

# Thinking About Inflation

The Federal Reserve in the 21<sup>st</sup> Century Conference

Robert Rich

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# Disclaimer

The views in this presentation are those of the speaker and do not necessarily reflect the views of the Federal Reserve Bank of New York or the Federal Reserve System.

# Inflation

- What Is It?
- How Is It Measured?
- What are the Costs of Inflation?
- What Explains Its Behavior?
- The Current Situation
- Deflation
- Inflation Targeting

# Prices and Inflation

- Prices act as the key mechanism for allocating resources efficiently throughout the economy;
- Prices of goods and services change over time as well as relative to each other;
- Relative price changes reflect underlying demand and supply conditions;
- Inflation: The process of a sustained or continuing rise in the general price level.

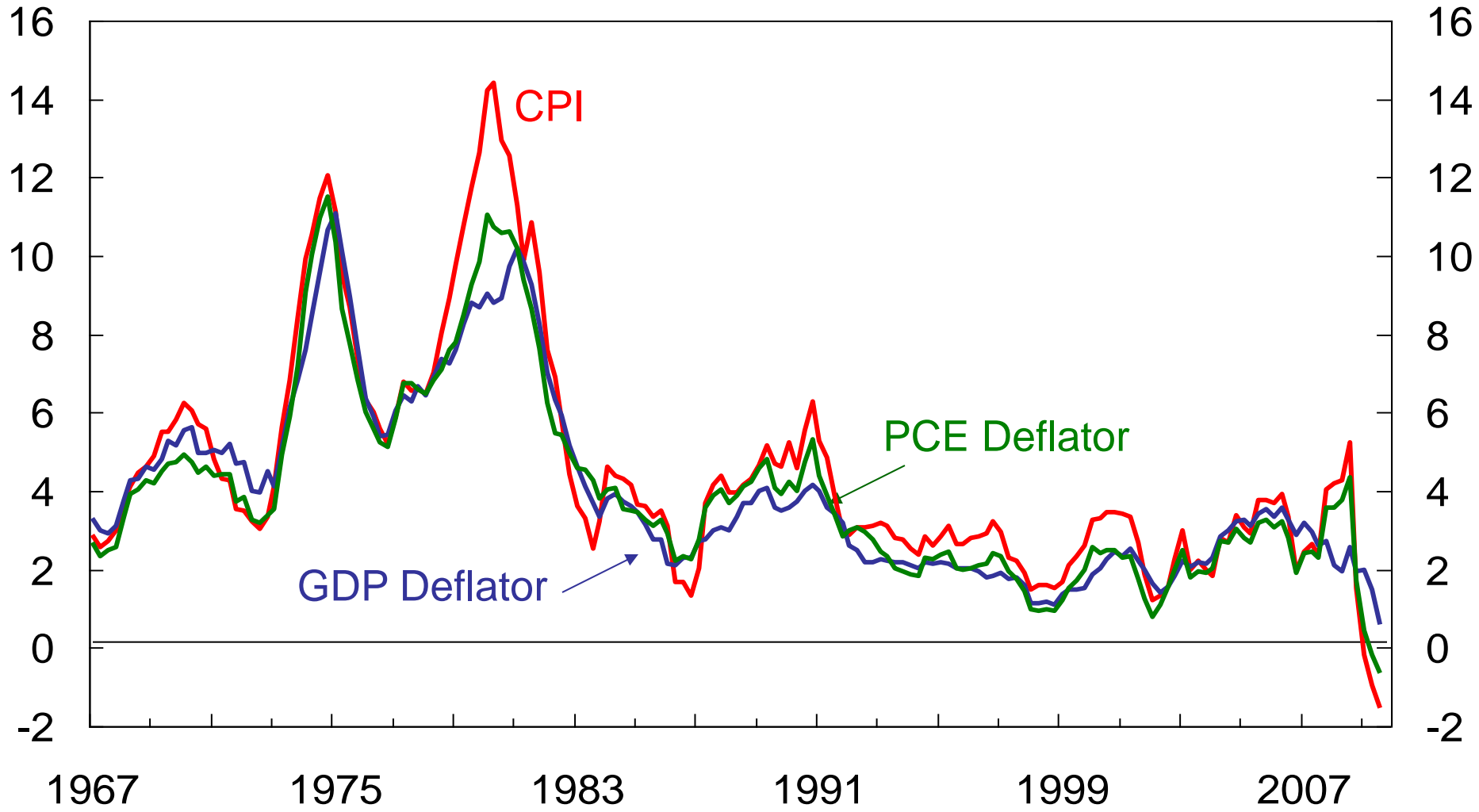
# Measuring Inflation

- Change in the price of a basket of goods and services: a price index
- Measures of total or headline inflation:
  - Consumer Price Index (BLS, Monthly)
    - Basket representative of actual consumption expenditures
  - GDP Deflator (NIPA, Quarterly)
    - Basket is all GDP (includes I and G)
  - PCE Deflator (NIPA, Monthly)
    - Basket is consumption part of GDP

# Chart 1: Three Measures of Inflation

% Change - Year to Year

% Change - Year to Year



Sources: Bureau of Economic Analysis, Bureau of Labor Statistics

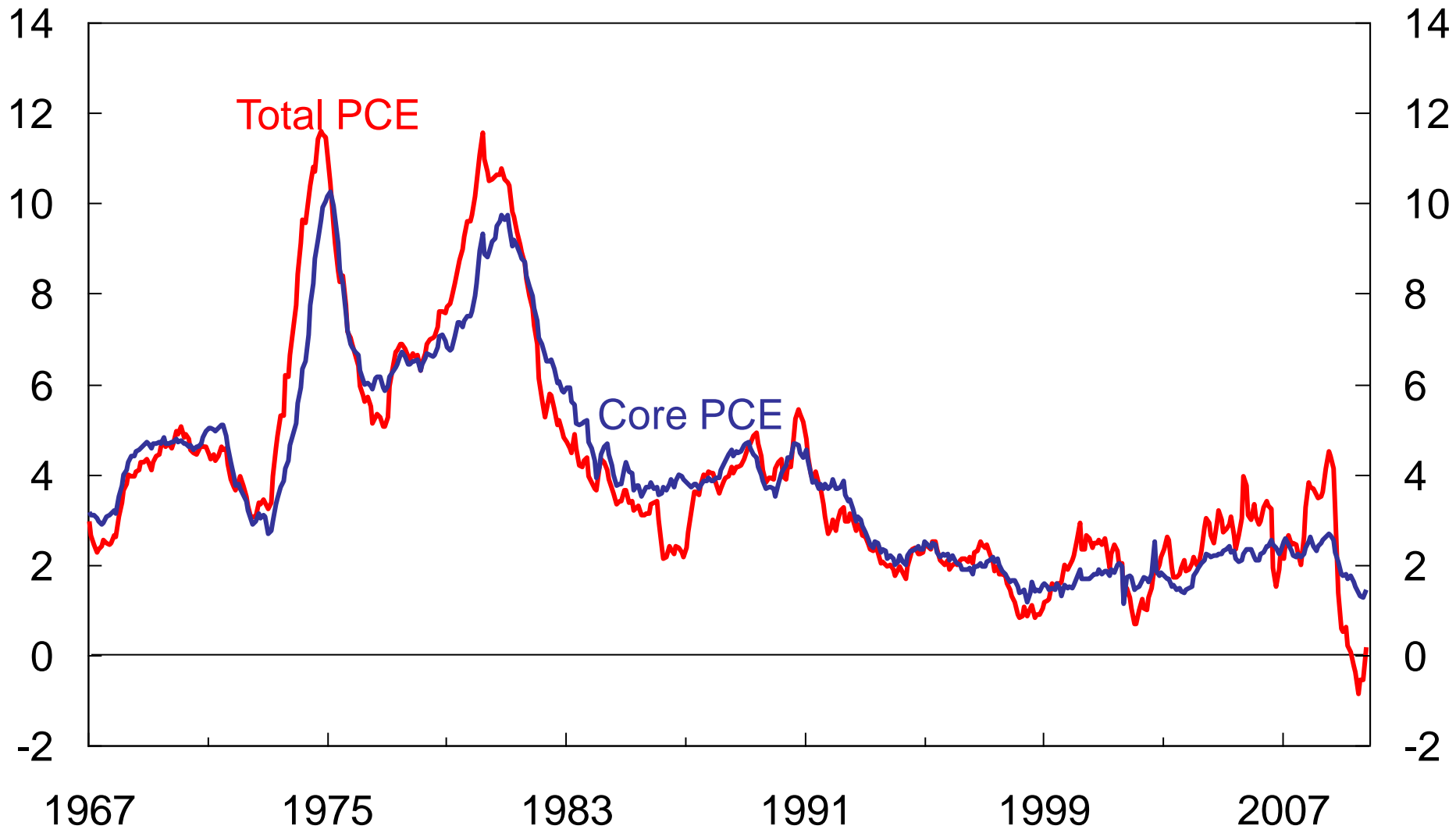
# Core Inflation

- A measure designed to remove transitory price changes and therefore produce a gauge of underlying (trend) inflation
- Alternative Measures of Core CPI or Core PCE:
  - Excluding food and energy prices
  - Weighted median
  - Trimmed mean

# Chart 2: Total and Core PCE

% Change - Year to Year

% Change - Year to Year



Source: Bureau of Economic Analysis



# Costs of Inflation

- There is disagreement about the size of the social costs
- Perfectly anticipated inflation:
  - Taxes are based on nominal (not inflation-adjusted) quantities;
  - Induces firms to bear costs associated with changing their prices more often;
  - Hurts people on fixed pensions.
- Unanticipated inflation:
  - Inconvenience and difficulties associated with living in a world marked by uncertainty and a changing price level;
  - Resources must be devoted to forecasting inflation;
  - Arbitrary redistribution of income between creditors and debtors;
  - Inflation and its uncertainty may impinge on savings and investment decisions
  - Difficulty of inferring relative price changes.

# What Determines Inflation?

- Three determinants of inflation:
  - Inertia
  - Demand
  - Supply
- Inflation is influenced by several factors. When discussing movements in inflation (past, present or future), these factors need to be considered in conjunction rather than in isolation.

# Inertia

- Inflation tends to deviate only gradually from its own past values;
  - Slow adjustment of inflation expectations.
  - Existence of wage and price contracts in the economy.

# Demand

- Inflation will rise when there is excess demand in the economy and decline when there is slack in the economy;
- Output will grow over time because of increases in:
  - Labor
  - Capital
  - Land
  - Technology

# Demand

- The long-run movements of these inputs can be thought of as generating a smooth underlying trend for output;
- This (unobserved) trend is referred to as “potential” or “natural” output and should be thought of as a reference point for “full-employment” in the economy. Its growth rate can change over time;

# Demand

- At the full-employment level of output, there is no inherent tendency for inflation to accelerate or decelerate. It is also assumed that there are unique levels of unemployment and capacity utilization that correspond to this trend level of output;
  - Non-accelerating inflation rate of unemployment (NAIRU);
  - Non-accelerating inflation rate of capacity utilization (NAIRCU).
- Measuring demand pressures (relative to ‘full-employment’) in the economy:
  - Output relative to “potential” or “natural” output (“output gap”);
  - Unemployment relative to the NAIRU;
  - Capacity utilization relative to the NAIRCU.

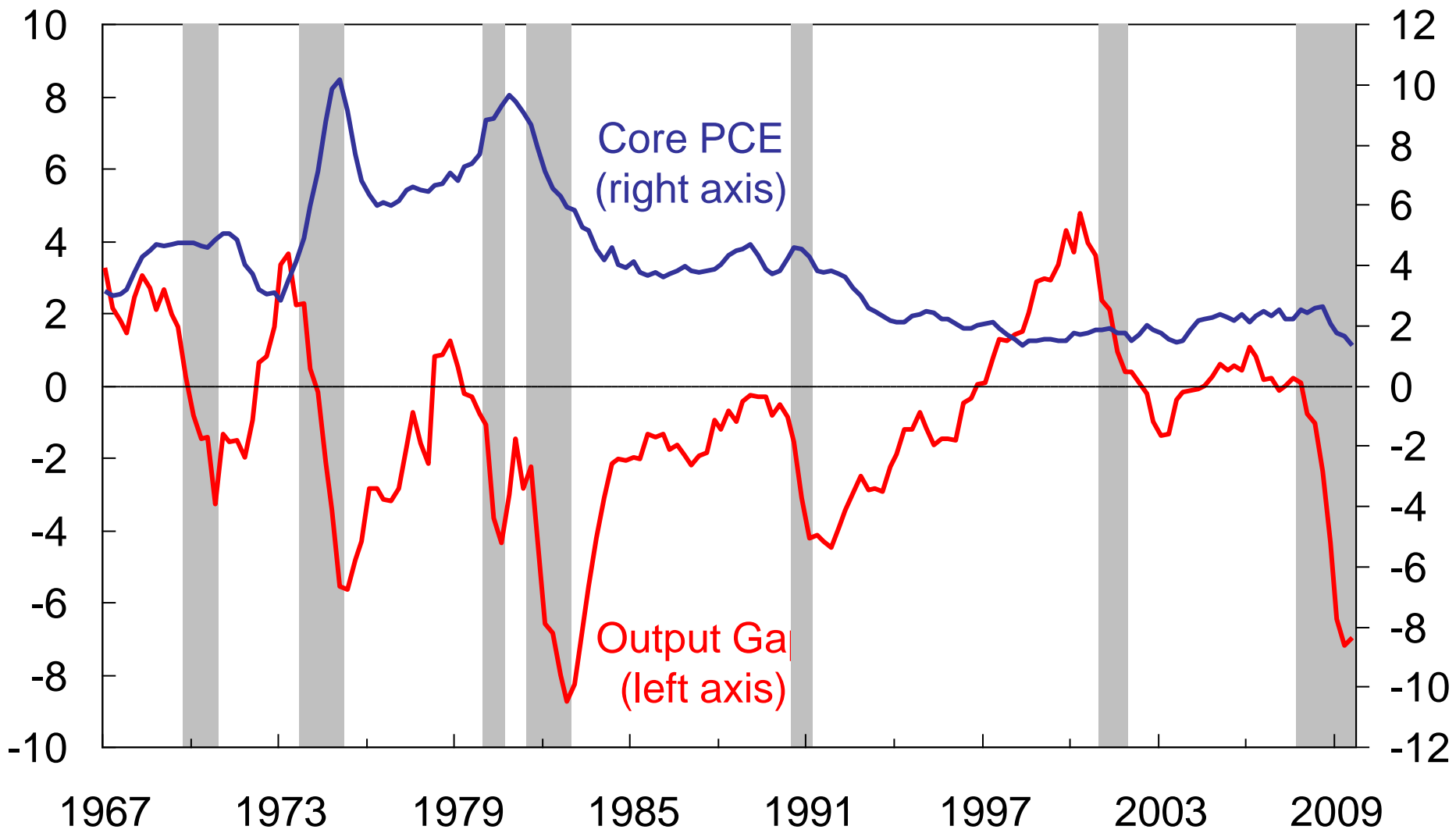
# Demand

- “Full-employment” is a bit of a misnomer;
- “Full-employment”  $\nrightarrow$  Unemployment rate = 0;
- Natural rate of unemployment:
  - Frictional Causes: Turnover unemployment:
    - Economy is dynamic;
    - Jobs are continually created and destroyed;
    - Workers are continually entering and exiting the labor market.
  - Structural Causes: Mismatch unemployment:
    - Low-skilled workers may not have opportunities for long-term employment;
    - Re-allocation of labor from shrinking industries and depressed regions to expanding industries and booming regions.
  - The NAIRU can vary over time;
  - Policies can be adopted to change the NAIRU;

# Chart 3: Output Gap and Inflation

Log Difference, Billions of Chained 2005\$

% Change - Year to Year



Sources: CBO, BEA

Note: Shading represents NBER recessions.



# Supply

- Inflation can also be influenced through sharp changes in business costs
- These “supply shocks” can be adverse or beneficial
  - Import prices
  - Food and energy prices
- The change in the relative prices of imports or food and energy is important for gauging inflationary pressures in the economy.

# What's The Fed Got to Do With It?

- Indirect transmission mechanism
  - The Fed controls the short-term interest rate
  - ...which affects long-rates (mortgage rates)
  - ...which affect demand (cars, houses...)
  - ...which is one of the determinants of inflation
- Direct effect on expectations
  - The Fed can influence inflation expectations, by promising low inflation...
  - ...as long as it has a reputation for delivering on its promises (credibility)

# The Current Situation

- The Fed Funds Rate has been between 0 and 25 basis points since December 2008
- Data have boosted our confidence that a rebound in economic activity is underway
- Financial markets have shown improvement, but remain fragile
- Risks remain skewed to the downside for output
- The risk of a severe deflation appears to have abated
- Some increased concerns about an acceleration in inflation due to large quantity of excess reserves

# Deflation

- Some definitions:
  - Deflation – The process of a sustained decline in the general price level
  - Disinflation – A decline in the inflation rate

# Deflation

- Sources of Deflation

- Important to distinguish between the causes of deflation
- Deflation could arise from favorable supply developments such as a productivity acceleration
- Deflation could also arise from adverse demand developments such as a collapse in consumption or investment

# Deflation

- Why is “demand-side” deflation such a concern?
  - Leads to an increase in the real interest rate
  - Raises the real value of outstanding debt
  - May lead to a deferment of planned expenditures
  - Interaction with wage rigidities can adversely affect the labor market and industry

# Inflation Targeting

- Key elements:
  - Announcement of official target rate (range) at one or more time horizons
  - Explicit acknowledgement that low, stable inflation is the overriding goal of policy
    - In practice, however, other goals matter
  - Increased communication with the public regarding plans and objectives

# Inflation Targeting

- What are the advantages?
  - Clarifies central bank's intentions for markets and for the general public
  - Increases credibility
  - Provides accountability
  - Less uncertainty about future inflation
  - Low and stable inflation is beneficial to growth and efficiency in the long run



# Inflation Targeting

- What are the disadvantages?
  - It is difficult to control inflation directly
  - Inflation targeting is a complicated approach to implement
  - Central bank has to have access to both an effective inflation forecasting model and policy instruments which influence the inflation forecast with reasonable precision
  - Changes in monetary policy may show their effects on inflation with long and variable lags

# Data Sources

- Bureau of Economic Analysis (GDP and PCE)

<http://www.bea.gov/national/index.htm>

- Bureau of Labor Statistics (CPI)

<http://www.bls.gov/cpi/>

- Congressional Budget Office (Potential GDP)

<http://www.cbo.gov>

# Reference Charts



# Measuring Inflation

- The inflation rate is measured as the percentage change in a price index;

$$(\text{Laspeyres Index})_t = \frac{\text{Value of period } 0 \text{ quantities at current prices}}{\text{Value of period } 0 \text{ quantities at baseyear prices}} = \frac{\sum p_t q_0}{\sum p_0 q_0}$$

$$(\text{Paasche Index})_t = \frac{\text{Value of period } t \text{ quantities at current prices}}{\text{Value of period } t \text{ quantities at baseyear prices}} = \frac{\sum p_t q_t}{\sum p_0 q_t}$$

$$\begin{aligned} (\text{Chain - type price index})_t &= \sqrt{\text{Laspeyres Price Index} \cdot \text{Paasche Price Index}} \\ &= \sqrt{\left( \frac{\sum p_t q_{t-1}}{\sum p_{t-1} q_{t-1}} \right) \cdot \left( \frac{\sum p_t q_t}{\sum p_{t-1} q_t} \right)} \end{aligned}$$

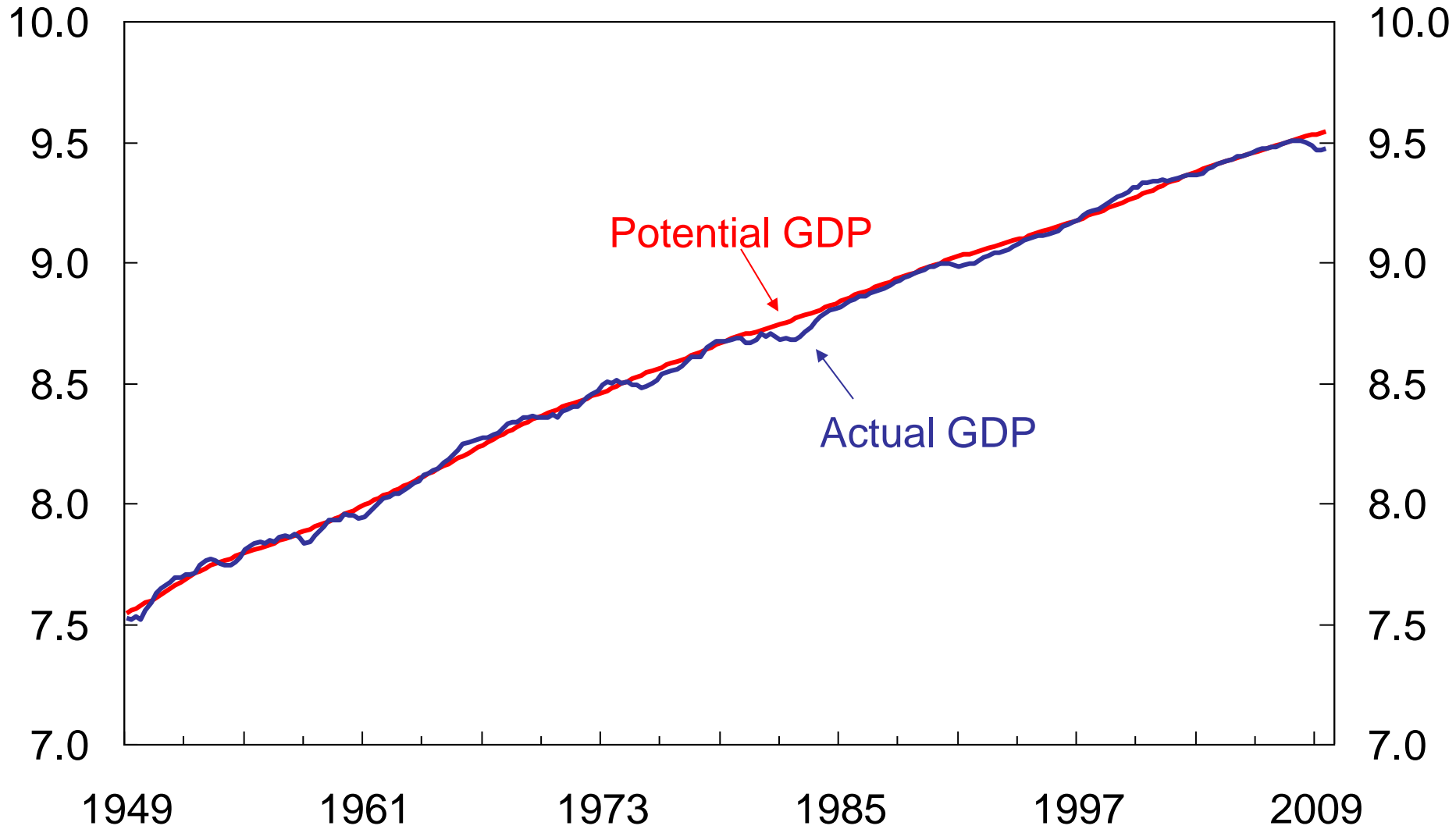
# Measuring Inflation

- Some recent methodological changes to price measurement:
  - Substitution of generic drugs when patents expire on proprietary brands;
  - A switch to measuring computer prices by computers' intrinsic characteristics;
  - A modification to the formula for measuring increases in rent;

# Potential Real GDP versus Actual Real GDP

Log Level, Billions of Chained 2005\$

Log Level, Billions of Chained 2005\$



Source: Bureau of Economic Analysis, Congressional Budget Office