

Handout 7

Fiscal Policy

Fiscal Policy

Topics:

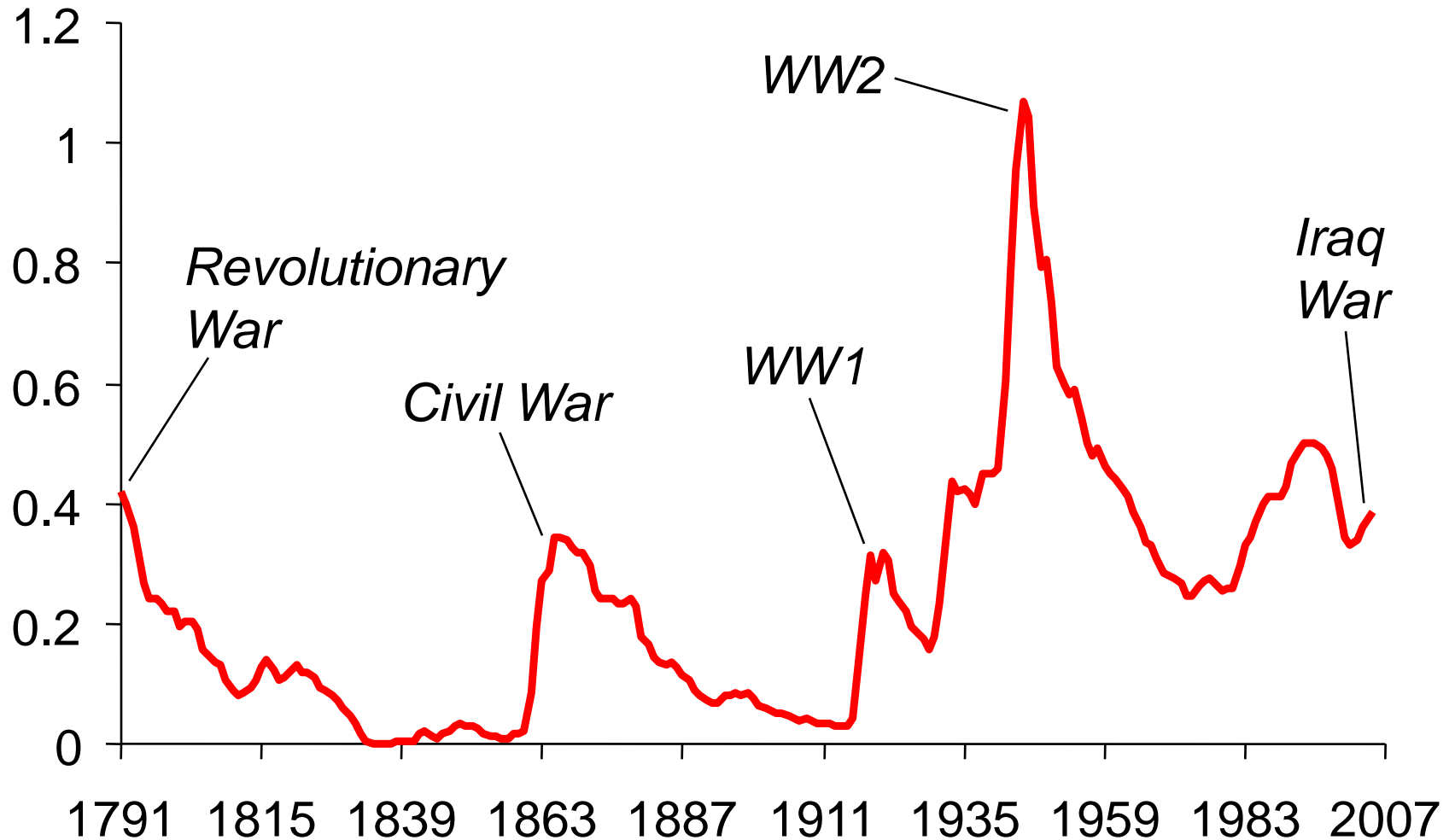
- Government Budget Constraint
 - ◆ Deficits and Debt
 - ◆ Evolution of Debt-to-GDP Ratio
- Ricardian Equivalence

Indebtedness of the world's governments

Country	Gov Debt (% of GDP)	Country	Gov Debt (% of GDP)
Japan	159	U.S.A.	64
Italy	125	Sweden	62
Greece	108	Finland	53
Belgium	99	Norway	52
France	77	Denmark	50
Portugal	77	Spain	49
Germany	70	U.K.	47
Austria	69	Ireland	30
Canada	69	Korea	20
Netherlands	64	Australia	15

War and Government debt

Example: U.S. gov debt to GDP Ratio



Deficits and Debt

Public Deficit in the European Union (2004), % of GDP

Belgium: 0.0

Luxembourg: 0.6

Denmark: -2.3

Netherlands: 2.1

Germany: 3.7

Austria: 1.0

Greece: 6.6

Portugal: 3.0

Spain: 0.1

Finland: -2.1

France: 3.6

Sweden: -1.6

Ireland: -1.4

U.K.: 3.1

Italy: 3.2

Source: Eurostat

Deficits and Debt

Public Debt in the European Union (2004), % of GDP

Belgium: 95.7

Denmark: 43.2

Germany: 66.4

Greece: 109.

Spain: 46.9

France: 65.1

Ireland: 29.8

Italy: 106.5

Luxembourg: 6.6

Netherlands: 53.1

Austria: 64.3

Portugal: 59.4

Finland: 45.1

Sweden: 51.1

U.K.: 41.5

Source: Eurostat

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Deficits and Debt

$$\text{deficit}_t = rB_{t-1} + G_t - T_t$$

- All variables in real terms: inflation-adjusted deficit
- B_{t-1} : Government debt at end of year $t-1$
- rB_{t-1} : Real interest payments on existing debt
- G_t : Government spending during year t
- T_t : Taxes minus transfers during year t
- *Deficit is a flow*
- *Debt is stock – a result of past deficits*

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Government Budget Constraint

- The deficit in year t is equal to change in debt, so the government budget constraint is:

$$\underbrace{B_t - B_{t-1}}_{\text{change in the debt}} = \underbrace{rB_{t-1}}_{\text{interest payments}} + \underbrace{G_t - T_t}_{\text{Primary deficit}}$$

- Debt at the end of year t equals:

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

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Government Budget Constraint: current versus future taxes

- To understand the implication of current tax cut on debt and future taxes, consider a simple example:
 - ◆ The initial government's debt is equal to zero ($B_0=0$)
 - ◆ Suppose government cut taxes by 1 for one year, and government expenditures remain constant.
 - ◆ So government run a primary deficits in year 1:

$$G_1 - T_1 = 1$$

- ◆ Government debt becomes:

$$B_1 = (1+r) B_0 + 1 = 1$$

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Government Budget Constraint: current versus future taxes

Full Repayment in Year 2:

If government decides to fully repay the debt in year 2

- ◆ From GBC: $B_2 = (1+r)B_1 + (G_2 - T_2)$
- ◆ Given $B_1 = 1$, for $B_2 = 0$ we must have

$$T_2 - G_2 = 1+r$$

- ◆ Therefore, to repay debt in year 2, the government must run a primary surplus equal to $(1+r)$ i.e. increase tax T_2 by $(1+r)$ if public spending remains constant.

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Government Budget Constraint: current versus future taxes

Full Repayment in Year t:

If government decides to fully repay the debt only in year t

- ◆ $t=1$: $G_1 - T_1 = 1$ and $B_1 = 1$
- ◆ $t=2$: $B_2 = (1+r)B_1 + 0 = 1+r$
- ◆ $t=3$: $B_3 = (1+r)B_2 + 0 = (1+r)^2$
- ◆ $t-1$: $B_{t-1} = (1+r)^{t-2}$

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Government Budget Constraint: current versus future taxes

Full Repayment in Year t:

- In year t, the GBC:

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

- Given $B_{t-1} = (1+r)^{t-2}$, for $B_t = 0$ we must have

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

- So must increase tax T_t by $(1+r)^{t-1}$ if public spending remains constant.

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Government Budget Constraint: current versus future taxes

- Observations from the examples of full repayment:
 - ◆ With unchanged spending , a decrease in taxes must be offset by an increase in taxes in the future.
 - ◆ The longer the government waits or the higher the real interest, the higher the eventual increase in taxes

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Government Budget Constraint: current versus future taxes

- Until now, we assumed that the government fully repays the debt. Another possibility is that it stabilizes the debt.
- Stabilizing the debt – changing taxes or spending so that debt remains constant from then on

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Government Budget Constraint: current versus future taxes

Stabilizing the Debt:

GBC at $t=2$:

$$B_2 = (1+r)B_1 + (G_2 - T_2)$$

Debt stabilisation requires:

$$B_2 = B_1 = 1$$

So GBC becomes:

$$1 = (1+r) + (G_2 - T_2)$$

Rearranging,

$$T_2 - G_2 = r$$

- Similarly, as $B_3 = B_2 = 1$, so must have $T_3 - G_3 = r$. The same logic follows for each of the following years.

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Government Budget Constraint: current versus future taxes

Stabilizing the Debt

- Observation from the example:
 - ◆ Past deficits imply higher government debt.
 - ◆ To stabilize the debt, the government must run a primary surplus equal to the interest payments on the existing debt in each of the following years.
 - ◆ This requires higher taxes forever.

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Government Budget Constraint: Debt-to-GDP Ratio

- Our previous analysis focused on the evolution of the *level* of debt
- If economy experiences growth in GDP, then it makes more sense to look at the evolution of ***debt-to-GDP ratio***.
- To study the dynamics of this ***debt ratio***, we need to first derive it from the government budget constraint.

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Government Budget Constraint: Debt-to-GDP Ratio

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

Divide both sides of the budget constraint by GDP,

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

Rewrite using Y_{t-1} ,

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

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Government Budget Constraint: Debt-to-GDP Ratio

Assume GDP is growing at constant rate g : $Y_t = (1+g)Y_{t-1}$

Using the approximation: $\frac{1+r}{1+g} = 1+r-g$

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

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

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Government Budget Constraint: Debt-to-GDP Ratio

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

change in the
debt ratio

Primary deficit
to GDP

- The increase in the debt ratio is larger if
 - ◆ Real interest rate is higher
 - ◆ Real growth rate is lower
 - ◆ Initial debt ratio is higher
 - ◆ The primary deficit to GDP ratio is higher

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The Evolution of the Debt-to-GDP Ratio in the OECD

Country	Debt/GDP			Primary Surplus/GDP	
	1981	1995	2003	2003	
United States	21.6	49.2	36.1	-1.4	
European Union	24.0	53.5	52	0.3	
Italy	56.4	108.7	93.5	2.3	
Belgium	82.2	125.2	94.2	5.5	
Greece	27.1	108.7	103	2.1	

Note: growth rates are low in the 1980s and high in the 1990s.

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Ricardian Equivalence

Ricardian Equivalence

- Once the government budget constraint is taken into account, neither deficit nor debt has an effect on economic activity.
- The effect of lower taxes today is cancelled out by higher taxes tomorrow.
- Consumers do not change their consumption in response to a tax cut if the present value of after-tax labor income is unaffected. (Recall the Permanent income and life-cycle theory of consumption)

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A Closer look at the Ricardian Equivalence

- The government can finance government spending through:
 1. Taxation – transfer income from current income earners to the government
 2. Borrowing – transfer income from future income earners to the government
 3. Printing money – transfer income from money holders to the government (Inflation Tax)
- ◆ Ricardian Equivalence: if the present value of the government spending remains the same then the timing of taxes does not matter and how much debt the government raises does not matter.

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A Closer look at the Ricardian Equivalence: a two-period model

- Consider a simple 2-period model: government has zero initial debt and it must repay all debts at the end of period 2.
- Government budget constraint in both periods together imply that present value of taxes must equal to present value of government spending

$$T_1 + T_2 / (1+r) = G_1 + G_2 / (1+r)$$

- The life-time income of consumer is

$$W = Y_1 - T_1 + (Y_2 - T_2) / (1+r)$$

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A Closer look at the Ricardian Equivalence: a two-period model

- The two inter-temporal budget constraints implies

$$W = Y_1 + Y_2 / (1+r) - [G_1 + G_2 / (1+r)],$$

- So the life-time income of consumer is the same if present value of government spending is the same.
- Therefore if consumption decision is based on W then it only depends on the present value of government spending.

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Ricardian Equivalence

Ricardian equivalence might not hold

- Consumers are myopic or “short-sighted”
- Consumer has borrowing constraint or for other reasons we went through for why consumption might depend not only on permanent income but also on current income
- Consumer has shorter life-span than government. But what if current generation cares about the next, i.e. altruistic parents?
- Tax is distortionary: labour income tax reduces incentive to work

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Cost of High Debt

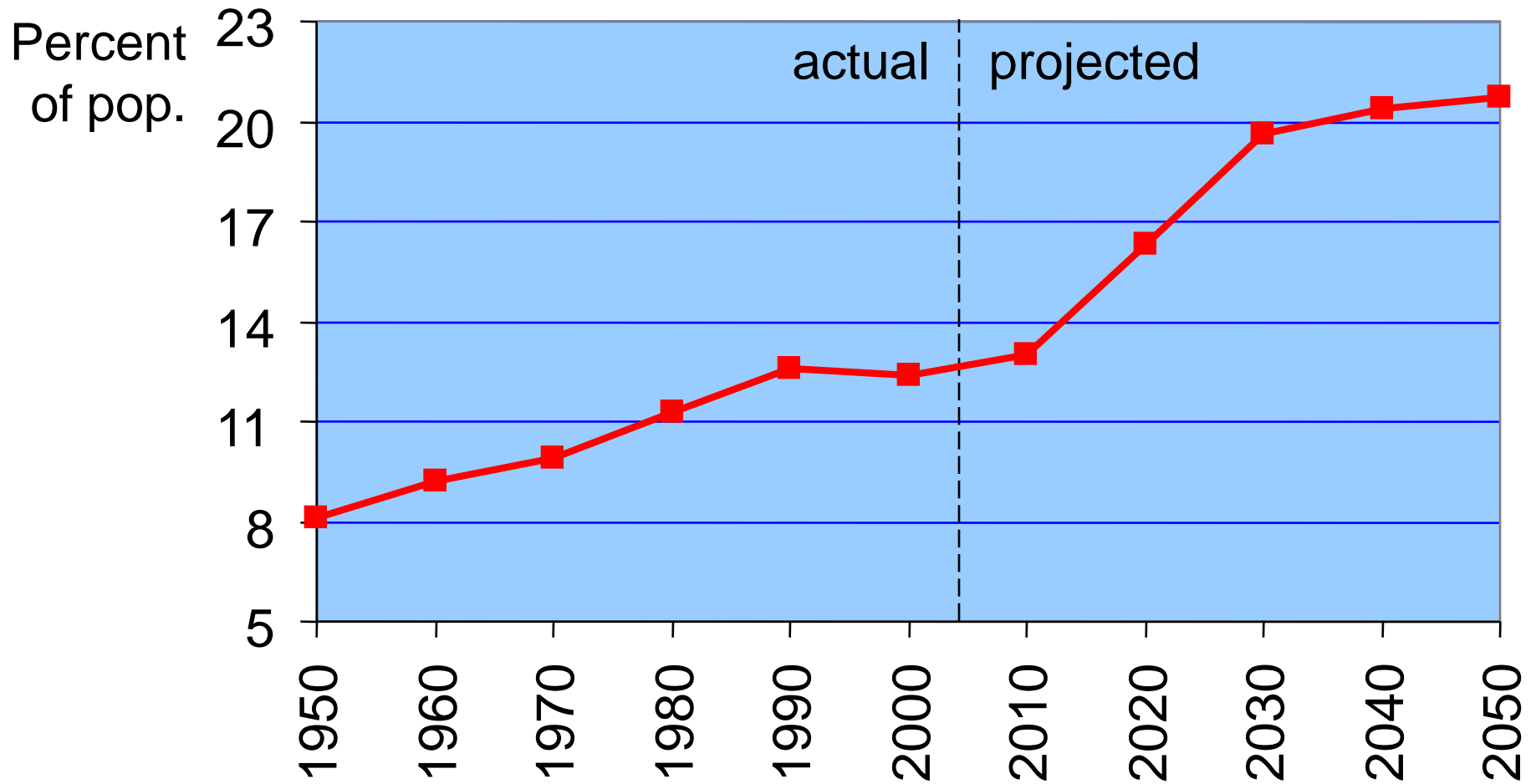
- In our monetary policy discussion, we studied costs and benefits of inflation, and why government might want to target inflation.
- For similar reasons, high debt is costly: when tax rates are very high, people will work less in the market and switch to ***home production*** or ***shadow economy***, reducing the effectiveness of fiscal policy.

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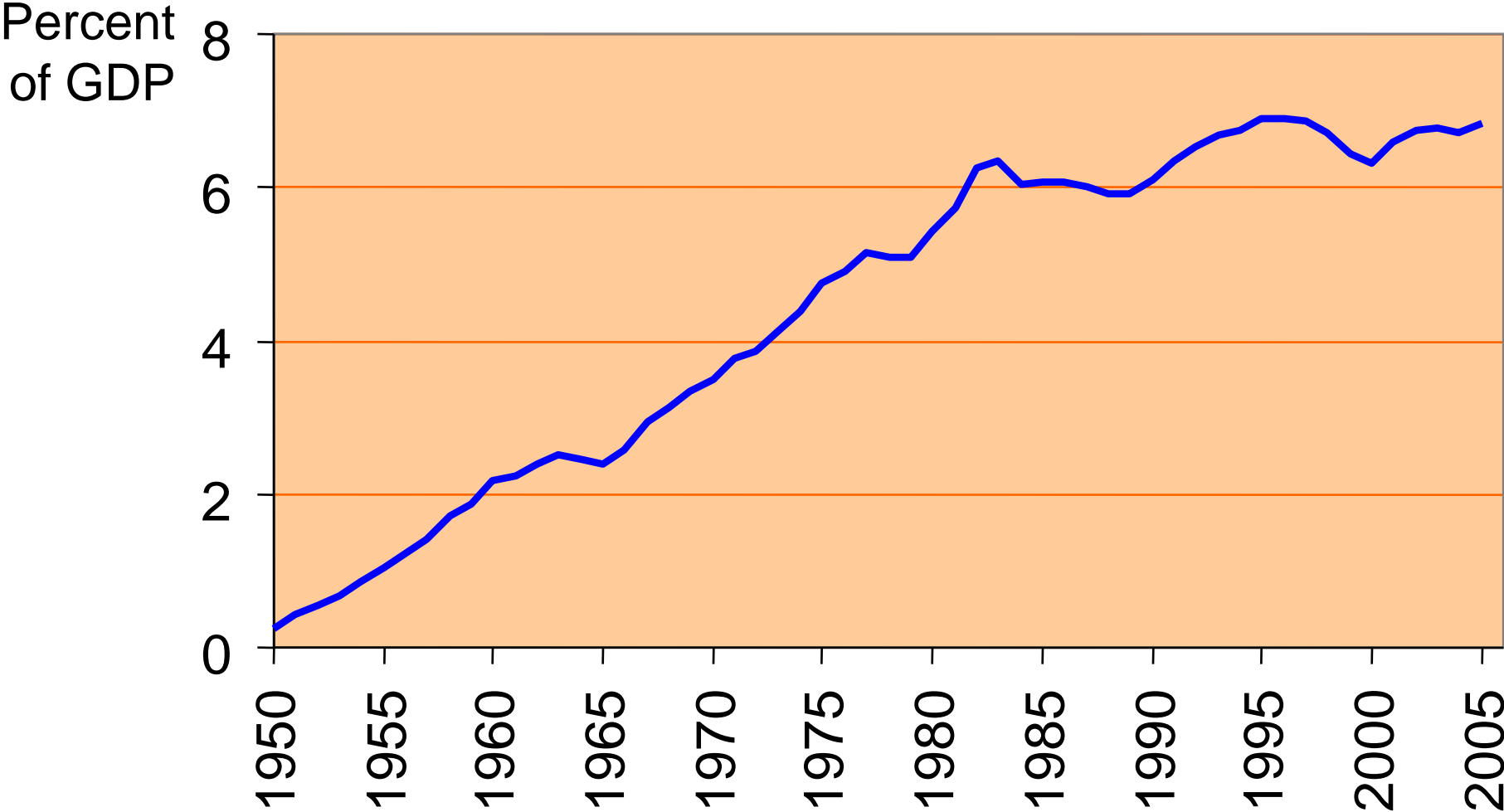
Population Aging

- The population is aging in most of OECD countries.
- Health care costs are rising.
- Spending on entitlements like Social Security and Medicare is growing.
- Deficits and the debt are projected to significantly increase.

Percent of U.S. population age 65+



U.S. government spending on Medicare and Social Security



Projected Spending on Social Security, Medicare, and Medicaid, US, 1998-2060 (Percent of GDP)

	2004	2010	2030	2050
Social Security	4.2	4.2	5.9	6.2
Medicare/Medicaid	4.1	4.8	8.4	11.5
Total	8.3	9.0	14.3	17.6

**Source: “The Long-Term Budget Outlook,”
Congressional Budget Office, December 2003.**

CBO projected U.S. federal Government debt

