

IAS 107 Lecture: Inflation Economics II

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IAS107 Lecture Notes

http://delong.typepad.com/berkeley_econ_101b_spring/

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Resolution for screencast capture: 1024x768

Assignments

- Problem Set 7 due April 5, 11 am
- April 7 class
- April 14 take-home assignment...
 - Due April 19 at start of class

#1: Ladies and Gentlemen, to Your i>Clickers...

- **About how much bigger is total world GDP now than it was 10,000 years ago?**
 - A. About 14 times bigger
 - B. About 17000 times bigger
 - C. About 1200 times bigger
 - D. It's a silly question: you cannot possibly make such comparisons.
 - E. It's a silly question: what the answer is depends on what your tastes and preferences are, and everybody is different.

#2: Ladies and Gentlemen, to Your i>Clickers...

- **What is the unemployment rate right now?**
 - A. 9.4%
 - B. 8.9%
 - C. 6.2%
 - D. 12.3%
 - E. 23.4%

#3: Ladies and Gentlemen, to Your i>Clickers...

- **Why is Say's Law—Jean-Baptiste Say's claim back in 1803 that if there was deficient demand for some goods and services there was equal excess demand for others—wrong?**
 - A. Because wages are sticky downward
 - B. Because people spend their incomes not just on currently-produced goods and services but on financial assets
 - C. Because financial panics disrupt the web of credit on which full employment depends
 - D. Because adverse supply shocks render important pieces of the capital stock valueless
 - Because overinvestment renders important pieces of the capital stock valueless

#4: Ladies and Gentlemen, to Your i>Clickers...

- From the equation that was the solution to our growth model: $Y/L = (s/(n+g+\delta))^{\alpha/(1-\alpha)}E$;
- Suppose $E=\$25000/\text{year}$, $s=0.21$, $n=0.01$, $g=0.02$, $\delta=0.04$, and $\alpha=1/2$; what then is Y/L ?
- A. $\$75,000/\text{year}$
- B. $\$250,000/\text{year}$
- C. $\$60,000/\text{year}$
- D. $\$90,000/\text{year}$
- E. $\$120,000/\text{year}$

To Your iClickers...

$$Y = \frac{c_0 + I + G + GX}{1 - (1 - t)c_y + im_y}$$

- Suppose $I = \$2$ trillion, $G = \$2$ trillion, $GX = \$2$ trillion, $im_y = 0.267$, $c_y = 0.8$, $t = 0.25$, $c_0 = \$2$ trillion. What is Y going to be?
- A. \$13.5 trillion
- B. \$22.5 trillion
- C. \$12.0 trillion
- D. \$17.5 trillion
- E. \$20.0 trillion

To Your iClickers...

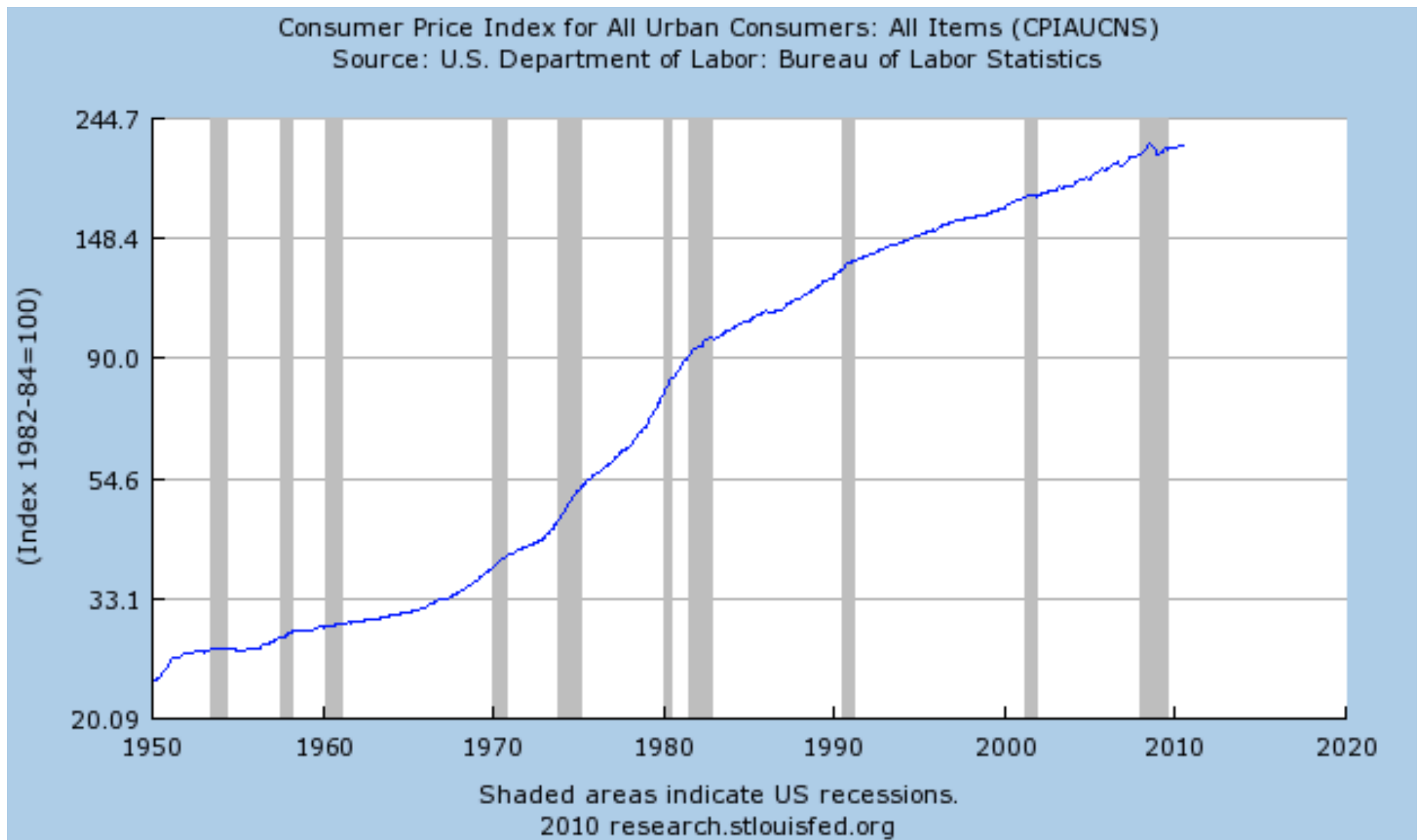
$$\Delta Y = \frac{\Delta A_0 + \Delta G - (I_r + X_\varepsilon \varepsilon_r) \Delta r}{1 - (1 - t)c_y + im_y}$$

- Suppose $im_y=0.1$, $c_y=0.8$, $t=0.25$, $I_r=25$, $X_\varepsilon=1$, $\varepsilon_r=5$. Suppose that the Federal Reserve and financial markets together raise the long-term risky real interest rate r by 3%. What will happen to Y ?
- A. Y will rise by \$1.5 trillion/year
- B. Y will fall by \$1.5 trillion/year
- C. Y will rise by \$1.8 trillion/year
- D. Y will fall by \$1.8 trillion/year
- E. Y will fall by \$2.4 trillion/year

Inflation Economics II

J. Bradford DeLong

The Consumer Price Index

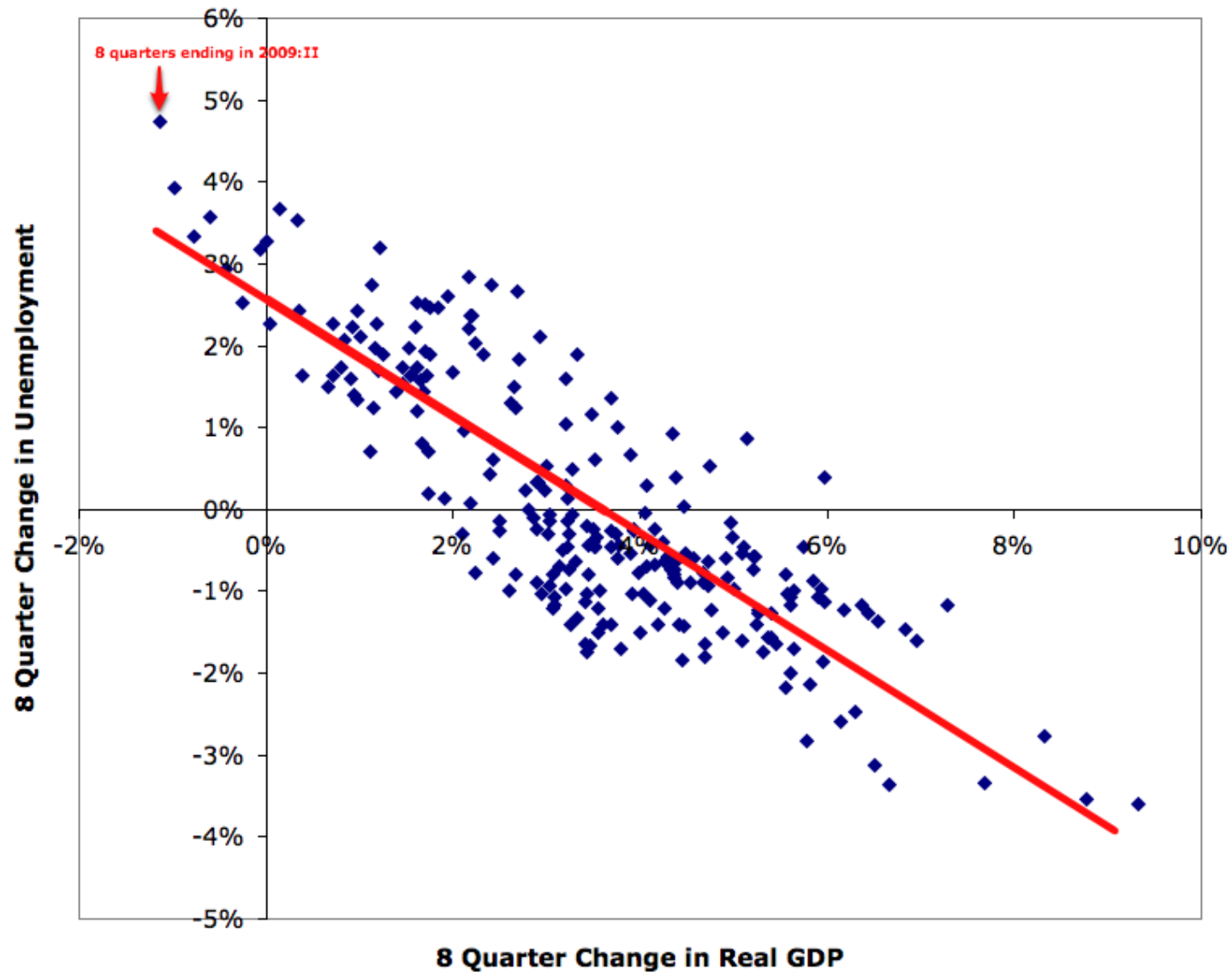


The Inflation Rate



Okun's Law

8 Quarter Changes in Real GDP and Unemployment since 1948



Okun's Law

- $\Delta u = -0.5 \times (\Delta Y/Y - n - g)$
- $\Delta u = -0.5 \times (\Delta Y/Y - 2.6\%)$
- $u - u^* = 0.5 \times (1 - Y/Y^*)$

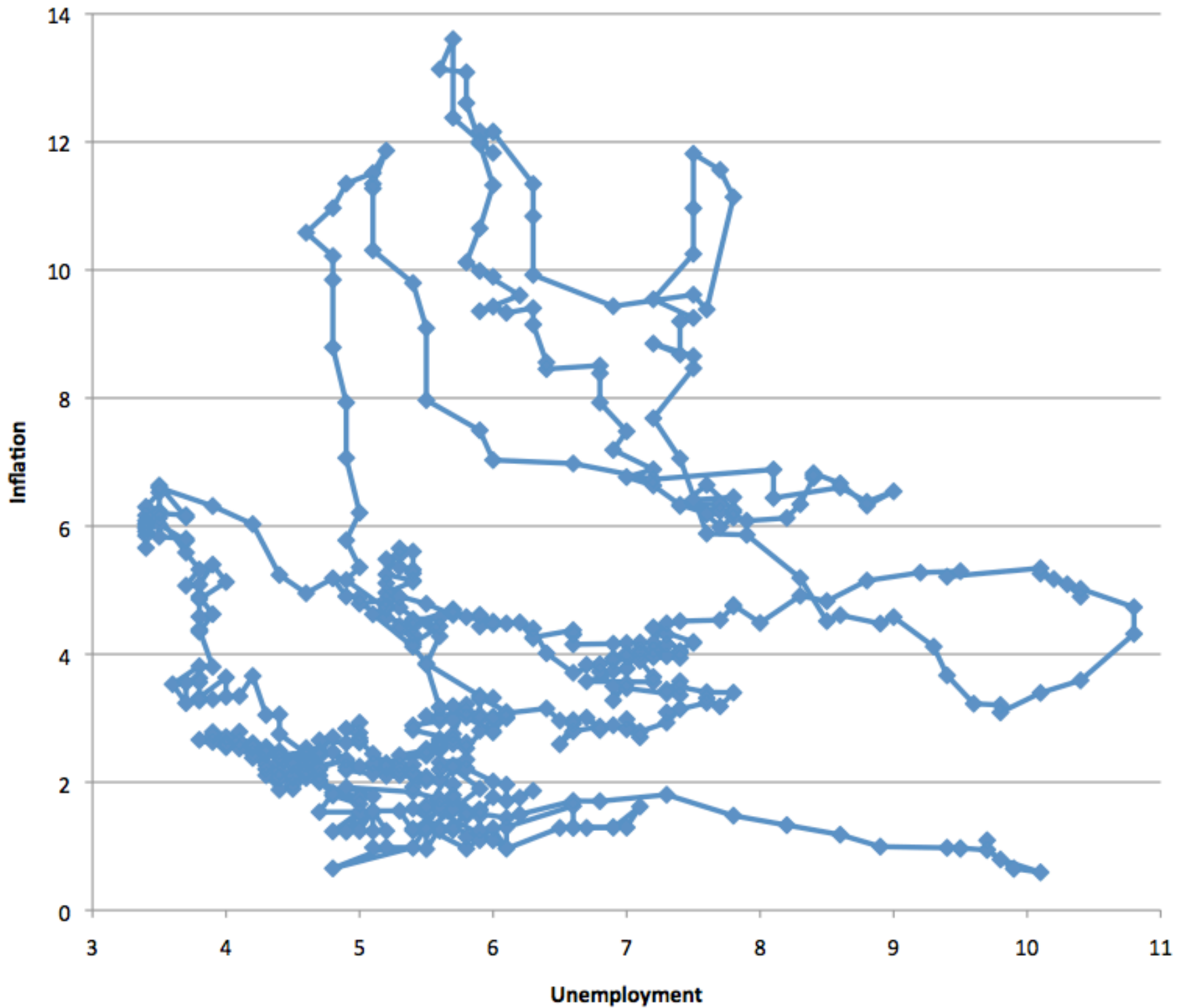
The Phillips Curve

- π : inflation
- $(P(t)-P(t-1))/P(t-1) = \pi(t)$
- $E(\pi)$: expected inflation:
- u : unemployment rate
- u^* : the “natural” rate of unemployment, the NAIRU
- $\pi = E(\pi) + \beta(u^* - u)$

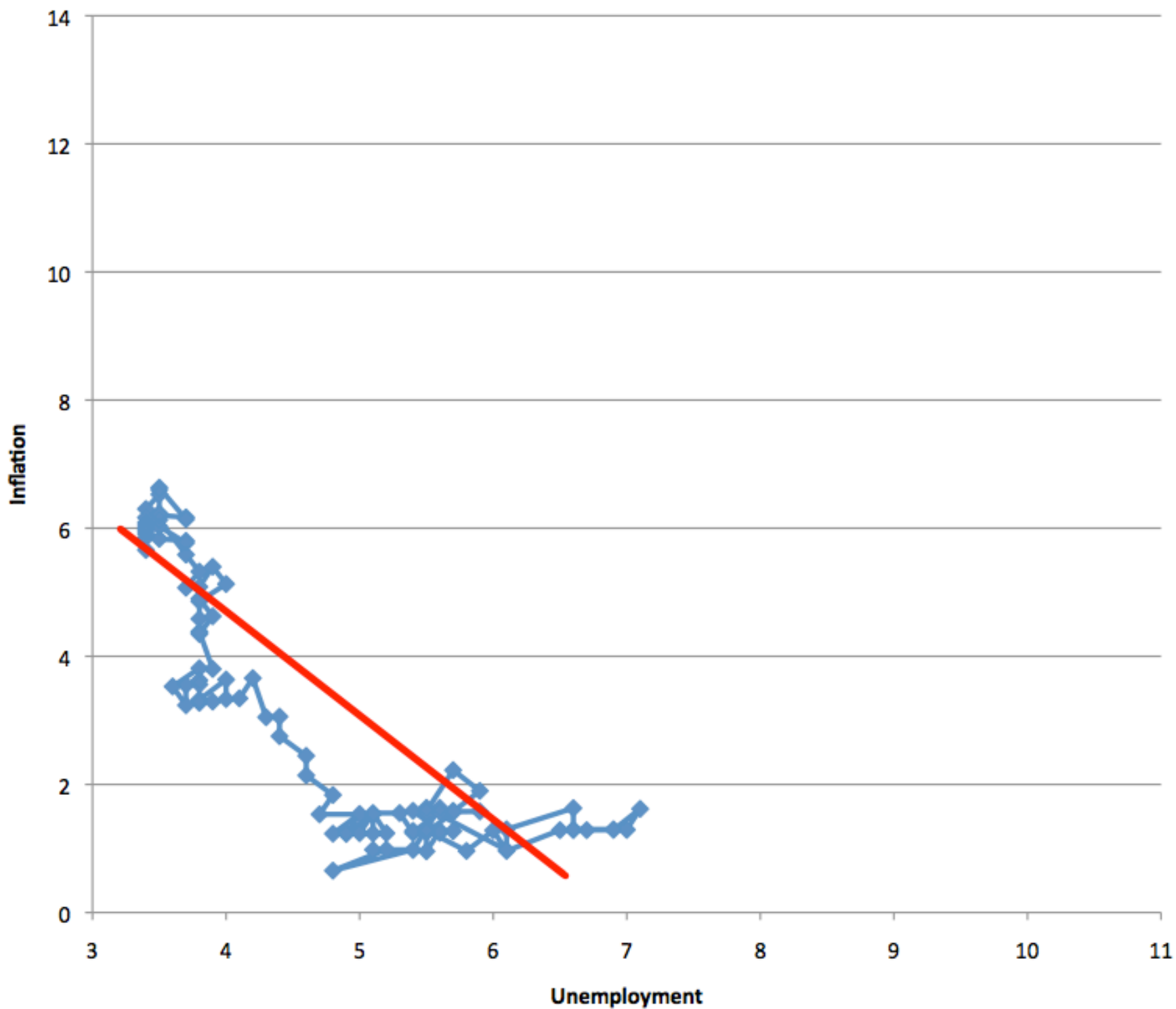
Ladies and Gentlemen, to Your iClickers...

- If the natural rate of unemployment is 5%, expected inflation is 4%/year, the parameter B governing the slope of the Phillips curve is $\frac{1}{2}$, and the actual unemployment rate is 8%, what is the inflation rate going to be?
 - A. 4%/year
 - B. 7%/year
 - C. 5.5%/year
 - D. 2.5%/year
 - E. 1%/year

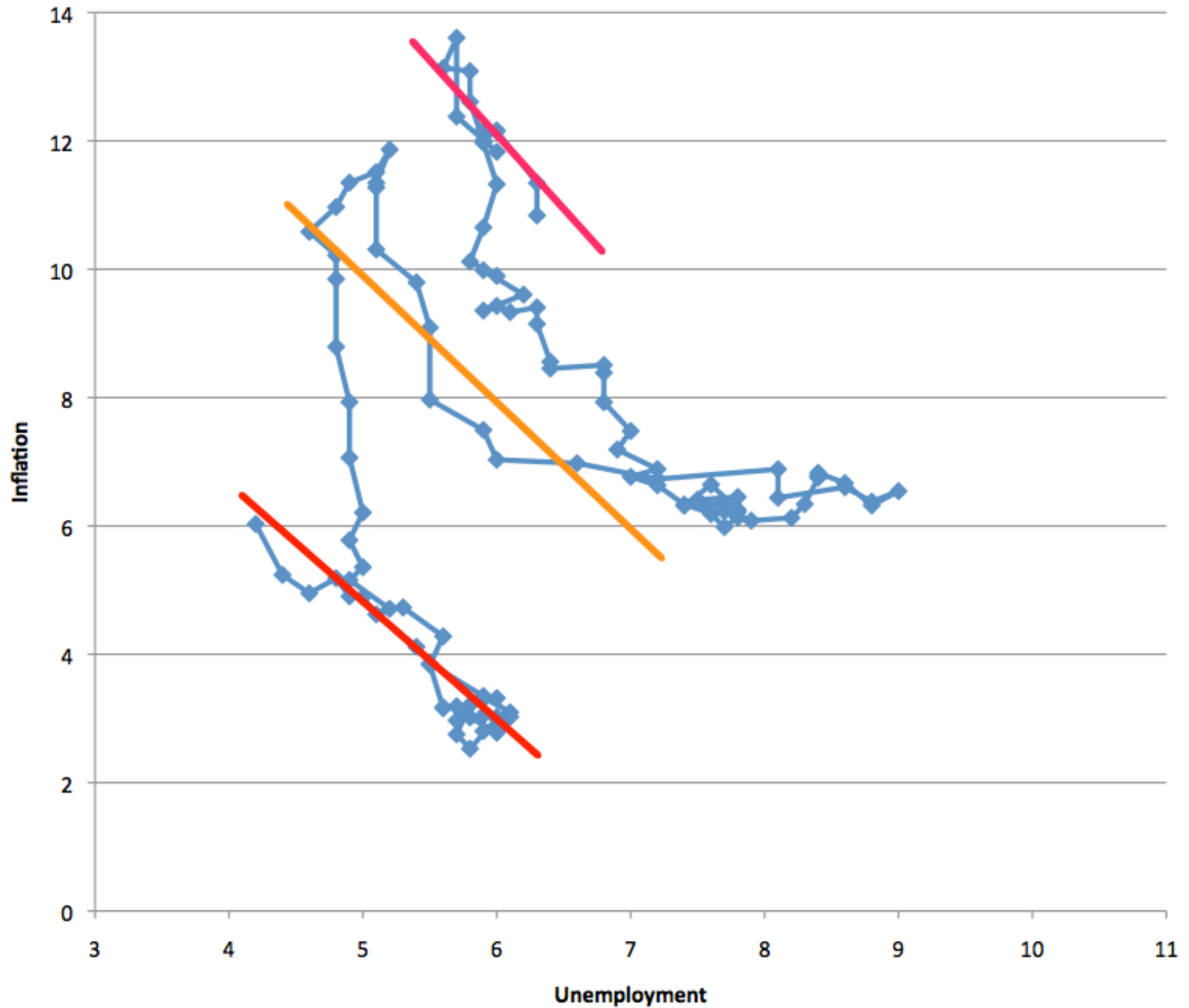
Inflation and Unemployment



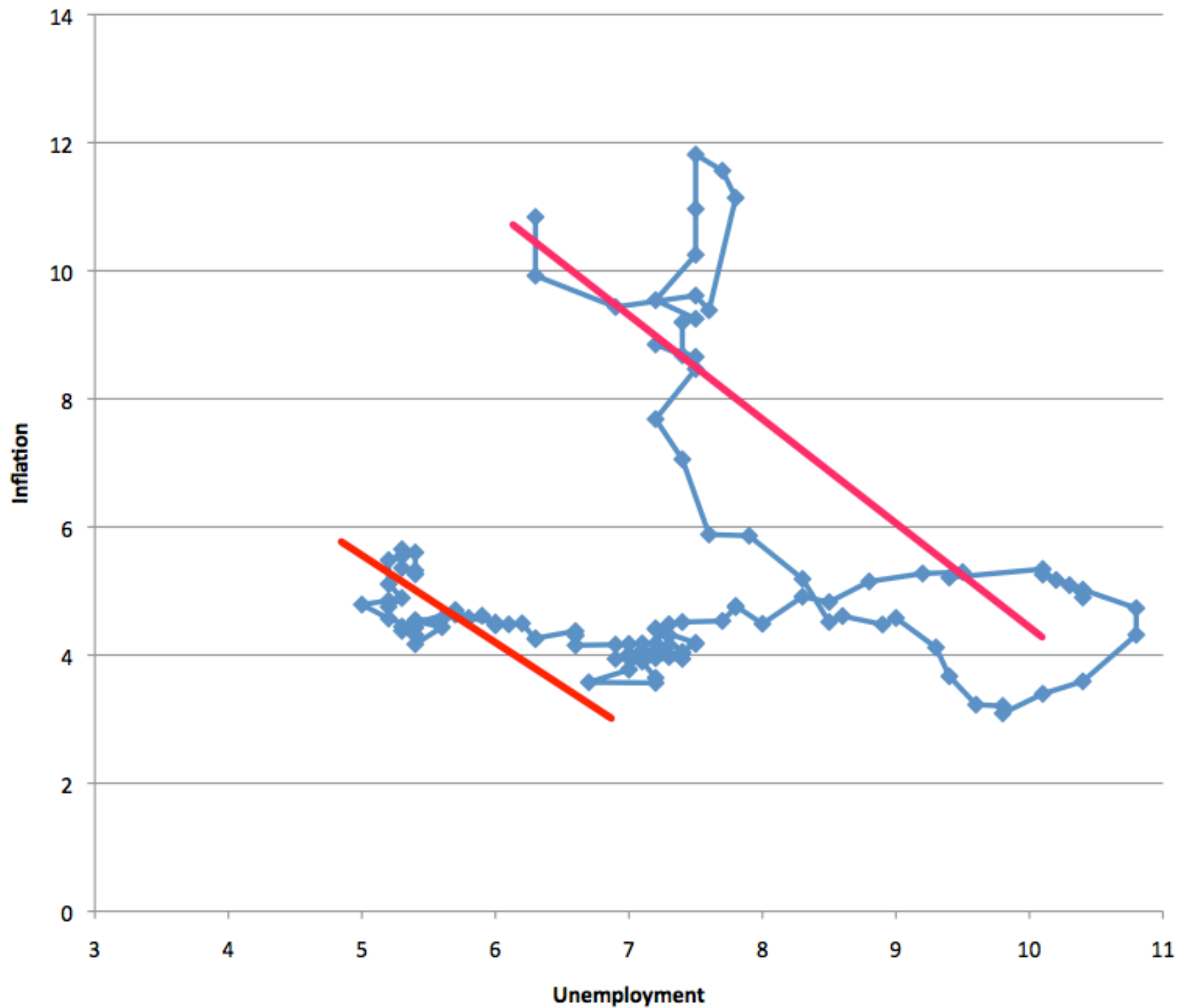
Inflation and Unemployment: 1960s



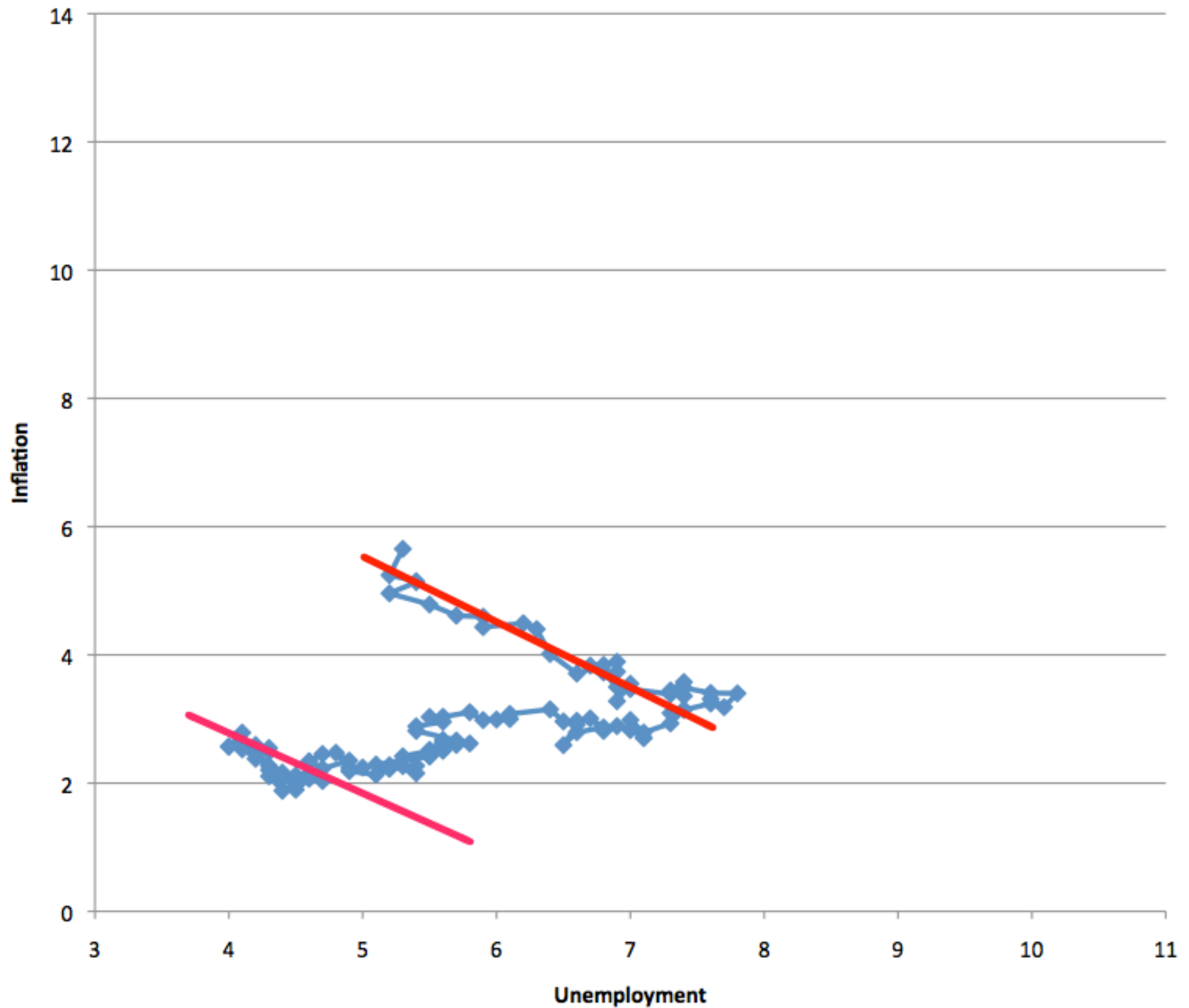
Inflation and Unemployment: 1970s



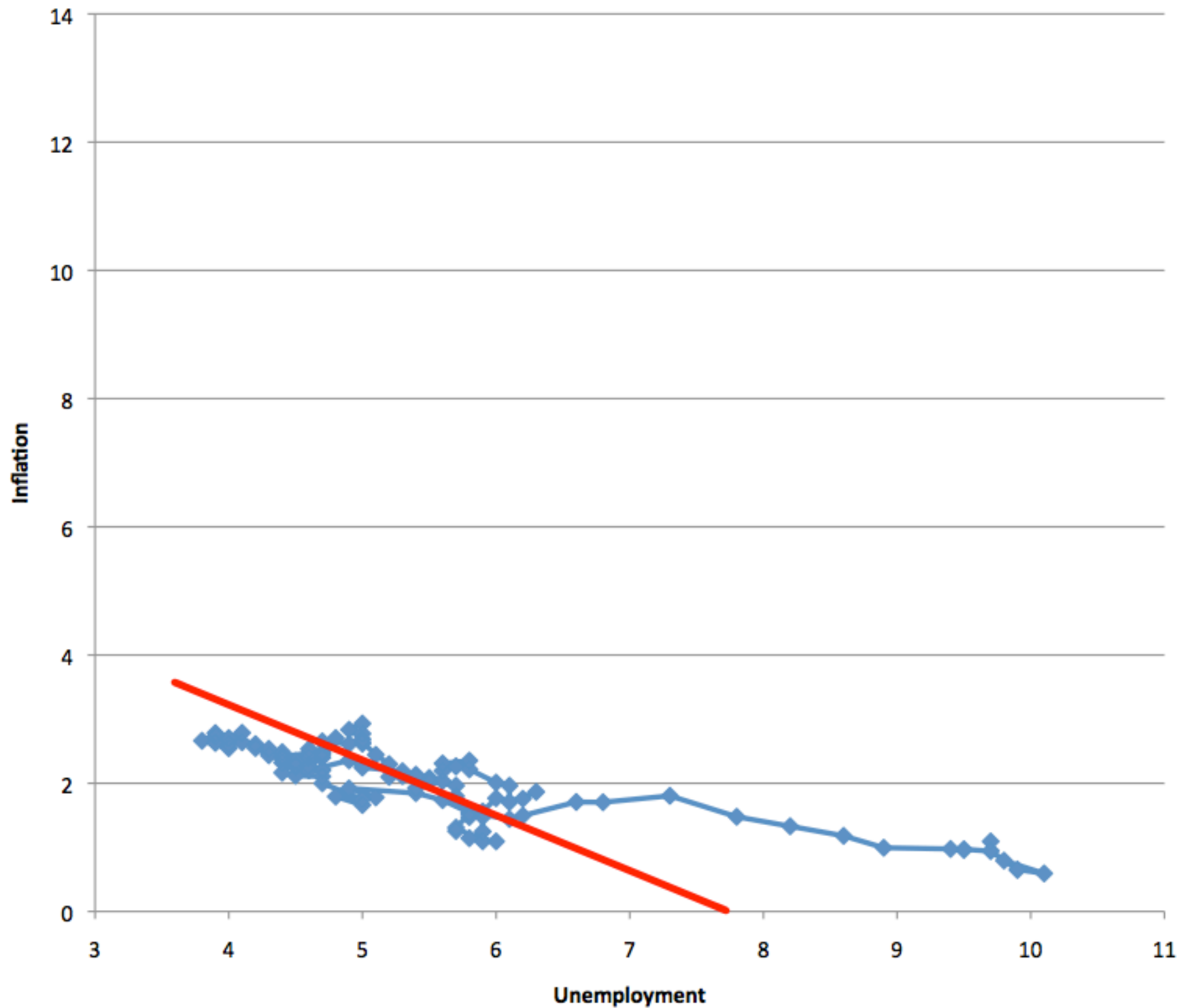
Inflation and Unemployment: 1980s



Inflation and Unemployment: 1990s



Inflation and Unemployment: 2000s



Ladies and Gentlemen, to Your i>Clickers...

- The Phillips Curve Is:
 - A. One of the most armor-plated, reliable, stable findings in all empirical economics
 - B. Too uncertain to be relied on
 - C. Tells you little about what will happen to inflation next year—hence ignorable
 - D. Tells you a lot about what will happen if unemployment stays high (or low) for even half a decade—hence essential
 - E. About to be tested: will the U.S. see actual deflation as it has never seen it since the Great Depression itself?

Why Does It Matter?

- Should we care about inflation?
- I mean, if wages and prices rise at about the same amount, why is it a problem?
- Why would anybody ever do what Paul Volcker did in 1982—deliberately trigger a nasty episode of depression economics in order to push inflation down?

Ladies and Gentlemen, to Your i>Clickers...

- Which Star Trek movie grossed the most, controlling for inflation?
 - A. Star Trek: The Motion Picture
 - B. Star Trek (2009)
 - C. Galaxy Quest
 - D. Star Trek II: The Wrath of Kahn
 - E. Star Trek IV: Star Trek at the Monterey Bay Aquarium

The Numbers

- STTMP: \$82
- STWK: \$79
- STSP: \$76
- STVH: \$110
- STFF: \$52
- STUC: \$75
- STG: \$76
- STFC: \$92
- STI: \$70
- STN: \$43
- ST (Reboot): \$258

The Inflation-Adjusted Numbers

- STTMP: \$262
- STWK: \$181
- STSP: \$163
- STVH: \$217
- STFF: \$93
- STUC: \$121
- STG: \$112
- STFC: \$129
- STI: \$93
- STN: \$52
- ST (Reboot): \$258

Inflation Deranges the Price System

- A market economy works by people using prices to calculate what to do
- And a market economy works well when prices reflect actual social values and scarcities
 - That is, when low-priced things are “cheap” in the sense that they use up little of our resources; and high-priced things are “valuable” and hence worth making
- Inflation makes these calculations difficult, and error-ridden

Inflation Is Unjust: John Maynard Keynes

- Lenin is said to have declared that the best way to destroy the capitalist system was to debauch the currency. By a continuing process of inflation, governments can confiscate, secretly and unobserved, an important part of the wealth of their citizens. By this method they not only confiscate, but they confiscate arbitrarily; and, while the process impoverishes many, it actually enriches some.

Inflation Is Unjust: John Maynard Keynes

- The sight of this arbitrary rearrangement of riches strikes not only at security, but at confidence in the equity of the existing distribution of wealth. Those to whom the system brings windfalls, beyond their deserts and even beyond their expectations or desires, become 'profiteers,' who are the object of the hatred of the bourgeoisie, whom the inflationism has impoverished, not less than of the proletariat.

Inflation Is Unjust: John Maynard Keynes

- As the inflation proceeds and the real value of the currency fluctuates wildly from month to month, all permanent relations between debtors and creditors, which form the ultimate foundation of capitalism, become so utterly disordered as to be almost meaningless; and the process of wealth-getting degenerates into a gamble and a lottery.

Inflation Is Unjust: John Maynard Keynes

- Lenin was certainly right. There is no subtler, no surer means of overturning the existing basis of society than to debauch the currency. The process engages all the hidden forces of economic law on the side of destruction, and does it in a manner which not one man in a million is able to diagnose.

Inflation Is Unpopular

- Arthur Okun and the “Misery Index”
- The defeat of Gerald Ford
- The defeat of Jimmy Carter
- The defeat of James Callaghan
- The reelection victory of Ronald Reagan
- The reelection victory of Margaret Thatcher

Ladies and Gentlemen, to Your i>Clickers...

- Which do you think is the most important reason to try to avoid even moderate inflation—say, 8% per year?
 - A. Inflation destabilizes the price system
 - B. Inflation is unfair
 - C. Because inflation is unfair it destabilizes the government and support for the market economy in general
 - D. Inflation is unpopular and tends to lead to the defeat of politicians currently in office
 - E. Even moderate inflation is unstable: a government that will tolerate 8% inflation will tolerate 10%, and a government that will tolerate 10% inflation will tolerate 12%, and things then unravel...

The Federal Reserve System

- The Federal Reserve Board
 - Chair (4-yr term)
 - Vice Chair (4-yr term)
 - Four members
- The FOMC
 - Chair of Fed is Chair of FOMC
 - President of FRBNY is Vice Chair of FOMC
 - Six FRB members are voting members of FOMC
 - Eleven other regional bank presidents
 - Four of whom vote in any given year

The Federal Reserve

- Moves by consensus
- Was scarred by the inflationary episode of the 1970s
- Was further scarred by the depth of the recession of the 1982 “Volcker disinflation” downturn
- Is outside of its comfort zone right now

Normal Federal Reserve Procedures

- Increase the money supply by buying short-term U.S. Treasury bonds for cash
- Decrease the money supply by selling short-term U.S. Treasury bonds for cash
- Occasionally loan via the “discount window”
- Clear checks
- Regulate banks
 - The money multiplier μ : how many dollars of liquid checking account deposits are banks willing to make for each dollar of bank reserves R ?

Controlling the Money Stock

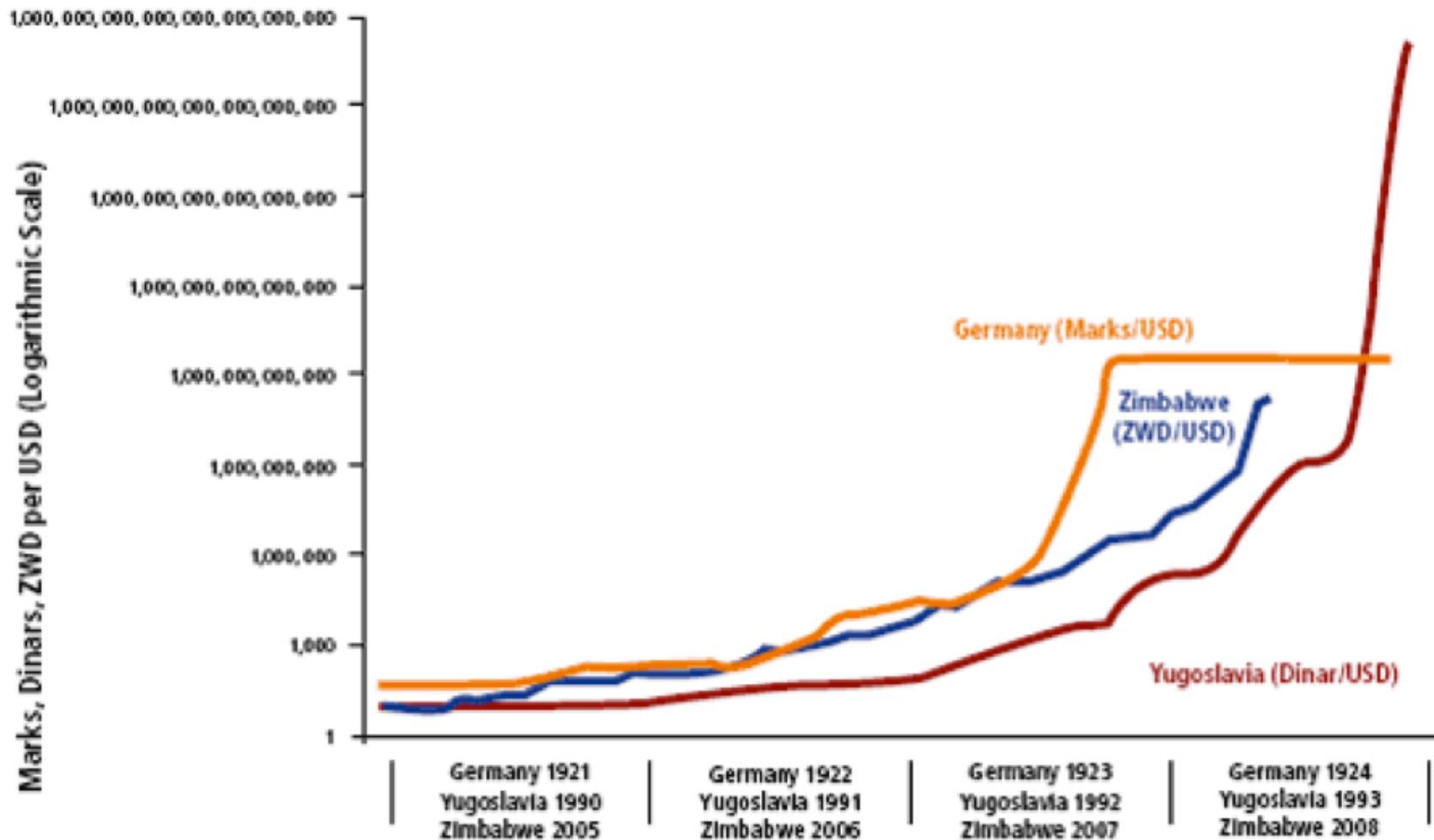
- “Money” = “assets people are holding only because they are ways of paying for things that they buy”
- The Federal Reserve makes money: “high powered money”
 - It does so by buying bonds and paying for them with:
 - Cash which the Treasury prints
 - Deposits which the Federal Reserve simply announces exist
- Banks offer individuals and businesses checking accounts
 - The proportionality between checking accounts and bank reserves
 - Are checking deposits too high relative to reserves? Banks can and do make them less attractive...
- $M = \mu R$
 - μ for the money multiplier, determined by banking system behavior
 - R for high powered money, determined by the central bank

Why Would Anybody Allow Inflation?

- If you want to stop inflation, simply stop letting the money stock increase
- But what if people expect inflation? Then not fulfilling those expectations will create high unemployment
- And what if you want to goose the economy?
Richard Nixon
- And what if the government spends but cannot tax
 - It can borrow for a while
 - But then?

Hyperinflation

Mugabe vs Milosevic



Sources:

(Marks/USD) - Thomas J. Sargent, *Rational Expectations and Inflation*, 2nd ed.

(New York: Harper Collins, 1993); (Dinar/USD) - Steve Hanke; (ZWD/USD) - Imara Asset Management Zimbabwe

\$Z100,000,000,000,000



Ladies and Gentlemen, to Your i>Clickers...

- At the start of 2005, \$1=\$Z10. By the end of 2008, \$1=\$Z1,000,000,000,000,000,000,000,000,000,000,000,000,000,000. What was the average rate of inflation in % per day over those four years?
 - A. 1% per day
 - B. 4% per day
 - C. 10% per day
 - D. 100% per day
 - E. 1000% per day

An Answer: The Arithmetic of Compound Growth...

- $e = 2.71828$
 - A number growing at $k\%$ per day equals $e^{(kT)}$ after T days...
 - $10^3 = e^7$ more-or-less (actually $e^7=1096.7$)
- $10 = 10^1 = e^{(2.3)}$
- $1,000,000,000,000,000,000,000,000 = 10^{24} = e^{(56)}$
- 1460 days...
- Grow at 1% per day then after 1460 days $= e^{(14.6)}$
- 56 is four times as big as 14
 - So the Zimbabwean price level is growing 4 times as fast, so 4% per day...

Inflation and Central Bank Reactions

J. Bradford DeLong

Suppose We Have a Situation...

- The central bank thinks inflation is too high...
- It wants to do something about it...
- It moves cautiously...
 - It raises the short-term safe nominal interest rate it controls via contractionary open market operations—sales of bonds for cash
 - It promises to continue this policy
 - Long-term real interest rates rise
 - Investment spending and exports fall
 - GDP falls
 - The unemployment rate rises

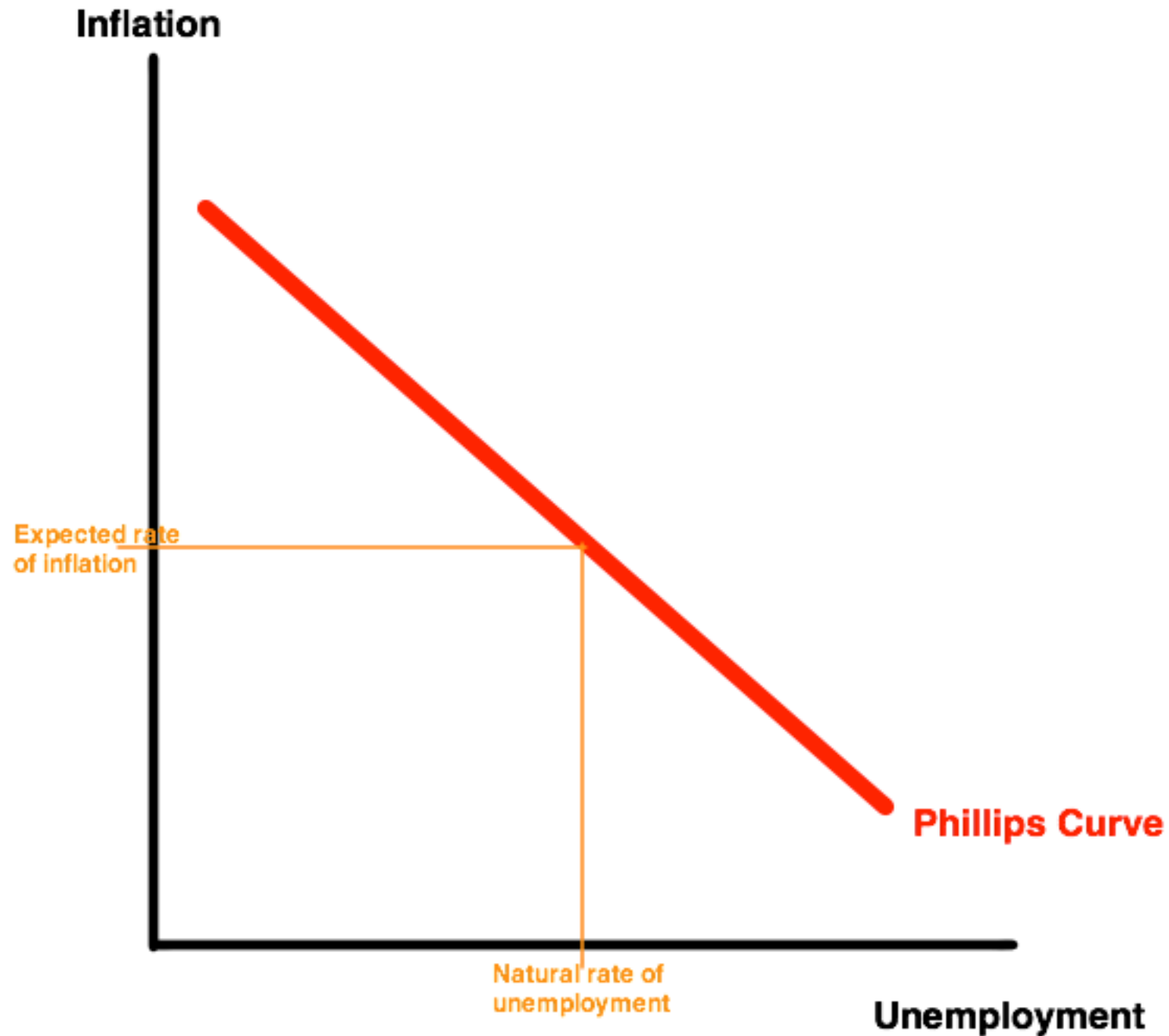
For Simplicity...

- Suppose that the central bank can set the inflation rate wherever it wishes
 - It can't, not really: it can try, but there is a lot of error and slack in this process of trying to curb inflation by provoking unemployment
- We have our Phillips Curve, and we also have a monetary policy reaction function:

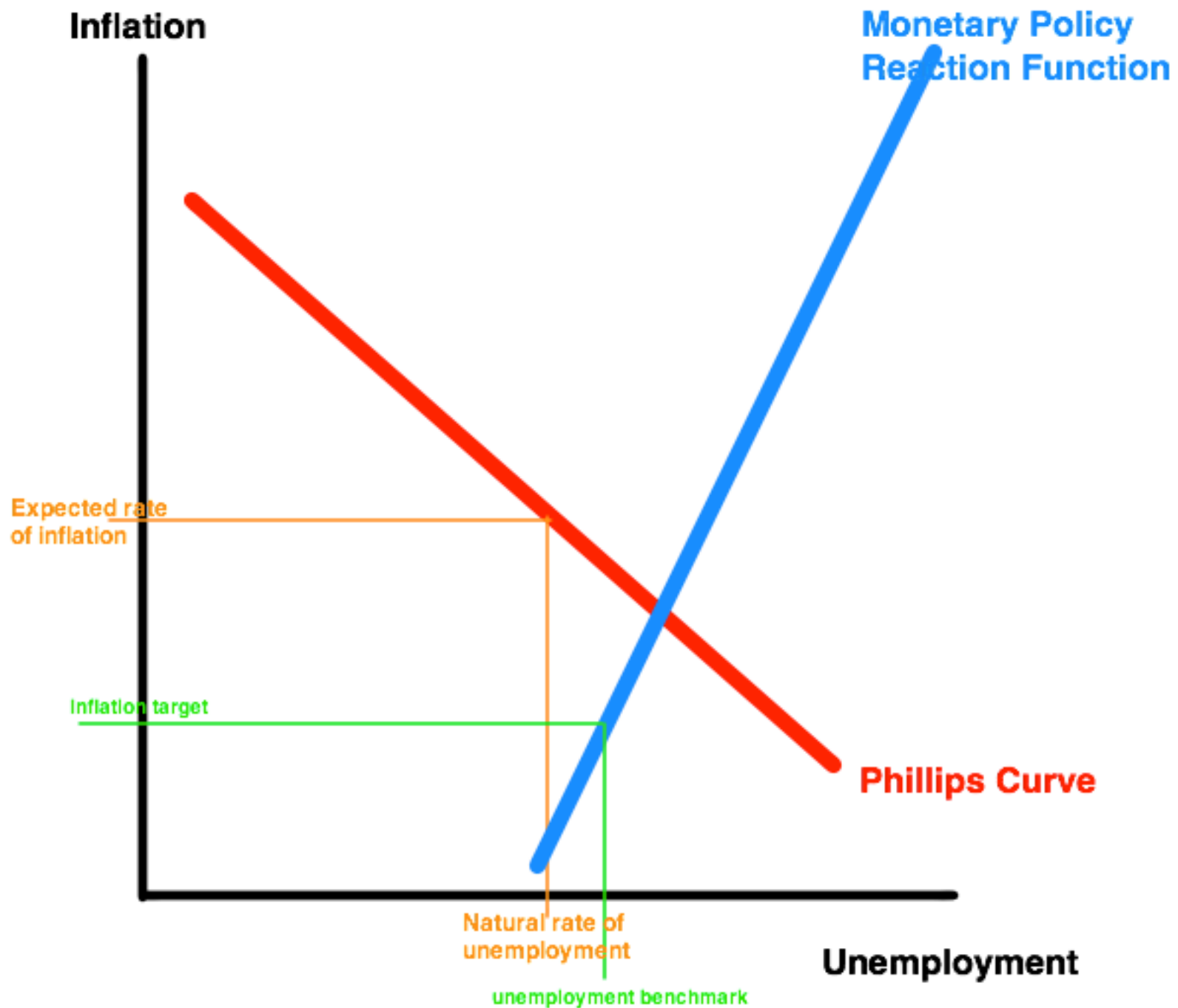
$$\pi = \pi^e + \beta(u^* - u) \quad :: \text{Phillips Curve}$$

$$u = u_0 + \phi(\pi - \pi^t) \quad :: \text{Monetary Policy Reaction Function}$$

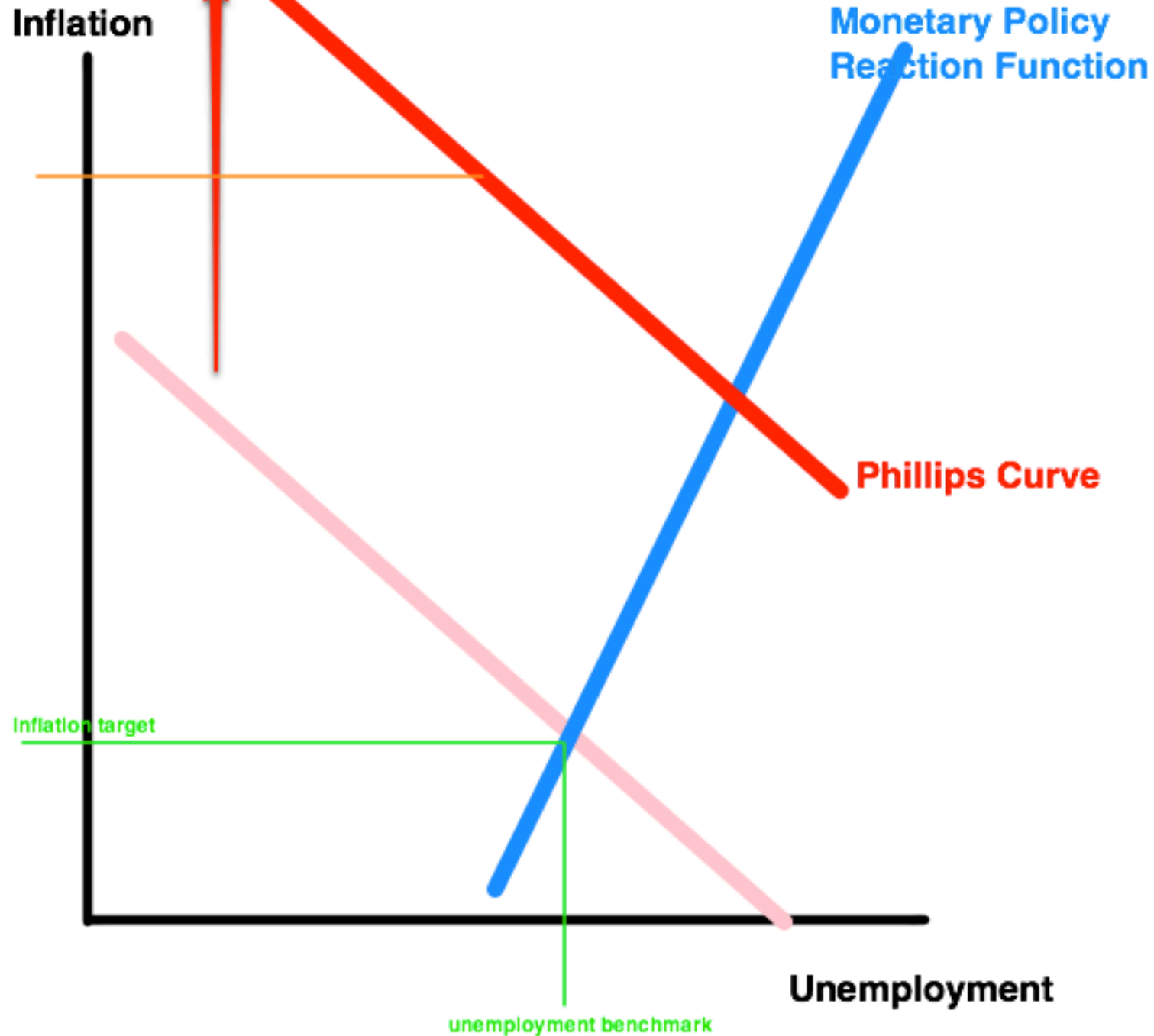
Phillips Curve



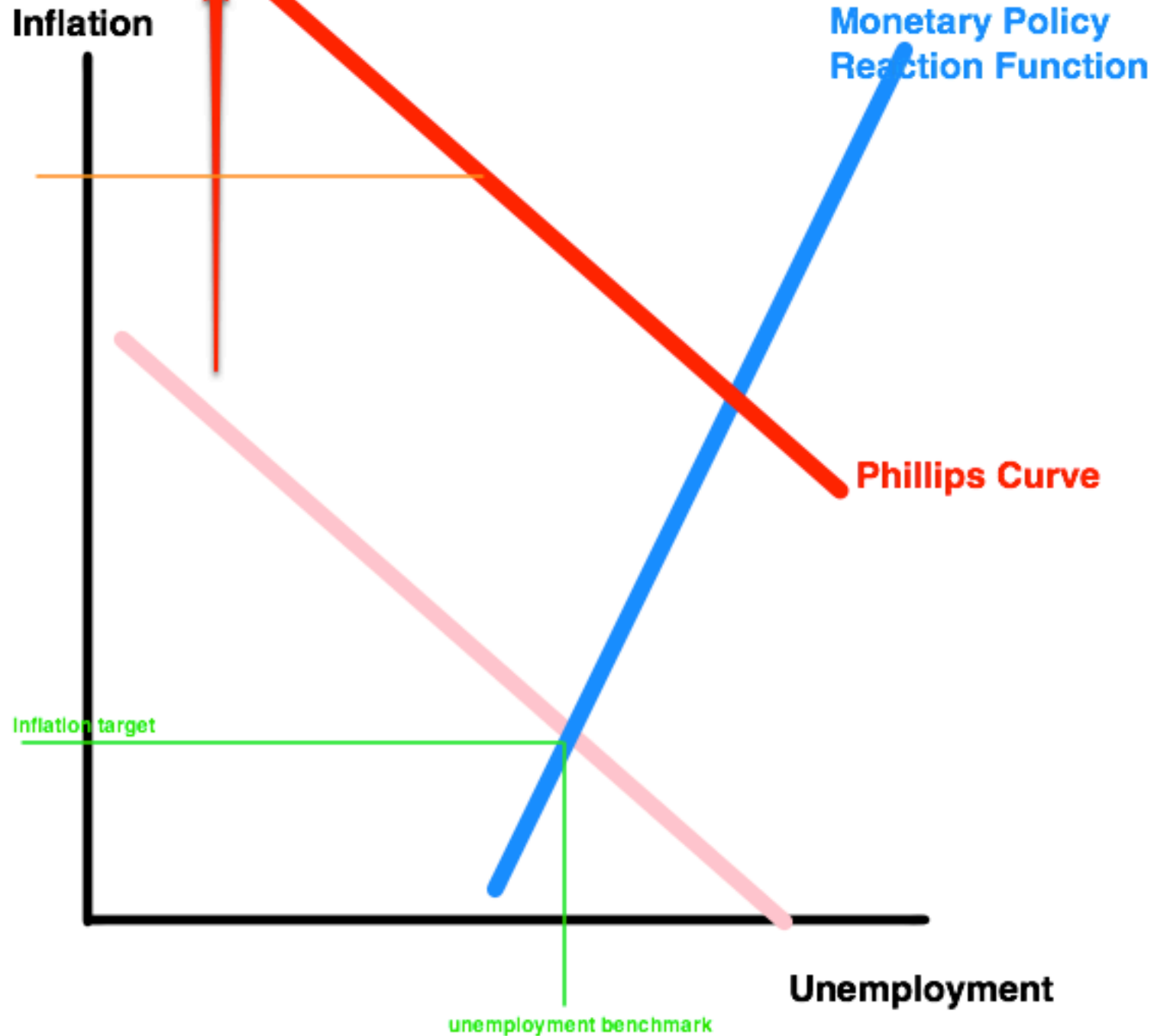
Phillips Curve



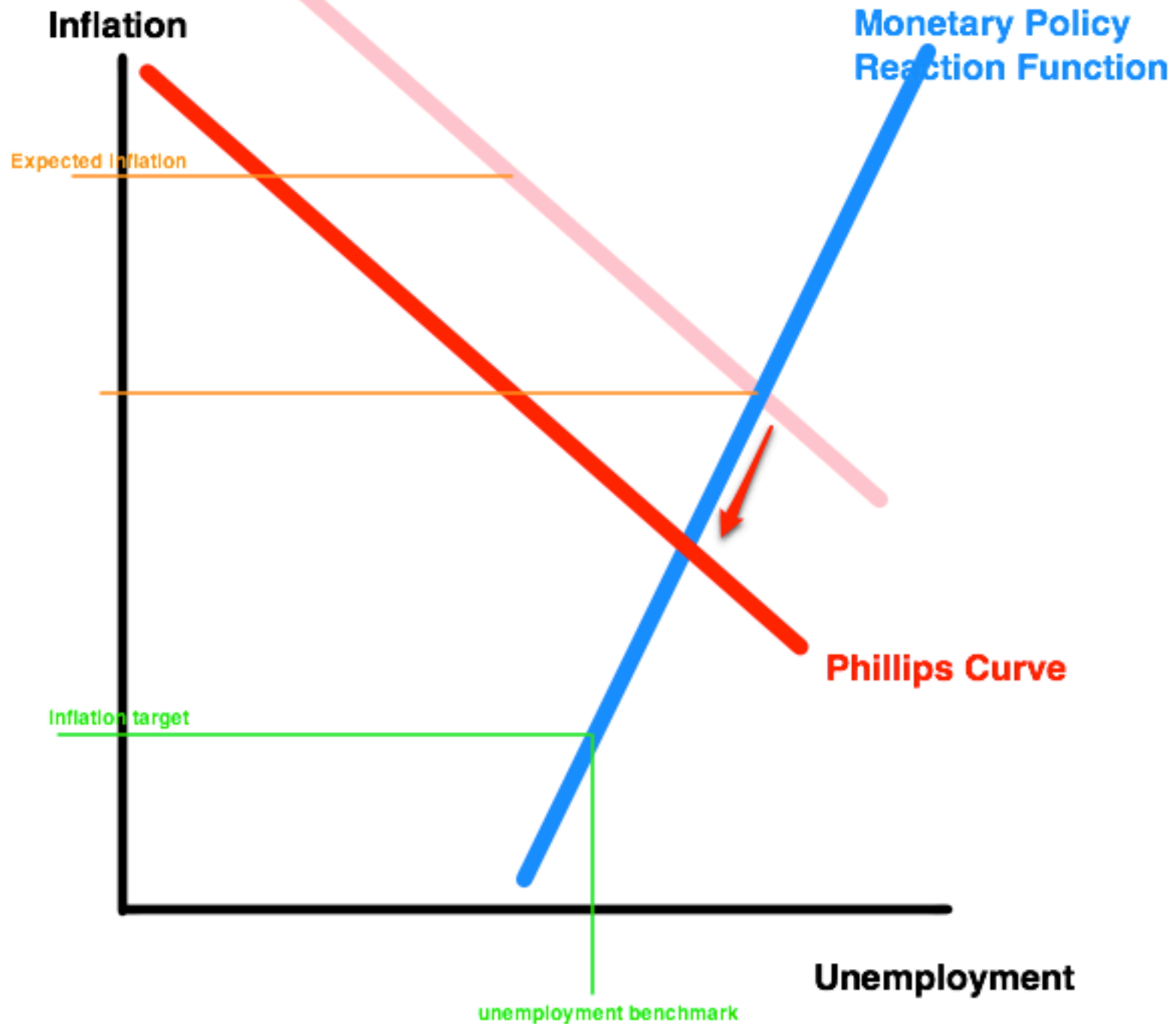
Phillips Curve



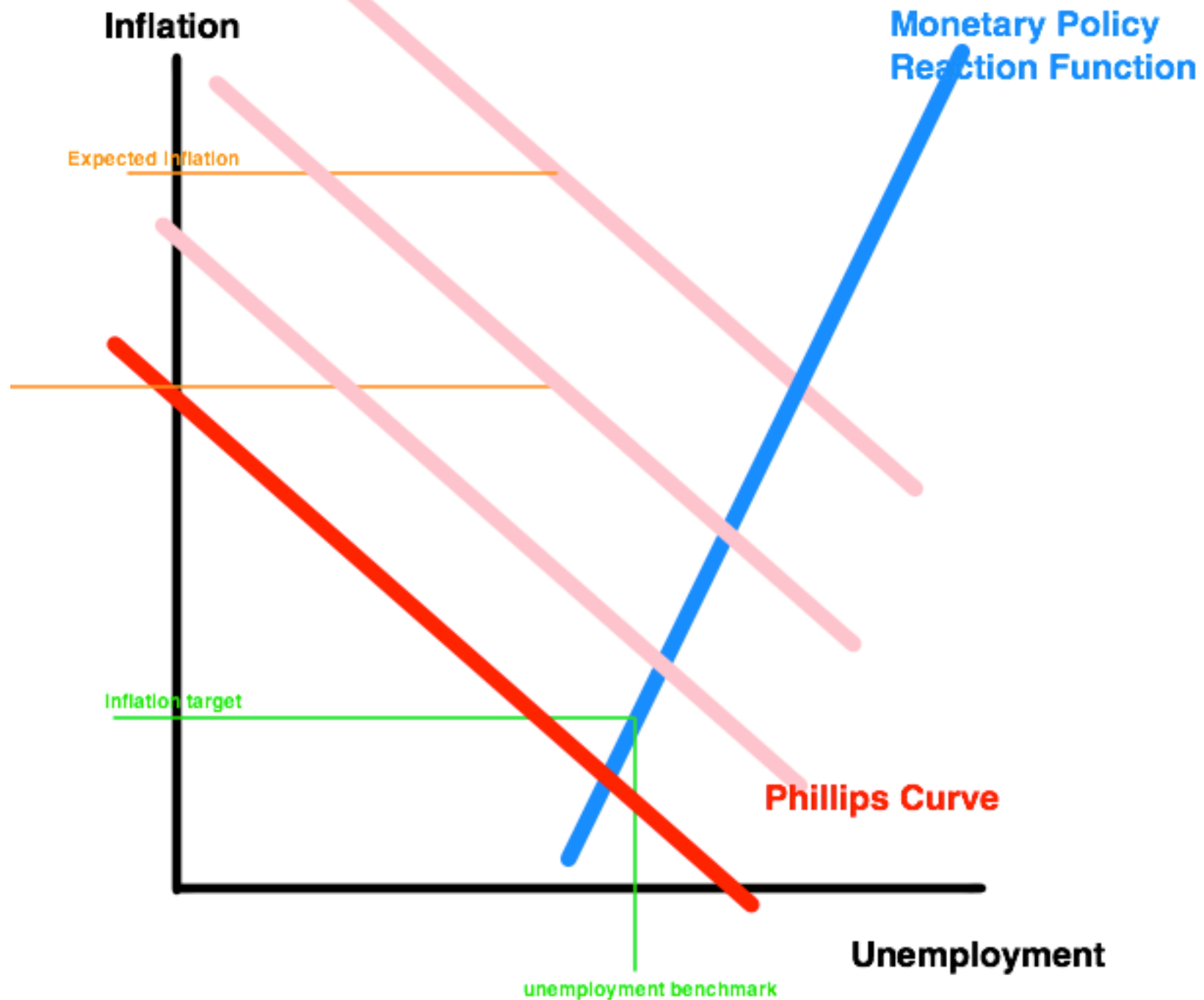
Phillips Curve



Phillips Curve



Phillips Curve



Some Algebra...

$$\pi = \pi^e + \beta(u^* - u) \quad :: \text{Phillips Curve}$$

$$u = u_0 + \phi(\pi - \pi^t) \quad :: \text{Monetary Policy Reaction Function}$$

$$\pi = \pi^e + \beta\left(u^* - [u_0 + \phi(\pi - \pi^t)]\right)$$

$$\pi = \pi^e + \beta(u^* - u_0) + \beta\phi\pi^t - \beta\phi\pi$$

$$(1 + \beta\phi)\pi = \pi^e + \beta(u^* - u_0) + \beta\phi\pi^t$$

$$\pi = \frac{\pi^e}{(1 + \beta\phi)} + \frac{\beta\phi\pi^t}{(1 + \beta\phi)} + \frac{\beta(u^* - u_0)}{(1 + \beta\phi)}$$

Some More Algebra...

$$\pi_t^e = \pi_{t-1}$$

$$\pi_t = \frac{\pi_{t-1}}{(1 + \beta\phi)} + \frac{\beta\phi\pi^t}{(1 + \beta\phi)} + \frac{\beta(u^* - u_0)}{(1 + \beta\phi)}$$

$$\pi^* = \frac{(u^* - u_0)}{\phi} + \pi^t$$

And Yet More Algebra...

$$\pi_t = \frac{\pi_t^e}{(1 + \beta\phi)} + \frac{\beta\phi\pi^t}{(1 + \beta\phi)} + \frac{\beta(u^* - u_0)}{(1 + \beta\phi)}$$

$$\pi_t = \frac{\pi_{t-1}}{(1 + \beta\phi)} + \frac{\beta\phi\pi^t}{(1 + \beta\phi)} + \frac{\beta(u^* - u_0)}{(1 + \beta\phi)}$$

$$\pi_t - \pi^* = \frac{\pi_{t-1} - \pi^*}{(1 + \beta\phi)} - \frac{\beta\phi\pi^*}{(1 + \beta\phi)} + \frac{\beta\phi\pi^t}{(1 + \beta\phi)} + \frac{\beta(u^* - u_0)}{(1 + \beta\phi)}$$

$$\pi_t - \pi^* = \frac{\pi_{t-1} - \pi^*}{(1 + \beta\phi)} - \frac{\beta\phi}{(1 + \beta\phi)} \left(\frac{(u^* - u_0)}{\phi} + \pi^t \right) + \frac{\beta\phi\pi^t}{(1 + \beta\phi)} + \frac{\beta(u^* - u_0)}{(1 + \beta\phi)}$$

$$\pi_t - \pi^* = \frac{\pi_{t-1} - \pi^*}{(1 + \beta\phi)} - \frac{\beta\phi\pi^t}{(1 + \beta\phi)} + \frac{\beta\phi\pi^t}{(1 + \beta\phi)} + \frac{\beta(u^* - u_0)}{(1 + \beta\phi)} - \frac{\beta\phi}{(1 + \beta\phi)} \frac{(u^* - u_0)}{\phi}$$

$$\pi_t - \pi^* = \frac{\pi_{t-1} - \pi^*}{(1 + \beta\phi)} - \cancel{\frac{\beta\phi\pi^t}{(1 + \beta\phi)}} + \cancel{\frac{\beta\phi\pi^t}{(1 + \beta\phi)}} + \cancel{\frac{\beta(u^* - u_0)}{(1 + \beta\phi)}} - \cancel{\frac{\beta(u^* - u_0)}{(1 + \beta\phi)}}$$

$$\pi_t - \pi^* = \frac{\pi_{t-1} - \pi^*}{(1 + \beta\phi)}$$

Test Your Knowledge

- Why does the Phillips Curve slope down?
- What is the natural rate of unemployment u^* ?
- How many significant shifts in inflation expectations have there been in the post-WWII U.S.?
 - When did they occur?
- Why is inflation worth worrying about?
 - What are the three reasons to fear inflation?
- How can the Federal Reserve expand or contract the money stock?
 - How can the banking system as a whole expand or contract the money stock?
- Why would any central bank allow inflation, ever?
- What is hyperinflation?