

saving and net taxes (the leakages) equal planned investment and government purchases (the injections): $S + T = I + G$.

24.2 FISCAL POLICY AT WORK: MULTIPLIER EFFECTS
p. 489

7. Fiscal policy has a multiplier effect on the economy. A change in government spending gives rise to a multiplier equal to $1/\text{MPS}$. A change in taxation brings about a multiplier equal to $-\text{MPC}/\text{MPS}$. A simultaneous equal increase or decrease in government spending and taxes has a multiplier effect of one.

24.3 THE FEDERAL BUDGET
p. 495

8. During the two Clinton administrations, the federal budget went from being in deficit to being in surplus. This was reversed during the two Bush administrations, driven by tax rate decreases and government spending increases. The deficit increased further during the first Obama administration.

The deficit to GDP ratio was roughly constant during the second Obama administration and the first year of the Trump administration, but it is projected to increase substantially from 2018 on. The same is true of the debt to GDP ratio.

24.4 THE ECONOMY’S INFLUENCE ON THE GOVERNMENT BUDGET
p. 500

9. Automatic stabilizers are revenue and expenditure items in the federal budget that automatically change with the state of the economy and that tend to stabilize GDP. For example, during expansions, the government automatically takes in more revenue because people are making more money that is taxed.
10. The full-employment budget is an economist’s construction of what the federal budget would be if the economy were producing at a full-employment level of output. The structural deficit is the federal deficit that remains even at full employment. The cyclical deficit is that part of the total deficit caused by the economy operating at less than full employment.

REVIEW TERMS AND CONCEPTS

automatic destabilizer, p. 500	fiscal policy, p. 484	Government budget deficit $\equiv G - T$, p. 486
automatic stabilizers, p. 500	full-employment budget, p. 501	Equilibrium in an economy with a government: $Y \equiv C + I + G$, p. 487
balanced-budget multiplier, p. 493	government spending multiplier, p. 490	Saving/investment approach to equilibrium in an economy with a government: $S + T = I + G$, p. 488
budget deficit, p. 486	monetary policy, p. 485	Government spending multiplier $\equiv \frac{1}{\text{MPS}} \equiv \frac{1}{1 - \text{MPC}}$, p. 490
cyclical deficit, p. 501	net taxes (T), p. 485	Tax multiplier $\equiv -\left(\frac{\text{MPC}}{\text{MPS}}\right)$, p. 493
discretionary fiscal policy, p. 485	privately held federal debt, p. 499	Balanced-budget multiplier $\equiv 1$, p. 493
disposable, or after-tax, income (Y_d), p. 485	structural deficit, p. 501	
federal budget, p. 495	tax multiplier, p. 492	
federal debt, p. 499	Equations:	
federal surplus (+) or deficit (−), p. 495	Disposable income: $Y_d \equiv Y - T$, p. 485	
fiscal drag, p. 500	$AE \equiv C + I + G$, p. 486	

PROBLEMS

All problems are available on MyLab Economics.

24.1 GOVERNMENT IN THE ECONOMY

LEARNING OBJECTIVE: Discuss the influence of fiscal policies on the economy.

- 1.1 Define saving and investment. Data for the simple economy of Newt show that in 2018, saving exceeded investment and the government is running a balanced budget. What is likely to happen? What would happen if the government were running a deficit and saving were equal to investment?
- 1.2 Expert economists in the economy of Bongo estimate the following:

	Billion Bongos
Real output/income	1,200
Government purchases	300
Total net taxes	300
Investment spending (planned)	200

Assume that Bongoliers consume 80 percent of their disposable incomes and save 20 percent.

a. You are asked by the business editor of the *Bongo Tribune* to predict the events of the next few months. By using the data given, make a forecast. (Assume that investment is constant.)

b. If no changes were made, at what level of GDP (Y) would the economy of Bongo settle?

- c. Some local conservatives blame Bongo's problems on the size of the government sector. They suggest cutting government purchases by 25 billion Bongos. What effect would such cuts have on the economy? (Be specific.)

1.3 Assume that in 2019, the following prevails in the Republic of Nurd:

$$\begin{aligned} Y &= \$200 & G &= \$0 \\ C &= \$160 & T &= \$0 \\ S &= \$40 \\ I (\text{planned}) &= \$30 \end{aligned}$$

Assume that households consume 80 percent of their income, they save 20 percent of their income, $MPC = 0.8$, and $MPS = 0.2$. That is, $C = 0.8Y_d$ and $S = 0.2Y_d$.

- Is the economy of Nurd in equilibrium? What is Nurd's equilibrium level of income? What is likely to happen in the coming months if the government takes no action?
- If \$200 is the "full-employment" level of Y , what fiscal policy might the government follow if its goal is full employment?
- If the full-employment level of Y is \$250, what fiscal policy might the government follow?
- Suppose $Y = \$200$, $C = \$160$, $S = \$40$, and $I = \$40$. Is Nurd's economy in equilibrium?
- Starting with the situation in part d, suppose the government starts spending \$30 each year with no taxation and continues to spend \$30 every period. If I remains

constant, what will happen to the equilibrium level of Nurd's domestic product (Y)? What will the new levels of C and S be?

- f. Starting with the situation in part d, suppose the government starts taxing the population \$30 each year without spending anything and continues to tax at that rate every period. If I remains constant, what will happen to the equilibrium level of Nurd's domestic product (Y)? What will be the new levels of C and S ? How does your answer to part f differ from your answer to part e? Why?

1.4 Some economists claim World War II ended the Great Depression of the 1930s. The war effort was financed by borrowing massive sums of money from the public. Explain how a war could end a recession. Look at recent and back issues of the *Economic Report of the President* or the *Statistical Abstract of the United States*. How large was the federal government's debt as a percentage of GDP in 1946? How large is it today?

1.5 Evaluate the following statement: for an economy to be in equilibrium, planned investment spending plus government purchases must equal saving plus net taxes.

1.6 For the data in the following table, the consumption function is $C = 800 + 0.6(Y - T)$. Fill in the columns in the table and identify the equilibrium output.

Output	Net Taxes	Disposable Income	Consumption Spending	Saving	Planned Investment Spending	Government Purchases	Planned Aggregate Expenditure	Unplanned Inventory Change
2,100	100				300	400		
2,600	100				300	400		
3,100	100				300	400		
3,600	100				300	400		
4,100	100				300	400		
4,600	100				300	400		
5,100	100				300	400		

1.7 For each of the following sets of data, determine if output will need to increase, decrease, or remain the same to move the economy to equilibrium:

- $Y = 1,000$; $C = 100 + 0.75(Y - T)$; $I = 200$; $G = 150$; $T = 100$
- $Y = 5,000$; $C = 200 + 0.9(Y - T)$; $I = 500$; $G = 400$; $T = 300$
- $Y = 2,000$; $C = 150 + 0.5(Y - T)$; $I = 150$; $G = 150$; $T = 50$
- $Y = 1,600$; $C = 300 + 0.6(Y - T)$; $I = 250$; $G = 150$; $T = 100$

graph showing the data for consumption spending, planned aggregate expenditures, and aggregate output. Be sure to identify the equilibrium point on your graph.

2.2 Suppose that the government of Ansonia is experiencing a large budget deficit with fixed government expenditures of $G = 250$ and fixed taxes of $T = 150$. Assume that consumers of Ansonia behave as described in the following consumption function:

$$C = 300 + 0.8(Y - T)$$

Suppose further that investment spending is fixed at 200. Calculate the equilibrium level of GDP in Ansonia. Solve for equilibrium levels of Y , C , and S . Next, assume that the Republican Congress in Ansonia succeeds in reducing taxes by 30 to a new fixed level of 120. Recalculate the equilibrium level of GDP using the tax multiplier. Solve for equilibrium levels of Y , C , and S after the tax cut and check to ensure that the multiplier worked. What arguments are likely to be used in support of such a tax cut? What arguments might be used to oppose such a tax cut?

24.2 FISCAL POLICY AT WORK: MULTIPLIER EFFECTS

LEARNING OBJECTIVE: Describe the effects of three fiscal policy multipliers.

2.1 Use your answer to Problem 1.6 to calculate the MPC, MPS, government spending multiplier, and tax multiplier. Draw a

- 2.3** A \$1 increase in government spending will raise equilibrium income more than a \$1 tax cut will, yet both have the same impact on the budget deficit. So if we care about the budget deficit, the best way to stimulate the economy is through increases in spending, not cuts in taxes. Comment.
- 2.4** Answer the following:
- $MPS = 0.1$. What is the government spending multiplier?
 - $MPC = 0.6$. What is the government spending multiplier?
 - $MPS = 0.25$. What is the government spending multiplier?
 - $MPC = 0.5$. What is the tax multiplier?
 - $MPS = 0.2$. What is the tax multiplier?
 - If the government spending multiplier is 8, what is the tax multiplier?
 - If the tax multiplier is -5 , what is the government spending multiplier?
 - If government purchases and taxes are increased by \$500 billion simultaneously, what will the effect be on equilibrium output (income)?
- 2.5** What is the balanced-budget multiplier? Explain why the balanced-budget multiplier is equal to one.

24.3 THE FEDERAL BUDGET

LEARNING OBJECTIVE: Compare and contrast the federal budgets of three U.S. government administrations.

- 3.1** You are appointed secretary of the treasury of a recently independent country called Rugaria. The currency of Rugaria is the lav. The new nation began fiscal operations this year, and the budget situation is that the government will spend 10 million lavs and taxes will be 9 million lavs. The 1-million-lav difference will be borrowed from the public by selling 10-year government bonds paying 5 percent interest. The interest on the outstanding bonds must be added to spending each year, and we assume that additional taxes are raised to cover that interest. Assuming that the budget stays the same except for the interest on the debt for 10 years, what will be the accumulated debt? What will the size of the budget be after 10 years?
- 3.2** [Related to the *Economics in Practice* on p. 498] Federal government expenditures and receipts for the simple economy of the nation of Topanga are listed in the table below. The government of Topanga would like to reduce the debt-to-GDP ratio, and the Finance Minister of Topanga has proposed the following: “The best way to reduce the

debt-to-GDP ratio is to increase GDP, because with a larger GDP, the ratio will have to get smaller. I therefore propose that government expenditures be increased by 25 percent, personal income taxes be reduced by 25 percent, corporate income taxes be reduced by 25 percent, and contributions for social insurance be reduced by 25 percent. All of these moves will increase GDP by 10 percent by increasing consumer spending, business spending, and government spending by the exact amounts of the increased spending and reduced taxes.” Assuming that GDP will, indeed, increase by 10 percent and the only changes to the data in the table are those proposed by the Finance Minister, answer the following questions:

- What is the current debt-to-GDP ratio?
- What is the amount of the current budget deficit or surplus?
- With the proposals made by the Finance Minister, what will be the amount of the new budget deficit or surplus and what will be the new debt-to-GDP ratio?
- Based on your answer to part (c), will the Finance Minister’s proposals work to reduce the debt-to-GDP ratio? Explain.

Debt	\$20 million
GDP	\$40 million
Government expenditures	\$5 million
Government transfer payments	\$5 million
Interest payment	\$1 million
Personal income tax receipts	\$6 million
Corporate income tax receipts	\$1 million
Contributions for social insurance	\$4 million

24.4 THE ECONOMY’S INFLUENCE ON THE GOVERNMENT BUDGET

LEARNING OBJECTIVE: Explain the influence of the economy on the federal government budget.

- 4.1** Suppose all tax collections are fixed (instead of dependent on income) and all spending and transfer programs are fixed (in the sense that they do not depend on the state of the economy, as, for example, unemployment benefits now do). In this case, would there be any automatic stabilizers in the government budget? Would there be any distinction between the full-employment deficit and the actual budget deficit? Explain.

EOC QUESTIONS

QUESTION 1 Households in the lowest quintile of the U.S. income distribution have larger marginal propensities to consume than households in the highest quintile. If the government wishes to reduce taxes to stimulate economic output during a recession, which households should it target tax cuts toward?

QUESTION 2 An equal-sized increase in government spending and taxes may be considered expansionary or contractionary fiscal policy. What information would you need in order to make this distinction?

CHAPTER 24 APPENDIX A

Deriving the Fiscal Policy Multipliers

The Government Spending and Tax Multipliers MyLab Economics Concept Check

LEARNING OBJECTIVE

Show that the government spending multiplier is one divided by one minus the *MPC*.

In the chapter, we noted that the government spending multiplier is $1/\text{MPS}$. (This is the same as the investment multiplier.) We can also derive the multiplier algebraically using our hypothetical consumption function:

$$C = a + b(Y - T)$$

where b is the marginal propensity to consume. As you know, the equilibrium condition is

$$Y = C + I + G$$

By substituting for C , we get

$$Y = a + b(Y - T) + I + G$$

$$Y = a + bY - bT + I + G$$

This equation can be rearranged to yield

$$Y - bY = a + I + G - bT$$

$$Y(1 - b) = a + I + G - bT$$

Now solve for Y by dividing through by $(1 - b)$:

$$Y = \frac{1}{(1 - b)}(a + I + G - bT)$$

We see from this last equation that if G increases by one with the other determinants of Y (a , I , and T) remaining constant, Y increases by $1/(1 - b)$. The multiplier is, as before, simply $1/(1 - b)$, where b is the marginal propensity to consume. Of course, $(1 - b)$ equals the marginal propensity to save, so the government spending multiplier is $1/\text{MPS}$.

We can also derive the tax multiplier. The last equation says that when T increases by \$1, holding a , I , and G constant, income decreases by $b/(1 - b)$ dollars. The tax multiplier is $-b/(1 - b)$, or $-\text{MPC}/(1 - \text{MPC}) = -\text{MPC}/\text{MPS}$. (Remember, the negative sign in the resulting tax multiplier shows that it is a *negative* multiplier.)

The Balanced-Budget Multiplier MyLab Economics Concept Check

It is easy to show formally that the balanced-budget multiplier equals one. When taxes and government spending are simultaneously increased by the same amount, there are two effects on planned aggregate expenditure: one positive and one negative. The initial impact of a balanced-budget increase in government spending and taxes on aggregate expenditure would be the *increase* in government purchases (ΔG) minus the *decrease* in consumption (ΔC) caused by the tax increase. The decrease in consumption brought about by the tax increase is equal to $\Delta C = \Delta T(\text{MPC})$.

$$\begin{array}{rcl} \text{initial increase in spending:} & \Delta G & \\ - \text{initial decrease in spending:} & \Delta C = \Delta T(\text{MPC}) & \\ \hline = \text{net initial increase in spending} & \Delta G - \Delta T(\text{MPC}) & \end{array}$$

In a balanced-budget increase, $\Delta G = \Delta T$; so in the above equation for the net initial increase in spending we can substitute ΔG for ΔT .

$$\Delta G - \Delta G(\text{MPC}) = \Delta G(1 - \text{MPC})$$

MyLab Economics Visit www.pearson.com/mylab/economics to complete these exercises online and get instant feedback. Exercises that update with real-time data are marked with .

Because $MPS = (1 - MPC)$, the net initial increase in spending is:

$$\Delta G(MPS)$$

We can now apply the expenditure multiplier $\left(\frac{1}{MPS}\right)$ to this net initial increase in spending:

$$\Delta Y = \Delta G(MPS) \left(\frac{1}{MPS}\right) = \Delta G$$

Thus, the final total increase in the equilibrium level of Y is just equal to the initial balanced increase in G and T . That means the balanced-budget multiplier equals one, so the final increase in real output is of the same magnitude as the initial change in spending.

CHAPTER 24 APPENDIX B

LEARNING OBJECTIVE

Explain why the multiplier falls when taxes depend on income.

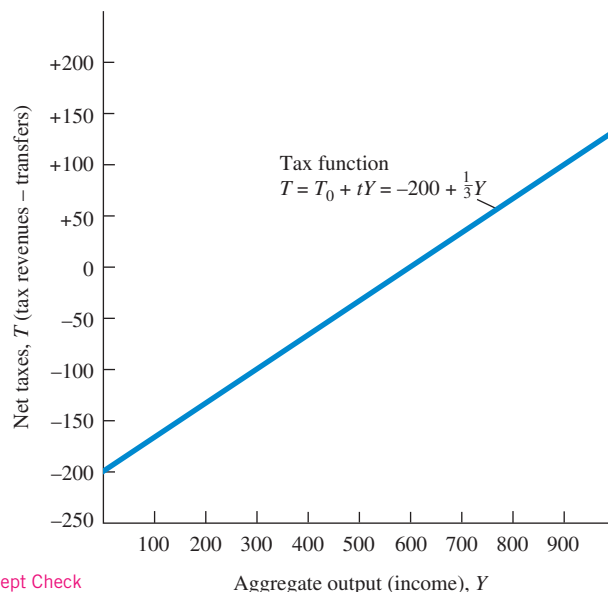
The Case in Which Tax Revenues Depend on Income MyLab Economics Concept Check

In this chapter, we used the simplifying assumption that the government collects taxes in a lump sum. This made our discussion of the multiplier effects somewhat easier to follow. Now suppose that the government collects taxes not solely as a lump sum that is paid regardless of income, but also partly in the form of a proportional levy against income. This is a more realistic assumption. Typically, tax collections either are based on income (as with the personal income tax) or follow the ups and downs in the economy (as with sales taxes). Instead of setting taxes equal to some fixed amount, let us say that tax revenues depend on income. If we call the amount of net taxes collected T , we can write $T = T_0 + tY$.

This equation contains two parts. First, we note that net taxes (T) will be equal to an amount T_0 if income (Y) is zero. Second, the tax rate (t) indicates how much net taxes change as income changes. Suppose T_0 is equal to -200 and t is $1/3$. The resulting tax function is $T = -200 + 1/3Y$, which is graphed in Figure 24B.1. Note that when income is zero, the government collects “negative net taxes,” which simply means that it makes transfer payments of 200. As income rises, tax collections increase because every extra dollar of income generates \$0.33 in extra revenues for the government.

► FIGURE 24B.1 The Tax Function

This graph shows net taxes (taxes minus transfer payments) as a function of aggregate income.



MyLab Economics Concept Check

How do we incorporate this new tax function into our discussion? All we do is replace the old value of T (in the example in the chapter, T was set equal to 100) with the new value, $-200 + 1/3Y$. Look first at the consumption equation. Consumption (C) still depends on disposable income, as it did before. Also, disposable income is still $Y - T$, or income minus taxes. Instead of disposable income equaling $Y - 100$, however, the new equation for disposable income is

$$Y_d = Y - T$$

$$Y_d = Y - (-200 + 1/3Y)$$

$$Y_d = Y + 200 - 1/3Y$$

Because consumption still depends on after-tax income, exactly as it did before, we have

$$C = 100 + 0.75Y_d$$

$$C = 100 + 0.75(Y + 200 - 1/3Y)$$

Nothing else needs to be changed. We solve for equilibrium income exactly as before, by setting planned aggregate expenditure equal to aggregate output. Recall that planned aggregate expenditure is $C + I + G$ and aggregate output is Y . If we assume, as before, that $I = 100$ and $G = 100$, the equilibrium is

$$Y = C + I + G$$

$$Y = \underbrace{100 + 0.75(Y + 200 - 1/3Y)}_C + \underbrace{100}_I + \underbrace{100}_G$$

This equation may look difficult to solve, but it is not. It simplifies to

$$Y = 100 + 0.75Y + 150 - 25Y + 100 + 100$$

$$Y = 450 + 0.5Y$$

$$0.5Y = 450$$

This means that $Y = 450/0.5 = 900$, the new equilibrium level of income.

Consider the graphic analysis of this equation as shown in Figure 24B.2, where you should note that when we make taxes a function of income (instead of a lump-sum amount), the AE function becomes *flatter* than it was before. Why? When tax collections do not depend on income, an increase in income of \$1 means disposable income also increases by \$1. Adding more income does not raise the amount of taxes paid because taxes are a constant amount. Disposable income therefore changes dollar for dollar with any change in income.

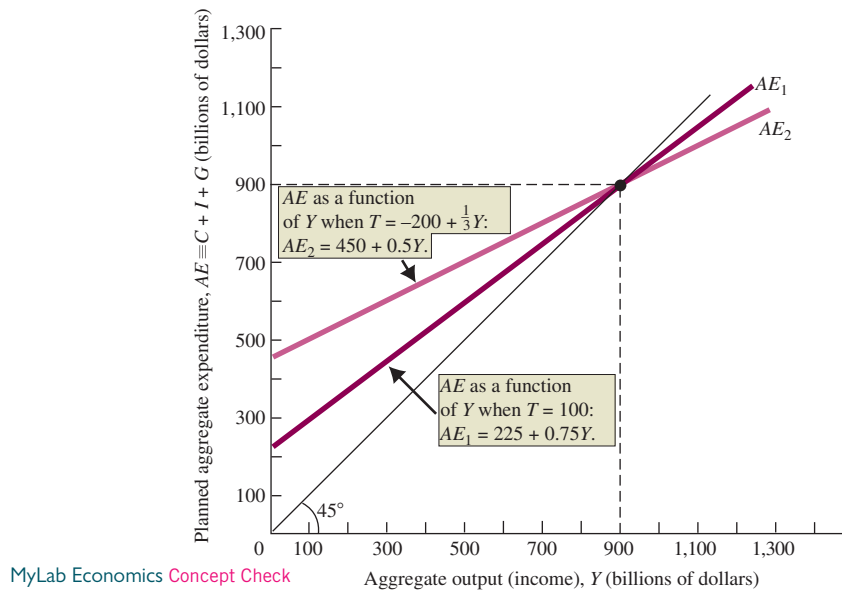
When taxes depend on income, a \$1 increase in income does not increase disposable income by a \$1 because some of the additional \$1 goes to pay extra taxes. Under the modified tax function of Figure 24B.2, an extra \$1 of income will increase disposable income by only \$0.67 because \$0.33 of the extra \$1 goes to the government in the form of taxes.

No matter how taxes are calculated, the marginal propensity to consume out of disposable (or after-tax) income is the same—each extra dollar of disposable income will increase consumption spending by 0.75. However, a \$1 change in before-tax income does not have the same effect on disposable income in each case. Suppose we were to increase income by \$1. With the lump-sum tax function, disposable income would rise by \$1, and consumption would increase by the MPC times the change in Y_d , or \$0.75. When taxes depend on income, disposable income would rise by only \$0.67 from the \$1 increase in income and consumption would rise by only the MPC times the change in disposable income, or $0.75 \times 0.67 = 0.50$.

If a \$1 increase in income raises expenditure by \$0.75 in one case and by only \$0.50 in the other, the second aggregate expenditure function must be flatter than the first.

► **FIGURE 24B.2** Different Tax Systems

When taxes are strictly lump-sum ($T = 100$) and do not depend on income, the aggregate expenditure function is steeper than when taxes depend on income.



The Government Spending and Tax Multipliers Algebraically

All this means that if taxes are a function of income, the three multipliers (investment, government spending, and tax) are less than they would be if taxes were a lump-sum amount. By using the same linear consumption function we used in Chapters 22 and 23, we can derive the multiplier:

$$C = a + b(Y - T)$$

$$C = a + b(Y - T_0 - tY)$$

$$C = a + bY - bT_0 - btY$$

We know that $Y = C + I + G$. Through substitution we get

$$Y = \underbrace{a + bY - bT_0 - btY}_C + I + G$$

Solving for Y :

$$Y = \frac{1}{1 - b + bt}(a + I + G - bT_0)$$

This means that a \$1 increase in G or I (holding a and T_0 constant) will increase the equilibrium level of Y by

$$\frac{1}{1 - b + bt}$$

If $b = MPC = 0.75$ and $t = 0.20$, the spending multiplier is 2.5. (Compare this to 4, which would be the value of the spending multiplier if taxes were a lump sum, that is, if $t = 0$.)

Holding a , I , and G constant, a fixed or lump-sum tax cut (a cut in T_0) will increase the equilibrium level of income by

$$\frac{b}{1 - b + bt}$$

Thus, if $b = MPC = 0.75$ and $t = 0.20$, the tax multiplier is -1.875 . (Compare this to -3 , which would be the value of the tax multiplier if taxes were a lump sum.)

APPENDIX SUMMARY

1. When taxes depend on income, a \$1 increase in income does not increase disposable income by \$1 because some of the additional \$1 must go to pay extra taxes. This means

that if taxes are a function of income, the three multipliers (investment, government spending, and tax) are less than they would be if taxes were a lump-sum amount.

APPENDIX PROBLEMS

All problems are available on [MyLab Economics](#).

APPENDIX B: THE CASE IN WHICH TAX REVENUES DEPEND ON INCOME

LEARNING OBJECTIVE: Explain why the multiplier falls when taxes depend on income.

1A.1 Assume the following for the economy of a country:

- a. Consumption function: $C = 60 + 0.75Y_d$
- b. Investment: $I = 75$
- c. Government spending: $G = 45$

d. Net taxes: $T = -25 + 0.2Y$

e. Disposable income: $Y_d \equiv Y - T$

f. Equilibrium: $Y = C + I + G$

Solve for equilibrium income. (*Hint:* Be very careful in doing the calculations. They are not difficult, but it is easy to make careless mistakes that produce wrong results.) How much does the government collect in net taxes when the economy is in equilibrium? What is the government's budget deficit or surplus?