

Lecture notes on risk management, public policy, and the financial system

# Development of the contemporary financial system

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## Broader postwar economic developments

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Rapid growth of income and wealth

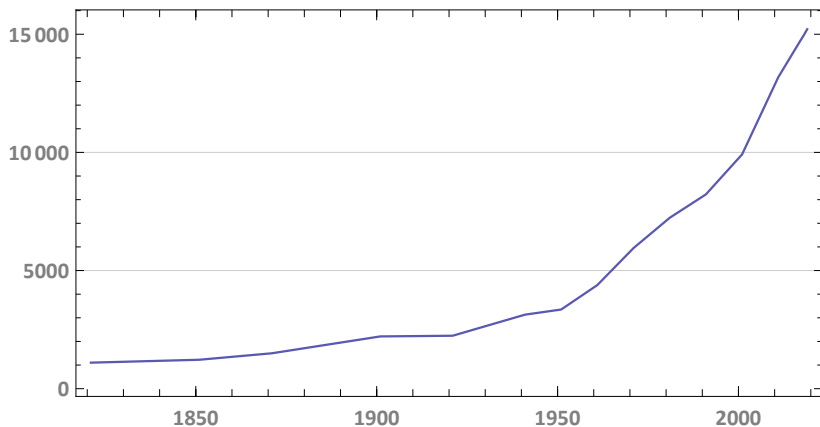
The Great Inflation and the Great Moderation

The decline in interest rates

## Rise in world income

- Rapid rise in world income in postwar era
  - Approx. 4-fold rise since 1950
  - Compare to approx. 4-fold rise in preceding *millennium*

## Growth in world real income 1820–2018

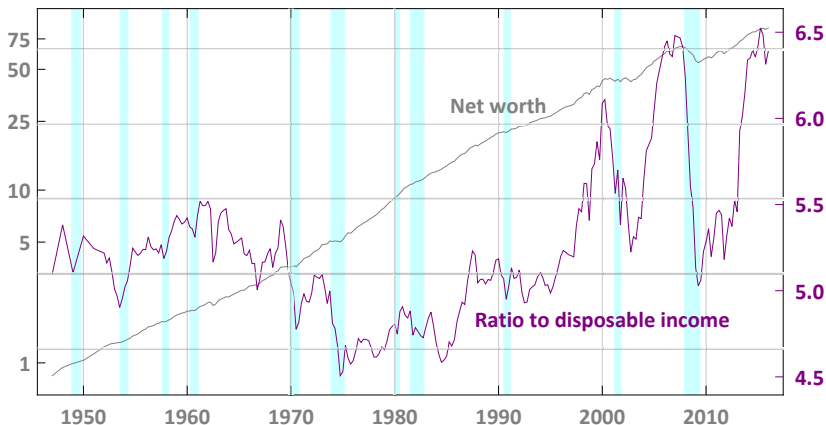


In 2011 dollars. *Source:* Maddison Project Database 2020,  
<https://www.rug.nl/ggdc/historicaldevelopment/maddison/>.

## Growth in assets

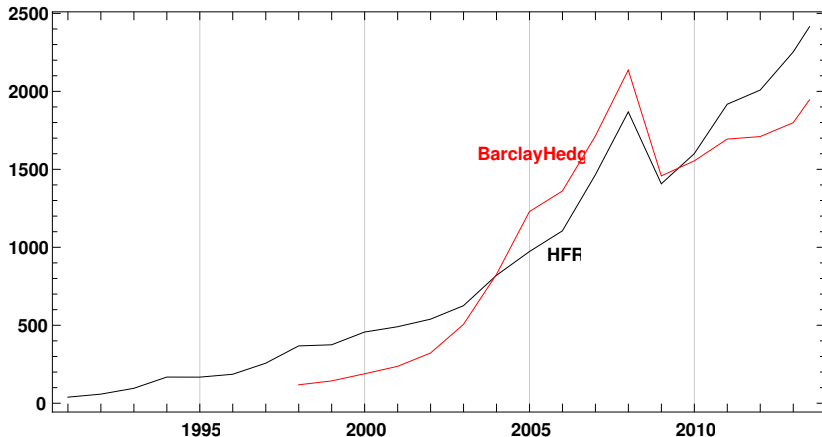
- Rise in household wealth
  - In U.S. and other countries, recent volatility due to house prices
  - And even greater volatility in ratio to income(→leverage)
- Rise of large capital pools (→safe assets, international imbalances)
  - Hedge funds
  - International reserves and sovereign wealth funds

## U.S. household net worth 1945–2015



Logarithm of household net worth, trillions of 2005 U.S. dollars (left y-axis) and ratio to disposable personal income (right y-axis), quarterly. Vertical shading represents NBER recession dates. *Source:* Federal Reserve Board, Financial Accounts of the United States (Z.1), Table B.101.

# Hedge fund assets under management 1990–2013



Annual, last observation Q2 2013, \$ bill. *Source:* HFR, BarclayHedge.



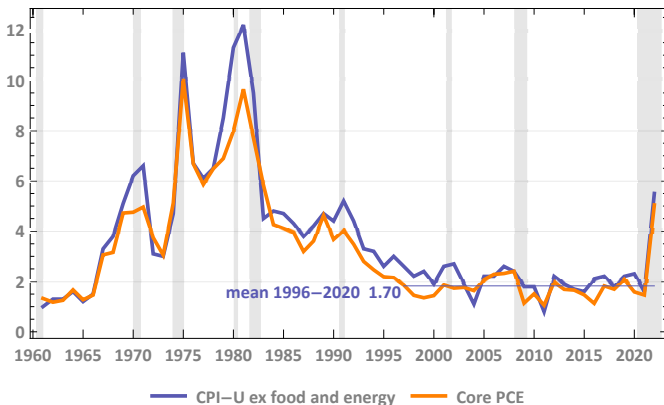
## From postwar growth to Great Inflation

- Growth of GDP through 1960's high by historical—and current—standards
- **Inflation**: rise in general price levels
  - Equivalently: decline in purchasing power of money unit
- Inflation rises from ca. 1965
  - **“Stagflation”**: high inflation together with low growth
- Collapse of Bretton Woods
  - **Gold-exchange standard** in place 1945–1971
- **Volcker disinflation** late 1979–1984

# The Great Moderation

- Period of perceived success of monetary policy
- Ca. 1984 until outbreak of global financial crisis
- Sharp decline in volatility of GDP growth, level and volatility of inflation
- **Interest-rate smoothing:** gradual adjustment of target funds rate
- Policy below rule 2000–06
  - But inflation itself suppressed by low import prices

# U.S. inflation 1960–2017

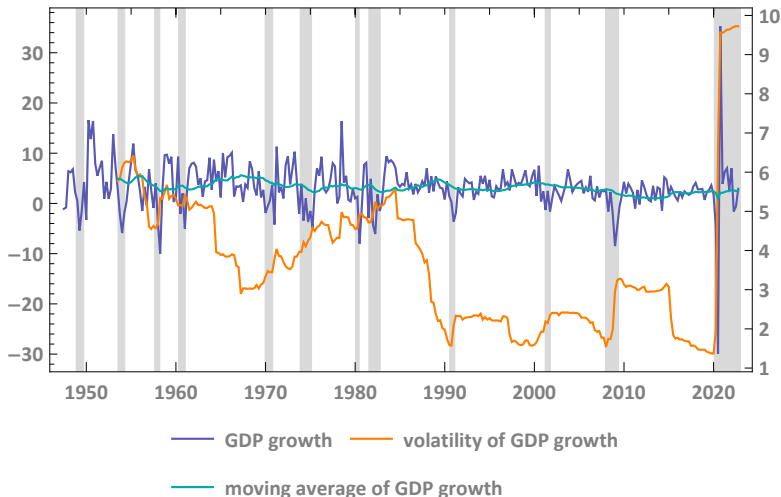


Annual percent change in the consumer price index—all urban consumers (CPI-U), all items less food and energy (*Source*: U.S. Bureau of Labor Statistics, series CUUR0000SA0L1E), and core Personal Consumption Expenditures price index (PCE) (*Source*: U.S. Bureau of Economic Analysis). The core PCE is a somewhat broader index and has different weights from CPI-U. Vertical shading represents NBER recession dates.

# Explanations for low inflation

- Credibility of monetary policy after 1980
  - Realized inflation low because central banks expected to pursue low-inflation policy
- Real factors:
  - Increase in productivity from 1980 until crisis (technology)
  - International factors: increase in trade, competition
- Since crisis, **Neo-Fisherian** effect of low interest rates on realized inflation
  - Low interest rates inconsistent with high expected inflation, so latter adjusts

# U.S. GDP growth rate and its volatility 1947–2013

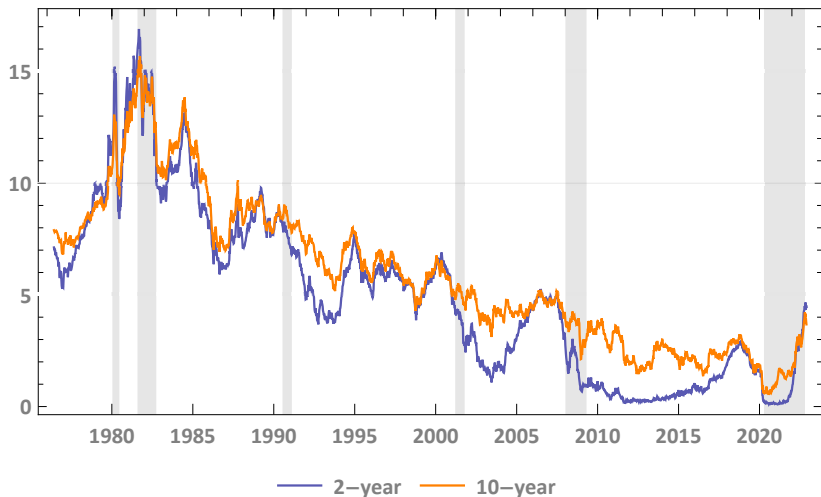


Percent change from preceding period in real gross domestic product, U.S. GDP growth, quarterly, percent, seasonally adjusted at an annual rate (black, left y-axis), and rolling standard deviation of the past 5 years' growth rates in percent (red, right y-axis). Vertical shading represents NBER recession dates. Source: U.S. Bureau of

## Behavior of U.S. interest rates

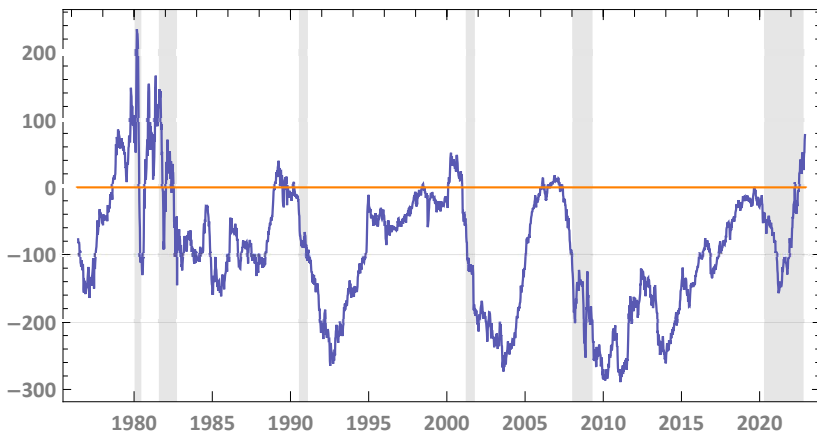
- **Nominal interest rates:** measured relative to money units
- **Real interest rates:** measured relative to purchasing power units
- **Equilibrium** or **neutral** or **natural** or **Wicksellian real interest rate:** the real rate that would prevail over the medium term if the economy were in equilibrium
- **Market real interest rate** is that currently prevailing
- Nominal rate can be decomposed into real rate plus *expected* inflation
- Three-decade decline in nominal rates and flattening of yield curve
  - Early manifestation: the Japan trap
  - **Conundrum** in U.S. rates 2004–2005: rising short-term rates, but steady or declining longer-term rates
  - Further decline during global financial crisis, policy response
- Both components of nominal rates falling
  - Expected inflation declining to below 2 percent
  - Real rate of interest declining to zero

## U.S. 2- and 10-year nominal rates 1997–2022



Constant maturity U.S. Treasury yields. *Data source:* Bloomberg LP.

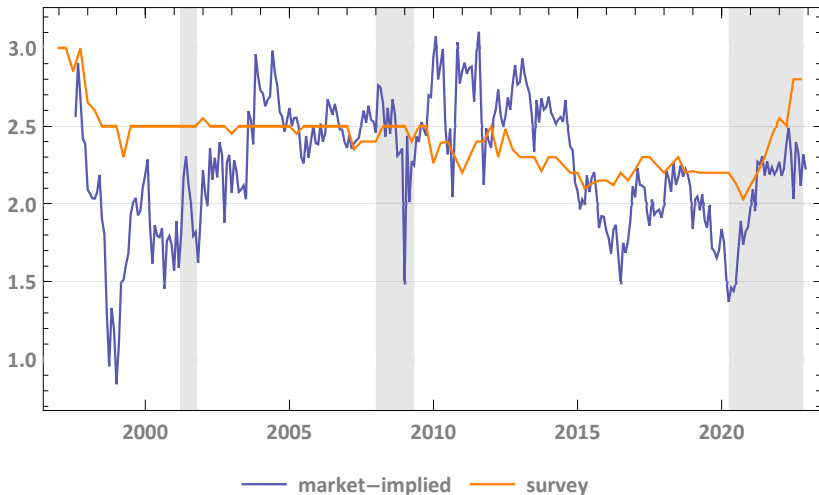
## U.S. 2- and 10-year spread 1997–2022



Constant maturity U.S. Treasury yields. *Data source:* Bloomberg LP.

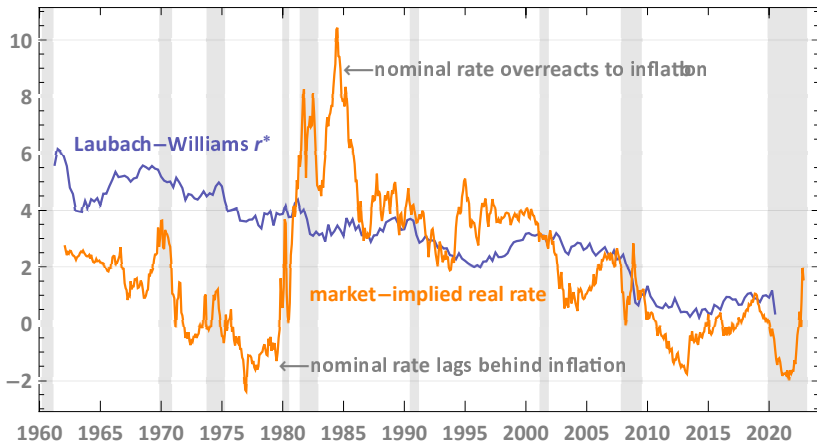


## Market-implied and survey inflation 2007–2022



**Purple** plot: 5-year 5-year forward breakeven inflation; **Orange** plot: Survey of Professional Forecasters median 10-year-ahead annual average inflation forecast, quarterly. Forward breakeven inflation is the inflation rate over some future interval implied by yields on nominal and inflation-adjusted bonds of two different terms to maturity. *Source:* Bloomberg LP, Federal Reserve Bank of Philadelphia.

# U.S. real interest rates 1961–2017

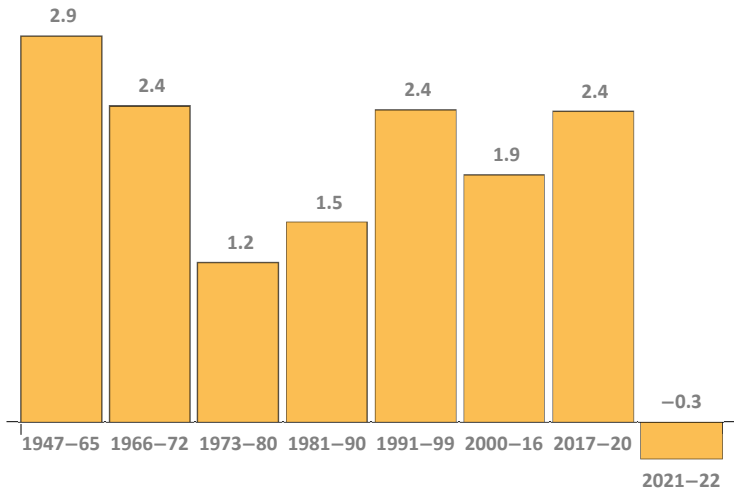


Laubach-Williams short-term natural rate  $r^*$  based on their Measuring the natural rate of interest, *Review of Economics and Statistics* 85(4), 2003, 1063-1070, estimates downloadable at [http://www.frbsf.org/economic-research/files/Laubach\\_Williams\\_updated\\_estimates.xlsx](http://www.frbsf.org/economic-research/files/Laubach_Williams_updated_estimates.xlsx); Mar. 1961–Dec. 2015, quarterly. Market-implied real rate is the 5-year U.S. TIPS yield from July 1997 (Bloomberg ticker USGGT05Y) and the 5-year nominal yield (Bloomberg ticker USGG10YR) minus a 10-year moving average of annual CPI-U All Items inflation rates centered on the current month Jan. 1967–June 1997; monthly.

## Why the decline in real rates?

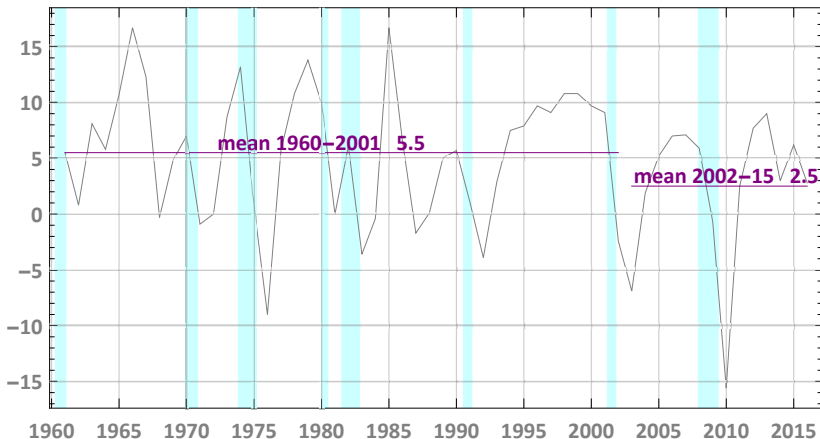
- Real interest rates unobservable, must be estimated
  - Models of equilibrium real rate
    - Considerable uncertainty around estimates
  - Market real rate based on inflation-indexed bond yields
    - Doesn't account for liquidity, inflation-risk premiums
- Possible explanations of low real rates:
  - **Global savings glut hypothesis:** rise in world saving (→international imbalances)
    - Including demographic reasons: aging population motivates higher saving
  - Demand for **safe assets**
  - **Secular stagnation** driven by low aggregate demand or by slowing technical progress
  - **International balances:** capital flows from less-developed to more advanced countries
- Consistent with low growth of productivity, business formation, and private investment

## U.S. labor productivity 1947–2016



Percent change in output per hour at an annual rate, nonfarm business, quarterly 1947Q2–2016Q2. *Source:* U.S. Bureau of Labor Statistics, series PRS85006092.

## Growth of U.S. investment spending 1960–2015



Percent change in gross domestic private nonresidential fixed investment, annual, National Income and Product Accounts, Table 1. *Source:* U.S. Bureau of Economic Analysis (BEA).