
  - Other shifts in economic efficiency

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
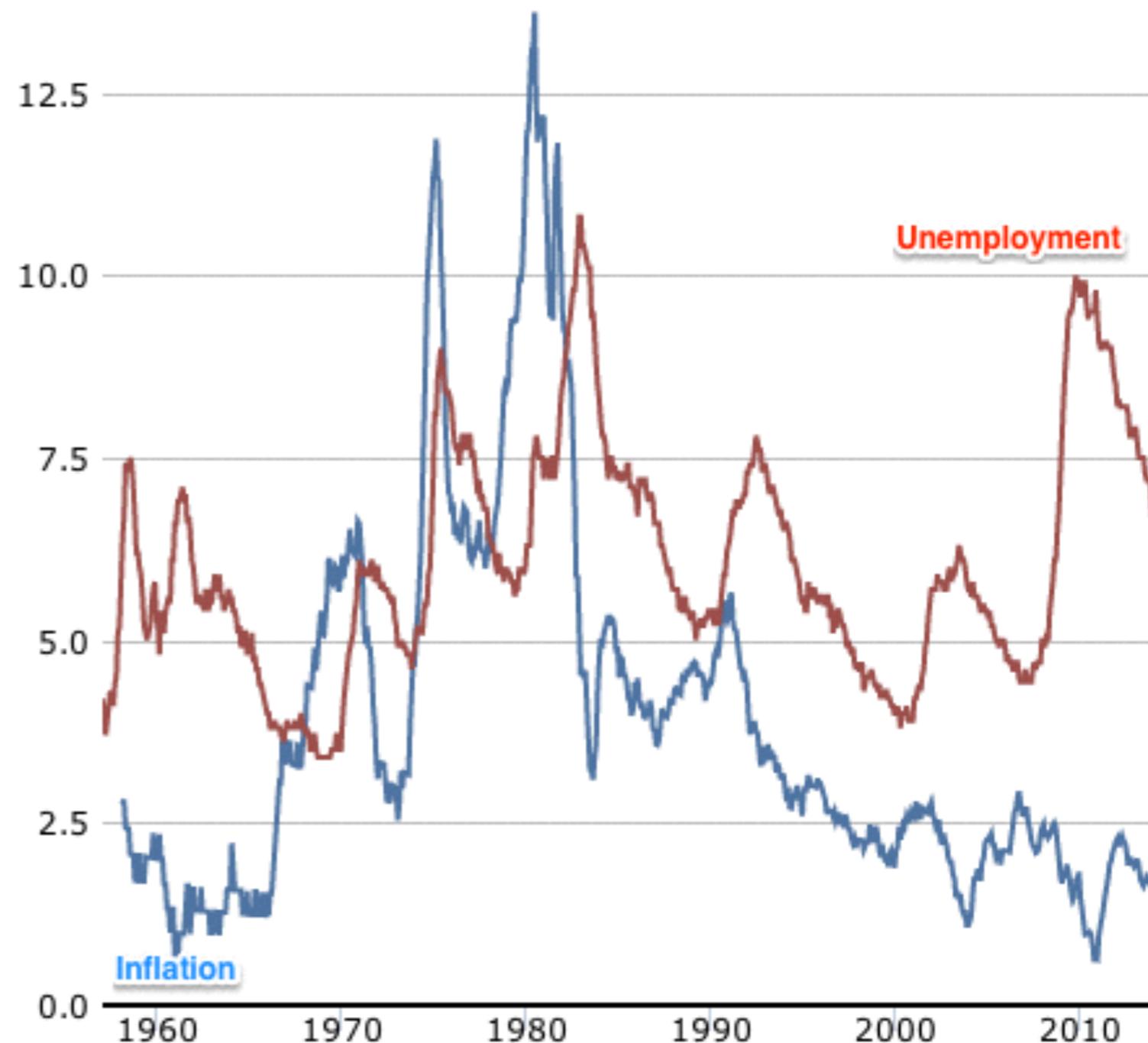
The Phillips Curve II

- 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

Tradeoff Between Unemployment and Core Inflation (PCE)

Legend: 2000-2014 (black), 1990-1999 (blue), 1980-1989 (green), 1970-1979 (red)

http://economistsview.typepad.com/timduy/

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…
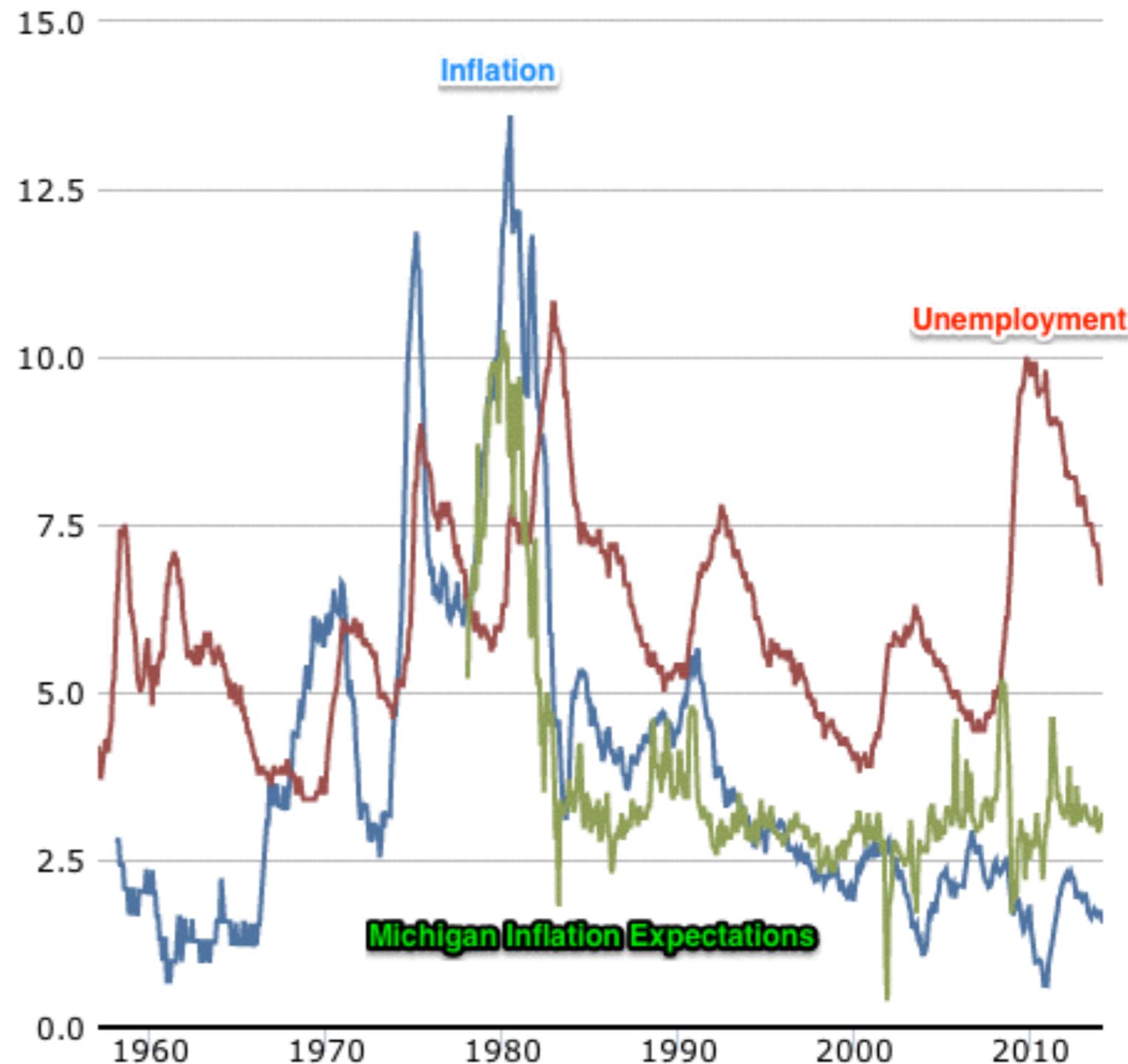
Okun's Law

- Production (relative to the full-employment "potential output" level)

- Unemployment (relative to the natural rate)

- A 2-to-1 relationship