

Fiscal Policy

Econ 4021, Washington University in St. Louis

Miguel Faria-e-Castro
Federal Reserve Bank of St. Louis

April 2022

Introduction

- ▶ Fiscal policy is the use of government revenue collection and expenditure to influence the economy
- ▶ While monetary policy is controlled by the Fed, fiscal policy occurs at every level of government
 - ▶ From military spending or the setting of social security benefits by the federal government
 - ▶ To the maintenance of Big Bend Boulevard, by the government of St. Louis County
- ▶ Fiscal policy affects almost every single economic decision taken by economic agents
- ▶ We focus on its macroeconomic effects

Introduction

This series of lectures:

1. The Government Budget
2. Government Spending , Taxes, and the Macroeconomy
3. Government Deficits and Debt
4. Fiscal Multipliers
5. Deficits and Inflation

1. The Government Budget

The Government Budget

- ▶ The **government budget** is a plan of anticipated government income and expenses for a given period
- ▶ It specifies explicitly government spending (or outlays) and income
- ▶ It specifies implicitly a budget surplus or deficit

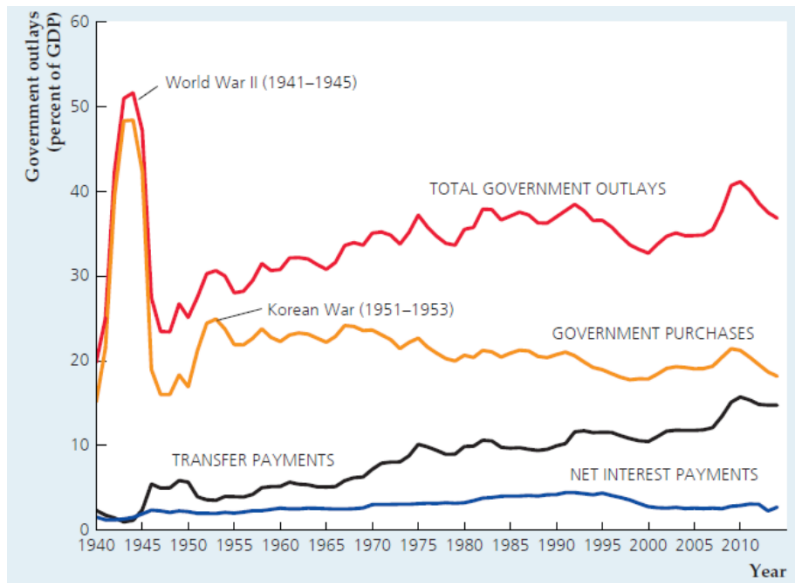
$$\text{Budget Balance}_t = \text{Revenue}_t - \text{Spending}_t$$

A negative budget balance is a **deficit**, while a positive is a **surplus** (or superavit)

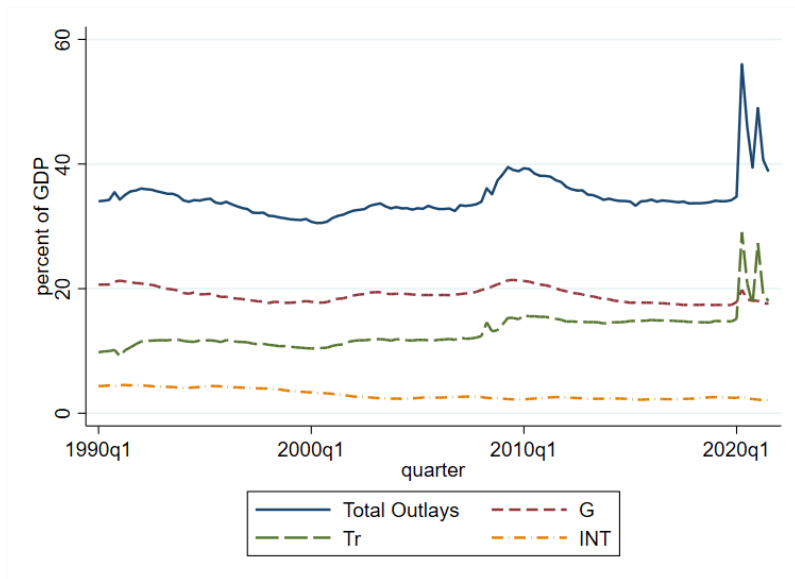
Government Outlays

- ▶ Government outlays, or spending, come in three major categories
 - ▶ Government purchases of goods and services (G), also includes government investment, which is about $1/6$
 - ▶ Transfer payments (Tr), expenditures for which the government receives no goods or services in return
 - ▶ Net interest payments (INT), interest paid to holders of government bonds less interest received
- ▶ Also: subsidies less surpluses of government enterprises, but this is small so we ignore it

Government Outlays



Government Outlays, incl/ COVID



How does the US compare to other countries?

Government Spending in 18 OECD Countries,
Percentage of GDP, 2014

Country	
United States	38.3
Japan	42.3
Germany	43.8
France	57.5
Italy	51.1
United Kingdom	44.0
Canada	39.4
Australia	36.0
Austria	52.2
Belgium	54.4
Denmark	57.2
Finland	58.7
Greece	49.5
Iceland	43.5
Ireland	39.0
Netherlands	46.6
Spain	43.6
Sweden	52.9

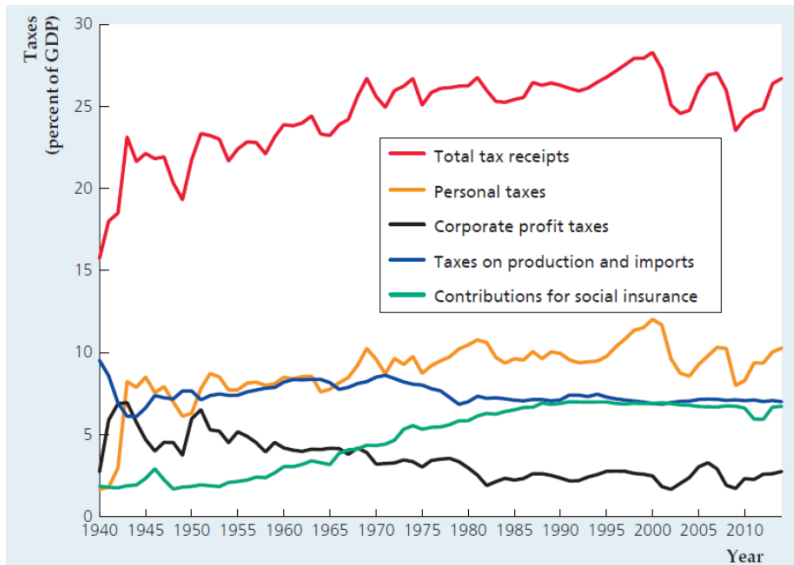
Source: OECD Economic Outlook, Annex Table 25, www.oecd.org/jeco/outlook/economicoutlookannextables.htm.

Taxes

Tax receipts come in four main types

- ▶ Personal taxes, the largest category, primarily personal income taxes and property taxes
- ▶ Contributions for Social Insurance, which are similar to personal income taxes, but capped and matched by the employer
- ▶ Taxes on production and imports, which are mainly sales taxes and tariffs
- ▶ Corporate taxes, particularly corporate profit taxes

Taxes in the US



Federal vs. State and Local Governments

The budget of the federal government is very different than that of local and state governments

- ▶ G larger for local/state, Tr larger for federal
- ▶ INT larger for Federal
- ▶ Personal, corporate, and social security taxes larger for federal
- ▶ States are heavily reliant on sales taxes

Government Receipts and Current Expenditures, 2014

	Federal		State and local	
	Billions of dollars	Percentage of current expenditures	Billions of dollars	Percentage of current expenditures
Current expenditures				
Consumption expenditures	955.3	25.3	1601.0	66.9
National defense	599.8	15.9	0.0	0.0
Nondefense	355.5	9.4	1601.0	66.9
Transfer payments	1949.1	51.7	609.9	25.5
Grants in aid	494.8	13.1	0.0	0.0
Net interest paid	416.7	11.1	181.4	7.6
Net other expenditures*	-45.8	-1.2	0.5	0.0
Total current expenditures	3770.1	100.0	2392.8	100.0
	Federal		State and local	
	Billions of dollars	Percentage of receipts	Billions of dollars	Percentage of receipts
Receipts				
Personal taxes	1396.9	45.1	383.3	18.9
Contributions for social insurance	1145.2	37.0	18.9	0.9
Taxes on production and imports	137.8	4.4	1075.9	53.0
Corporate taxes	417.9	13.5	58.3	2.9
Grants in aid	0.0	0.0	494.8	24.4
Total receipts	3097.8	100.0	2031.2	100.0
Current deficit (current expenditures less receipts; negative if surplus)	672.3		361.6	
Primary current deficit (negative if surplus)	255.6		180.2	

Budget Balance

Government outlays typically exceed revenues, i.e. the government usually runs a **deficit**

$$\text{deficit}_t = G_t + Tr_t + INT_t - T_t$$

The **primary deficit** excludes net interest payments from the deficit

$$\text{primary deficit}_t = G_t + Tr_t - T_t$$

- ▶ The “standard” deficit answers the question: how much does the government need to borrow to pay for its outlays?
- ▶ The primary deficit answers the question: can the government afford its current programs?

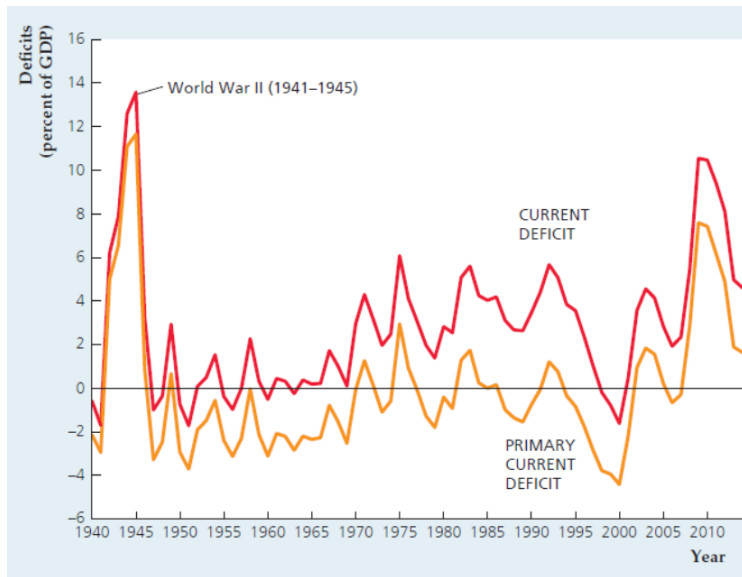
Budget Balance

The **current deficit** excludes government investment and compares only *current outlays* to current receipts

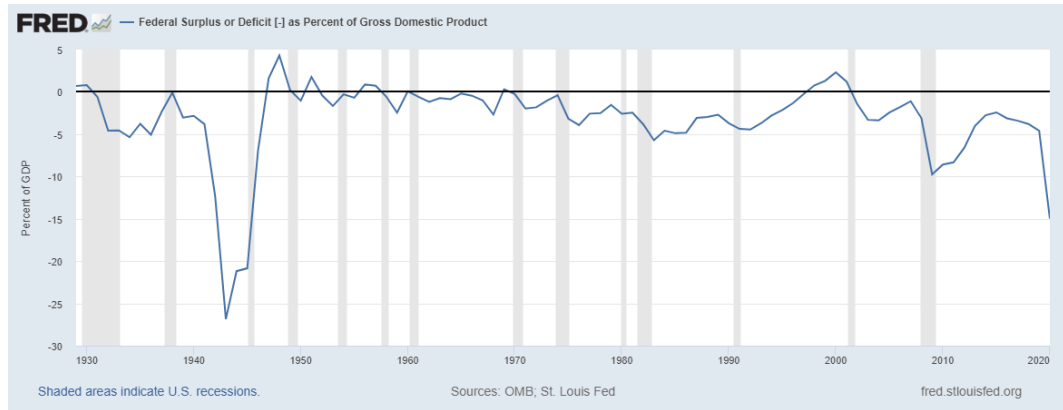
$$\text{current deficit}_t = (G_t - I_t^g) + Tr_t + INT_t - T_t$$

- ▶ The primary current deficit excludes interest payments from the above definition
- ▶ It is useful to sometimes exclude investment from the deficit, as investment may pay for itself in the future

Budget Balance in the US



Budget Balance in the US, incl/ pandemic



2. Government Spending, Taxes, and the Macroeconomy

Government Spending, Taxes, and the Macroeconomy

There are three main ways in which fiscal policy affects the macroeconomy:

1. Aggregate demand
2. Government capital formation
3. Incentives

Fiscal Policy and Aggregate Demand

- ▶ In either the classical or Keynesian models, an increase in government purchases shifts IS to the right, and AD to the right
- ▶ This increases output and inflation in the short-run
- ▶ The effects of taxes are less consensual
 - ▶ Classicals emphasize the Ricardian Equivalence: as long as the path of government spending does not change, changes in taxes have no effect on private consumption and investment
 - ▶ Keynesians believe that liquidity and borrowing constraints prevent the Ricardian equivalence from holding, and consumers are more responsive to changes in current income. So tax cuts can expand aggregate demand.

Fiscal Policy and Aggregate Demand

- ▶ Classicals oppose activist fiscal policy, while Keynesians favor it
- ▶ But even Keynesians agree that fiscal policy is a difficult tool to use
 - ▶ It is not flexible enough, as much of government spending is committed months or years in advance
 - ▶ Expanding or contracting spending rapidly is generally difficult due to political constraints
 - ▶ There may be long implementation lags

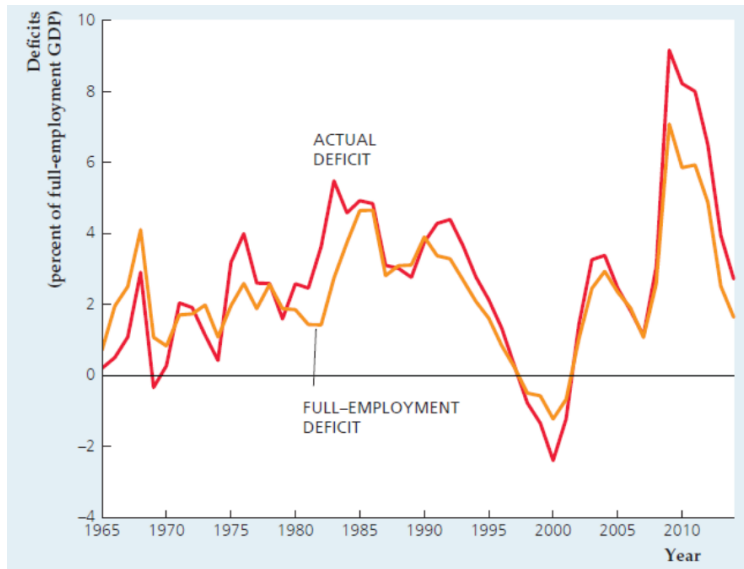
Automatic Stabilizers

- ▶ One way to get around fiscal policy inflexibility is to build **automatic stabilizers** into the budget
- ▶ These are budget provisions that make government spending and revenue rise or fall automatically, depending on the business cycle
 - ▶ Unemployment insurance spending rises automatically during recessions, as more people become unemployed
 - ▶ Income tax revenues rise during expansions and fall during recessions
- ▶ Automatic stabilizers help stabilize the cycle
 - ▶ They make recessions less severe as the government transfers more money and taxes less
 - ▶ They moderate expansions, as the government taxes more (especially in a progressive system)
- ▶ They make government deficits rise in recessions and fall in booms

Automatic Stabilizers

- ▶ To distinguish changes in the deficit caused by the business cycle from changes caused by other factors, we can use the **full-employment deficit**
- ▶ Also known as the **structural deficit**
- ▶ This is a measure of what the government deficit would be if the economy were at full employment
- ▶ The full-employment deficit is only affected by legislation, and not by the state of the economy
- ▶ The difference between the deficit and the structural deficit is sometimes called the **cyclical deficit**

Full-Employment Deficit



Government Capital Formation

- ▶ **Government capital** are long-lived physical assets owned by the government
 - ▶ Roads
 - ▶ Schools
 - ▶ Sewer systems
- ▶ Government capital affects productivity and may be important for economic growth
 - ▶ Roads help transfer raw materials from ports to factories, and goods to people
 - ▶ Schools help build human capital, which is essential for labor productivity
- ▶ Government current expenditures on healthcare, nutrition, education also contribute to human capital formation
- ▶ Government capital formation in 2017 was about $1/5$ of total G
- ▶ 55% of it was investment in national defense

Incentive Effects of Fiscal Policy

- ▶ Economists often assume that taxes are **lump-sum**
- ▶ i.e. fixed dollar amounts that do not depend on anyone's characteristics or behavior
- ▶ This is a useful theoretical construct, but very unrealistic
- ▶ In practice, almost all taxes depend on characteristics and behavior
 - ▶ Income
 - ▶ Consumption
 - ▶ Type of wealth owned

Incentive Effects of Fiscal Policy

- ▶ Fiscal policy can also affect private incentives to consume, invest, work, etc.
- ▶ Tax rates in particular can have a large effect on people's individual decisions
- ▶ Average vs. marginal tax rates
 - ▶ Average tax rate is the ratio of total taxes paid to pretax income
 - ▶ Marginal tax rate is the tax rate paid on an additional dollar of income

Marginal and Average Tax Rates: An Example
(Total Tax = 25% of Income More Than \$10,000)

Income	Income-\$10,000	Tax	Average tax rate	Marginal tax rate
\$ 18,000	\$ 8,000	\$ 2,000	11.1%	25%
50,000	40,000	10,000	20.0%	25%
100,000	90,000	22,500	22.5%	25%

Incentive Effects of Fiscal Policy

- ▶ Average vs. marginal tax rates can be important for labor supply decisions, for example
- ▶ If the average tax rate increases while the marginal tax rate is constant, labor supply expands
- ▶ Higher average tax rate causes a negative wealth effect
- ▶ Importantly there is no distortion at the margin
- ▶ If the marginal tax rate increases with the average tax rate constant, labor supply contracts
- ▶ People realize that they earn less for an extra hour of work, a negative substitution effect

Tax-Induced Distortions and Tax Smoothing

- ▶ People's behavior is affected by marginal taxes everywhere
- ▶ This changes the allocations that would arise in the equilibrium of tax-free markets
- ▶ The difference in the allocations is called a **tax-induced distortion**
 - ▶ i.e., if people choose to work less than they would otherwise because of high marginal tax rates, we say that their labor supply is distorted
- ▶ Distortions are virtually unavoidable, and sometimes they are intended
 - ▶ Pigouvian taxes are taxes that are aimed at “correcting” behavior in the presence of externalities

Tax-Induced Distortions and Tax Smoothing

- ▶ The goal of policymakers is to raise a certain amount of revenue while minimizing the amount of distortions that the taxes that generate such revenue impose in the economy
- ▶ High tax rates tend to distort behavior a lot, so economists tend to recommend **tax smoothing**
 - ▶ Setting a tax always at 20% is better than setting it at 30% half the time and at 10% the other half

3. Government Deficits and Debt

Government Deficits and Debt

- ▶ The deficit is a *flow*, while debt is a *stock*
- ▶ **Government debt** is the total value of outstanding government bonds on a given date
- ▶ The deficit is the change in the debt in a year

$$\Delta B_t = \text{deficit}_t \Rightarrow B_t = \text{deficit}_t + B_{t-1}$$

- ▶ When deficits are large, debt grows quickly
- ▶ People usually refer to the debt-to-GDP ratio instead of the dollar level of debt

$$b_t = \frac{B_t}{P_t Y_t}$$

Government Deficits and Debt

Take logs on both sides and difference the expression to write

$$\Delta \log b_t = \Delta \log B_t - \Delta \log(P_t Y_t)$$

Now use the fact that

$$\Delta \log x_t \simeq g_t^x = \frac{\Delta x_t}{x_t}$$

Apply this fact:

$$\frac{\Delta b_t}{b_t} = \frac{\Delta B_t}{B_t} - \frac{\Delta P_t Y_t}{P_t Y_t}$$

And rewrite

$$\Delta b_t = def_t - b_t g_t^{PY}$$

where def_t is the deficit as a percentage of GDP and g_t^{PY} is the growth rate of *nominal* GDP

Government Deficits and Debt

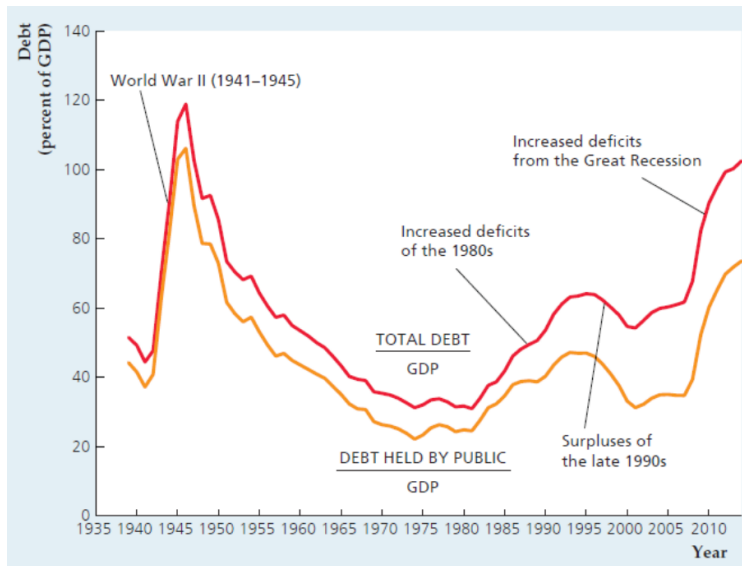
$$\Delta b_t = def_t - b_t g_t^Y$$

This expression shows that b_t rises when:

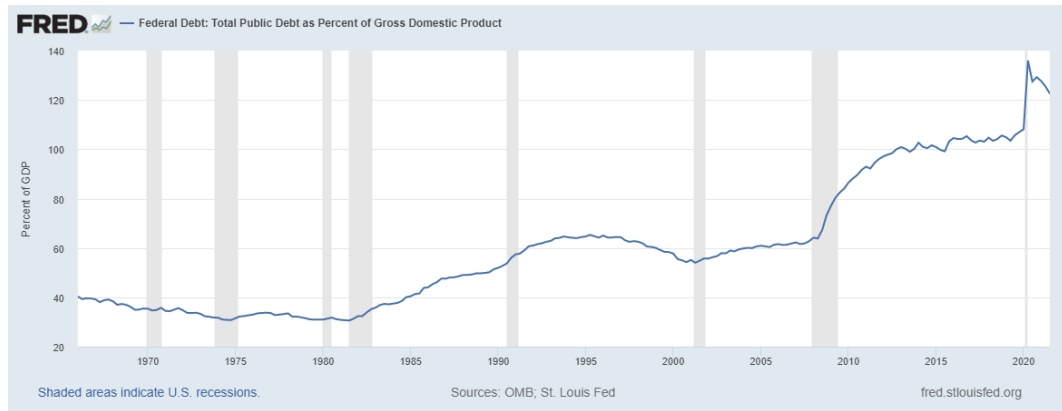
- ▶ Deficits are high relative to GDP
- ▶ Nominal GDP grows slowly

Note that inflation can help in reducing the debt-to-GDP ratio!

Government Deficits and Debt



Government Deficits and Debt, incl/ pandemic



The Burden of Govt Debt on Future Generations

- ▶ People often worry that large deficits and a growing govt debt will be a burden on future generations who will have to pay for that debt
- ▶ Until the 1990s, this argument did not hold:
 1. Most US debt was mostly owned by US citizens themselves
 2. Future generations will have to pay taxes on that debt, but they will also inherit the bonds and thus be the ones to be repaid
 3. This echoes Ricardian Equivalence
- ▶ This argument makes more sense nowadays:
 - ▶ Large amounts of US debt are held by investors in Japan, China, and the Middle East
 - ▶ US citizens won't be repaying the debt to themselves

The Burden of Govt Debt on Future Generations

There are other reasons why a large stock of debt could be problematic in the future

1. Tax rates will have to rise to pay for a large stock of debt, and these taxes cause distortions and impose inefficiencies
2. Large bondholders tend to be richer than those who own little or no bonds. Even if we raise taxes to pay ourselves, this places a disproportionate burden on the less wealthy and could exacerbate inequality.
 - ▶ This could be offset with progressive fiscal and transfer policies
3. Government debt reduces national saving, reducing capital accumulation and foreign assets
 - ▶ Government debt may **crowd out** private investment
 - ▶ If I have a fixed amount to save in govt debt and capital and govt debt increases, I will end up investing less in capital
 - ▶ This means the economy will have less capital in the future, and output will be lower

Ricardian Equivalence revisited

- ▶ The fact that government debt crowds out private investment may be the single largest cost of government debt for the economy
- ▶ This is predicated on the assumption that government deficits reduce national saving, but is this really the case?
 - ▶ Economists agree that an increase in G will typically reduce national saving
 - ▶ Less clear for increases in Tr or reductions in T
 - ▶ Proponents of Ricardian Equivalence argue that transfers and tax policy does not change national saving

Ricardian Equivalence revisited

- ▶ Consider a tax cut of \$100 per person
- ▶ Recall that national saving is given by

$$S = Y - C - G$$

- ▶ Assuming that G and Y are fixed, national saving only falls if $C \uparrow$
- ▶ Proponents of RE argue that C should not change, as today's tax cut has to be paid for with a future tax increase since G is constant
- ▶ Assume that both households and the government can save/borrow at interest rate r
- ▶ People's income increases by \$100 today but falls by $\$100 \times (1 + r)$ tomorrow
- ▶ What is the effect on lifetime earnings?

$$y_1 + \$100 + \frac{y_2 - (1 + r)\$100}{1 + r} = y_1 + \frac{y_2}{1 + r} + \$100 - \$100 = y_1 + \frac{y_2}{1 + r}$$

- ▶ None!

Ricardian Equivalence revisited

- ▶ Proponents of RE argue that since this tax cut has no effect on lifetime income, it should not affect consumption decisions
- ▶ Thus national saving does not change
- ▶ Same argument can be made with government transfers
- ▶ Note that people are saving more
- ▶ ...but by the exact amount that the government is saving less

Ricardian Equivalence across generations

- ▶ RE assumes that the same people who enjoy the tax cut will be responsible for paying for it
 - ▶ This is another way to say that RE assumes infinitely-lived consumers
- ▶ If the tax cut is enjoyed by people who won't be around to pay for it, then a tax cut could increase consumption
- ▶ Roberto Barro argues that if today's taxpayers care about the well-being of future generations, they will behave as infinitely-lived households
 - ▶ Economists call these "dynasties"
- ▶ Today's taxpayers will internalize the fact that their children will have to pay more taxes, and thus leave them larger bequests

Departures from Ricardian Equivalence

- ▶ The empirical evidence on the RE is mixed
 - ▶ It seems to hold well in some countries, i.e. Israel and Canada
 - ▶ Certainly did not hold in the US in the 1980s, when the Reagan tax cuts and corresponding deficits led to very low national saving
 - ▶ No systematic relationship between deficits and national saving
- ▶ The theoretical arguments against RE are:
 1. Borrowing and liquidity constraints
 2. Myopia/shortsightedness
 3. Failure to leave bequests
 4. Non-lump-sum taxes

4. Fiscal Multipliers

Fiscal Multipliers

- ▶ We know that:
 1. Changes in G affect C and I (through the real rate for example)
 2. Changes in T , Tr may affect C depending on whether the RE holds
- ▶ Economists are interested in quantifying the size of these changes
- ▶ Recall that the fiscal multiplier is

$$\begin{aligned}\mathcal{M} &= \frac{\Delta Y}{\Delta G} \\ &= \frac{\Delta C + \Delta I + \Delta G + \Delta NX}{\Delta G} \\ &= 1 + \frac{\Delta C + \Delta I + \Delta NX}{\Delta G}\end{aligned}$$

Depending on whether the second term is positive or negative, the fiscal multiplier will be smaller or larger than 1.

Fiscal Multipliers

- ▶ Classical economists argue that $\mathcal{M} \in (0, 1)$
 - ▶ They agree that it is positive, as $G \uparrow$ causes a negative wealth effect that makes people work more
 - ▶ That same wealth effect makes people consume less, so $\Delta C < 0$
 - ▶ The increase in the real rate also makes firms invest less, so $\Delta I < 0$
- ▶ Keynesian economists argue that $\mathcal{M} \geq 1$
 - ▶ Consumption depends on current income Y
 - ▶ Since $G \uparrow$ expands the IS curve, output rises, and this raises people's incomes who then consume more
 - ▶ Thus $\Delta C > 0$

Keynesian Fiscal Multiplier

- ▶ Consider a closed economy without investment
- ▶ Aggregate consumption is given by

$$C = a + bY$$

a is the **autonomous component** and b is the **marginal propensity to consume**

- ▶ We can compute the equilibrium level of output as

$$Y = C + G$$

$$Y = a + bY + G$$

$$Y = \frac{a + G}{1 - b}$$

This implies

$$C = a + b \frac{a + G}{1 - b} = \frac{a + bG}{1 - b}$$

Keynesian Fiscal Multiplier

Given a ΔG , the fiscal multiplier in this economy is

$$\begin{aligned}\mathcal{M} &= \frac{\Delta Y}{\Delta G} \\ &= \frac{\Delta G / (1 - b)}{\Delta G} \\ &= \frac{1}{1 - b}\end{aligned}$$

- ▶ It is greater than 1 as long as $b > 0$, i.e. people's consumption responds to current income
- ▶ In practice, people's consumption will also react to other things that will offset some of these effects
- ▶ But the MPC is absolutely essential to generate large fiscal multipliers

Fiscal Multipliers in the Data

- ▶ It is hard to estimate the size of the FM
 1. Especially because there may not be “a” FM
 2. The size of the FM may depend on the type of spending, the state of the economy, the monetary policy stance, etc.
- ▶ Valerie Ramey has possibly the best estimates: between 0.8 and 1.5 in 2009
- ▶ Auerbach and Gorodnichenko find 0 to 0.5 in expansions, 1 to 1.5 in recessions
- ▶ Eggertsson was the first to make the point that the FM may be very large at the zero lower bound
 - ▶ Typically the Fed reacts to the expansionary effects of $G \uparrow$ by tightening policy
 - ▶ This lowers C, I and reduces the size of the FM
 - ▶ But the Fed cannot do that at the ZLB!

5. Deficits and Inflation

Deficits and Inflation

- ▶ One of the primary concerns about budget deficits is that they may cause inflation
- ▶ Inflation results when AD grows more quickly than AS
- ▶ But one-time increases in G or tax cuts would lead to a jump in the price level, not sustained inflation
- ▶ Sustained inflation requires sustained growth in the money supply
- ▶ How can deficits lead then to sustained growth in M^s ?

Deficits and Inflation

How can deficits lead then to sustained growth in M^s ?

- ▶ If spending is financed by printing money
- ▶ A government that is not willing to (or cannot) raise taxes to finance its deficits may pay for its expenditure by printing money instead
- ▶ The revenue a government raises by printing money is called **seignorage**
- ▶ Governments do not do this directly, but rather indirectly
 - ▶ The Treasury borrows by issuing government bonds
 - ▶ The central bank buys those bonds with newly printed money

Deficits and Inflation

- ▶ Note that the CB is thus expanding the monetary base
- ▶ The precise relationship is the following

$$\text{deficit}_t = \Delta B_t = \Delta B_t^p + \Delta B_t^{cb} = \Delta B_t^p + \Delta \text{BASE}_t$$

where ΔB_t^p is the change in debt held by the public

- ▶ In an all-currency economy with no banks, the base equals the money supply (i.e. the money multiplier is 1)
- ▶ In that case, we have that $\Delta \text{BASE}_t = \Delta M_t$ and thus

$$\text{deficit}_t = \Delta B_t^p + \Delta M_t$$

Seignorage

- ▶ If seignorage leads to inflation, why do governments use it?
- ▶ Developed economies do not use it much, $\sim 2\%$ of government revenues in the US
- ▶ Developing or war-torn economies may not have the capacity to raise substantial tax revenue
 - ▶ Large informal economy
 - ▶ Technical/social inability to raise the revenue
 - ▶ Low income population/undeveloped financial markets make it hard to borrow from the public

Seignorage and Inflation

- ▶ The real revenue the government gets from seignorage is related to the inflation rate
- ▶ Consider again an all-currency economy
- ▶ Assume that output Y and the real interest rate r are fixed
- ▶ Constant growth rates of money growth and inflation
- ▶ Real money demand $L(Y, r + \pi)$ must then be constant
- ▶ Thus real money supply must be constant, which implies that

$$\pi_t = \frac{\Delta M_t}{M_t}$$

Seignorage and Inflation

- ▶ The nominal value of seignorage revenue every period is equal to ΔM_t
- ▶ Real seignorage revenue is then

$$R = \frac{\Delta M_t}{P_t} = \frac{\Delta M_t}{M_t} \frac{M_t}{P_t} = \pi_t \frac{M_t}{P_t}$$

- ▶ Real seignorage revenue is equal to the inflation rate times real money supply
- ▶ That is why seignorage is also called the **inflation tax**
 - ▶ For any tax: tax revenue = tax rate \times tax base
 - ▶ Inflation is a tax rate
 - ▶ Real money supply is the tax base
- ▶ The inflation tax is paid by everyone who holds money

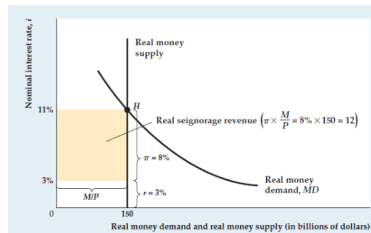
Seignorage and Inflation

- ▶ Suppose that the government wants to raise more revenue and so it makes money supply grow faster
- ▶ Will this increase revenue, R ?
- ▶ This will raise inflation $\pi \uparrow$, but may also cause people to hold less real money balances $\frac{M}{P} \downarrow$
- ▶ Thus an increase in the tax rate may shrink the tax base, leading to lower total revenue
- ▶ Whether R increases or not depends on whether the reduction in the tax base offsets or not the increase in inflation

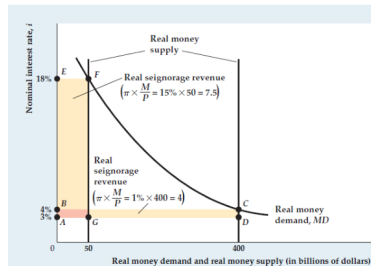
Seignorage and Inflation

Assume that $\pi = 8\%$, $r = 3\%$, $L(Y, 11\%) = 150$

- ▶ $R = 0.08 \times 150 = 12$
- ▶ Assume that govt raises $\pi_1 = 15\%$
- ▶ Demand for money falls, $L(Y, 18\%) = 50$
- ▶ Seignorage revenue falls, $R_1 = 0.15 \times 50 = 7.5$
- ▶ If $\pi_2 = 1\%$, demand for money rises $L(Y, 4\%) = 400$
- ▶ But seignorage revenue also falls, $R_2 = 0.01 \times 400 = 4$



a) Determination of real seignorage revenue for $\pi = 8\%$



Seigniorage and Inflation

- ▶ Low π : tax rate is low, base is high
- ▶ High π : tax rate is high, base is low
- ▶ There is a π^* that trades-off the two effects and maximizes seigniorage revenue
- ▶ If govt tries to raise revenue over this maximum, it may cause hyperinflation
- ▶ All hyperinflations in history happened due to governments trying to do this
- ▶ French Revolution, Weimar Germany, Zimbabwe, etc.

