DYNAMIC FISCAL POLICY

Empirical Facts of Government Economic Activity

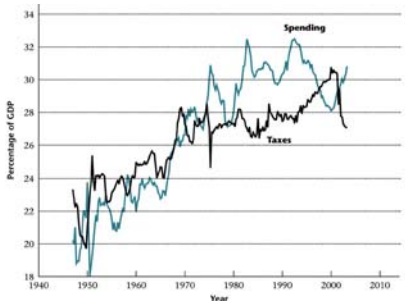
The Size of the Government in the US

- In NIPA, government spending(G) is the sum of federal, state and local government purchases of goods and services.
- Government spending does not equal government outlays. Transfer payments to households and interest on public debt are outlays, but not included in spending

Components of GDP, 2001

	In bill. $	% of GDP
GDP	10,082.2	
Consumption	6,987.0	69.3%
Investment	1,586.0	15.7%
Government	1,858.0	18.4%
Federal	628.1	6.2%
State-Local	1,229.9	12.2%
Net Exports	-348.9	-3.5%

Figure 1.6 Total Taxes (black line) and Total Government Spending (colored line) in the United States, as Percentages of GDP

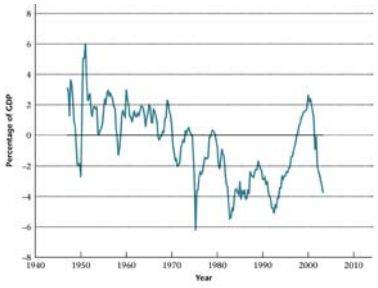


The Structure of Government Budgets

The Federal Budget, 2002(in bill)

Receipts	1853.3
Individual Income Taxes	858.8
Corporate Income Taxes	148.0
Social Insurance Receipts	700.8
Other	146.0
Outlays	2011.0
National defense	348.6
International Aid	22.4
Health	196.5
Medicare	230.9
Income Security	312.5
Social Security	456.4
Net Interest	171.0
Other	272.8
Surplus	-157.9

Figure 1.7 The Total Government Surplus in the United States\break as a Percentage of GDP



Relationship between Federal Debt and Federal deficits

$$Debt_t = Debt_{t-1} + Deficit_t$$

1999-2000 State and Local Budgets

Total Revenue	1514.3
Property Taxes	249.2
Sales Taxes	309.3
Individual Income Taxes	211.7
Corporate Income Taxes	36.1
Revenue from Fed. Gov	292.0
Other	443.2
Total Expenditures	1506.8
Education	521.6
Highways	101.3
Public Welfare	237.3
Other	646.5
Surplus	7.5

Does it matter how we finance an increase in government spending?

- Definition- The Ricardian Equivalence Theorem states if current and future government spending are held constant, then a change in current taxes with an equal and opposite change in the present value of future taxes leaves the equilibrium real interest rate and consumption choices unchanged.

Example to Illustrate Ricardian Equivlence

- A two period world
- The government decides to fight a war in period 1 that costs G_1 and G_2 =0.
- The government is considering two financing plans.
  (1) Tax people T_1 to pay for the war
  (2) Use government debt and tax in period 2 equal to T_2

- What will T_2 be set at?

The government budget constrain in period 1 is:

$G_1 = T_1 + B_2 = B_2$

The government budget constraint in the second period is

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

Or

$(1+r) B_2 = T_2 = (1+r) G_1$

Implications of policies for consumer

- The consumer lifetime budget constraint is:

$c_1 + c_2/(1+r) = y_1 - T_1 + (y_2 - T_2)/(1+r)$

we $= y_1 - T_1 + (y_2 - T_2)/(1+r)$

- Household wealth under option 1

$we_1 = y_1 - T_1 + (y_2)/(1+r)$

$= y_1 + (y_2)/(1+r) - G_1$

- Household wealth under option 2

$we_2 = y_1 + (y_2 - T_2)/(1+r)$

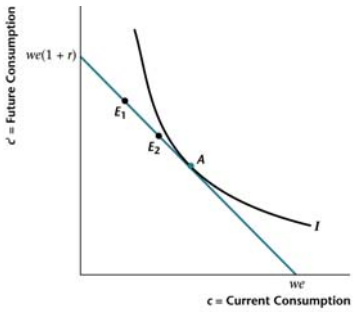
$= y_1 + (y_2 - (1+r) G_1)/(1+r)$

$= y_1 + (y_2)/(1+r) - G_1$

A Graphical Approach to Ricardian Equivalence

- Options 1 and Option 2 do not change the interest rate. Thus, the household budget constraint does not change.
- What changes is the endowment points.

Figure 8.17 Ricardian Equivalence with a Cut in Current Taxes for a Borrower



- Since household wealth is the same under the financing options, households consumption choices will not be impacted.
- RESULT: How we finance the war doesn't matter.

The message of the Ricardian equivalence theorem- A tax cut is not a free lunch

Critical Assumptions Behind the Ricardian Equivalence Theorem

- Policy changes impact on everyone equally
- Debt not transferred to other generations
- Lump sum taxes
- Perfect credit markets

How do credit market imperfections affect individuals if taxes are cut?

- Assume a borrower-lending interest rate spread. You borrow money at r_2 and lend money at r_1.(r_2>r_1)
- Consumers now have a kink in their budget constraint

Figure 8.21 A Consumer Facing Different Lending and Borrowing Rates

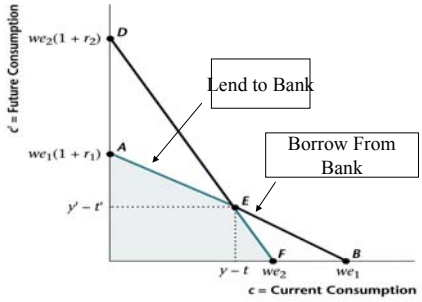
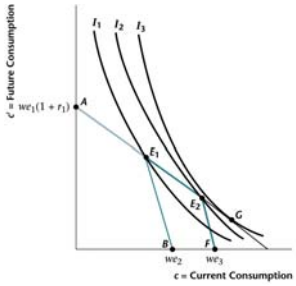


Figure 8.22 Effects of a Tax Cut for a Consumer with Different Borrowing and Lending Rates



Explanation of Diagram

- At the original tax level, you are at point E_1 because of the interest rate is r_2.
- If you could borrow at r_1 you would be at point E_2.
- A tax cut in period 1 of Δt_1 and a tax increase in period 2 of $(1+r_1)\Delta t_1$ moves your endowment point to E_2.

- With the tax cut, you now are at the point E_2.
- With a tax cut, the consumer changes his/her consumption plans.
- The tax cut is in some sense completing the market-giving loans at the low interest rate.

A Simple Test of Ricardian Equivalence-The Bush Witholding Reduction

- In January 1992, George H. Bush changed withholding tables so that withholding amounts were reduced.
- Each married household would get a reduction in tax withholding of $28.80 per month.
- The withholding reduction would not affect anyone's federal income taxes payable in 1992; taxes were simply deferred until April 1993.

- This comes close to a Ricardian policy.
- Bush thought this policy would increase private consumption spending. Ricardian equivalence predicts no change in consumption and an incease in savings?
- What happened?

Figure 8.24 Real Consumption of Nondurables, 1991–1993

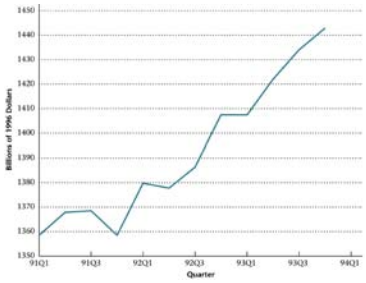


Figure 8.23 Real Consumption of Durables, 1991–1993

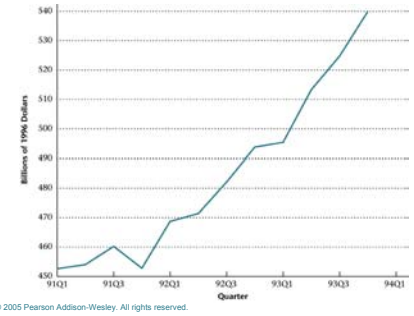
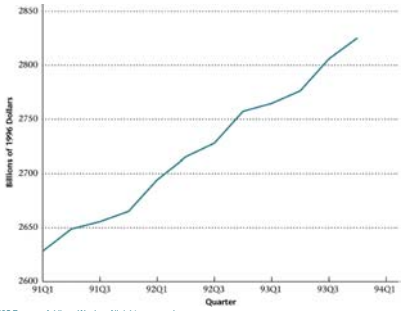


Figure 8.25 Real Consumption of Services, 1991–1993



Conclusion

- If Bush is correct, we should see consumption spending increasing between 1992-I to 1993-I. In 1993-II, consumption spending should decrease.
- There is no apparent change in consumption spending which supports the Ricardian position.

Social Security Issues in the US

History of the US Social Security System

- The Social Security Act of 1935 was a response to the change in the structure of the economy (agricultural to industry)
- A response to the Great Depression where retirement wealth was destroyed.
- The goal of the act was to provide funds for retirement by using a 2% payroll tax(1% on emplyers and employees each).

- By 1939, it became clear the system had to be a pay-as-you go system
- Social Security Tax Rate

Year	Max. Tax Earn.	Tax Rate
1937	$3,000	2.00%
1950	$3,000	3.00%
1960	$4,000	6.00%
1970	$7,800	8.40%
1980	$29,700	10.16%
1990	$51,300	12.40%
1998	$68,400	12.40%
2004	$87,900	12.40%

The Current System

- A pay-as-you system-taxes are paid by current workers and immediately used to pay benefits for current retirees.
- Current system defined by three things:
  - (1) t = tax rate (6.2%)
  - (2) $\underline{y}$ = maximum amount of earning subject to tax
  - (3) benefits a function of lifetime earnings

How are benefits calculated if you retire at age 65?

- Calculate average indexed monthly earnings. Let y_t be income for year t
- Let yhat be qualified earnings in a year

  $yhat_t = \min(y_t, \underline{y}_t)$

- Put qualified earnings in real terms(2004 dollars)

  $ryhat_t = yhat_t * (P_{2004}/P_t)$
- Adjust wages by average wage growth to reflect technological progress. Define gross growth rate as

  $G_{t,2004}$=ave real w_{2004}/ave. real w_t

- Indexed earning in earnings in year t

  $Y_t = ryhat_t * G_{t,2004}$
- Compute AIME by computing the average the 35 highest indexed annual earning.

- Compute benefit

b = 0.9*AIME if AIME<=$606

545.40+0.32*(AIME-606) if $606<AIME<=$3,653

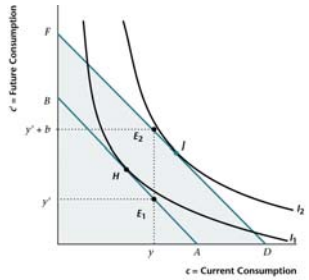
1,520.44+0.15*(AIME-3,653) if AIME>$3,653

Analysis of Social Security System

The benefit from the introduction of a social security program if old

- With no program, your decision is at point H
- With the program, your decision is at point point J
- This person is better off. Why?

Figure 8.18 Pay-As-You-Go Social Security for Consumers Who Are Old in Period T



An individual who is young when the program is introduced

- With no program, your decision is point H.
- With program, you pay taxes when young(period 1) and receive benefits when old. If the population is growing, then benefits exceed taxes. The optimal decision is point J, but the endowment is E_2.

- In this case, welfare is increased.
- If the population growth is less that r, the indifference curve would shift in, and welfare would decline with the introduction of a social security program.

What about a fully funded Social Security System?

- Without a social security program, the decision is denoted by point D and the endowment point is E.
- Suppose the social security has the effect of forcing you to save more than you would choose.
- With higher taxes to finance the high benefit, you are at point F
- This consumer is made worse off!

Figure 8.19 Pay-As-You-Go Social Security for Consumers Born in Period T and Later

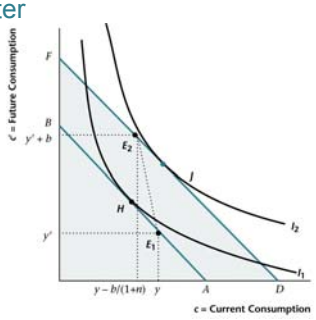
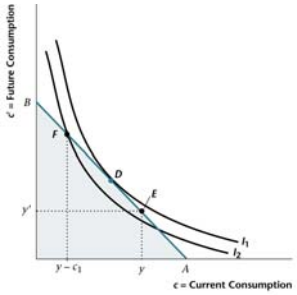


Figure 8.20 Fully Funded Social Security When Mandated Retirement Saving Is Binding



Taxation and Economic Decisions

What tax rates are relevant for economic decisions?

- The **average tax rate** is the fraction of taxable income a person with income level y that must be delivered to the government.
- The **marginal tax rate** measures the amount of taxes on the last dollar of income y earned.

- Since economic decisions are made at the margin, the marginal tax rate is the correct measure

Marginal Tax Rates for 2003, Married

Income	Marginal Rate	Tax Function
0<=y<$14,000	10%	.1y
$14,000<=y<$56,000	15%	$1400+.15(y-14,000)
$56,800<=y<$114,650	25%	$7,820+0.25(y-56,000)
$114,650<=y<$174,400	28%	$22,282.50+.28(y-114,650)
$174,400<=y<$311,950	33%	$39,096.50+.33(y-174,700)
$311,950<=y<infinity	35%	$84,389.50+.35(y-311,950)

How tax rate affect the savings decision

- The consumer's problem

$$\max u(c_1, c_2)$$

Subject to the budget constraints

First period

$$(1+t_{c1})c_1+s_2 = wl_1$$

Second period

$$(1+t_{c2})c_2 = (1+r(1-t_s))s+b_2$$

- Substitute period 1 budget constraint into period 2 budget constraint to find the lifetime budget constraint

$$(1+t_{c1})c_1+ [(1+t_{c2})/ (1+r(1-t_s))]c_2 = wl_1 +[1/ (1+r(1-t_s))] b_2$$

- Prior analysis tells is optimal consumption in each is determined by the point where the indifference curve is tangent to the budget constraint. That is,

$$MU_{c2}/ MU_{c1} = MRS_{c1,c2} = (1+r(1-t_s))$$

- Taxes on savings affect the slope of the budget constraint
- An increase in the capital income tax reduces the after-tax interest rate and induces households to consume more in the first period relative to the second period.

How tax rates affect the work - leisure decision

- The consumer's problem

$$\max u(c_1, c_2)$$

Subject to the budget constraint

First period

$$(1-t_{c1})c_1+s_2 =(1-t_l)\, wl_1$$

Second period

$$(1-t_{c2})c_2 = (1+r)s+b_2$$

- The labor-leisure choice depends on the lifetime budget constraint.

$$(1+t_{c1})c_1+ [1/ (1+r)](1+t_{c2})c_2 = (1-t_l)wl_1 +[1/ (1+r)]\, b_2$$

Or

$$c_1+ [1/ (1+r)][(1+t_{c2})/ (1+t_{c1})]c_2 = [(1-t_l)/ (1+t_{c1})]wl_1 +[1/(1+r)(1+t_{c1})]\, b_2$$

- Prior analysis taught that consumption and leisure in period 1 is determined where

$$MRS_{l,C} = [(1-t_l)/ (1+t_{c1})]w$$

We see that taxes reduce the wage income you earn. The term

$[(1-t_l)/ (1+t_{c1})]$ is called a tax wedge.

Data: 1970-74

Country	GDP/N	Hours	GDP/H
Germany	75	105	72
France	77	105	74
Italy	53	82	65
Canada	86	94	91
UK	68	110	62
Japan	62	127	49
US	100	100	100

Data: 1993-96

Country	GDP/N	Hours	GDP/H
Germany	74	75	99
France	74	68	110
Italy	57	64	90
Canada	79	88	89
UK	67	88	76
Japan	78	104	74
US	100	100	100

Why do American's work so much?

One way to investigate this question is to use the tangency condition for the labor-leisure choice.

- Review: $MRS_{l,C} = [(1-t_l)/ (1+t_{c1})]w$
- $MRS_{l,C1} = MU_l/MU_{c1}$
- Then

  $MU_l/MU_{c1} = [(1-t_l)/ (1+t_{c1})]w$

How can we use this equation if we can not observe MU_l/MU_{c1}?

- We must specify a functional form for the utility function.
- Assume that $U(c_1,l_1)=\ln(c_1)+ \theta\ln(l_1)$
- Then

  $MU(c_1)=1/c_1$

  $MU(l_1)=1/l_1$

- This means the tangency condition can be written in observable form as

$$\theta c_1 / l_1 = [(1-t_l)/ (1+t_{c1})]w$$

We know that leisure is equal to the number of hours in a period less the number of hours you work.

$$l_1 = 1 - h_1$$

Then,

$$\theta c_1 / 1-h_1 = [(1-t_l)/ (1+t_{c1})]w$$

- To use this equation with data, we need to specify wages. We must look at the typical firm's optimization problem. We have already found that:

$$MP_N = w$$

- We have introduced another variable we don't observe-the marginal productivity of capital.
- To get around this problem we must specify the the functional form of the production function. Assume

$$Y = zF(K,h)= zK^{\alpha}h^{1-\alpha}$$

From this equation

$$MP_h = (1-\alpha)(Y/h)=w$$

$MP_h = (1- \alpha)(Y/h)=w$

We can use this information in the tangency condition.

$\theta c_1 / 1-h_1 = [(1-t_l)/ (1+t_{c1})]w$

$\theta c_1 / 1-h_1 = [(1-t_l)/ (1+t_{c1})] (1- \alpha)(Y_1/h_1)$

Solve this equation for hours, h

$h = (1- \alpha)/[(1- \alpha)(1-t_l)/ (1+t_{c1}) \theta (c/Y)]$

This equation can be used to predict hours worked in a country. In order to use it we need to know

(1) The value of α, θ

(2) The value of the tax rates- t_l,t_{c1}

(3) The consumption-output ratio- c/Y

Where do get this information?

- (c/Y)- NIPA
- t_c – ratio total indirect consumption taxes/total consumption expenditures
- t_l – payroll tax rate+income tax rate
- α – capital share of output=.3224
- θ □ fraction of time worked(ave hours)

The hours equation with data:70-74

Country	Tax rate	c/Y	h-actual	h-pred
Germany	0.59	0.66	24.6	24.6
France	0.49	0.66	24.4	25.4
Italy	0.41	0.66	19.2	28.3
Canada	0.44	0.72	22.2	25.6
UK	0.45	0.77	25.9	24.0
Japan	0.25	0.60	29.8	35.8
US	0.49	0.74	23.5	26.4

The hours equation with data:93-96

Country	Tax rate	c/Y	h-actual	h-pred
Germany	0.59	0.74	19.3	19.5
France	0.59	0.74	17.5	19.5
Italy	0.64	0.69	16.5	18.8
Canada	0.52	0.77	22.9	21.3
UK	0.44	0.83	22.8	22.8
Japan	0.37	0.68	27.0	29.0
US	0.40	0.81	25.9	24.6

Answer to the Question: Why do American's work so much?

- Differences in tax rates and their changes can explain a large part of the fact that in the last 30 years Europeans started working significantly less than Americans