

Economics 1: Introduction to Economics

J. Bradford DeLong <delong@econ.berkeley.edu>

Monetary Policy

April 13, 2016 8-9 AM
Wheeler Auditorium, U.C. Berkeley

How Does the Federal Reserve Influence Spending?

- $Y = \mu[c_0 + NX + I] + \mu G$
- By changing G —fiscal policy—the government can stabilize the level of production and employment
- But there also is the Federal Reserve, monetary policy, and this insight that the business cycle is due to a surplus/shortage of money
- How does the Federal Reserve fit into all this?
- By changing the supply of money relative to the demand, the Fed changes interest rates
- And changing interest rates affects investment spending (and, secondarily, consumption spending and exports as well)

CHAPTER 23

Monetary Policy and the Federal Reserve



HOW DOES THE FEDERAL RESERVE AFFECT SPENDING AND OUTPUT IN THE SHORT RUN?

Financial market participants and commentators go to remarkable lengths to try to predict the actions of the Federal Reserve. For a while, the CNBC financial news program *Squawk on the Wall* reported regularly on what the commentators called the Greenspan Briefcase Indicator. The idea was to spot the Fed chairman at that time, Alan Greenspan, on his way to meet with the Federal Open Market Committee, the group that determines U.S. monetary policy. If Greenspan's briefcase was packed full, presumably with macroeconomic data and analyses, the guess was that the Fed planned to hike interest rates. A slim briefcase meant no change in rates was likely.

"It was right 17 out of the first 20 times," the program's anchor Mark Haines noted, "but it has a built-in self-destruct mechanism because Greenspan packs his [own] briefcase. He can make it wrong or right. He has never publicly acknowledged the indicator, but we have reason to believe that he knows about it. We have to consider the fact that he wants us to stop doing it because the last two times the briefcase has been wrong, and that's disturbing."

The Briefcase Indicator is but one example of the close public scrutiny that the chairman of the Federal Reserve and other monetary policymakers face. Every speech, every congressional testimony, every interview from a member of the Board

Robert H. Frank, "Safety in Numbers," *The New York Times Magazine*, November 28, 1999, p. 35.

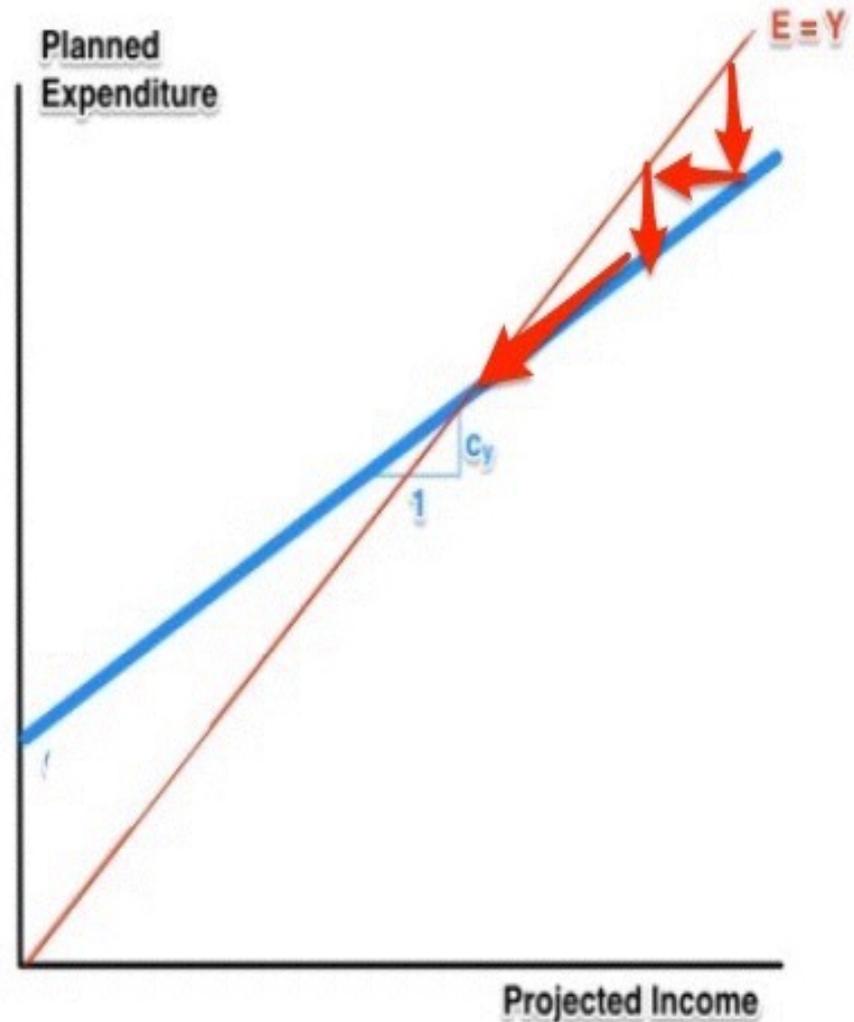
LEARNING OBJECTIVES

After reading this chapter, you should be able to:

- LO1 Describe the structure and responsibilities of the Federal Reserve System.
- LO2 Analyze how changes in the federal funds rate and real interest rates affect planned aggregate expenditure and the short-run equilibrium level of output.
- LO3 Show how the demand for money and the supply of money interact to determine the equilibrium nominal interest rate.
- LO4 Discuss how the Fed uses its ability to control the money supply to influence nominal and real interest rates.

Our Basic Income-Expenditure Model

- The basic math:
 - $Y = E = C + I + NX + G$
 - $C = c_0 + (c_y \times Y)$
 - $Y = [(c_0 + I + NX) + G]/(1-c_y)$
 - $Y = \mu[(c_0 + I + NX) + G]$
 - with $\mu = 1/(1-c_y)$
- By changing G —fiscal policy—the government can stabilize the level of production and employment
- But there also is the Federal Reserve, monetary policy, and this insight that the business cycle is due to a surplus/shortage of money.
- How? The Federal Reserve's actions affect the real interest rate r , and thus affect investment spending I ...



What Determines Investment Spending by Businesses?

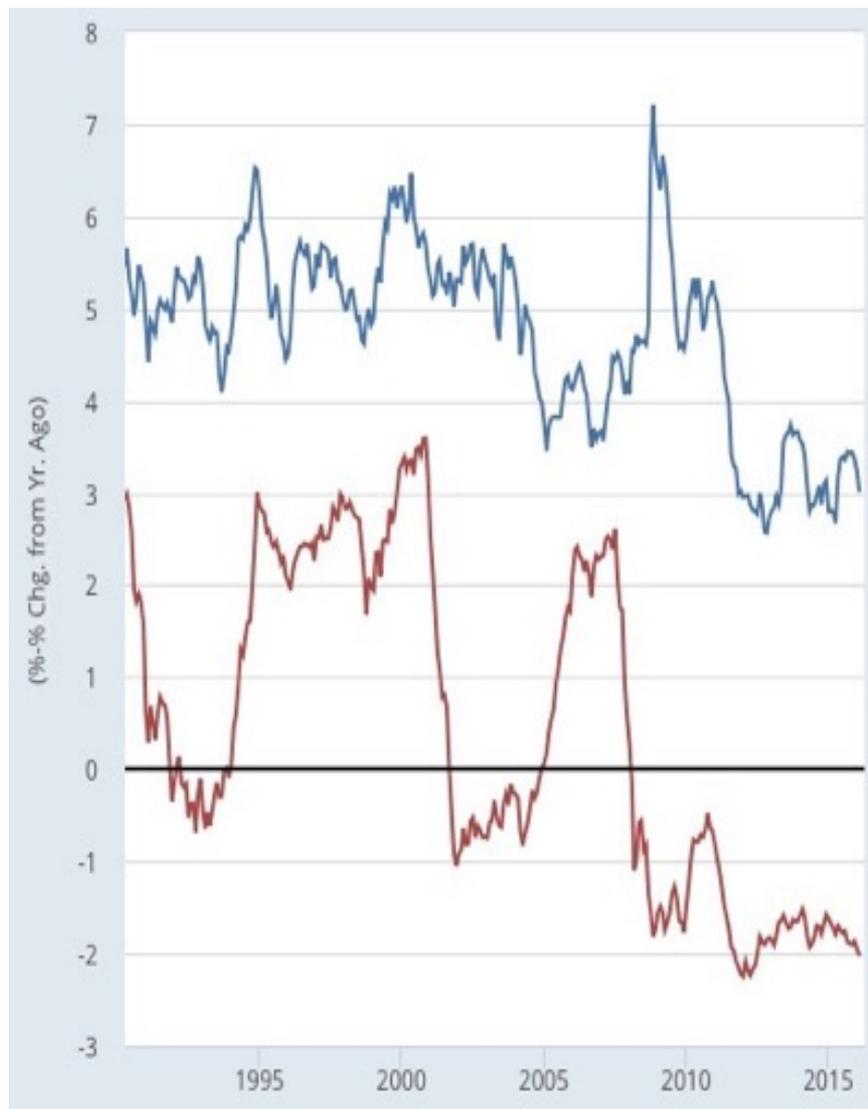
- $I = I_0 - I_r \times r$
 - Investment spending depends on business calculation and optimism on future profits (I_0) but also on the real interest rate (r) at which businesses can borrow to fund investment
- I_0 tells about business confidence, about willingness to take risks, about “animal spirits”.
- I_r tells us how sensitive business investment spending is to changes in the cost of financing capacity expansion

What Determines Investment Spending by Businesses? II

- $r = i + \rho + \tau - \pi$
 - the nominal short-term safe interest rate on government bonds i .
 - Plus the so-called *risk premium*, the extra interest rate financiers demand for lending to a business that might go bankrupt rather than to the government (which will always repay). For this we use ρ , the lower-case Greek letter rho.
 - Plus the so-called *term premium*, the extra interest rate financiers demand (or accept) for lending long-term rather than short-term because they think the Federal Reserve will make future short-term interest rates higher (or lower) than they are in the present. For this we use τ , the lower-case Greek letter tau.
 - Minus the expected inflation rate. For this we use π , the lower-case Greek letter pi.

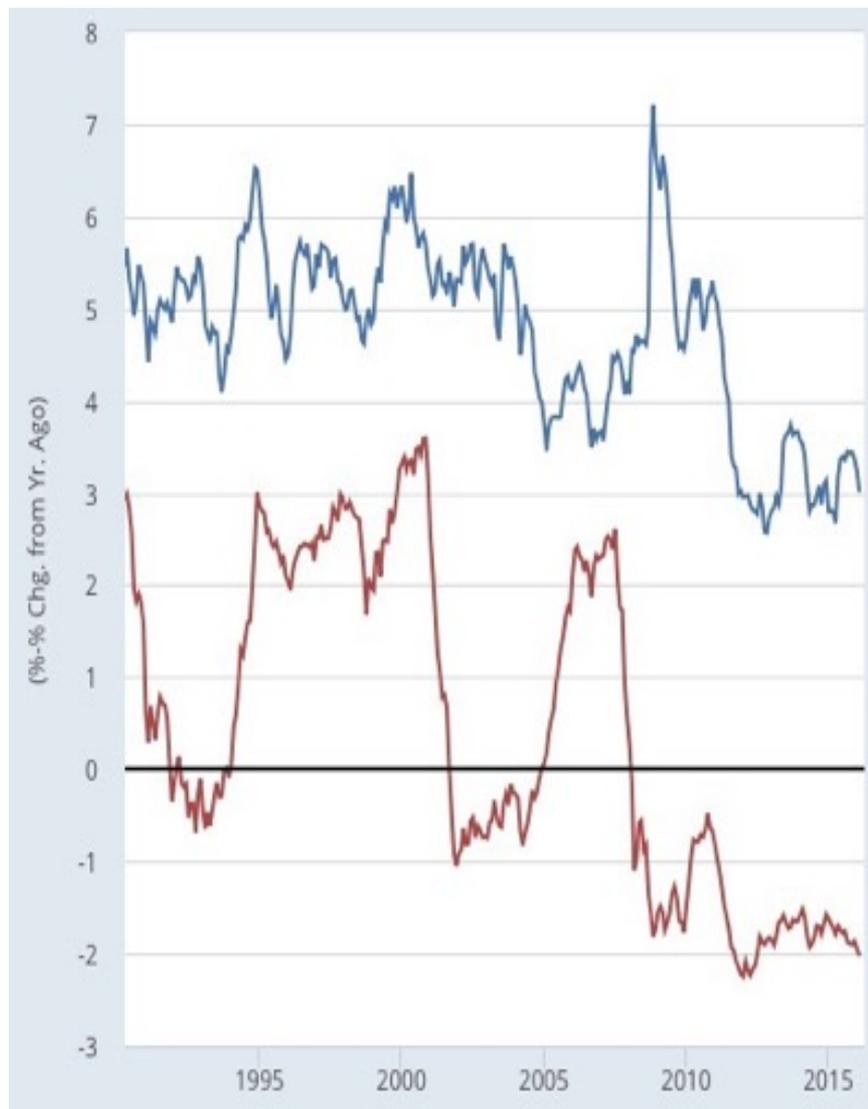
The Long-Term Interest Rate and the Federal Reserve

- 1990-2: Greenspan lowers the short-term safe real interest rate (i.e., the nominal rate i) by 3.5%-pts:
 - But the long-term rate r falls by less than 1%-point
- 2001: Greenspan lowers the the short-term safe interest rate rate by 4.5%-pts:
 - But the long-term rate r , initially, does not move at all
- 2008: Bernanke lowers the the short-term safe real interest rate rate by 4%-pts—lowers the nominal rate to 0:
 - But the long-term rate r first spikes upward, then drops to a level only 1.5%-pts lower



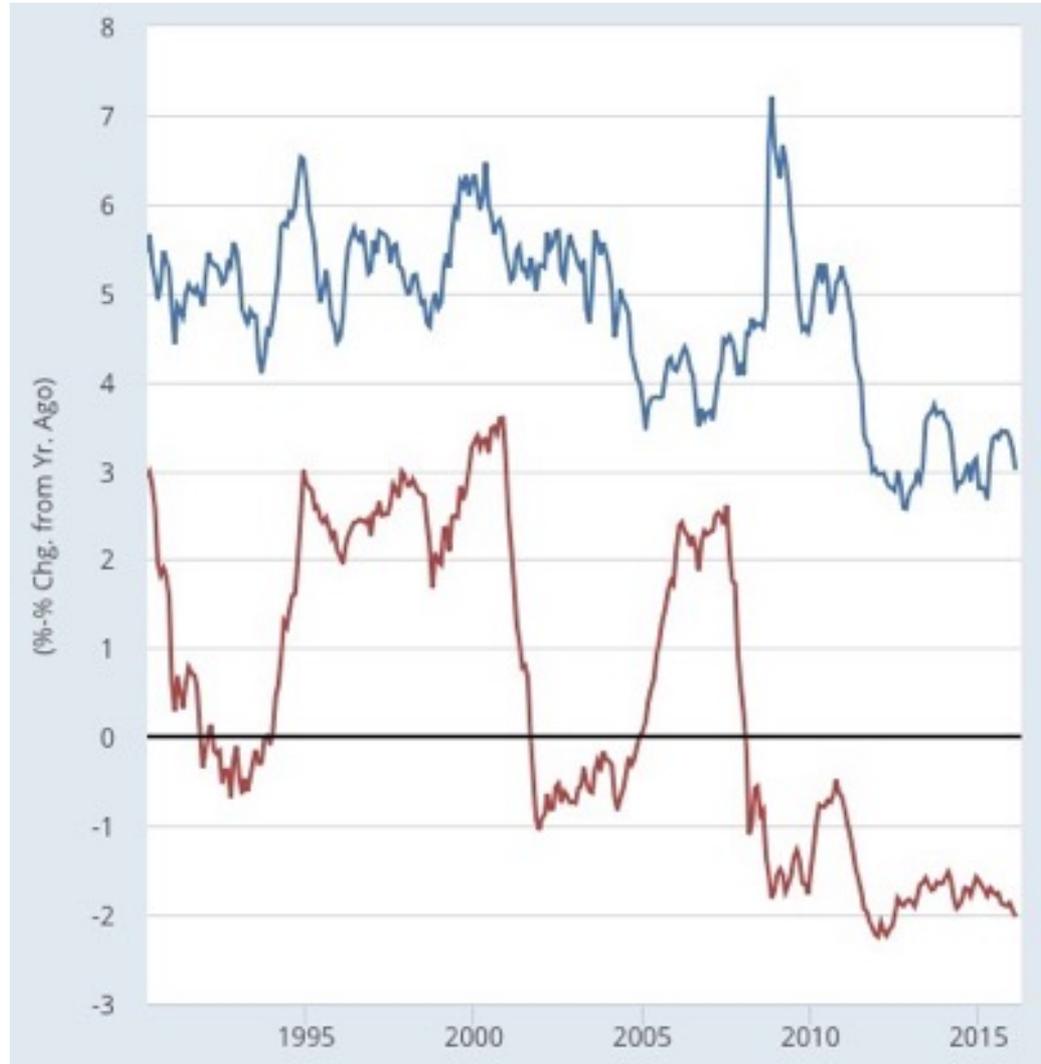
The Long-Term Interest Rate and the Federal Reserve II

- $r = i + \tau + \rho - \pi$
 - Term premium τ and risk premium ρ are jokers in the deck in the transmission mechanism from i to r
 - Fear that Fed will do something different in the future
 - Fear that Fed won't support the economy to keep companies from going bankrupt and defaulting on their debts
 - Plus the zero-lower bound: the fact that i cannot go below zero means that the interest rate r can never be less than $-\pi$



The Long-Term Real Risky Interest Rate and the Federal Reserve III

- Since 2008:
 - The Bernanke-Yellen Fed lowered the the short-term safe nominal interest rate as far as it could
 - Announced it was going to keep it low
 - Bought up a whole bunch of bonds
 - Maintained its 2.5%/year inflation target
 - And so found r still hanging up there at 3%/year



Review

April 13, 2016 8-9 AM
Wheeler Auditorium, U.C. Berkeley

Review: Our Enhanced Income-Expenditure Model

- $Y = E = C + I + NX + G$
- $C = c_0 + (c_y \times Y)$
- $I = I_0 - I_r \times r$
- $Y = \mu[c_0 + NX + I] + \mu G - (\mu I_r)r$
- with $\mu = 1/(1-c_y)$
- $Y = \mu[c_0 + NX + I_0 - I_r \times r] + \mu G - (\mu I_r)r$
- **$Y = \mu[c_0 + NX + I_0] + \mu G - (\mu I_r)r$**
- By changing G —fiscal policy—the government can stabilize the level of production and employment
- By influencing r —monetary policy—the Federal Reserve can stabilize the level of production and employment

Review: Our Enhanced Income-Expenditure Model II

- $Y = \mu \times [c_0 + I_0 + NX] + \mu \times G - (\mu I_r) \times r$
 - Y—GDP, should be equal to potential output, at level consistent with full employment, equal to total expenditure E
 - $[c_0 + I_0 + NX]$ —consumer confidence, plus business-investor confidence, plus net foreign demand for American products
 - μ —the multiplier, with $\mu = 1/(1-c_y)$
 - G—government purchases. A change ΔG in government purchases will (if nothing else is going on) cause a change $\Delta Y = \mu \Delta G$ in GDP
 - r—the real interest rate: $r = i + \rho + \tau - \pi$. If the Federal Reserve can induce a change Δr in the real interest rate, then (if nothing else is going on) that will cause a change $\Delta Y = (\mu I_r) \Delta r$ in GDP
 - The Federal Reserve *influences* r. The Federal Reserve *controls* i.

Our Enhanced Income-Expenditure Model III

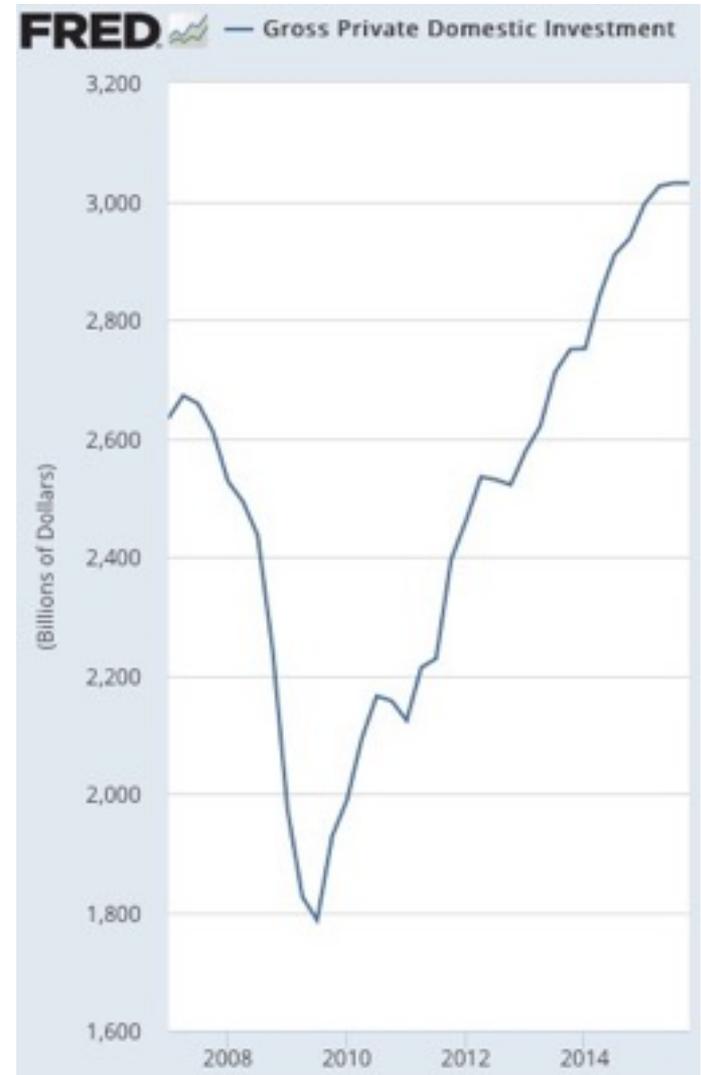
- Basic rule-of-thumb parameter values:
 - $\mu = 3$ —a multiplier of 3, corresponding to an mpc $c_y = 2/3$
 - $Y = \$18T$ —annual GDP, with a full-employment value of Y of $\$20T$ (if you are me) and of about $\$18T$ (if you are Janet Yellen)
 - $I_r = \$0.2T$ —a 1%-point decline in the real interest rate r should boost annual business investment spending by about $\$0.2T$

Monetary Policy: Application

April 13, 2016 8-9 AM
Wheeler Auditorium, U.C. Berkeley

To Your i>Clickers...

- Right now business investment spending—Gross Private Domestic Investment—I is \$3T/yr, and the long-term risky real interest rate r is 3%.
- If $I_r = \$0.2T$, what would investment I be if r were not 3% but 1%?
 - A. \$3.4T
 - B. \$2.6T
 - C. \$3.2T
 - D. \$2.8T
 - E. None of the Above



To Your i>Clickers...

- Right now business investment spending—Gross Private Domestic Investment—I is \$3T/yr, and the long-term risky real interest rate r is 3%.
- If $I_r = \$0.2T$, what would investment I be if r were not 3% but 1%?

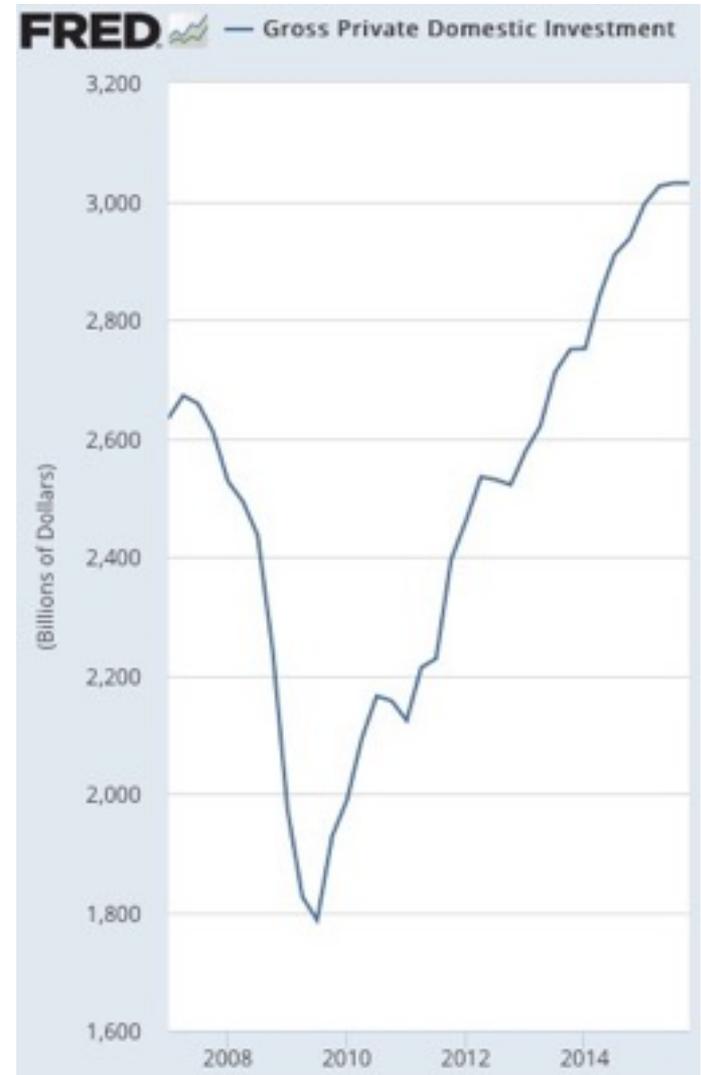
A. \$3.4T <<

B. \$2.6T

C. \$3.2T

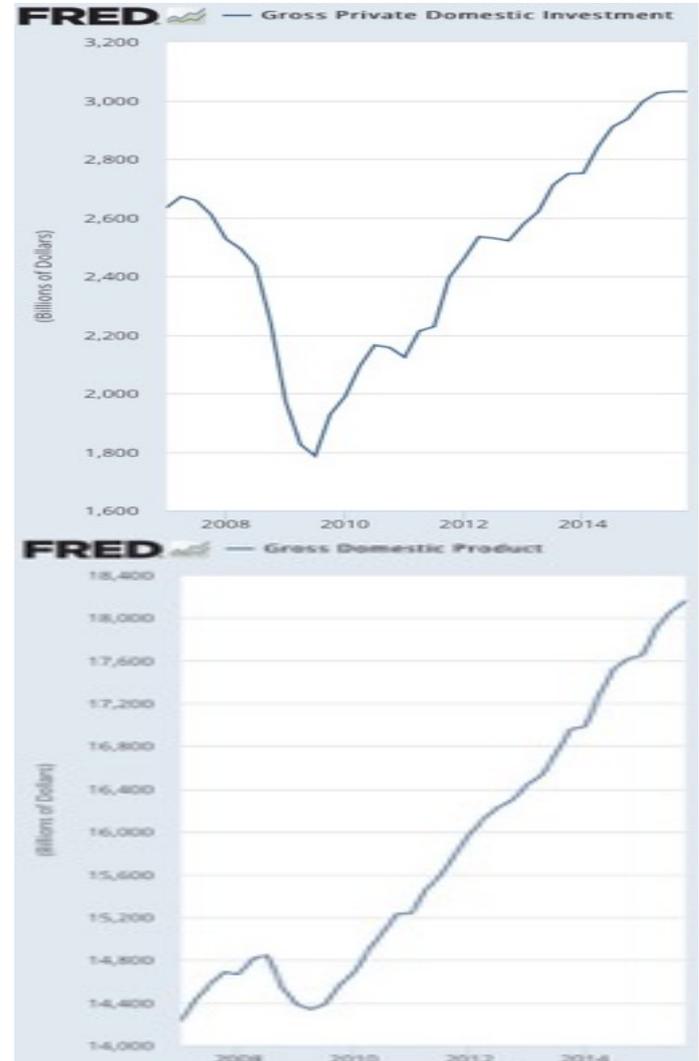
D. \$2.8T

E. None of the Above



To Your i>Clickers...

- Right now output—Gross Domestic Product—Y is \$18T/yr, and the long-term real interest rate is 3%.
- If $I_r = \$0.2T$ and $\mu = 3$, what would GDP Y be if r were not 3% but 1% and nothing else were to change?
 - A. \$19.2T
 - B. \$18.4T
 - C. \$21.4T
 - D. \$17.6T
 - E. None of the Above



To Your i>Clickers...

- Right now output—Gross Domestic Product—Y is \$18T/yr, and the long-term real interest rate is 3%.
- If $I_r = \$0.2T$ and $\mu = 3$, what would GDP Y be if r were not 3% but 1% and nothing else were to change?

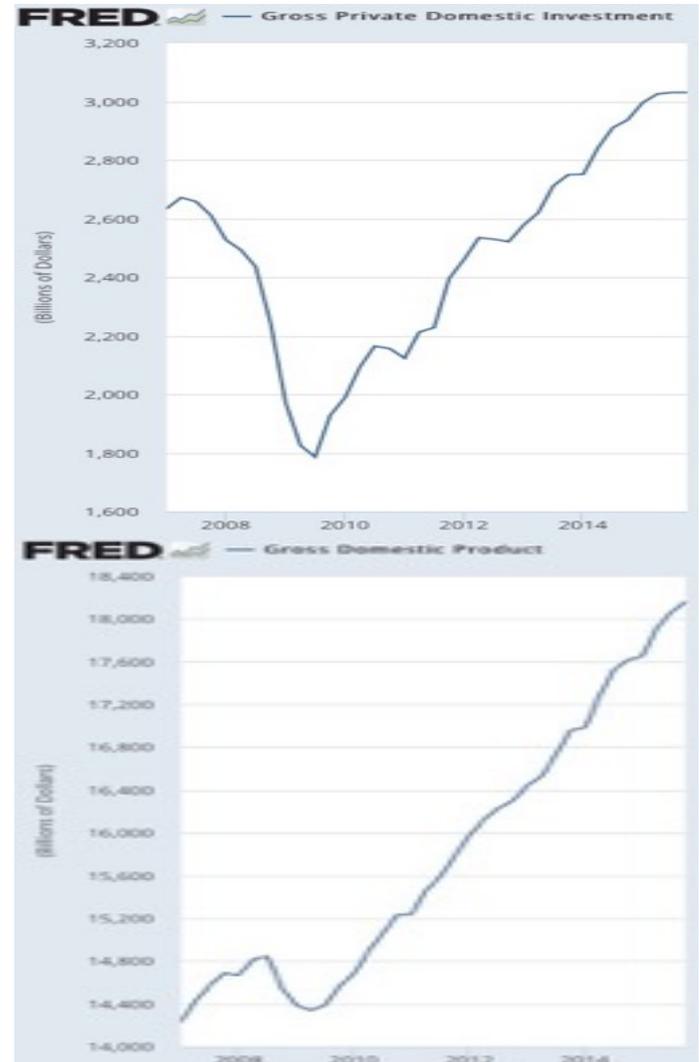
A. \$19.2T <<

B. \$18.4T

C. \$21.4T

D. \$17.6T

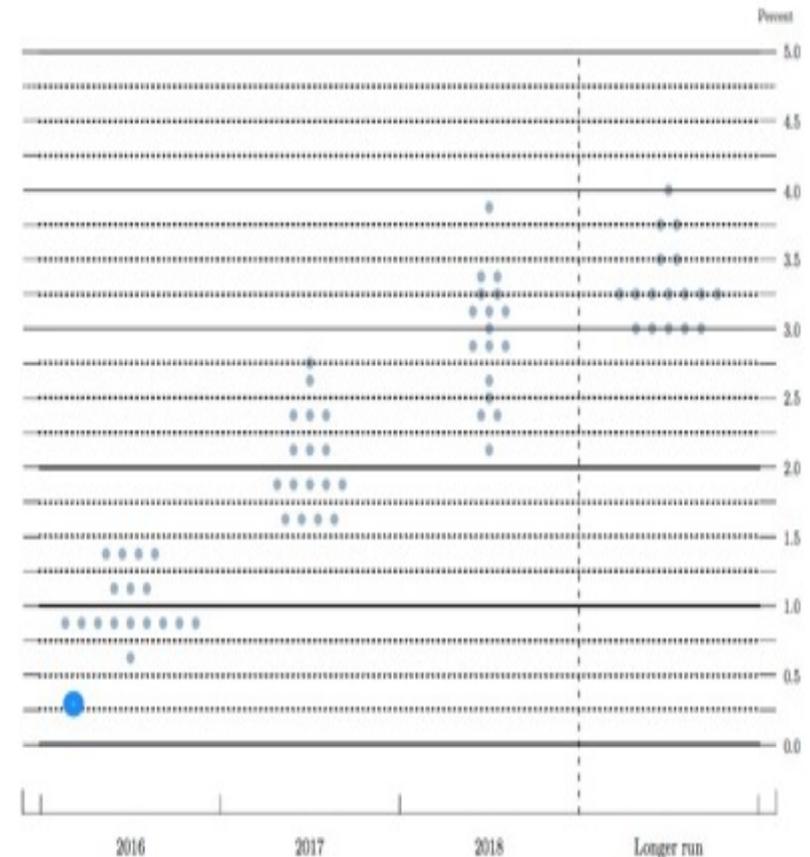
E. None of the Above



To Your i>Clickers...

- Over the next two years, the Fed is planning to raise i by 2.5%. If $I_r = \$0.2T$ and $\mu = 3$, by how much would such an increase in rates lower investment spending I , if half of the increase were passed through to r , and were nothing else to change?
 - $\$0.25T$
 - $\$5.75T$
 - $\$1.50T$
 - $\$0.75T$
 - None of the Above

Figure 2. FOMC participants' assessments of appropriate monetary policy: Midpoint of target range or target level for the federal funds rate

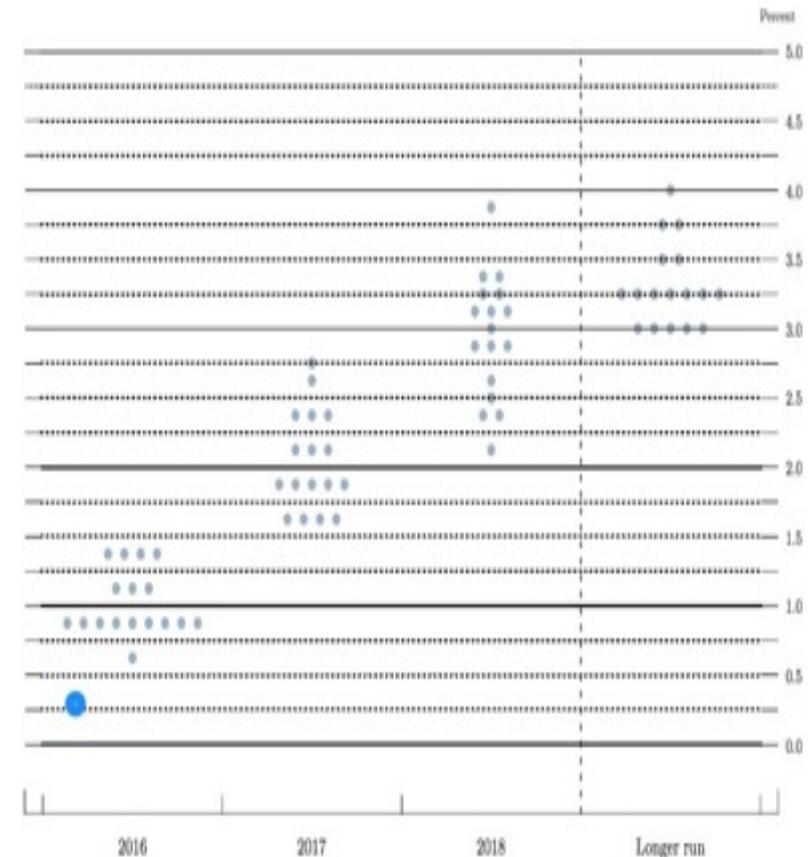


To Your i>Clickers...

- Over the next two years, the Fed is planning to raise i by 2.5%. If $I_r = \$0.2T$ and $\mu = 3$, by how much would such an increase in rates lower investment spending I , if half of the increase were passed through to r , and were nothing else to change?

- A. \$0.25T <<**
- B. \$5.75T
- C. \$1.50T
- D. \$0.75T
- E. None of the Above

Figure 2. FOMC participants' assessments of appropriate monetary policy: Midpoint of target range or target level for the federal funds rate



To Your i>Clickers...

- During the last three years of his term, 2011-2014, then Fed Chair Ben Bernanke repeatedly admonished Congress for being too eager to cut spending. Such spending cuts, Bernanke said:
 - A. Pushed interest rates down so far that the banking sector found itself unable to make enough money to cover the costs of servicing all of its ATMs.
 - B. Made it impossible for the Fed to guide the economy to full employment because of the downward drag cuts in G placed on the economy that it could not counteract
 - C. Risked a large increase in inflation in the future via unsustainable government finances
 - D. Required the Fed to push interest rates far down below long-term sustainable values in order to offset the effects of spending policy on GDP
 - E. None of the Above

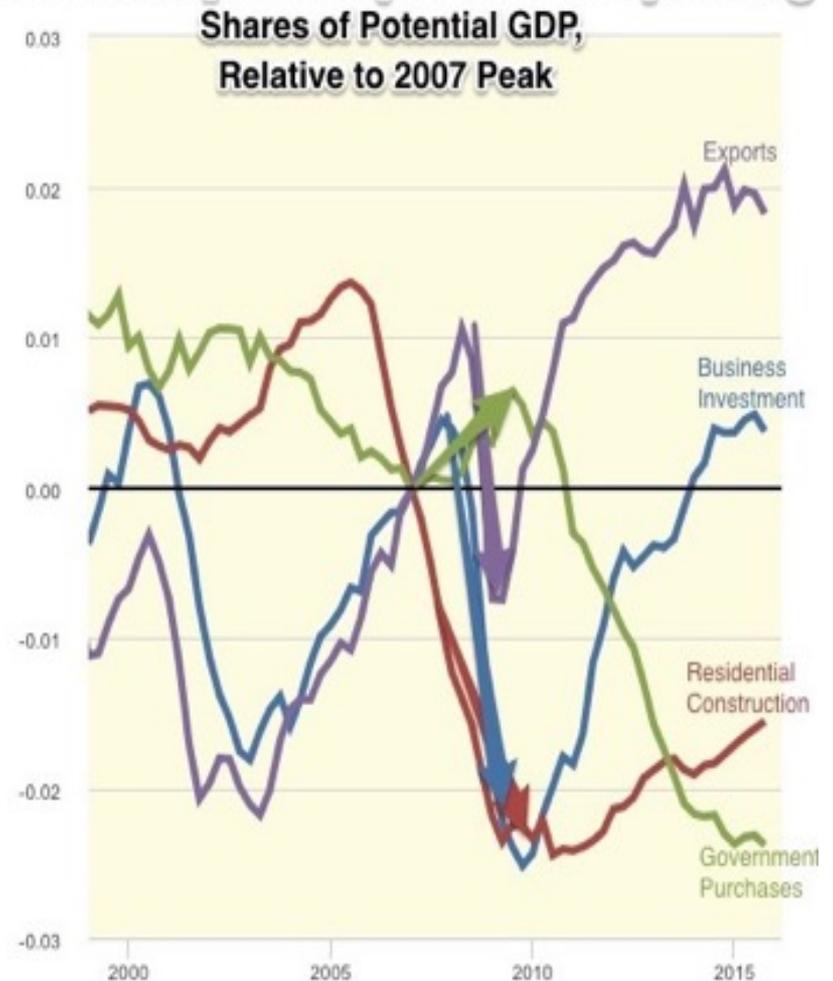
The “Neutral” Interest Rate

April 13, 2016 8-9 AM
Wheeler Auditorium, U.C. Berkeley

The “Neutral” Interest Rate

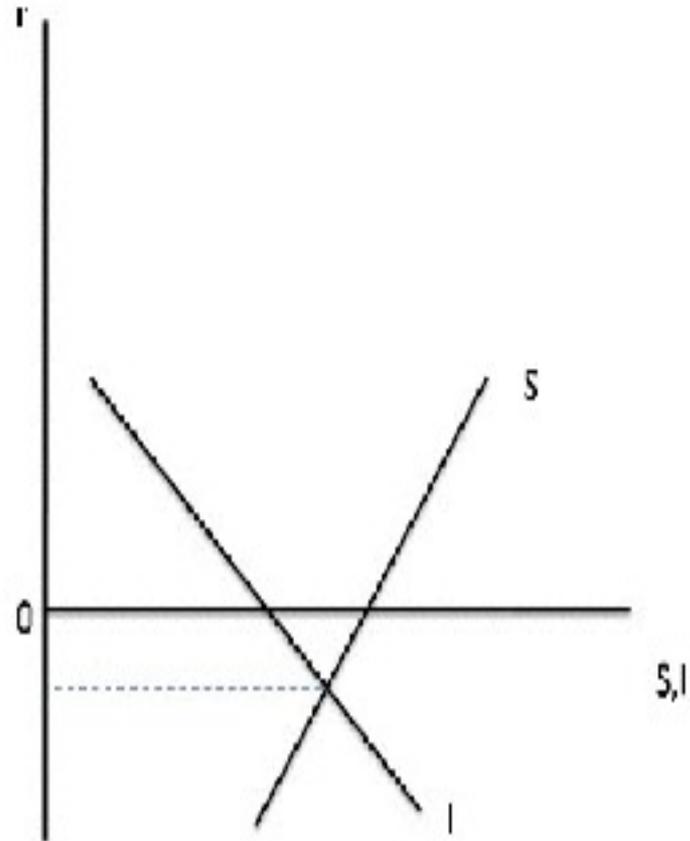
- Our enhanced model:
- $Y = \mu[c_0 + I_0 + NX] + \mu G - (\mu I_r)r$
- There is, at any point in time, a “full employment” level of GDP Y^*
- Substitute and solve for r and call it r^* :
- $r^* = [Y^*/\mu - (c_0 + I_0 + NX + G)]/I_r$
- r^* is the “neutral” real interest rate
- Can think of the Fed’s job as being to shift the money stock around in order to make the actual long-term risky real interest rate equal to this r^*

Four Principal Components of Spending



The “Neutral” Interest Rate II

- Can think of the Fed’s job as being to shift the money stock around in order to make the actual real interest rate equal to this r^*
- And you will often see, if you read Paul Krugman, a figure like this one here ($S=I$ is where $Y=E$, where income = expenditure \rightarrow)
- The point of this figure is to say that, in the economic conditions we have had since 2008 and have today, even an i of 0 is too high and keeps the actual interest rate above r^*
- (Yes, this is a confusing graph—PK should have labeled the vertical axis with an “ i ” rather than an “ r ”. This is a bad habit of MIT macro...)



In effect, we have an incipient excess supply of savings even at a zero interest rate. And that’s our problem.