

Macro Week 4

A. Interest Rates, Saving and Investment

B. Fiscal Policy

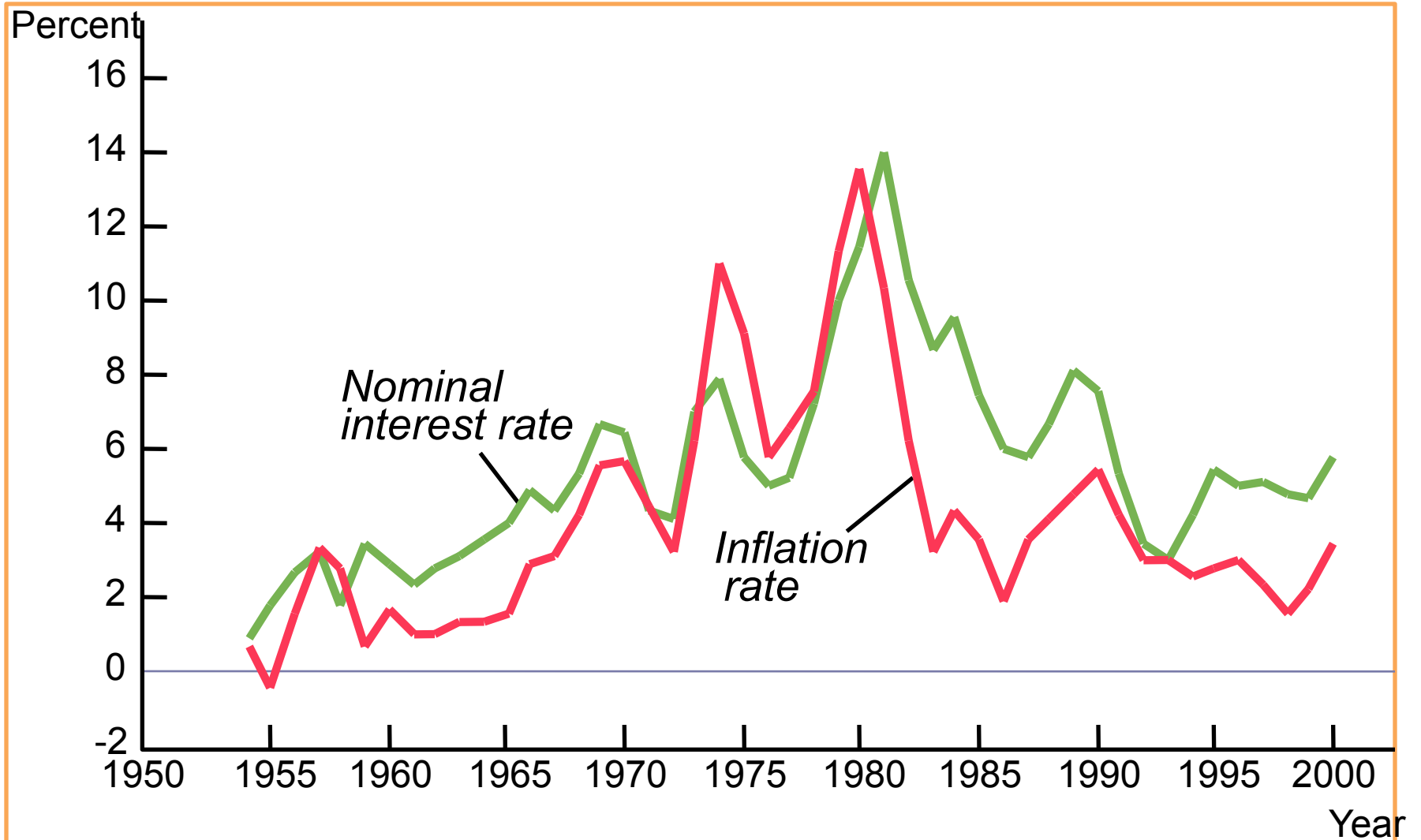
Interest Rates: Fisher Effect

- Two components of the nominal interest rate (n):

$$n = r + p^e$$

where p^e represents expected inflation and r represents real interest rates.

U.S. inflation and nominal interest rates



Role of Banks

- Intermediaries
- Accept savings (part of income that is not consumed) from workers in the form of deposits
- Make loans to firms who carry out the investment

Determination of real interest rates

- National Income: Savings and Investment
 - <http://faculty.haas.berkeley.edu/arose/Macro2.pdf>

Short-run vs. Medium-run relationship between money supply growth and interest rates



Fed buys
T-bills
from
banks

Fed pays
for the T-
bills by
writing a
cheque:
**injecting
liquidity**

**Banks now
have more
cash** than
they want to
hold

Banks that
want to
borrow from
other banks
can do so at
a **lower fed
funds rate**

***money is
cheap***

Fed injects
liquidity
until **fed
funds rate**
has fallen to
the Fed's
set "**target**"

Many different interest rates

- For this course:
 - Policy interest rate (can be “set” by central bank)
 - Short-term interest rate
 - Long-term interest rate
- Each of these interest rates can be decomposed into a part that is “real” and a part due to “expected inflation”
- An assumption we make is that by changing the policy interest rate the central bank can influence other interest rates
- The relationship among short-term and long-term interest rates is called the ‘yield curve’ or the ‘term structure of interest rates’

B. Fiscal Policy

Role of Government

Government's decisions:

- Decide how much to spend: G
- Decide how to finance the spending

Deciding how much to spend

- Is it something that the private sector does not already provide? (e.g. defense)
- Does it add to the productivity of the economy? (e.g. infrastructure)
- Does it give happiness? (e.g. public parks)
- Does it meet distributional goals? (e.g. transfers; unemployment benefits during recessions)

Decide how to finance the spending

Three ways to finance G

- Taxation
- Borrowing
- Inflation
 - In this part of the presentation we assume government does not choose this option.

Deciding whether to tax or borrow

- One option: “balanced budget rule”

$$G = T$$

Which is, $G = \tau Y$ (because tax revenue = tax rate times tax base)

- Why balanced budget rule may not be a good idea
 - Suppose G goes up temporarily (e.g. due to war); under balanced budget rule, would have to raise τ
 - Suppose economy goes into recession (Y is less than potential), and so τY drops; under balanced budget rule, options would be either to cut G or raise τ
- A better rule
 - Finance temporary increases in G or temporary shortfalls in T by borrowing
 - Finance permanent increases in G by a permanent increase in T (raise τ ; unless increased G is expected to make economy more productive and thus raise Y)

Fiscal balances

- Suppose government of a new country decides it needs to spend more than it can collect in taxes in its first year

$$\text{So } G_1 > T_1$$

The government borrows the rest (“issues bonds”)

$$\text{So government runs a fiscal deficit: } G_1 - T_1 = B_1$$

- Second year:

$$(G_2 + rB_1) - T_2 = B_2 - B_1$$

If $G_2 + rB_1 = T_2$ (govt. has a balanced budget in year 2),

then $B_2 = B_1$ (stock of outstanding debt remains constant)

If $G_2 + rB_1 < T_2$ (govt. has a fiscal surplus in year 2),

then $B_2 < B_1$ (government pays off some of the outstanding debt)

If $G_2 + rB_1 > T_2$ (govt. has a fiscal deficit in year 2),

then $B_2 > B_1$ (government adds to the outstanding debt)

Evolution of the debt

- $(G_2 + rB_1) - T_2 = B_2 - B_1$
- We can rewrite as $B_2 = B_1 + (G_2 + rB_1 - T_2)$
- *Which is the same as: $B_2 = (1 + r) B_1 + (G_2 - T_2)$*

In general, for year t

$$B_t = (1 + r) B_{t-1} + (G_t - T_t)$$

- B_{t-1} is government debt at the end of year, $t - 1$ or, equivalently, at the beginning of year t ; r is the real interest rate, which we shall assume to be constant here. Thus rB_{t-1} equals the real interest payments on the government debt in year t .
- G_t is government spending during year t .
- T_t is taxes minus transfers during year t .

Evolution of the debt-to-GDP ratio

$$\frac{B_t}{Y_t} = (1+r) \frac{B_{t-1}}{Y_t} + \frac{G_t - T_t}{Y_t}$$

$$\frac{B_t}{Y_t} = (1+r) \left(\frac{Y_{t-1}}{Y_t} \right) \frac{B_{t-1}}{Y_{t-1}} + \frac{G_t - T_t}{Y_t}$$

$$\frac{B_t}{Y_t} = (1+r-y) \frac{B_{t-1}}{Y_{t-1}} + \frac{G_t - T_t}{Y_t}$$

$$\frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}} = (r-y) \frac{B_{t-1}}{Y_{t-1}} + \frac{G_t - T_t}{Y_t}$$

Evolution of the debt-to-GDP ratio

$$\frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}} = (r - y) \frac{B_{t-1}}{Y_{t-1}} + \frac{G_t - T_t}{Y_t}$$

The change in the debt-to-GDP ratio over time is equal to the sum of two terms.

- The first term is the difference between the real interest rate and the growth rate times the initial debt ratio.
- The second term is the ratio of the **primary balance** to GDP.

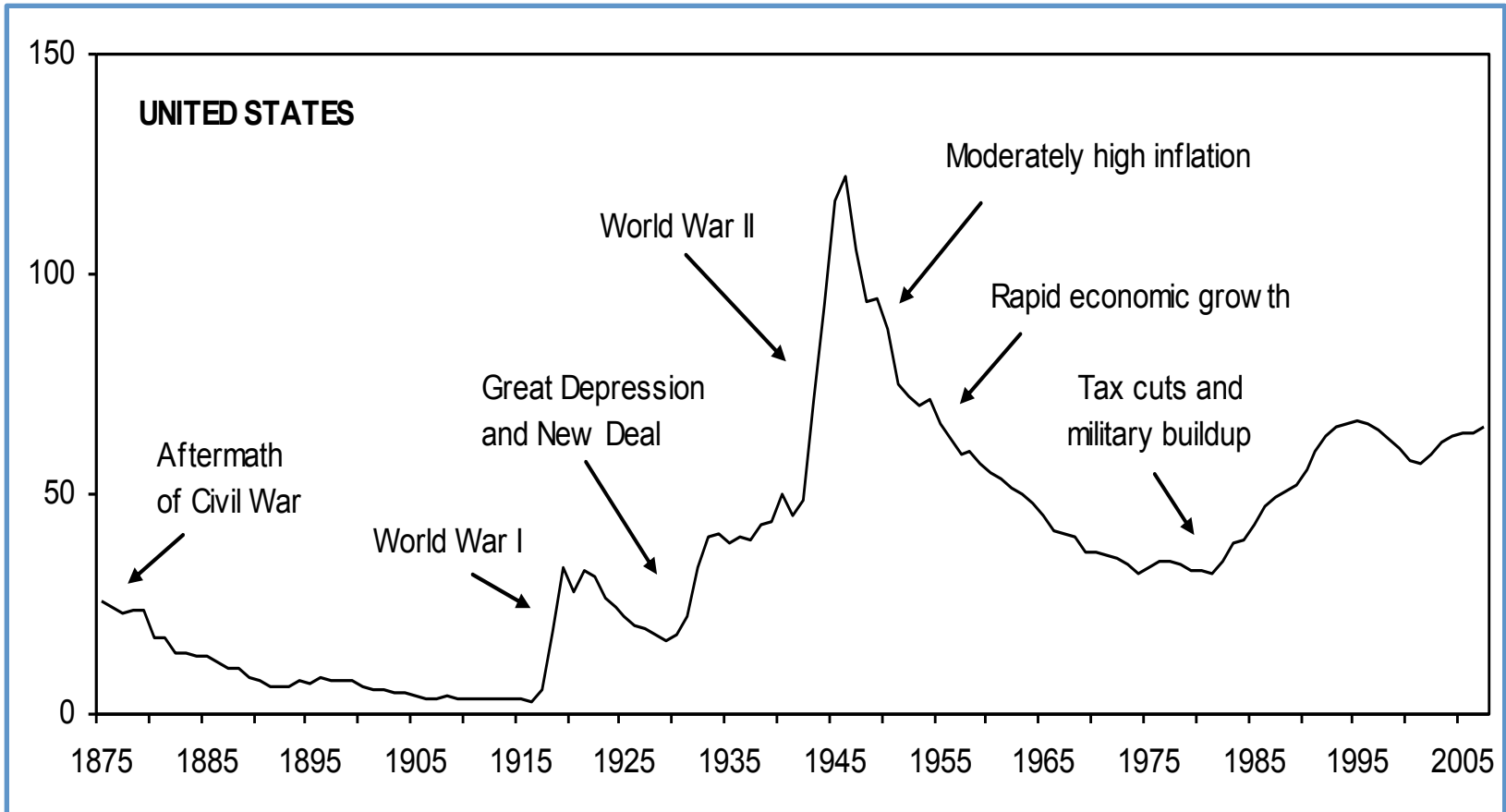
Evolution of the debt-to-GDP ratio

$$\frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}} = (r - y) \frac{B_{t-1}}{Y_{t-1}} + \frac{G_t - T_t}{Y_t}$$

• This equation implies that the increase in the ratio of debt to GDP will be larger:

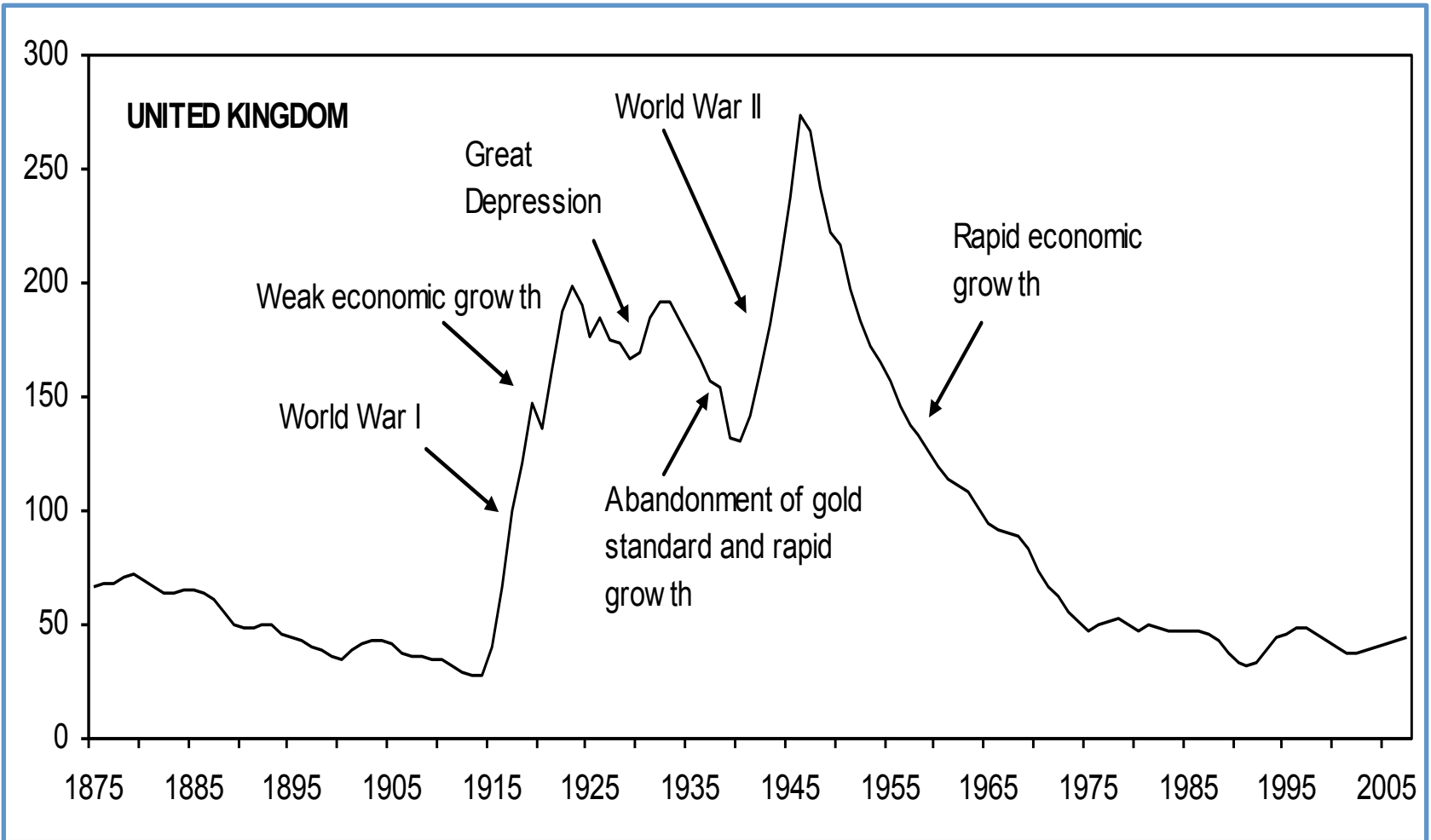
- the higher the real interest rate,
- the lower the growth rate of output,
- the higher the initial debt ratio,
- the higher the ratio of the primary deficit to GDP.

U.S. Debt-to-GDP ratio



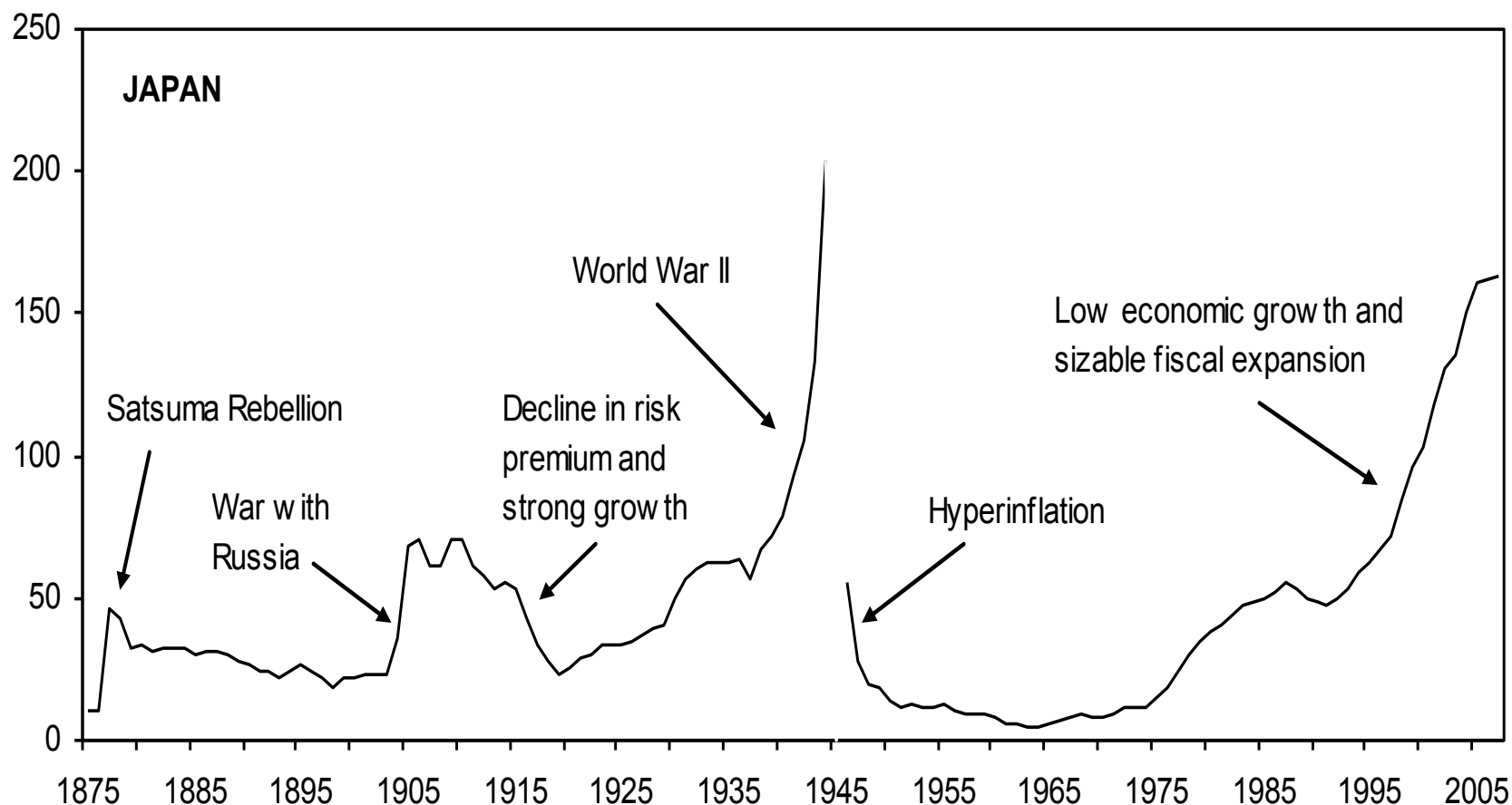
Source: Finance and Development, March 2009; Paying the Piper, Carlo Cottarelli.

U.K. Debt-to-GDP Ratio



Source: Finance and Development, March 2009; Paying the Piper, Carlo Cottarelli.

Japan's Debt-to-GDP Ratio



Source: Finance and Development, March 2009; Paying the Piper, Carlo Cottarelli.