



# ECON 202 - MACROECONOMIC PRINCIPLES

Instructor: Dr. Juergen Jung

Towson University

# Disclaimer

These lecture notes are customized for the Macroeconomics Principles 202 course at Towson University. They are not guaranteed to be error-free. Comments and corrections are greatly appreciated. They are derived from the Powerpoint© slides from online resources provided by Pearson Addison-Wesley. The URL is: <http://www.pearsonhighered.com/osullivan/>

These lecture notes are meant as complement to the textbook and not a substitute. They are created for pedagogical purposes to provide a link to the textbook. These notes can be distributed with prior permission.

This version was compiled on: May 4, 2016.

# Chapter 16 - The Dynamics of Inflation and Unemployment

# The Dynamics of Inflation and Unemployment - Topics

- 1 Describe how an economy at full unemployment with inflation differs from one without inflation
- 2 Explain the relationship between inflation and unemployment in the short run and long run
- 3 Discuss why increasing the credibility of a central bank can reduce inflation
- 4 Define the velocity of money
- 5 Identify the origins and causes of hyperinflation

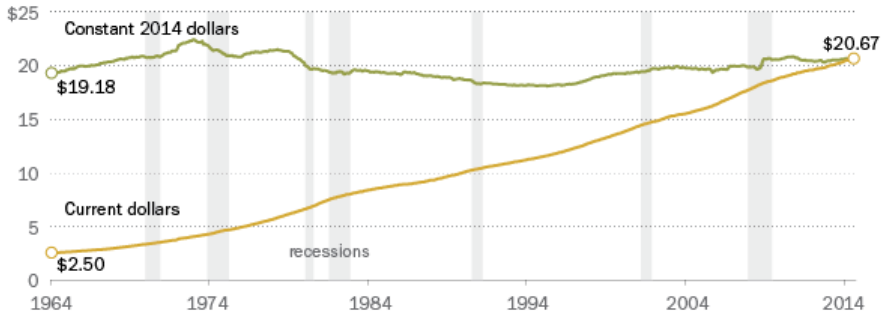
# Money Growth, Inflation and Interest Rates

- Money illusion
- Nominal interest rate = real interest rate + Expected rate of inflation

# Real Wages over Time

## Bigger Paychecks, But Little Change in Purchasing Power

*Average hourly wages, seasonally adjusted*



Note: Data for production and non-supervisory employees on private non-farm payrolls.

Source: Bureau of Labor Statistics

PEW RESEARCH CENTER

# How much Inflation?

- In theory any rate of inflation can occur at full employment
- Remember the Fed can set the money supply which determines the rate of inflation in the long run
- After a while people form expectations about future inflation and base their decision upon them

# Monetary Policy and Interest in the Long Run

TABLE 16.1 Money, Inflation, and Interest Rates in a Steady-State Economy

| Money<br>Growth Rate | Inflation | Growth in<br>Money Demand | Real Interest<br>Rate | Nominal<br>Interest |
|----------------------|-----------|---------------------------|-----------------------|---------------------|
| 4%                   | 4%        | 4%                        | 2%                    | 6%                  |
| 5%                   | 5%        | 5%                        | 2%                    | 7%                  |



# Expected Inflation

- Say the Fed wants a lower inflation rate and decreases money growth but the public still believes in the higher money growth rate
- Short-Run→ contractionary policy in the short run
- Long-Run→ the real world stays the same

# Summary

- Tight monetary policy in the short run
  - Slower money growth
  - Raised interest rates
- Tight monetary policy in the long run
  - Reduced money growth leads to Lower inflation and
  - Lower nominal interest rates

# Expectations Phillips Curve

- Is the relationship between unemployment and expected inflation

TABLE 16.2 Expectations and Business Fluctuations

| When the economy experiences a ... | Unemployment is ...     | Inflation is ...      |
|------------------------------------|-------------------------|-----------------------|
| boom                               | below the natural rate. | higher than expected. |
| recession                          | above the natural rate. | lower than expected.  |

# And the other way round

- Likewise, a temporary decrease in the inflation rate is likely to be associated with temporary increases in unemployment
- Friedman and Phelps worked the expectations into this model
- How are expectations formed
  - Rule of thumb
  - Taking all available info into account
  - A mix?

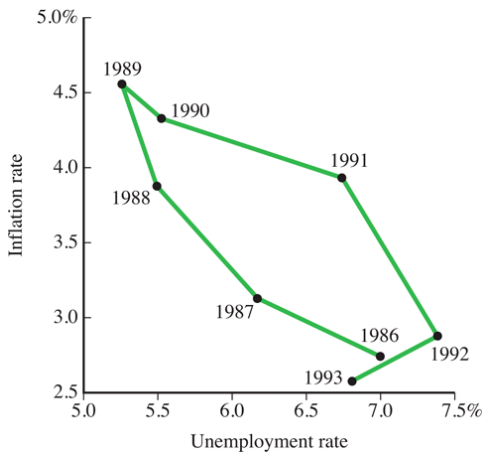
# Are the Public's Expectations About Inflation Rational?

- There are two broad classes of theories of how the public forms its expectations:
  - Some economists and psychologists, including Nobel laureate Herbert Simon, believe that the public uses simple rules-of-thumb to predict future inflation
  - An alternative view, called the theory of rational expectations, holds that workers and firms base their expectations on all available information

# U.S. Inflation and Unemployment in the 1980s

- In the early 1980s, high, real interest rates eventually caused the unemployment rate to rise to over 10% by 1983
- As the actual unemployment exceeded the natural rate of unemployment, the inflation rate fell, just as was predicted by the expectations Phillips curve
- The severe recession had done its job in reducing the inflation rate

# U.S. Inflation and Unemployment in the 1980s (cont.)



# U.S. Inflation and Unemployment in the 1980s (cont.)

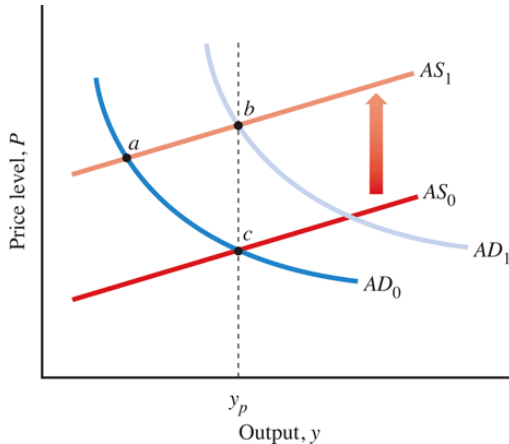
- After 1986, the unemployment rate began to fall again, and as the actual unemployment fell below the natural rate, inflation began to rise
- In 1989, the Fed raised interest rates to combat inflation
- This reduced output and increased unemployment to over



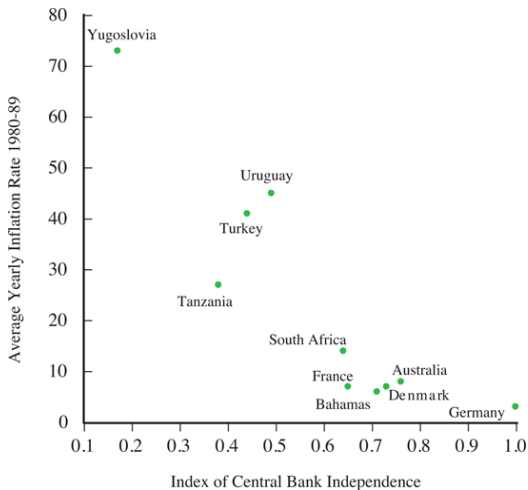
# Shifts in the Natural Rate of Unemployment

- The natural rate of unemployment can shift over time
- The factors that cause this include:
  - Demographics, and the composition of the workforce
  - Institutional changes, or changes in laws and regulations that affect unemployment benefits and restrictions placed on employers that make it difficult to fire workers
  - The state of the economy
  - Changes in the growth of labor productivity

# How the Credibility of a Nation's Central Bank Affects Inflation



# How the Credibility of a Nation's Central Bank Affects Inflation (cont.)



# Inflation and the Velocity of Money

- The rate at which money turns over during the year

$$\text{velocity of money} = \frac{\text{nominal GDP}}{\text{money Supply}}$$

- Velocity is the number of times that money must change hands in economic transactions during a given year for an economy to reach its GDP level

$$\text{velocity of money} = \frac{\$5 \text{ trillion per year}}{\$1 \text{ trillion}} = 5 \text{ times per year}$$

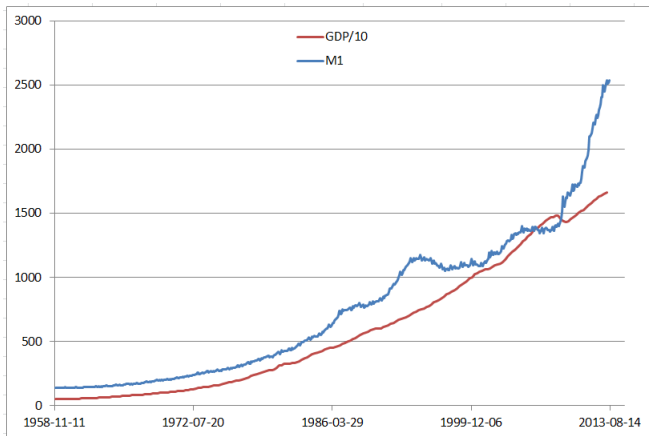
- The equation of exchange, or quantity equation, links the money supply and velocity to nominal GDP:

$$\text{money supply} \times \text{velocity} = \text{nominal GDP},$$

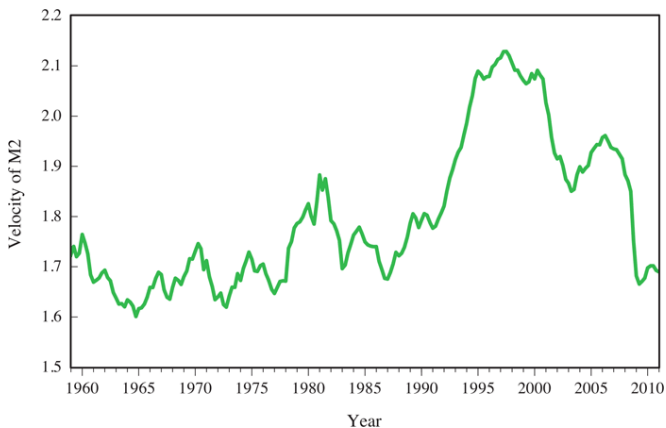
# Inflation and the Velocity of Money (cont.)

- Quantity equation:

$$M \times V = P \times y$$



# Inflation and the Velocity of Money (cont.)



# Use Velocity to Predict Inflation

$$\begin{array}{ccccccc} \text{Growth rate} & & \text{Growth} & & \text{Growth} & & \text{Growth rate} \\ \text{of the money} & + & \text{rate of} & = & \text{rate of} & + & \text{of real output} \\ \text{supply} & & \text{velocity} & & \text{prices} & & \end{array}$$

- Example:

$$10\% + 0\% = \text{Growth rate of money} + 3\%$$

- can be solved for the inflation rate as

$$\text{Growth rate of money (inflation)} = 7\%$$

# Hyperinflation



# Hyperinflation

- Economists call very high inflation rates—
  - over 50% per month, which is approximately
  - 13,000% per year—hyperinflation

TABLE 16.3 Hyperinflations and Velocity

| Country | Dates                          | Monthly Rate of Inflation | Monthly Rate of Money Growth | Approximate Increase in Velocity |
|---------|--------------------------------|---------------------------|------------------------------|----------------------------------|
| Greece  | November 1943 to November 1944 | 365%                      | 220%                         | 14.00                            |
| Hungary | August 1945 to July 1946       | 19,800%                   | 12,200%                      | 333.00                           |
| Russia  | December 1921 to January 1924  | 57%                       | 49%                          | 3.70                             |

SOURCE: Adapted from Phillip Cagan, "The Monetary Dynamics of Hyperinflation," in *Studies in the Quantity Theory of Money*, ed. Milton Friedman (Chicago: University of Chicago Press, 1956), 26.

# Hyperinflation (cont.)

- A monthly rate of inflation of 365% means that the price level rises by a factor of 4.65 each month

$$\frac{4.65 - 1}{1} = 3.65 \text{ or } 365\%$$

- At the end of the month, it will take \$4.65 to buy a good that was \$1. The dollar is worth:

$$\frac{1}{4.65} = 0.215 \text{ or } 21.5\text{cents}$$

- And, at the end of two months:

$$0.215 \times 0.215 = 0.046 \text{ or } 4.6 \text{ cents}$$

# Hyperinflation (cont.)

TABLE 16.4 Hyperinflations in the 1980s

| Country   | Year | Yearly Rate of Inflation | Monthly Rate of Inflation | Monthly Money Growth Rate |
|-----------|------|--------------------------|---------------------------|---------------------------|
| Bolivia   | 1985 | 1,152,200%               | 118%                      | 91%                       |
| Argentina | 1989 | 302,200                  | 95                        | 93                        |
| Nicaragua | 1988 | 975,500                  | 115                       | 66                        |

SOURCE: International Financial Statistics, International Monetary Fund.

- During hyperinflations, we would expect that people wouldn't want to hold money very long but would immediately try to spend it
- In other words, we would expect the velocity of money to increase sharply

# How Budget Deficits Lead to Hyperinflation

- Hyperinflation arises when governments allow the money supply to grow in order to finance the gap between government spending and revenues—the budget deficit
- Seignorage Revenue → raised from money creation → inflate debt away
- In principle, governments could use a mix of borrowing funds from the public and printing money to cover the deficit:

Government deficit = New borrowing from public + New money created

- Hyperinflations occur when governments cannot borrow from the public and are forced to print new money
- To stop hyperinflation, it is necessary to eliminate the government deficit
- Once the government stops printing money, the hyperinflation will end

# How Budget Deficits Lead to Hyperinflation (cont.)

- Economists who emphasize the role that the supply of money plays in determining nominal income and inflation are called monetarists
- Today, most economists agree with the monetarists that, in the long run, inflation is caused by growth in the money supply

# Cost of Hyperinflation

- Hyperinflation causes large costs (search costs) since money cannot fulfill its functions anymore:
  - Medium of exchange
  - Store of value
  - Unit of account
- No country can maintain a hyperinflation over a longer time period
- Hyperinflation destroys economic systems

# Cause of Inflation

## ■ Anticipated Inflation

### ■ Menu costs

- Have to change prices on menus, catalogs, ...
- These costs tend to be low

### ■ Shoe leather costs

- People hold less money (since opportunity costs are higher when inflation is high) and have to go to the bank more often
- Can be as large as 1% of GDP

- Other costs: taxes are based on nominal income, interest rate ceilings based on nominal rates → can lead to distortions

## ■ Unanticipated Inflation

- “unfair” redistributions, lenders lose, borrowers gain
- Anyone making a nominal contract to sell something based on expected inflation would lose, if “surprise” inflation turns out to be higher (wage contracts, ...)
- People would start taking measures against unanticipated inflation which imposes real costs

# Indexing Contracts

- Indexing might build inflation into the system and makes it difficult to reduce inflation



# Inflation and Unemployment

# Cost of Unemployment

- When unemployment is above the potential rate a society is wasting resources → this can be substantial
- Immediate hardship on HH
- Unemployment insurance is only a temporary cushion
- When unemployed people might also lose some of their skills and “good” work habits
- This is not only a financial but also a social question (increased crime, divorce, and suicidal rates)

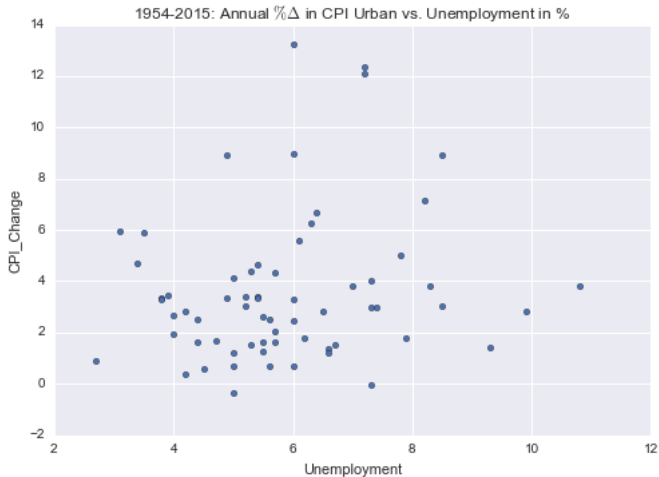
# Original Phillips Curve: 1954-1970



# Original Phillips Curve: 1954-1970 (cont.)

- The Phillips Curve appears to present a trade-off between inflation and unemployment:
  - Higher inflation, lower unemployment and vice versa
- But is this trade-off exploitable by policy makers?
- Let's check more data

# Original Phillips Curve: 1954-1970 (cont.)



## Original Phillips Curve: 1954-1970 (cont.)

- What do you think of the Friedman/Phelps argument now?

# Rational Expectations

- Lucas 1970s:
  - Individuals form their expectations such that, on average, they anticipate the future correctly
- Do the Math:
  - Money growth is 10%
  - Real GDP growth 3%
  - Velocity has zero growth  $\rightarrow$  inflation is: ?
- Empirically given link
- Growth rate of real GDP and growth rate of velocity influence this relationship