Chapter 10
Fiscal Policy

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Chapter 10: Fiscal Policy

What happens when economic conditions are not good – when the economy enters a slowdown or recession? We often hear of the need to “stimulate” the economy. Sometimes political leaders advocate tax cuts or a variety of specific government spending programs. The common-sense idea behind this is that more spending, either by individuals and families who receive tax cuts, or by government, will create demand for goods and thereby expand employment and output. In terms of the macroeconomic theory sketched out in Chapter 9, these policies are intended to increase aggregate demand, generating positive multiplier effects. That sounds good. But critics sometimes argue that such policies will create other problems, such as large government deficits or inflation. The analysis of such issues is the subject of this and the next two chapters.

1. The Role of Government Spending and Taxes

Economists often disagree about what tax and spending policies are best in different economic situations. These debates are about fiscal policy—what government spends, how it gets the money it spends, and the effects on the economy of these activities. To understand these issues, we need to extend the simple macroeconomic model of Chapter 9 to include the role of government.

| Fiscal Policy: government spending and tax policy |

In Section 3 of this chapter, we will also introduce another step towards realism in our model of the economy by adding the international sector – exports and imports.

Bringing in the role of the government, the equation for aggregate demand used in previous chapters becomes:

\[ AD = C + I + G \]

Government spending by Federal, state, and local governments \((G)\) is added to aggregate demand since it represents additional goods and services purchased. Taxes do not appear directly in this equation, but as we will see they have an impact through their effect on consumption spending.

We will examine the effects of these changes to our model one at a time, starting with the impact of a change in government spending.

1.1 A Change in Government Spending

Government Spending \((G)\) has a direct impact on the economy. When the government purchases goods and services, this adds to aggregate demand, boosting economic equilibrium. In Chapter 9 we showed how a decline in intended investment
lowered the $AD$ line, leading to equilibrium at a lower level of income. This suggests that
government spending might be used as an antidote to low investment spending.

Suppose we start with the macroeconomic equilibrium that we showed in Chapter
9, Table 9.5 and Figure 9.14. Remember that this was an unemployment equilibrium. If
we start at an unemployment equilibrium, additional aggregate demand will be needed to
get back to full employment. Our first model assumed no government role; hence initial
government spending ($G$) is equal to zero. Thus a simple policy would be to increase
government spending on goods and services from 0 to 80.\(^1\) As you can see in Table 10.1
and Figure 10.1, the addition of 80 units of government spending causes the equilibrium
to shift up by 400, to the full employment $Y^*$ of 800. Why does this happen?

Let’s look at a simple example – a new building construction program.
Government money is spent to purchase goods such as concrete and steel, as well as to
pay workers. This directly creates new aggregate demand. In addition, there are
multiplier effects – construction workers will spend their paychecks to buy all kinds of
consumer goods and services. The multiplier effects add to the original economic
stimulus resulting from the government spending.

The effect is exactly the same as the multiplier for intended investment which we
discussed in Chapter 9. The initial change in government spending $\Delta G$ becomes income
to individuals ($\Delta Y$), which leads to a round of consumer spending $\Delta C$ equal to $mpc \, \Delta Y$,
which in turn becomes income to other individuals, leading to another round of
consumer spending, and so forth. The whole process can be summarized using the same
formula as in Chapter 9, but now applied to government spending rather than intended
investment:

$$\Delta Y = \frac{1}{1 - mpc} \Delta G$$

Or:

$$\Delta Y = mult \, \Delta G$$

Using the same $mpc$ and multiplier as before (we had chosen the example where
$mpc = 0.8$, resulting in $mult = 5$), this allows us to predict the impact of government
spending on economic equilibrium. The multiplier applies to government spending in
exactly the same way that it does to changes in intended investment. Therefore an
increase in government spending of 80 leads to an equilibrium shift of $80 \times 5 = 400$.
Looking at it the other way, if we start with the goal of an increase of 400 in $Y$, we can
divide 400 by 5 to find the needed quantity of $\Delta G$: $400/5 = 80$.

\(^1\) We’ll deal with the issue of where the government gets the funds for spending – from taxes, borrowing,
or "printing money" – in the following sections and in Chapter 11.
Table 10.1 An Increase in Government Spending

<table>
<thead>
<tr>
<th>(1) Income (Y)</th>
<th>(2) Consumption (C)</th>
<th>(3) Intended Investment (II)</th>
<th>(4) Original Aggregate Demand (AD = C + II)</th>
<th>(5) Government Spending (G)</th>
<th>(6) New Aggregate Demand (AD₁ = C + II + G)</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>260</td>
<td>60</td>
<td>320</td>
<td>80</td>
<td>400</td>
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<tr>
<td>400</td>
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<td>720</td>
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<tr>
<td>800</td>
<td>660</td>
<td>60</td>
<td>720</td>
<td>80</td>
<td>800</td>
</tr>
</tbody>
</table>

Note that at the original AD level, there is an equilibrium at 400, where AD = Y, and there is significant unemployment. After the addition of 80 in government spending (G), the new equilibrium is at the full employment level of 800, where AD₁ = Y. (You can check other levels in the table to make sure that this is the only level at which AD₁ = Y). Figure 10.1 shows the same thing graphically. The aggregate demand schedule moves up by 80 at each level of income, so that the horizontal intercept of the AD line moves up from 80 to 160. The slope of the AD line remains the same, since there has been no change in the mpc. The change in equilibrium income is equal to the change in government spending times the multiplier.

Using the multiplier, we can easily calculate the effect of further changes in government spending. For example, suppose government spending were reduced from 80 to 60. This negative change of 20 in G would lead to a change of 5 x (–20) = –100 in equilibrium Y. Income would fall from 800 to 700.

So we can see that an increase in government spending will raise the level of economic equilibrium, while a decrease in government spending will lower it. The multiplier effect, which is the same size in both directions, gives the policy extra “bang for the buck” – in this case, a change in government spending leads to five times as great a change in national income. In real life the multiplier is rarely this large, but there will usually be some multiplier effects from a change in government spending.³

² Note: The zero level of income has been omitted from this table, since it is not relevant to the analysis of fiscal policy.
³ Econometric studies of the U.S. economy have generally indicated a multiplier effect of 2.0 or less (Renshaw, Edward (1990) "A Keynesian View of the US Budget and Trade Deficits," Public Finance, 45(No. 3), 440-48).
1.2 Taxes and Transfer Payments

To complete the picture of fiscal policies, we need to include the role of taxes and transfer payments. If voters and government officials do not want to raise government spending, they have another option. To expand the economy, the government could cut taxes and/or increase transfer payments. Transfer payments are government grants, subsidies, or gifts to individuals or firms. Examples of transfer payments include social security payments and payments of interest to holders of government bonds.

**Transfer Payments:** payments by government to individuals or firms, including social security payments, unemployment compensation, and interest payments.
In recent decades the fiscal tool most often chosen by policy makers has been tax reductions. Increases in transfer payments would have the same general positive effect on aggregate demand. The opposite policies – increasing taxes or decreasing transfer payments – would have a negative effect, like reducing government spending.

Changes in taxes and transfer payments, however, are not exactly similar to changes in government spending. The mechanism by which tax and transfer changes affect the economy is a little different from the process discussed above for government spending. While government spending directly affects aggregate demand and GDP, the effect of taxes and transfer payments is indirect, based on their effect on consumption or investment. There are many kinds of taxes and transfers, including corporate taxes, tariffs, and inheritance taxes, but we will focus here on the effects of changes in personal income taxes and transfers to individuals.

For example, let’s say consumers receive a tax cut of 50. If they spent it all, that would add 50 to aggregate demand. But according to the “marginal propensity to consume” (mpc) principle, consumers are likely to use some portion of the tax cut to increase saving or reduce debt. With the mpc of 0.8 that we used for our basic model in Chapter 9, the portion saved will be 0.2 x 50 = 10, leaving 40 for increased consumption. Thus the effect on aggregate demand would be only 40, not 50 (since saving is not part of aggregate demand).

The same logic would hold if consumers received extra transfer income of 50. They would spend only 40, and save 10. The reverse would be true for a tax increase or a cut in transfer payments. With a tax increase or benefit cut of 50, individuals and families would have less to spend, and would reduce their consumption by 40.

Economists define disposable income ($Y_d$) as the income available to consumers after paying taxes and receiving transfers:

$$Y_d = Y - T + TR$$

where $T$ is the total of taxes paid in the economy and $TR$ is the total of transfer payments from governments to individuals.

Changes in taxes ($T$) or transfer payments directly affect disposable income, but only indirectly affect consumption and aggregate demand. Hence their impact on economic equilibrium is less than that of government spending, which affects aggregate demand directly.

For this reason, the multiplier effect of changes in taxes and transfer payments are less than the multiplier impacts of government spending. If taxes are "lump sum"—that
is, set at a level that does not change with income, then we can write $T = \bar{T}$. The **tax multiplier for a lump sum tax** works in two stages. In the first stage, consumption is reduced by $mpc (\Delta \bar{T})$. In the second stage, this reduction in consumption has the regular multiplier effect on equilibrium income. The combined effect can be expressed as:

$$\Delta Y = (\text{mult}) \Delta C = -(\text{mult}) (mpc) \Delta \bar{T}$$

The tax multiplier is equal to $\Delta Y/\Delta \bar{T} = -(\text{mult}) (mpc)$. Mathematically, this always works out to exactly 1.0 less than the regular multiplier. (You can use the multiplier formula from Chapter 9 to work out why this is true). Using the figures from our previous example, where $mpc = 0.8$ and $\text{mult} = 5$, the tax multiplier would be $(0.8)(5) = 4$. (For a more detailed algebraic account of the tax multiplier for a lump sum tax, see Appendix A1.)

**Tax multiplier:** the impact of a change in a lump sum tax on economic equilibrium, expressed mathematically as $\Delta Y/\Delta \bar{T} = -(\text{mult}) (mpc)$

Just as a tax increase has a contractionary effect, a tax cut will have an expansionary effect. Historically, tax cuts played an important role in U.S. economic policy in the 1960s, 1980s, and 2000s. In all cases, the effect on the economy was expansionary (though there is debate about the exact mechanism through which this occurred – not all economists accept the simple tax multiplier process that we have discussed).

Transfer payments, which as we noted are a kind of “negative tax”, affect the economy through a similar logic. An increase in transfer payments, like a tax cut, will give people more money that they can spend. But the expansionary effect only occurs when they actually do spend – so, according to the $mpc$ logic, the impact of an increase in transfer payments is reduced by whatever portion of the extra income people decide to save. The multiplier impact of a change in transfer payments is therefore the same as that of a change in taxes, except in the opposite direction. A cut in transfer payments, like an increase in taxes, will be contractionary, tending to lower economic equilibrium.

In the real economy, income taxes are generally proportional or progressive — that is, they increase with income levels (as discussed in Chapter 3). In our model, the effect of a proportional tax would be to flatten the aggregate demand curve, since it has a larger effect at higher income levels. (See Appendix A2 for a more detailed treatment of the impact of a proportional tax – we omit analysis of progressive taxes, which is a bit more complex).

Taxes that rise with income will tend to lower the proportion consumed out of each dollar increase in income. For example, with a 15% tax each extra dollar of income will be reduced to 85 cents of disposable income. Applying our original $mpc$ of 0.80 to the remaining 85 cents, we get $0.8 \times 0.85 = 0.68$, indicating that 68 cents will be devoted to consumption (and 17 cents to saving). The result is similar to having a lower $mpc$,
which also means a lower multiplier. This will damp down the effect of changes in aggregate demand.

You might wonder what would be the effect of an increase in government spending that is exactly balanced by an increase in taxes (a balanced budget)? Since we have shown that the multiplier effect of taxes goes in the opposite direction from that of government spending, it might appear that the effects would cancel out. But this is not the case. Because the tax multiplier is less than the government spending multiplier, there is a net positive effect on aggregate demand and equilibrium. The difference between the two multipliers is equal to one, so the net multiplier effect will also be equal to one. In the example we have used, the government policy multiplier is 5, and the tax multiplier is 4, so the balanced budget multiplier \( = 5 - 4 = 1 \). Thus the impact on economic equilibrium is exactly equal to the original change in government spending (and taxes). So we can say that \( \Delta Y = \Delta G \). This is, of course, a weaker effect than government spending alone, which would lead to \( \Delta Y = (\text{mult}) \Delta G = 5 \Delta G \).

Balanced budget multiplier: the impact on economic equilibrium of simultaneous increases of equal size in government spending and taxes. The effect is positive, and equal in size to the original change in government spending and taxes.

1.3 Expansionary and Contractionary Fiscal Policy

These three fiscal policy tools – changes in government spending, changes in tax levels, and changes in transfer payments – will affect income, employment and (in the case of high aggregate demand) inflation. They will also, of course affect the government’s budgetary position. The budget could be balanced, in surplus, or in deficit, depending on the combinations of spending and tax policies that are employed.

Increasing government spending is an example of what economists refer to as expansionary fiscal policy. Another expansionary fiscal policy would be to increase transfer payments or to lower taxes. Whether through a direct impact on aggregate demand, or through giving consumers more money to spend, these policies will increase aggregate demand and equilibrium.

Expansionary Fiscal Policy: the use of government spending, transfer payments, or tax cuts to stimulate a higher level of economic activity.

If that was the whole story, macroeconomic policy would be simple – just use sufficient government spending or tax cuts to maintain the economy at full employment. But there are complications. One problem is that in order to spend more, the government either has to raise taxes, borrow, or "print money." (Issues of how government finances its expenditures will be discussed later in this chapter and in Chapter 11). Raising taxes would tend to counteract the expansionary effects of increased spending. Borrowing money creates deficits and raises long-term government debt, which may or may not be a problem – we’ll discuss this in Section 2 of this chapter.
Another problem is that too much government spending may lead to inflation. The goal of expansionary fiscal policy is to bring the economy up to its full employment level. But what if fiscal policy overshoots this level? It’s easy to see how this might occur. Government spending on popular programs is easy for politicians, and raising taxes to pay for them is hard. This can lead to budget deficits (discussed in section 2 below), but it can also cause excessive aggregate demand in the economy. Excessive demand could also, in theory, arise from high consumer or business spending, but usually government spending, alone or in combination with high consumer and business expenditures, is partially to blame when the economy “overheats.” The result is likely to be inflation.

According to our basic analysis, the cure for inflation should be fairly straightforward. If the problem is too much aggregate demand, the solution is to reduce aggregate demand. This could be done by reversing the process discussed in the previous section, and lowering government spending on goods and services. A similar effect can be obtained by reducing transfer payments or by increasing taxes. With lower transfer payments and/or higher taxes, businesses and consumers will have less spending power. Lower spending by government, businesses, and consumers will result in a lower economic equilibrium level, and there will no longer be excess demand pressures creating inflation.

Thus we have identified another important economic policy tool – **contractionary fiscal policy**. This is a weapon that can be used against inflation, though it would generally be unwise to use it at times of high unemployment. (The problem of what to do if unemployment and inflation occur at the same time – something that isn’t shown in our simple model – will be discussed in Chapter 12). Of course, too large a spending reduction could overshoot in a downwards direction, leading to excessive unemployment and possibly a recession.

**Contractionary Fiscal Policy:** reductions in government spending or transfer payments, or increases in taxes, leading to a lower level of economic activity

Although the effects of contractionary fiscal policy can be painful, it would be wrong to assume that expansionary fiscal policy is always beneficial, and contractionary policy always harmful. Contractionary policy can be essential when previous policies have “overshot” the goal, or when the economy is suffering from inflation. We’ll discuss this issue of policy choice a lot more in this and the following chapters.

**Discussion Questions**

1. What recent changes in government spending or tax policy have been in the news? How would you expect these to affect the economy and employment levels?
2. Tax increases are generally politically unpopular. Would you ever be likely to favor a tax increase? Under what circumstances, if any, might a tax increase be beneficial to the economy?

2. **Budgets, Deficits, and Policy Issues**

   The Federal government budget includes spending on goods and services, transfer payments and taxes. (This is also true of state and local government budgets, but our focus for purposes of fiscal policy analysis is mainly on the Federal budget). Thus we can break down total government expenditures, or government outlays, into two categories. Total government outlays include not only government spending on goods and services \((G)\) but also government transfer payments:

   \[
   \text{Government Outlays} = G + TR
   \]

   **Government outlays:** Total government expenditures including spending on goods and services and transfer payments.

   On the revenue side, government income comes from taxes \((T)\). When revenues are not sufficient to cover outlays, the government borrows to cover the difference. The actual financing of a deficit is accomplished through the sale by the United States Treasury of government bonds – interest-bearing securities that can be bought by firms, individuals, or foreign governments. In effect, a government bond is a promise to pay back, with interest, the amount borrowed at a specific time in the future.

   **Government bond:** An interest-bearing security constituting a promise to pay at a specified future time.

   Current Federal sources of revenue and outlays are shown in Figure 10.2. The major sources of Federal revenue are personal income and social security taxes. In fiscal 2004, the federal government also borrowed an amount equal to 18% of the total budget. Government borrowing varies from year to year, but deficits are more common than surpluses. The major categories of government spending are social security, defense spending, and social programs. Interest payments on the debt amounted to 7% of Federal spending in fiscal 2004.

   Clearly, government borrowing and interest payments on the debt will have economic impacts. What is the nature of these impacts? To answer this question, we need to look more carefully at the nature of government deficits.
The largest sources of Federal revenues are personal income and social security taxes. 18% of the Federal budget must be covered by borrowing (issuing government bonds).

Net interest on the debt represents 7% of Federal outlays.

Source: U. S. Department of the Treasury
2.1 The Government Budget: Surplus and Deficit

First, we need to define what we mean by the government budget surplus or deficit. This can be calculated by subtracting total government outlays from total government tax revenues. A positive result indicates a surplus; a negative one, a deficit.

\[
\text{Budget Surplus (+) or Deficit (–) = } T - \text{Government Outlays} \leq T - (G + TR)
\]

Figure 10.3: The Government Deficit as a Percentage of GDP

The government’s deficit – as measured by its borrowing – reached 6% of GDP in 1983, a year of deep recession. The deficit was reduced as a percent of GDP from the early 1990s until 1998, when the budget went back into surplus. From 1998 to 2001, the government actually had a surplus in its budget (so that it retired some of its debt). After 2001, a recession combined with the Bush administration tax cuts put the budget back into deficit.


Showing the government’s deficit as a percentage of nominal GDP is a simple way to correct the numbers for the effects of both inflation and the ability of the economy to handle the deficit. The larger the economy – as measured by GDP – the easier it is to
manage a deficit, since both the fiscal and budgetary impacts of a deficit will be smaller relative to the size of the economy. A bigger economy means that people will have higher incomes, and are likely to be willing to purchase more government bonds, making it easier for the government to borrow.

State and local governments are generally required to separate their current spending and capital budgets. Current spending must be paid for out of current taxes, but money can be borrowed for investment ("capital") projects such as school buildings, bridges, and new highway or transit systems. The Federal budget, however, makes no such distinction between current and capital spending.

During the period 1992-2001, the U.S. Federal government budget went from a large deficit to a surplus (Figure 10.3). Then during 2001-2004, the government budget went back into deficit. Since 2004, the deficit has moderated a bit, but is projected to continue and perhaps increase in future years. This has led to an extensive debate about the impact of deficits on the economy. In this section, we examine this question and other issues related to the government budget and fiscal policy. As we will see, there is much continuing controversy, both among economists and the general public, about the significance of budgetary policy and deficits, and many different ideas about the best way to handle issues of government spending, taxes, and transfer payments.

Perhaps because the two terms sound so much alike, many people confuse the government’s deficit with the government debt. But these two “D words” are very different. The deficit totaled about $412 billion during 2004, while the debt equaled about $4.3 trillion at the end of 2004. The reason why the second number is more than ten times as large as the first is that the debt represents deficits accumulated over many years. In economists’ terms, we can say that the government deficit is a flow variable while its debt is a stock variable. (See Chapter 3 for this distinction.)

The government’s debt rises when the government runs a deficit and falls when it runs a surplus. Figure 10.4 shows some recent data on the government’s debt, again measured as a percentage of GDP. This percentage was fairly steady during the period 1993-1996. After 1996, growth in GDP, combined with a government budget that moved from deficit into surplus, reduced debt as a percent of GDP from nearly 50% down to about 33%. The government debt started rising again as the economy slowed and as deficits became positive in the 2000s.

What is the impact of government debt on the economy? One commonly expressed view of the government’s debt is that it represents a burden on future generations of citizens. There is some truth to this assertion, but it is also somewhat misleading. It implicitly compares the government debt to the debt of a private citizen. Certainly, if you personally ran up a huge debt, this would not be a good thing for your financial future. But government debt is different in some important ways.

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4 Both of these are measured in current dollars. The debt figure represents Federal debt held by the public. It excludes debt held by Federal agencies (in effect, money owed by the government to itself). The larger figure of over $8 trillion often discussed, for example, in debates about raising the Federal debt limit, includes debt held by Federal agencies.
First, most of the government debt is owed to U.S. citizens. When people own Treasury bills (T-Bills), Treasury notes, or Treasury bonds, they own government IOUs. From their point of view, the government debt is an asset, a form of wealth. If your grandmother gives you a U.S. Savings bond, she is giving you a benefit, not a burden. These assets are some of the safest ones you can own.

![Graph of U.S. Federal Debt as % GDP]

**Figure 10.4: Government Debt Held by the Public as a Percentage of GDP**

*In the second half of the 1990s the government debt (the tall line) fell as a percentage of GDP, as a result of government budget surpluses and abundant GDP growth during that period. In 2001, it began to rise, as a result of the rising deficits of that period along with slower growth of GDP. Throughout, the fraction of the government debt that was owed to foreign citizens and governments (the shorter segment of each tall line) was a minority of the total, but it has increased significantly as a proportion of total debt in recent years, amounting to 45% of all Federal debt in 2005.*

Second, the government debt does not have to be paid off. Old debt can be “rolled over,” i.e., replaced by new debt. Provided that the size of the debt does not grow too much, the government’s credit is good – there will always be people interested in buying and holding government bonds. Most economists use the rule of thumb that as long as the government’s debt does not rise significantly faster than GDP for several years in a row, it does not represent a severe problem for the economy. The government debt is currently a smaller percentage of GDP (less than 40%) than it was immediately after World War II (when it was more than 100%). The fact that this debt was not a severe burden is indicated by the abundant economic prosperity that most people enjoyed in this country during the 1950s and 1960s.

Third, the U.S. government pays interest in U.S. dollars. A country such as Argentina that owes money to other countries and must pay interest in a foreign currency (the U.S. dollar) can get into big trouble and go bankrupt. But it is much easier to manage a debt that is denominated in your own currency. Even if some of the debt is owed to foreigners we do not have to obtain foreign currency to pay it. And so long as foreigners are willing to continue holding U.S. government bonds, it will not be necessary to pay it at all — instead, the debt can be rolled over as new bonds replace old ones.

But this should not encourage us to believe that government debt is never a concern. Rising debt creates several significant problems. First, interest must be paid on the debt. This means that a larger share of future budgets must be devoted to paying interest, leaving less for other needs. It is true that most of this interest goes to U.S. citizens who hold government bonds. But it is also true that the largest holders of government bonds tend to be wealthier people, so that most of the interest paid by the government goes to better-off individuals. If this payment is not counteracted by changes in the tax system, it encourages growing income inequality. It also creates a problem of generational equity – future taxpayers will have to pay more interest because of government borrowing today.

A second problem is that in recent years an increasing proportion of the debt has been borrowed from foreign governments, corporations, and individuals. The interest payments on this portion of the debt must be made to those outside the country. That means that the U.S. must earn enough income from exports and other sources to pay not only for imports, but also for interest payments to the rest of the world. Alternatively, the country could borrow more, but it is best to avoid this solution in the long run. It also poses another problem – what if those foreign debt holders decided to sell the U.S. bonds they hold? In that case the government might have trouble finding enough people who are willing to hold government bonds (that is, lend money to the government). As we will see in Chapter 13, this could cause interest rates to rise sharply, which in turn would push the government budget further into deficit. Some painful belt-tightening would be needed as a result.

The question “is government debt worth it?” can only be answered if we consider what that debt was used to finance. In this respect, an analogy to personal or business debt is appropriate. Most people – including economists – do not reject consumer and corporate debt – rather, our judgment about debt depends on the benefits received.
For example, if debt is accumulated for gambling, it is a bad idea. If the bet doesn’t pay off, then it is very difficult to pay the interest on the debt (not to mention the principal). But if borrowing is done to pay for intelligently planned investment, it can be very beneficial. If the investment leads to economic growth, this raises the ability of the government to collect tax revenue, so this kind of borrowing can pay for itself, as long as the investment is not for wasteful (“pork barrel” projects, poorly planned or unnecessary projects, etc.) Even if the debt finances current spending, it can be justifiable, if it as seen as necessary to maintain or protect valuable aspects of life. Most people would not be opposed to borrowing to pay for clean up after a natural disaster or to contain a deadly pandemic. How about for military spending? Opinions will differ about whether particular defense expenditures are necessary to maintain or protect valuable aspects of life. But wasteful spending, or spending on unwise defense policies, would constitute a drag on more productive economic activity (as suggested by the Production Possibilities Curve “guns versus butter” analysis introduced in Chapter 2).

The management of debt involves standard principles of wise stewardship of finances. When we apply them to government deficits and debt, we will need to weigh the economic benefits of different spending and tax policies. In the following sections, we will look at some of the issues involved in the evaluation of fiscal policy.

2.2 Automatic Stabilizers

Since the 1950s, government spending has been a major part of the U.S. economy. As we have seen, this was partly a result of the Keynesian idea that government spending was needed to prevent recession. In recent decades, the use of expansionary fiscal policy has been controversial, partly as a result of issues such as deficits and inflation. During this period, however, total government outlays (including transfers and spending on goods and services) have not gone down, either in money terms or as a percent of GDP.

As Figure 10.5 shows, government receipts and outlays tend to fluctuate over time. For example, during the period from 1992 to 2000, when the economy was generally expanding, government receipts rose and outlays fell. Economists refer to this as the automatic stabilization effect of government spending and taxes. This refers to the way in which the government budget moderates fluctuations of aggregate demand even without any active decision-making or legislating by the government.

**Automatic stabilizers:** tax and spending institutions that tend to increase government revenues and lower government spending during economic expansions, but lower revenues and raise government spending during economic recessions

Even if no specific budgetary action is taken, the government’s budget will vary over the business cycle. Suppose the economy is entering a recession. As aggregate demand falls, the government deficit generally rises. Tax revenues fall as falling GDP reduces people’s incomes. In addition, more people receive unemployment insurance and
“welfare” payments. If the agricultural sector declines, more farmers receive farm-support payments. This limits the fall in personal disposable income – and thus the fall in consumer spending.

**Figure 10.5  Government outlays, taxes and surplus/deficit as % GDP 1975-2006**

*Government outlays as a percent of GDP have not changed much over the last thirty years. Tax receipts tend to rise during economic expansions and fall during recessions, leading to higher Federal deficits in recession years such as 1975-6, 1982-3, 1991-2, and 2001-2. The Reagan tax cuts in the 1980s and the Bush tax cuts in the 2000s further lowered tax receipts and increased deficits.*


If the Federal government does not actively move to balance its budget, these automatic changes in spending and taxes tend to moderate the recession. In effect, the recession creates an automatic response of expansionary fiscal impacts – increased spending and lower taxes. It will also, of course, tend to increase the government deficit (or reduce any surplus).
Similarly, if aggregate demand is rising during an economic expansion, tax revenues rise. Fewer people receive unemployment or “welfare” payments, and farmers receive fewer subsidies if demand for agricultural products increases. This means that personal disposable income does not rise as quickly as national income. This in turn puts a damper on increases in consumer spending – and limits the inflationary over-heating that can arise from increased aggregate demand.

This phenomenon helps explain why the U.S. government was able to enjoy budgetary surpluses in the late 1990s. It is true that the policies of the Clinton administration, which included raising tax rates to try to balance the budget, contributed. But as private investment and consumer demand soared, this allowed the government’s coffers to fill.

In addition to the automatic stabilizers, the Federal budget has another aspect that levels the fluctuations of the economy. This is the steadiness of government spending. Unlike investment, consumer spending, net exports, and to some extent state and local government spending, most areas of Federal spending do not change drastically from year to year. This adds an element of stability to the economy’s aggregate demand.

2.3 Discretionary Policy

Sometimes the automatic stabilization effect of government spending and taxes cannot smooth economic ups and downs as much as is desired. Relatively severe problems of recession or inflation often give rise to proposals to use an active fiscal policy to remedy the situation. This issue is one that arouses more controversy among economists. Some economists, as we will see, believe that the government should never use activist fiscal policy – that it is likely to do more harm than good. Others believe that it should be used, but with caution. Regardless of economists’ advice, the fact is that governments are making fiscal policy all the time, whether in a planned or unplanned manner. Each year the government revises its budget, including levels of spending and taxation. These spending and tax levels have effects on the economy, and it is important to try to understand them.

Historically, the first major experience with expansionary fiscal policy was during World War II. Prior to the war, President Franklin D. Roosevelt’s New Deal had initiated some government spending programs intended to put the unemployed to work during the Great Depression. But these programs were dwarfed by the size of war spending in the 1940s. As a result, unemployment, which had been as high as 25 percent in 1933 and 19 percent in 1938, fell to about 2 percent by 1943.\(^5\) The fall in unemployment was a beneficial side-effect of the onset of World War II and the war-induced spending.

\(^5\) Employment figures for that era covered a labor force in which a much lower proportion of women were seeking jobs than is the case today. During World War II, an unusually large number of women were employed, filling jobs left vacant by men who were serving in the armed forces.
After World War II, government spending never returned to pre-war levels, and it seemed that the beneficial effects of the expanded government role—steady economic growth with relatively low unemployment levels—justified this. In the 1960s, economists became even more optimistic about the benefits of fiscal policy. At that time, it was suggested that it would be possible for the government to “fine-tune” the economic system using fiscal policy, to ratchet aggregate demand up or down in response to changes in the business climate.

“Fine-tuning” was largely discredited in the 1970s and 1980s, as the economy struggled with inflationary problems that were seen as having been worsened by excessive government spending (we’ll look at this in more detail in Chapter 12). In addition, many economists argued that problems of **time-lags** made fiscal policy unwieldy and often counterproductive.

**Time lags:** the time elapsing between the formulation of an economic policy and its actual effects on the economy

To understand the problems with fine-tuning and time-lags, we can use a common-sense example. Imagine that your apartment is too cold, so that you turn up the temperature on the thermostat. It might take so much time for the apartment to warm up that you do not get the benefits before you leave for work. You then might become impatient, raising the temperature again. In that case, it could easily happen that the apartment gets too hot, so when you return home you have to turn the thermostat down again. Thus delayed responses make your management of the apartment’s temperature less effective. The best strategy is to set the thermostat at a single temperature and then to resist fiddling with it.

Similarly, time lags can make active fiscal policy less effective as a way to stabilize the economy. There are two types of lags: **inside** and **outside** lags. Inside lags refer to delays that occur within the government, while outside lags refer to the delayed effects of government policies. There are four major types of inside lags:

1. **a data lag:** it may take some time for the government to collect information about economic problems such as unemployment.

2. **a recognition lag:** government decision-makers may not see an event as a problem right away.

3. **a legislative lag:** discretionary fiscal policy must be instituted in the form of legal changes in the government’s budget. The government’s economists may want to increase spending or decrease taxes, but they have to convince both the President and Congress to act to solve the problem.

4. **a transmission lag:** these legal changes take time to actually show up in actual tax forms and government spending budgets. One solution is that changes can be made retroactive to speed up their implementation: a tax cut legislated now may apply to income received during the last year. However, this is not always done.
In addition, even if all these lags have been overcome, it takes time for the new policies actually to affect the economy (the “outside lag”). Suppose, for example, that the government responds to a rise in unemployment with increased government spending or a tax cut. By the time these policies are in place and create an economic stimulus, the economy may have recovered on its own. In that case, the extra aggregate demand will not be needed, and is likely to create inflationary pressures.

Despite these problems with discretionary fiscal policy, governments have continued to use it, with mixed results. Government fiscal stimulus, with or without a formal economic justification, was applied during the periods 1964-68, 1975-77, 1980-87, and the early 2000s. An especially popular form of expansionary policy has been tax cuts, implemented under Presidents Kennedy, Reagan, and George W. Bush. In recent years overt policies of increased government spending have not been viewed favorably, but as Figure 10.5 shows, even conservative presidents have tended to maintain or increase the level of government spending. So while increasing spending is less often advocated as a desirable expansionary policy, it has frequently been practiced.

Proponents of tax cuts sometimes appeal to supply-side economics (first introduced during the Reagan administration) to support their policies. The supply-side argument for tax cuts is essentially that lower taxes encourage more work, saving, and investment, thereby creating a more dynamic economy. According to the most enthusiastic advocates of supply side economics, the economy will grow so rapidly in response to a tax cut that total tax revenues will actually increase, not decrease. This is different from the logic of increased aggregate demand that we have discussed, which implies that tax cuts will create an economic stimulus, but are likely to raise the government deficit. The economic record seems to show that tax cuts do indeed create an economic stimulus – but debate continued among economists as to whether this effect is demand-led (as implied by our fiscal policy model) or based on supply-side effects. And in general, tax cuts have usually led to lower revenues and higher deficits (this was true both of the Reagan tax cuts in the 1980s and the Bush tax cuts in the 2000s).

Supply-side economics: an economic theory that emphasizes policies to stimulate production, such as lower taxes. The theory predicts that such incentives stimulate greater economic effort, saving, and investment, thereby increasing overall economic output and tax revenues.
News In Context: Recent Fiscal Policy Issues

It is well known that, starting in 2001, Federal policies in the United States have emphasized tax cuts. What’s less well known is that during the same period Federal spending has risen significantly. Between 2001 and 2005, total Federal outlays rose from $1,813 billion to $2,204 billion in inflation-adjusted (constant dollar) terms, an increase of 21.5%. As a proportion of GDP, Federal outlays rose from 18.5% to 20.1% during these years, while total federal revenues fell from 19.8% to 17.5% of GDP (see Figure 10.5). These combined changes in outlays and revenues led to a significant increase in the Federal deficit (Figure 10.3).

Both tax cuts and spending increases are expansionary policies. Since the economy entered a recession in March 2001, it is reasonable to suggest that these expansionary policies contributed to the recovery which started in 2002 (see Figure 9.1 in the previous chapter). According to the Economic Report of the President for 2006:

The expansion of the U.S. economy – having gathered momentum in 2003 and 2004 – continued for its fourth full year in 2005. Economic growth was solid, with real gross domestic product (GDP) growing 3.1 percent during the four quarters of 2005 and 3.5 percent for the year as a whole.

Was this expansion partly a result of fiscal policy? Certainly government spending played an important role in increasing employment. Between 2001 and 2005, total employment in the U.S. rose 1.2%, gaining 1,637,000 jobs. Of these, 685,000, or about 40%, were in the government sector. Thus increased government spending directly accounted for a large proportion of the net gain in jobs over this four-year period.

According to the analysis of fiscal policy developed in this chapter, we would expect that both increased government spending and lower tax levels would have positive multiplier effects on GDP. The pattern of recovery and expansion in the economy during 2001-2005 is consistent with this analysis. Classical economists would generally reject the idea that increased government spending can be beneficial to the economy, arguing that the incentive effects of lower taxes were the key factor in promoting recovery. Keynesian economists would suggest that both increased spending and tax cuts contributed to the recovery, but that tax cuts would have been more effective if targeted to middle and lower-income families, who tend to have a higher marginal propensity to consume.

Whether the impact of government policies is felt more on the “demand side” (as Keynesian economists would suggest) or on the “supply side” (consistent with Classical views), it seems that fiscal policies of increased spending and reduced taxes under the Bush administration had an expansionary effect on the economy – whether or not that was the deliberate intent.

2.4 Balanced Budgets and Deficit Spending

The long history of federal deficits has led some critics to call for legislation requiring a Federal balanced budget. Under this proposal, the U.S. government would be subject to a “balanced budget amendment,” compelling it to keep spending equal to tax revenues. Thus the U.S. government’s budget would be like the current expenditure budgets of most state and local governments, which are generally required to be balanced.

To many people, a balanced budget amendment sounds good. It would prevent deficit spending and the accumulation of more Federal debt. But our discussion of fiscal policy and automatic stabilizers suggests that there are three major problems with this idea:

1. A rule requiring a balanced budget at all times would make it difficult to respond to emergencies such as natural disasters and wars.

2. Every time the economy went into a recession, the automatic increase in the deficit would have to be counteracted by an increase in taxes, a cut in transfer payments, or decreased government spending. This would make the recession worse, since each of these policies decreases aggregate demand. In other words, this kind of rule would destroy the role of the automatic stabilizers.

3. The Federal government would not be able to respond to severe recessions such as the Great Depression. Discretionary fiscal policy would be ruled out. Monetary policy (discussed in the next chapter) would still be possible, but many economists argue that monetary policy alone would be insufficient in the case of severe recession.

The theory of fiscal policy presented in this chapter suggests that deficit spending is sometimes necessary, and indeed can be beneficial to the economy. As we have noted, problems may arise, when deficits are too large and continue for too long, pushing the government debt up significantly as a proportion of GDP. For this reason, economic judgment is required concerning what level of deficit is “too high”. Economists often differ in their opinions on this issue. It is unlikely, however, that the problem can be solved with a single, inflexible rule.

Before we move on to other elements of economic analysis that are relevant to this debate – in particular a consideration of money, monetary policies, and inflation – we need to add one more element to our macroeconomic model – the international sector. In today’s economy, it is impossible to get a complete picture of issues of fiscal policy, unemployment, and inflation, without considering the role of international trade and investment flows. We will go into these in greater detail in Chapter 14. But first, we can take some simple steps to add international trade to our basic model, which we will do in the next section.
Discussion Questions

1. “The national debt is a huge burden on our economy.” How would you evaluate this statement?

2. Would you favor a Federal balanced budget amendment? Why or why not?

3. The International Sector

How does trade affect the economy? It is certainly an important factor. Consumers who go to any U.S. shopping mall can’t help but notice that a large proportion of the goods are imported. Many U.S. jobs are in industries that depend on export markets. We often hear concern expressed about the trade deficit. In 2005, as in many previous years, the U.S. trade deficit equaled about 5.5% of Gross Domestic Product. This meant that people in the U.S. were buying many more foreign goods and services (importing) than the U.S. was selling to foreign buyers (exporting). In other words, U.S. net exports (exports – imports) were negative. In other countries, such as China, the situation is reversed – they are large net exporters. Clearly, it is important to examine how trade, trade deficits, and trade surpluses are related to macroeconomic issues of income, unemployment, and inflation. Here we will look at the relationship of trade to employment and equilibrium income levels; in Chapter 12 we will deal with the question of inflation.

**Trade deficit:** an excess of imports over exports, causing net exports to be negative

3.1 Exports and Imports

We can introduce trade into our macroeconomic model by adding Net Exports (NX) into the equation for aggregate demand:

\[ AD = C + I + G + NX \]

As discussed in Chapter 5, Net Exports (NX) are equal to Exports minus Imports \((X – IM)\). Exports, like intended investment and government spending, represent a positive contribution to aggregate demand. More exports mean more demand for domestically-produced goods and services. Imports, on the other hand are a negative in the equation. That means they represent a leakage from U.S. aggregate demand – a portion of income that is not spent on U.S. goods and services.
Negative net exports (when $X < IM$) therefore represents a net subtraction from demand for the output of U.S. businesses, and a net leakage from the circular flow. A decrease in exports (or increase in imports) tends to reduce the circular flow of domestic income, spending, and output – unless injections such as intended investment and government spending counteract this contraction. On the other hand, an increase in net exports encourages a rise in GDP and employment. For example, if Americans increase their purchases of foreign cars while buying fewer domestic cars, this will lower aggregate demand in the U.S. (and raise it in other car-exporting countries). On the other hand, if the U.S. computer software industry increases foreign sales, this will raise U.S. aggregate demand and employment.

The multiplier effect for an increase in exports is essentially the same as that for an increase in $I$ or $G$. In our model (with a multiplier of 5), an increase of exports of 40, for example, would lead to an increase of 200 in economic equilibrium.

$$\Delta Y = \text{mult} \, \Delta X$$

We can use exactly the same logic for a lump-sum increase in imports – the effect on equilibrium income just goes in the opposite direction. An increase in imports of 40 would lower the equilibrium level of income by 200, and a decrease in imports of 40 would raise the equilibrium by 200.

The multiplier logic becomes a little more complicated, however, when we consider how import levels are determined. In general, when people receive more income in an economy that is open to trade, they spend some of it on domestically produced goods and some on imports. The proportion spent on imports, as we noted above, is a “leakage” that does not add to domestic demand. If we want to account for this fully, we need to modify our multiplier logic. The effect is similar to that of a proportional tax on consumption: it will tend to flatten the aggregate demand curve, and for the same reason. When people receive extra income, some portion of it “leaks” away into imports. This portion does not stimulate the domestic economy, so multiplier effects are smaller and the economic response a bit less dynamic. (For a full treatment of this effect, see Appendix A3).

In effect, a portion of any aggregate demand increase goes to stimulate someone else’s economy via imports. Thus American consumers who buy imported goods from Canada are creating jobs and income in Canada, not the U.S. Does this mean that imports are bad for the U.S.? Not necessarily. Two other factors are important to consider. One is that U.S. consumers and U.S. industry benefit from cheaper imported goods and services, raw materials, and other industrial inputs. Another is that at least some of the money spent on imports is likely to return to the U.S. as demand for exports, which as we have seen stimulates an increase in GDP and employment. Problems can arise, however, when trade deficits (negative net exports) are too large for too long. We will explore this issue further in Chapter 13.
3.2 A Complete Macroeconomic Model with Trade

We have now completed our basic macroeconomic model. We started with a very simple economy, with just consumers and businesses, then added government spending, taxes, and the international sector. We can sum things up by referring back to the macroeconomic circular flow diagram shown in Chapter 9, Figure 9.6. In that simple model, there was one “leakage” from the macroeconomic circular flow (saving), and one “injection” back into the flow (intended investment). As we discussed, the process of macroeconomic equilibrium essentially concerns balancing these leakages and injections.

Now we have a more complex model, with three leakages: saving, taxes, and imports, and three injections: intended investment, government spending, and exports. Taxes and imports are considered leakages because, like saving, they draw funds away from the domestic income-spending flow. Government spending and exports add funds to the flow. We can modify our original circular flow diagram to show all these flows (Figure 10.6).

![Figure 10.6: Leakages and Injections in a Complete Macroeconomic Model](image)

Leakages from the circular flow include taxes, saving, and imports. Injections include intended investment, government spending, and exports. The level of macroeconomic equilibrium will depend on the balance of all these flows as well as consumption levels.
Macroeconomic equilibrium involves balancing the three types of leakage with the three types of injection. A change in any one will alter the equilibrium level of the economy. The model we have constructed allows us to understand how all these factors are related to levels of income and employment.

Does this complete our study of macroeconomic theory? No, for two major reasons. One reason is that, as we noted in Chapter 9, economists differ about how the economy works at the macro level. Economists in the Classical school tend to believe that the leakages and injections will balance themselves automatically at the full employment level of output, provided that government does not adversely affect the situation by excessive government spending. Economists of the Keynesian school believe that government policy is essential to achieve acceptable levels of income and employment. We will have a lot more to say about these economic policy debates in the next chapters.

The other reason is that we have yet to consider a very important aspect of the economy: the money supply and monetary policy. The supply of money in the economy is a very important factor affecting, among other things, interest rates and inflation. We need to understand how the money is supplied and regulated, and how this relates to other macroeconomic factors. This is the topic of Chapter 11. After we have covered the topics of money and monetary policy, we will return to a consideration of the issues of unemployment and inflation, and appropriate policies to respond to them, in Chapter 12.

Discussion Questions

1. What will be the likely effect on the U.S. economy of increased imports? Do imported goods undercut employment in the U.S.? What other developments in the economy might counteract this effect?

2. Savings, imports, and taxes are all considered to be “leakages” from aggregate demand. Does this mean that they are bad for the economy? Or is there an important function for each? How are their levels related to economic equilibrium, income, and employment?
Review Questions

1. What is the impact of a change in government spending on aggregate demand and economic equilibrium?
2. What is the impact of a lump-sum change in taxes on aggregate demand and economic equilibrium? How does it differ from a change in government spending?
3. Give some examples of expansionary and contractionary fiscal policy.
4. How is the Federal budget surplus or deficit defined? How has the Federal budget position varied in recent years?
5. How is the Federal debt different from the deficit? How has the Federal debt varied in recent years?
6. What is meant by an automatic stabilizer? Give some examples of economic institutions that function as automatic stabilizers.
7. What are some of the advantages and disadvantages of discretionary fiscal policy? Give some examples of the use of discretionary fiscal policy.
8. How would a balanced budget amendment work? What are some of the arguments for and against it?
9. How does an increase in exports affect economic equilibrium?
10. How would an increase in the trade deficit affect economic equilibrium?
11. What are the three leakages and three injections in a complete macroeconomic model? How do they affect the level of economic equilibrium?

Exercises

1. Using the figures given in Table 10.1, determine the economic equilibrium for a government spending level of 60.

2. Using the formulas and figures given in the text for the multiplier and tax multiplier, calculate the effect on economic equilibrium of a government spending level of 100 combined with a tax level of 100. What does this imply about the impact of a balanced government budget on the economy?

3. Go to the Economic Report of the President at http://www.gpoaccess.gov/eop/ Consult the 2006 Report, Table B-1, “Gross Domestic Product”. For the year 2004 (the last year with final rather than preliminary figures), find the values of Gross Domestic Product, Personal Consumption Expenditures, and Gross Private Domestic Investment. Now find the value for Fixed Investment (which is the same thing as what we have called Intended Investment). You will notice that the column on the right titled “Change in Private Inventories” is equal to the difference between total and fixed investment (just as we have noted that total investment equals intended investment plus change in inventories). Calculate
Personal Consumption Expenditures \((C)\) and Fixed Investment \((II)\) as percentages of Gross Domestic Product \((Y)\). Calculate a simple measure of Aggregate Demand \((C + II)\) without government spending.

4. Now go to Table B-20 (Government Consumption Expenditures and Gross Investment). Find the total for the year 2004. This is what we have referred to as \(G\) (government spending on goods and services). Approximately what percentage is \(G\) of Gross Domestic Product? Calculate Aggregate Demand including government spending \((C + II + G)\) for 2004. Now go to Table B-103 (U.S. International Transactions) and look at the column entitled “Balance on Goods and Services” for 2004. This is what we have identified as \((X – IM)\). Finally, calculate Aggregate Demand for 2004 \((C + II + G + X – IM)\). This final figure for Aggregate Demand should be very close to Gross Domestic Product \((Y)\) -- the difference will be change in inventories and a statistical discrepancy.

5. Which of the following are examples of automatic stabilizers, and which are examples of discretionary policy? Could some be both? Explain.
   a. Tax revenues rise during an economic expansion
   b. Personal tax rates are reduced
   c. Government spending on highways is increased
   d. Farm support payments increase
   e. Unemployment payments rise during a recession

6. Suppose exports \((X)\) rise by 120 billion and imports \((IM)\) rise by 200 billion, resulting in an increase of 80 billion in the trade deficit. In an economy with an mpc of 0.75, what will be the effect of these changes on economic equilibrium? (Calculate the multiplier for this economy using the formula given in Chapter 9, section 3.7 and repeated on page 3 of this chapter. Then apply this multiplier to the changes in \(X\) and \(IM\))

7. Match each concept in Column A with a definition or example in Column B.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. tax multiplier</td>
<td>i. reduction in income tax rates</td>
</tr>
<tr>
<td>b. disposable income</td>
<td>ii. unemployment compensation</td>
</tr>
<tr>
<td>c. expansionary fiscal policy</td>
<td>iii. (Y – T + TR)</td>
</tr>
<tr>
<td>d. contractionary fiscal policy</td>
<td>iv. imports</td>
</tr>
<tr>
<td>e. government outlays</td>
<td>v. (G + TR)</td>
</tr>
<tr>
<td>f. automatic stabilizer</td>
<td>vi. reduction in government spending</td>
</tr>
<tr>
<td>g. trade deficit</td>
<td>vii. (X &lt; IM)</td>
</tr>
<tr>
<td>h. leakage from circular flow</td>
<td>viii. intended investment</td>
</tr>
<tr>
<td>i. injection into circular flow</td>
<td>ix. (-(mult)(mpc))</td>
</tr>
</tbody>
</table>
8. (Appendix) Using the formula given in Appendix A3 for a multiplier in an economy with proportional taxes and imports dependent on income, calculate the effect of an increase in government spending ($G$) of 150 billion on economic equilibrium. Assume that $mpc = 0.75$, $t = 0.2$ and $mpim = 0.1$. How does this more sophisticated multiplier differ from the basic multiplier? What effect will this have on the aggregate demand curve and on the economy’s response to a fiscal stimulus?
APPENDICES

A1. An Algebraic Approach to the Multiplier, With a Lump-Sum Tax

A lump-sum tax is a tax that is simply levied on an economy as a flat amount. This amount does not change with the level of income. Suppose a lump-sum tax is levied in an economy with a government (but no foreign sector). Since consumption in this economy is $C = \bar{C} + mpc \ Y_d$ while disposable income is $Y_d = Y - \bar{T} + TR$, we can write the consumption function as:

$$C = \bar{C} + mpc \ (Y - \bar{T} + TR)$$

Thus aggregate demand in this economy can be expressed as:

$$AD = C + II + G$$

$$= \bar{C} + mpc \ (Y - \bar{T} + TR) + II + G$$

$$= (\bar{C} - mpc \ \bar{T} + mpc \ TR + II + G) + mpc \ Y$$

The last rearrangement shows that the AD curve has an intercept equal to the term in parentheses and a slope equal to the marginal propensity to consume. Changes in any of the variable in parentheses, by changing the intercept, shift the curve up or down in a parallel manner.

By substituting this into the equation for the equilibrium condition, $Y = AD$, we can derive an expression for equilibrium income in terms of all the other variables in the model:

$$Y = (\bar{C} - mpc \ \bar{T} + mpc \ TR + II + G) + mpc \ Y$$

$$Y - mpc \ Y = \bar{C} - mpc \ \bar{T} + mpc \ TR + II + G$$

$$(1- mpc)Y = \bar{C} - mpc \ \bar{T} + mpc \ TR + II + G$$

$$Y = \frac{1}{1-mpc} \ (\bar{C} - mpc \ \bar{T} + mpc \ TR + II + G)$$

If autonomous consumption, intended investment, or government spending change, these each increases equilibrium income by $mult = 1/(1-mpc)$ times. If the level of lump-sum tax or transfers change, these change $Y$ by $(mult)(mpc)$ times.

To see this explicitly, consider the changes that would come about in $Y$ if there is a change in the level of the lump sum tax from $T_0$ to a new level, $T_1$, if everything else stays the same. We can solve for the change in $Y$ by subtracting the old equation from the new one:
\[
Y_1 = \frac{1}{1 - mpc} (\overline{C} + II + G - mpc \overline{T}_1 + mpc TR)
\]
\[
- Y_0 = \frac{1}{1 - mpc} (\overline{C} + II + G - mpc \overline{T}_0 + mpc TR)
\]
\[
Y_1 - Y_0 = \frac{1}{1 - mpc} (\overline{C} - \overline{C} + II - II + G - G - mpc \overline{T}_1 + mpc \overline{T}_0 + mpc TR - mpc TR)
\]

But \(\overline{C}, II, G, TR\) (and the \(mpc\)) are all unchanged, so most of the subtractions in parentheses come out to be zero. We are left with (taking the negative sign out in front):

\[
Y_1 - Y_0 = -\frac{1}{1 - mpc} mpc(\overline{T}_1 - \overline{T}_0)
\]

or

\[
\Delta Y = - (\text{mult})(mpc) \Delta \overline{T}
\]

As explained in the text, the multiplier for a changes in taxes is smaller than the multiplier for a change in government spending, because taxation affects aggregate demand only to the extent that people spend their tax cut (instead if saving it) or pay their increased taxes by reducing consumption (not their saving). It has a negative sign, since a decrease in taxes increases consumption, aggregate demand, and income, while a tax increase decreases them.
A2. An Algebraic Approach to the Multiplier, With a Proportional Tax

With a proportional tax, total tax revenues are not set at a fixed level of revenues as was the case with a lump sum tax, but rather are a fixed proportion of total income. That is, \( T = tY \) where \( t \) is the tax rate. The equation for \( AD \) becomes

\[
AD = \bar{C} + mpc (Y - tY + TR) + II + G
\]

\[
= (\bar{C} + mpc TR + II + G) + mpc (Y - tY)
\]

\[
= (\bar{C} + mpc TR + II + G) + mpc(1 - t) Y
\]

With the addition of proportional taxes, the \( AD \) curve now has a new slope: \( mpc(1-t) \). Since \( t \) is less than one, this slope is generally flatter than the slope we've worked with before. A cut in the tax rate rotates the curve upwards, as shown in Figure 10.7.

Substituting in the equilibrium condition and solving yields:

\[
Y = \frac{\bar{C} + mpc TR + II + G + mpc(1-t) Y}{1 - mpc(1-t)}
\]

\[
Y = \frac{1}{1 - mpc(1-t)} (\bar{C} + mpc TR + II + G)
\]
The term in brackets is a new multiplier, for the case of a proportional tax. It is smaller than the basic (no proportional taxation) multiplier, reflecting the fact than now any change in spending has smaller feedback effects through consumption. (Some of the change in income "leaks" into saving.) (You can check that it is smaller by plugging in numbers.) Changes in autonomous consumption or investment (or government spending or transfers) now have less of an effect on equilibrium income—the "automatic stabilizer" effect mentioned in the text.

Is there a multiplier for the tax rate, \( t \)? That is, could we derive from the model a formula for how much equilibrium income should change with a change in the rate (rather than level) of taxes? Yes, but deriving this formula requires the use of calculus, so it will not be pursued here.
A3. An Algebraic Approach to the Multiplier, in a Model with Trade

Suppose, in addition to consumption depending on income, imports depend on income according to the equation \( IM = mpim \cdot Y \) where \( mpim \) is the marginal propensity to import (the proportion of extra income spent on imports). The \( mpim \) is a fraction. In an economy including trade, the equation for aggregate demand is:

\[
AD = C + II + G + X - IM \\
= C + mpc \cdot (Y - tY + TR) + II + G + X - mpim \cdot Y \\
= (C + mpc \cdot TR + II + G + X) + [mpc(1-t) - mpim] \cdot Y
\]

The AD curve now has the intercept given by the first term in parentheses. Changes in exports shift the curve up or down. The new slope is given by the term in brackets. The slope is flatter, due to the subtraction of \( mpim \).

Solving for \( Y \) (using the same method as above—but we will now leave out some of the intermediate steps) yields:

\[
Y - mpc(1-t)Y + mpimY = C + mpc \cdot TR + II + G + X \\
Y = \frac{1}{1 - mpc(1-t) + mpim} \cdot (C + mpc \cdot TR + II + G + X)
\]

The first term is a new multiplier that includes both proportional taxes and imports that depend on domestic income. This multiplier is even smaller than the previous two. (You can check this by plugging in numbers.) This is because now any increase in \( Y \) "leaks" not only into saving and taxes, but also into increases in imports (which takes away from demand for domestic products).