

INTERMEDIATE MACROECONOMICS
MODELS OF INFLATION

21. PHILLIPS CURVE & QUANTITY THEORY

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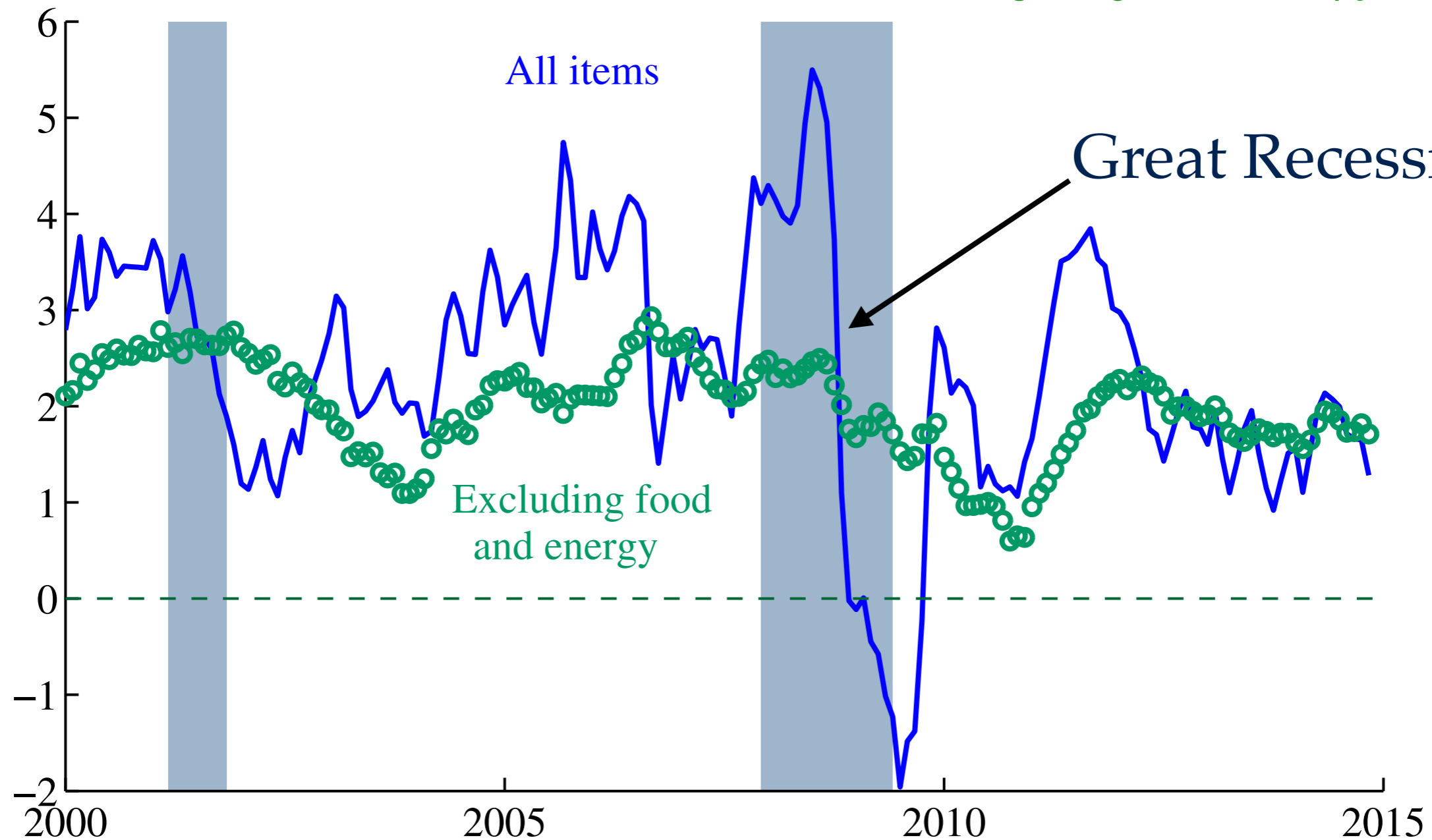
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STABILITY OF INFLATION IN US

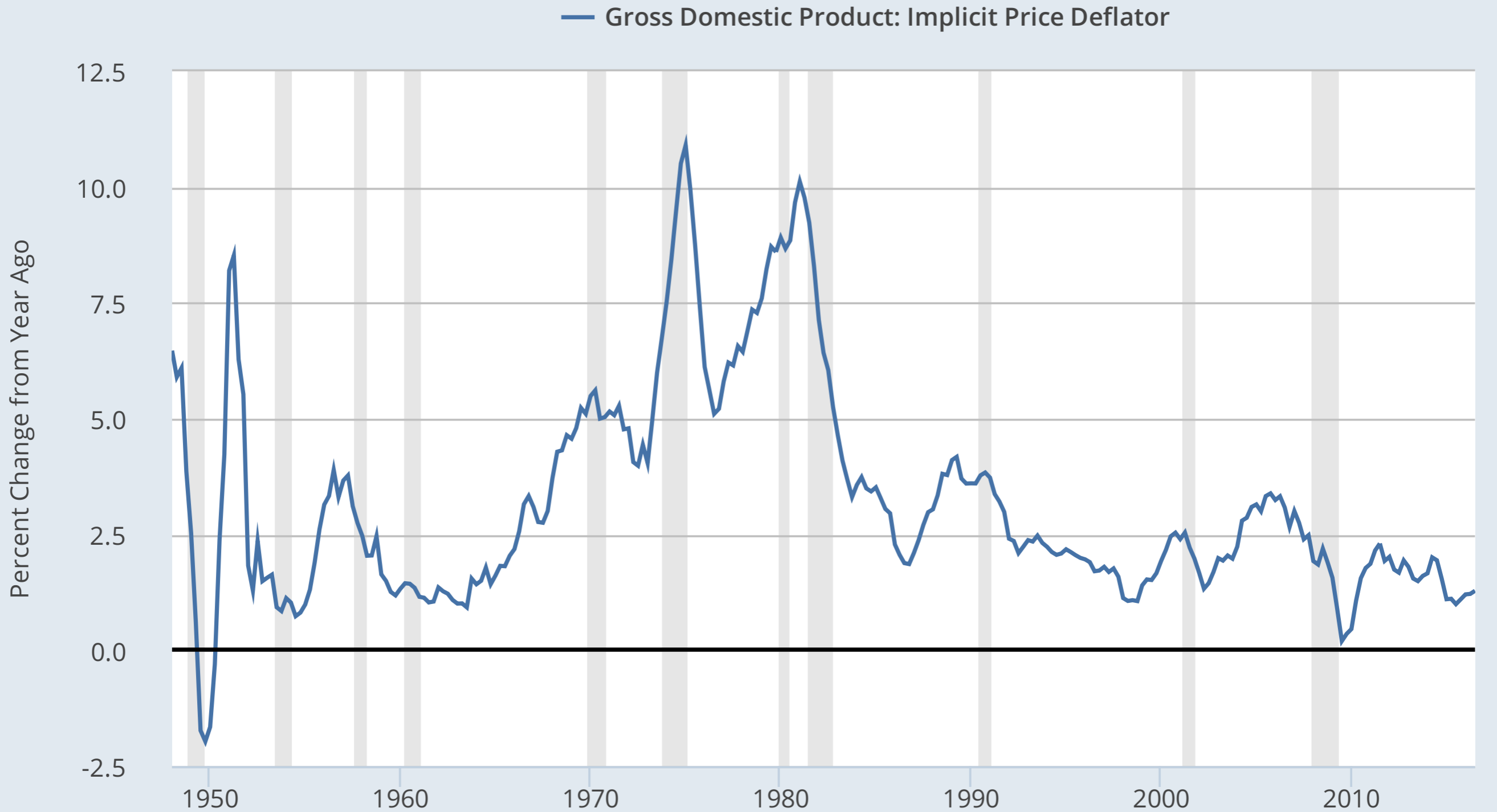
Dec 2010 = 0.6%

Nov 2014 = 1.7%

Percent



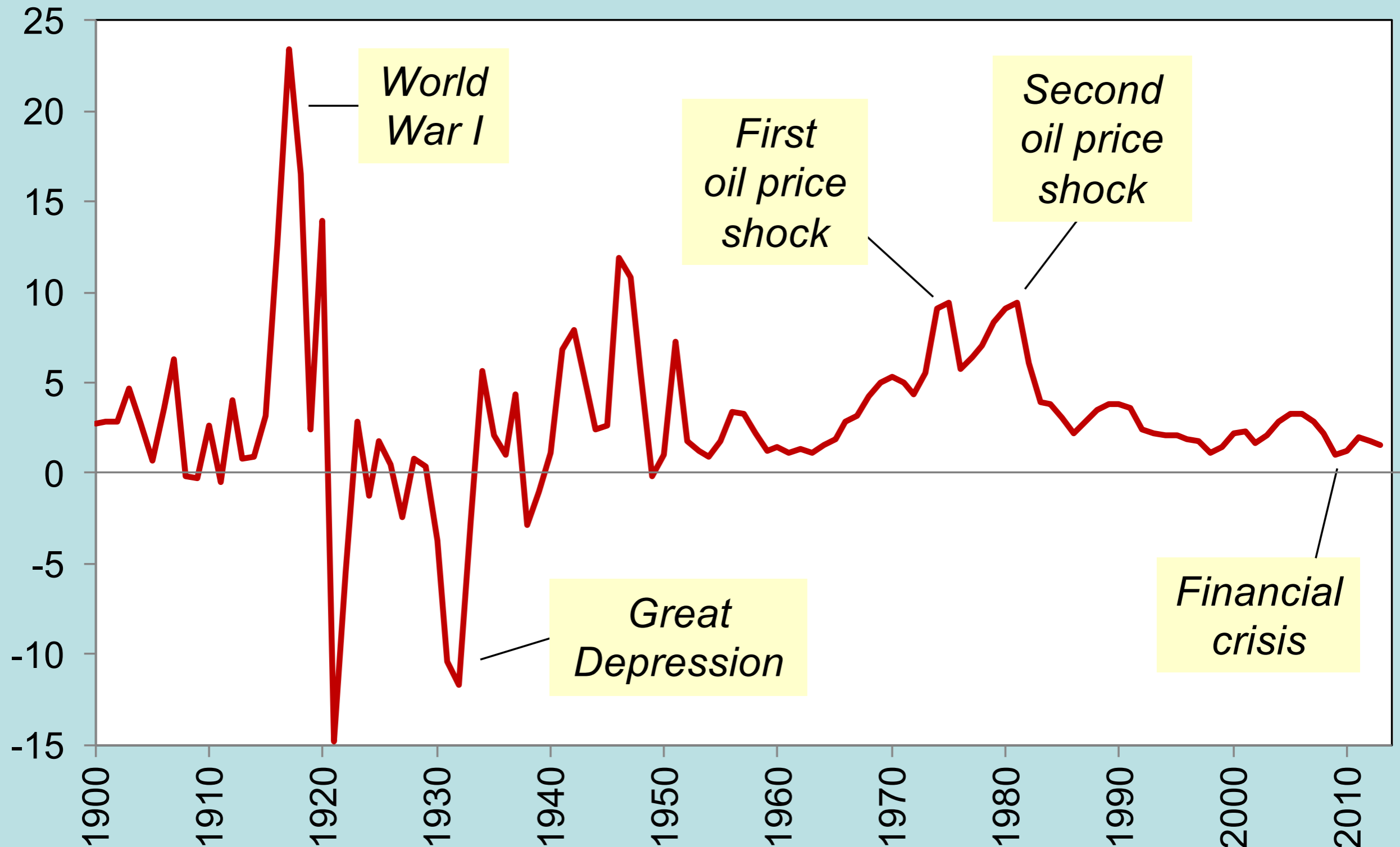
INFLATION IN THE US: GDP DEFLATOR



Source: US. Bureau of Economic Analysis
fred.stlouisfed.org

myf.red/g/888N

U.S. Inflation Rate (% per year)



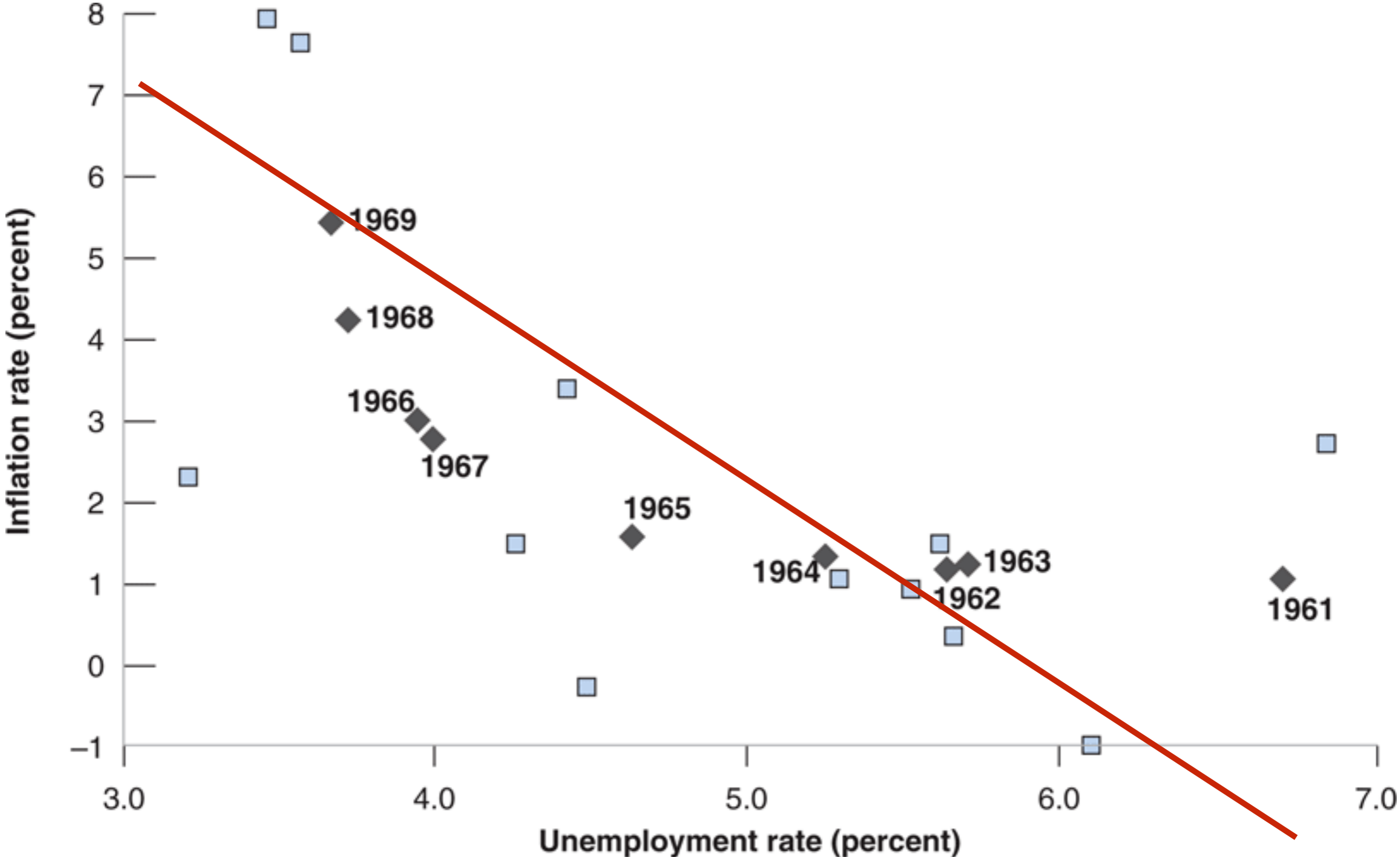
MODEL 1: PHILLIPS CURVE

- The Phillips curve is an empirical relationship
 - when unemployment is low, inflation is typically high
 - when unemployment is high, inflation is typically low or negative
- theory behind Phillips curve: less unemployment means more queues of customers and higher production costs
—> upward pressure on prices
- the Phillips curve is a **short-run relationship**: applies to short-run variations in inflation and unemployment

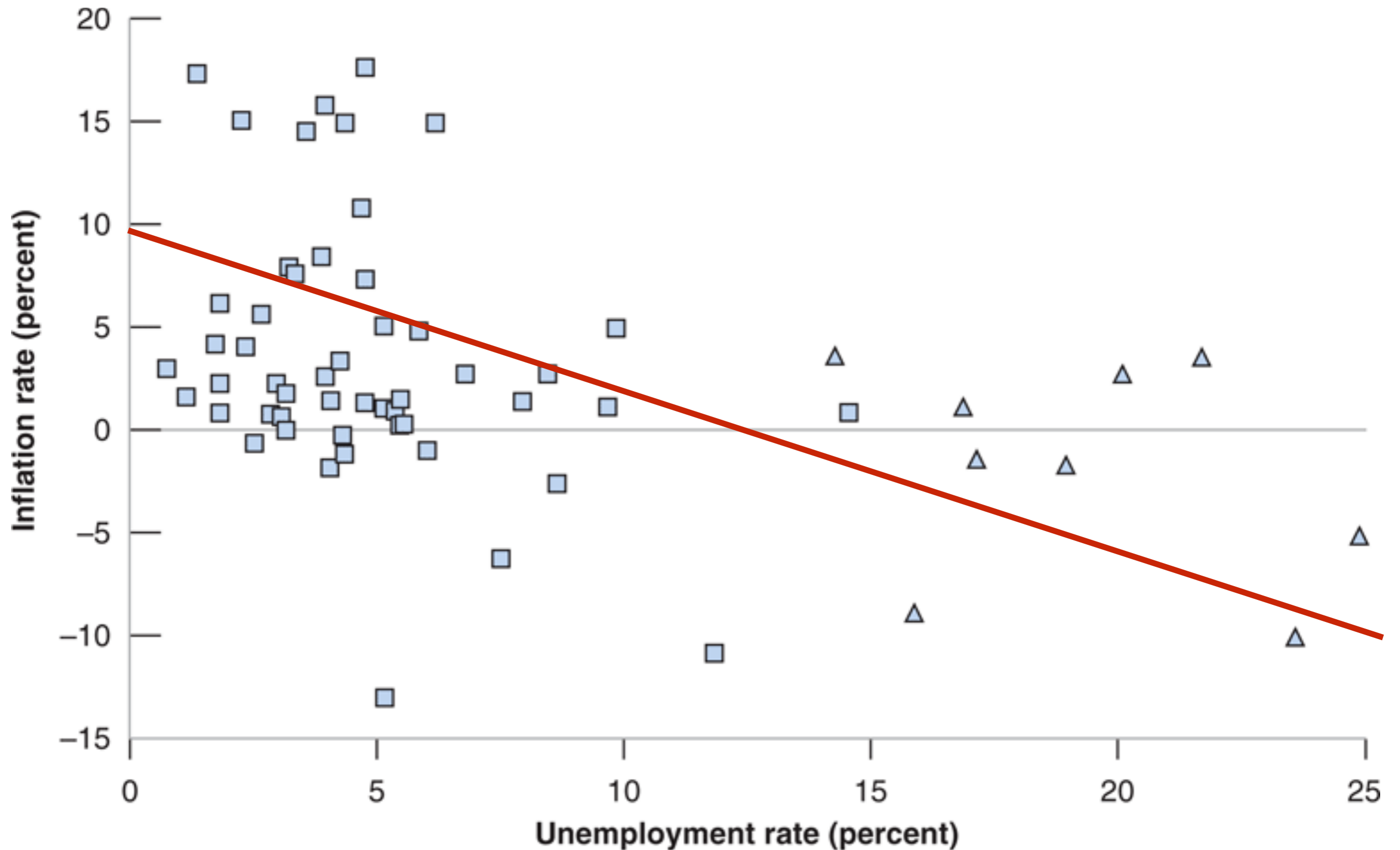
HISTORY OF THE PHILLIPS CURVE

- in 1958, Phillips found a negative relation between wage inflation and unemployment rate in the UK, 1861–1957
- in 1960, Samuelson and Solow showed that the relationship held in the US, 1940–1960
- Samuelson and Solow then focused on the negative relationship between price inflation and unemployment rate
- but then the Phillips curve disappeared, triggering a revolution in macroeconomics
 - end of **Keynesian economics** – people with behavioral biases, rigid prices and wages, important role for fiscal and monetary policy
 - beginning of **neoclassical economics** – fully rational people, flexible prices and wages, no role for government intervention

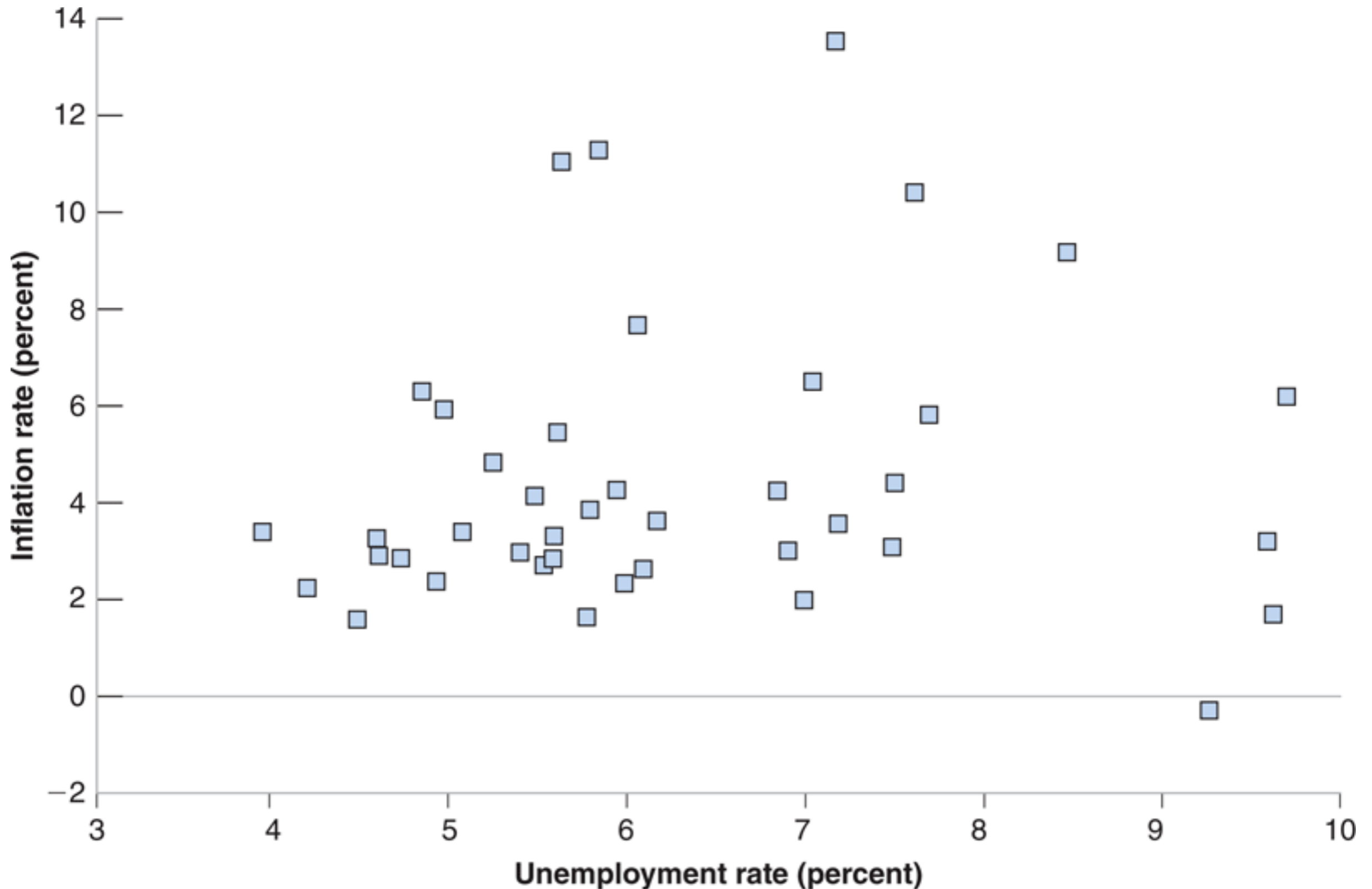
PHILLIPS CURVE IN THE US, 1948-1969



PHILLIPS CURVE IN THE US, 1900-1960



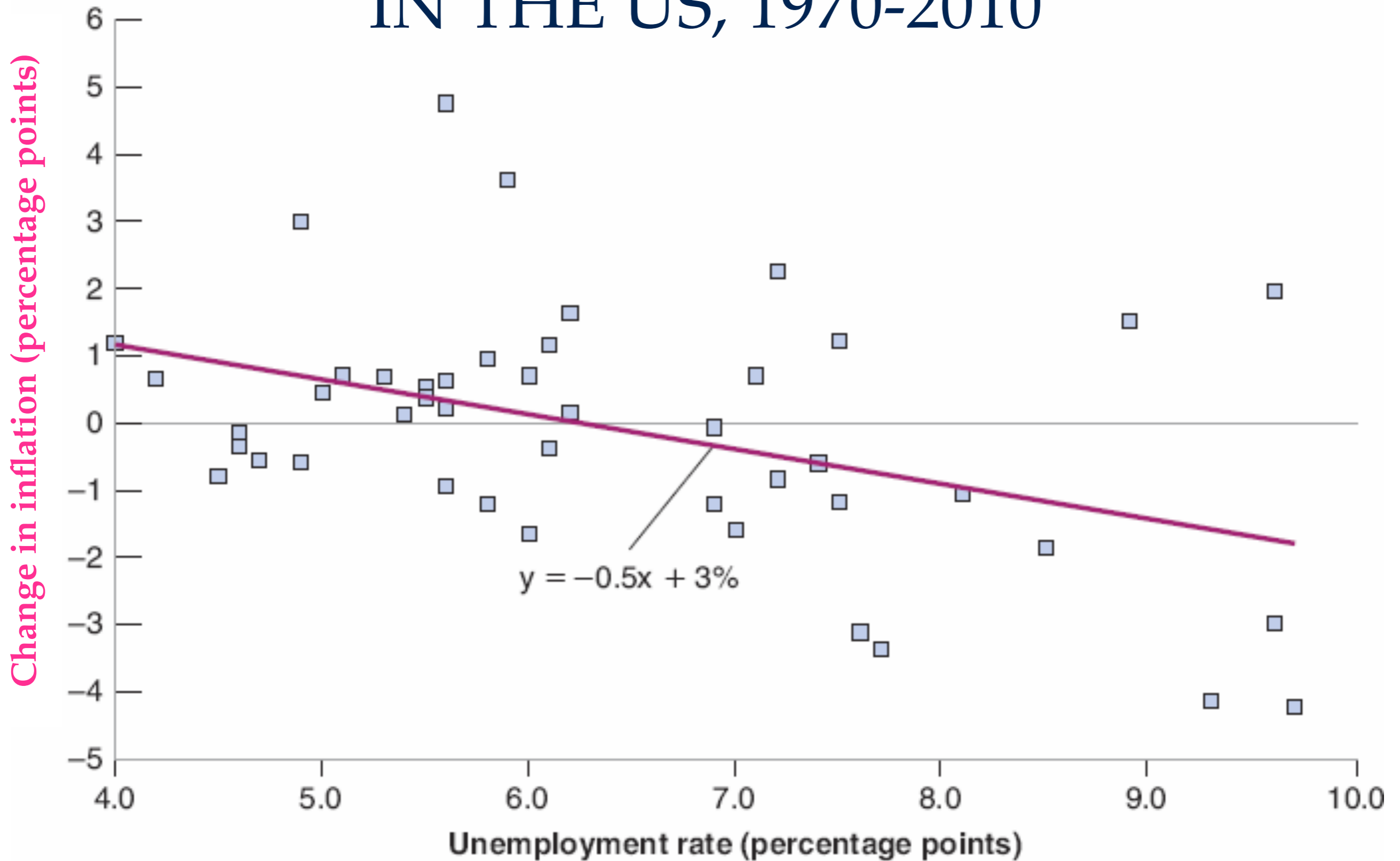
DISAPPEARANCE OF PHILLIPS CURVE IN THE US, 1970-2010



DISAPPEARANCE OF THE PHILLIPS CURVE

- beginning in 1970 in the US, the negative relation between unemployment rate and inflation rate disappeared
- what happened in the 1970s and 1980s?
 - oil price shocks
 - new monetary policy under chairman Paul Volcker
- and why did the Phillips curve hold for 70 years in the US before disappearing?

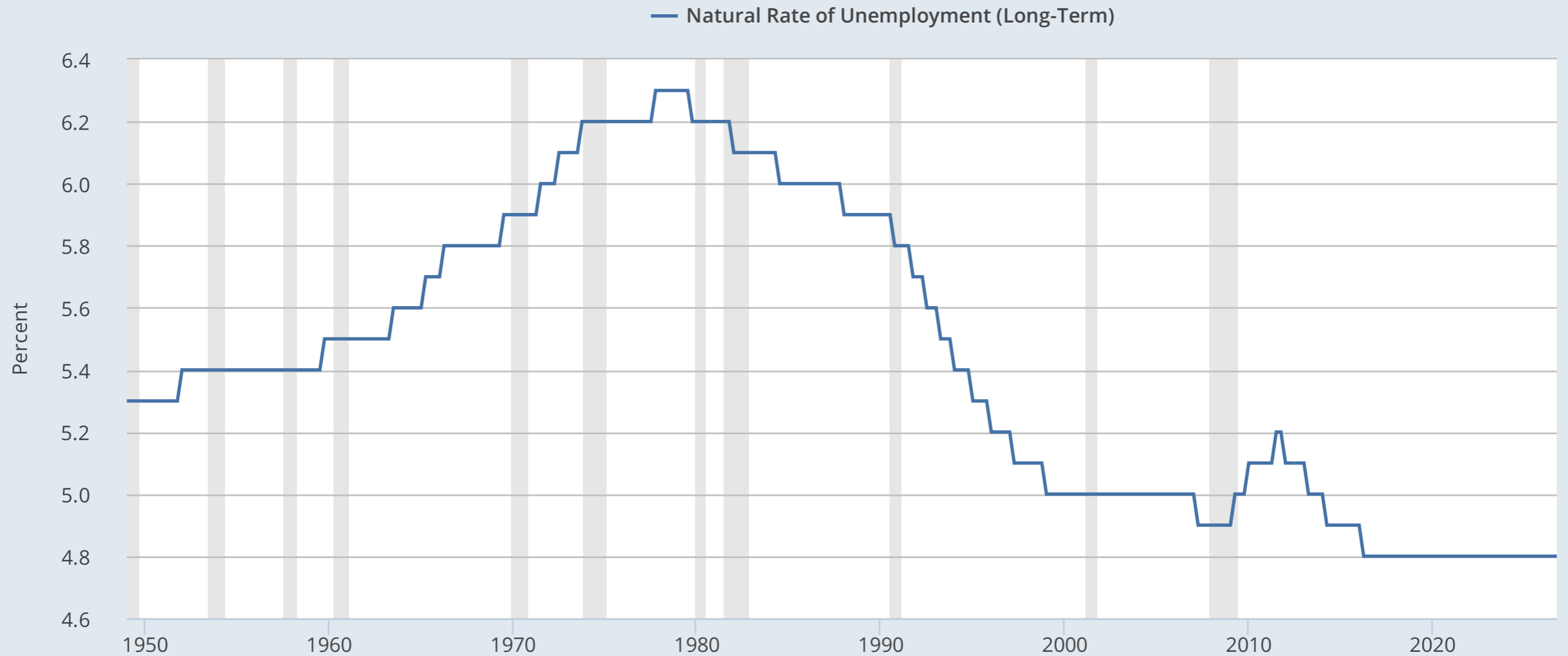
THE ACCELERATIONIST PHILLIPS CURVE IN THE US, 1970-2010



THE ACCELERATIONIST PHILLIPS CURVE

- since 1970, there is a negative relation between unemployment rate and change in inflation rate in the US
 - equation: $\pi(t+1) - \pi(t) = 3\% - 0.5 \times u(t)$
- this is the accelerationist Phillips curve
 - it describes how inflation accelerates or decelerates based on unemployment
- **NAIRU**: rate of unemployment such that $\pi(t+1) = \pi(t)$
 - Non-Accelerating Inflation Rate of Unemployment

NAIRU IN THE US



Source: US. Congressional Budget Office
fred.stlouisfed.org

myf.red/g/7IAX

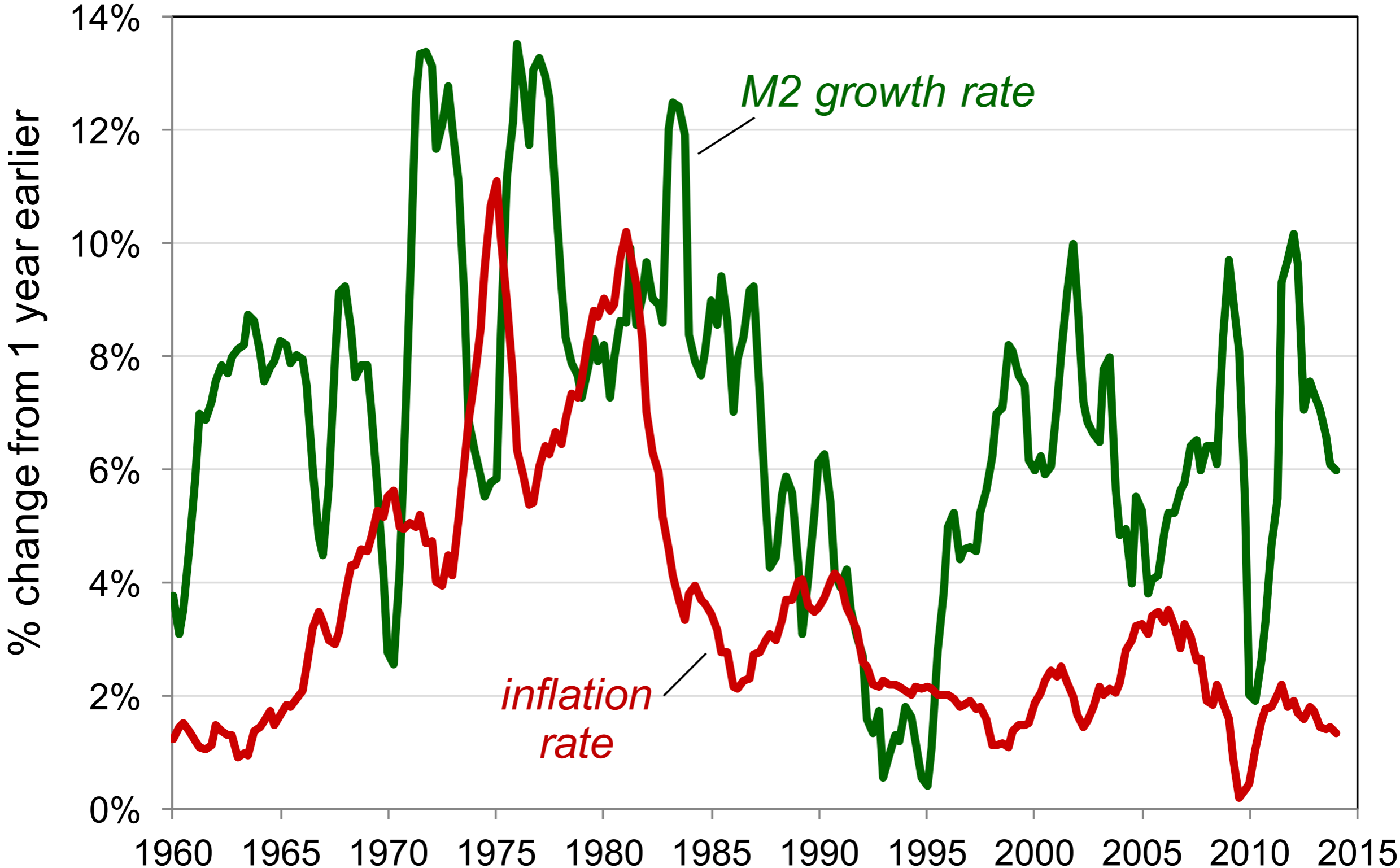
MODEL 2: QUANTITY THEORY OF MONEY

- quantity equation: $M \times V = P \times Y$
 - M: money supply, issued by central bank
 - V: velocity of money
 - parameter determining the speed at which money circulates: determined by the banking and financial systems
 - P: price level
 - Y: real GDP
- this is a **long-run** relationship: applies to long-run averages of inflation and money supply growth

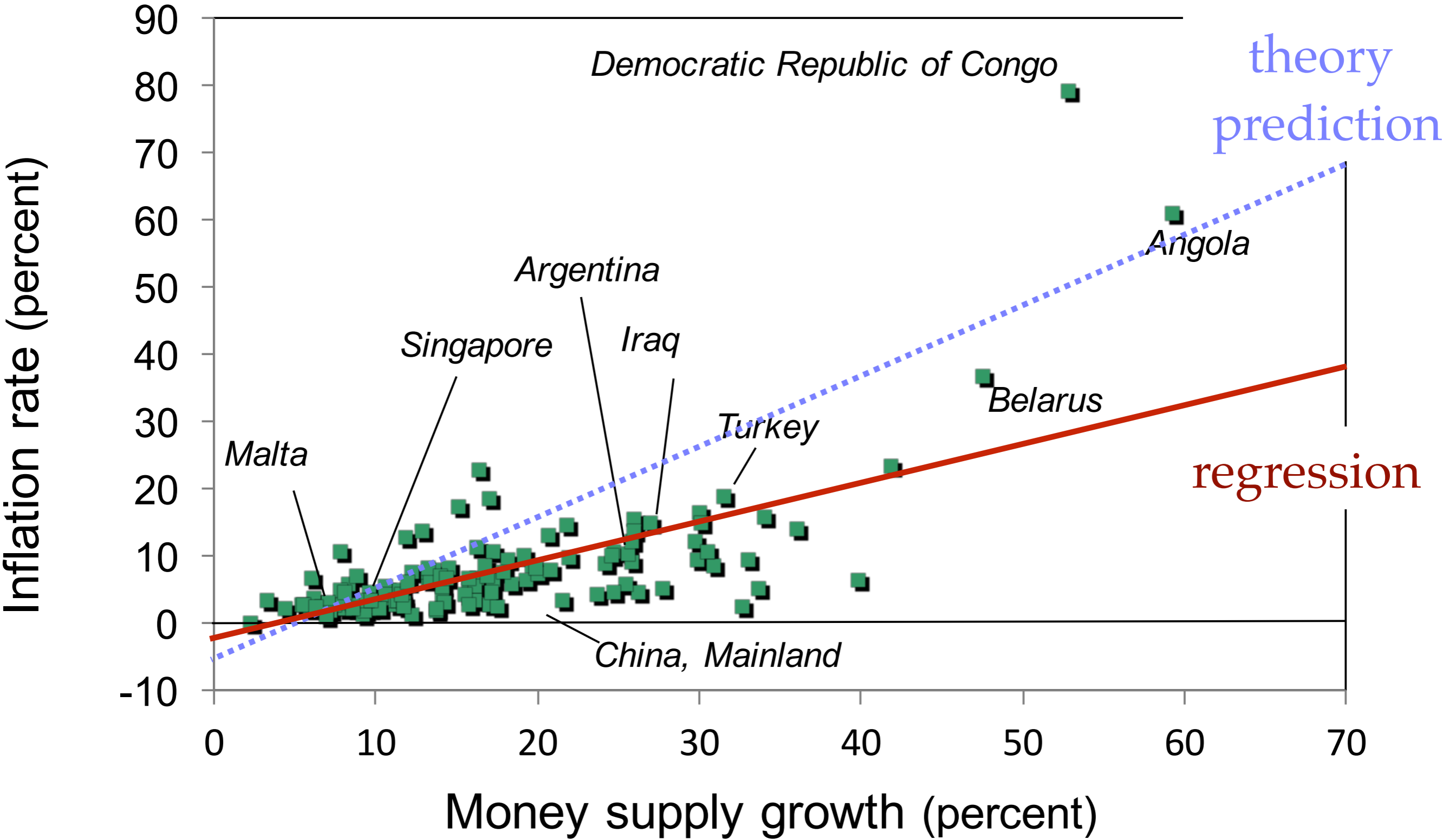
QUANTITY THEORY OF MONEY

- take growth rates of $M \times V = P \times Y$ with V fixed
 - growth of money supply = growth of prices + growth of real GDP
- growth rate of prices = inflation
- growth rate of real GDP = g
 - determined by technological progress and population growth
- then **inflation = growth rate of money supply - g**
 - one-for-one relation between inflation and the growth rate of money supply chosen by the central bank

MONEY GROWTH & INFLATION IN THE US: THEORY DOES NOT WORK IN SHORT RUN



AVERAGE MONEY GROWTH & INFLATION: THEORY WORKS IN THE LONG RUN



HYPERINFLATION

- common definition: inflation $> 50\%$ per month
- hyperinflation has huge economic costs
 - money ceases to function as a store of value, unit of account, and medium of exchange
 - in response people may conduct transactions with barter or a stable foreign currency
- hyperinflation also has huge social costs
 - German hyperinflation of 1921—1924

EXAMPLES OF HYPERINFLATION

<i>country</i>	<i>period</i>	<i>CPI Inflation % per year</i>	<i>M2 Growth % per year</i>
Israel	1983-85	338	305
Brazil	1987-94	1,256	1,451
Bolivia	1983-86	1,818	1,727
Ukraine	1992-94	2,089	1,029
Argentina	1988-90	2,671	1,583
Dem. Republic of Congo / Zaire	1990-96	3,039	2,373
Angola	1995-96	4,145	4,106
Peru	1988-90	5,050	3,517
Zimbabwe	2005-07	5,316	9,914

CAUSES OF HYPERINFLATION

- hyperinflation is caused by excessive money supply growth
 - when the central bank prints money, the price level rises
 - if it prints money rapidly enough —> hyperinflation
- why would a government create hyperinflation?
 - when a government cannot raise taxes or sell bonds, it must finance spending by printing money
 - in theory, the solution is simple: stop printing money
 - in the real world, this requires painful fiscal restraint