Chapter 12 Aggregate Supply, Aggregate Demand, and Inflation: Putting It All Together

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Macroeconomics in Context, Goodwin, et al.
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Last revised April 12, 2006
Chapter 12: Aggregate Supply, Aggregate Demand, and Inflation: 
Putting It All Together

If you read the financial pages in any newspaper (or sometimes the front pages if 
economic issues are pressing), you will see discussion about government budgets and 
deficits, interest rate changes, and how these affect unemployment and inflation. You 
may also see news about changes in the availability of certain crucial resources--
particularly energy resources--and about how the impact of such changes in resource 
supplies spread throughout the nation's economy. How can a person make sense of it all?

In Chapter 9, we started to build a model of business cycles, focusing at first on 
the downturn side of the cycle and the problem of unemployment. In Chapters 10 and 11 
we explained economic theories concerning fiscal and monetary policy. So far our 
models have all been "demand side," illustrated by shifts of the Aggregate Demand curve. 
In this chapter, we complete the demand side story so that it includes explicit attention to 
the upturn side of the story and the potential problem of inflation. Then we move on to 
the issue of the actual productive capacity of the economy, or "supply side" issues. 
Finally, we will arrive at a model that we can use to "put it all together." We present a 
general form of the model, first, closely relating it to the macroeconomic performance of 
the United States in recent decades as measured by government statistics. Then we 
 discuss controversies about the implications of this model from Keynesian and Classical 
points of view, and from the point of view of environmental sustainability.

1. Inflation and Aggregate Demand Equilibrium

The AD curve in the Keynesian model used in the previous three chapters was 
graphed with income on the horizontal axis and output on the vertical axis. We 
mentioned that if output is above its full employment level there may be a threat of rising 
inflation, but nothing in the figures incorporated this idea. It is time now to remedy that 
omission.

How does aggregate demand in the economy change as the rate of inflation 
changes? Economists have modeled this with a simple relationship that we will call the 
Aggregate Demand Equilibrium (ADE) curve. This curve represents the various 
equilibrium points (points where our Keynesian AD curve crosses the 45-degree line) that 
are consistent with various levels of inflation.¹

The ADE relationship builds on the Keynesian AD relationship discussed in the 
last three chapters. In addition, it incorporates two assumptions about the behavior of the Federal Reserve:

¹ If you have friends taking a macroeconomics class using a different book, you may find they are using a 
different graph with different labels to study inflation and aggregate demand equilibrium (and aggregate 
supply, to be discussed in Section 2 below). This is because economists have not converged on a 
completely standard treatment of these issues. We have included here a model that we believe represents 
the best of contemporary macroeconomic research, as it can be presented in an introductory-level textbook.
Goal #1: The Federal Reserve generally sees its major month-to-month responsibility as aiding in the stabilization of output, helping to keep the economy from either overheating or going into a slump.

Goal #2: Over the long haul, the Federal Reserve would also like to stabilize prices—that is, get the inflation rate to be fairly low.

If the ongoing inflation rate is already low, there is little contradiction between the two goals. But if the inflation rate is high, these two goals may be in conflict. In our model, we will incorporate the first goal in deriving the slope of the ADE curve, and the second goal in deriving its position. In later sections of the chapter, this curve will be used to examine actual Fed actions and macroeconomic performance in recent decades.

1.1 Deriving the Aggregate Demand Equilibrium Curve

Before we get to the ADE curve itself, we need to model the Fed's behavior with respect to the goal of output stability (Goal #1). Figure 12.1 graphs the Fed Reaction Rule. Inflation, denoted by the Greek letter $\pi$ ("pi") is on the vertical axis, and the interest rate is on the horizontal axis. Suppose the Fed observes that inflation is on the rise, as noted by arrow A in Figure 12.1. This is often taken as a sign that the economy is "overheating"—that output is being pushed up too high. (Recall Stylized Fact #2 from Chapter 9, which said that increases in inflation may be caused by strong economic expansions.) The Fed Reaction Rule shows that the Fed will use contractionary monetary policy (as described in Chapter 11) to try to "cool down" the economy by raising interest rates, as shown by arrow B.

![Fed Reaction Rule Diagram](image)

**Figure 12.1 The Fed Reaction Rule**

The Fed, on a month-to-month basis, would like to help stabilize output. If it sees inflation rising, it will usually take this as a sign that the economy is "overheating." It will try to raise interest rates in order to "cool off" the economy.

We know from the last chapter that, according to standard theories about the effect of monetary policy, an increase in the interest rate should tend to reduce the level
of investment. Figure 12.2 shows the effect of contractionary monetary policy on investment and aggregate demand. According to the Fed Reaction Rule, higher inflation will cause the Fed to raise interest rates (as shown in Figure 12.1). This Fed action discourages investment, shifting the aggregate demand schedule down (as shown by arrow A in Figure 12.2), thus reducing equilibrium income and output (as shown by arrow B.) Higher interest rates thus lead to lower aggregate demand and a lower level of equilibrium GDP.

![Figure 12.2 Changing AD Equilibrium due to the Fed Reaction](image)

If the Fed succeeds in raising interest rates and discouraging investment spending, aggregate demand, income, and output will fall.

Thus, overall, there is an inverse relationship between inflation and output, as shown in Figure 12.3. The economy before the rise in inflation is characterized by relatively high output, but if the Fed observes inflation rising it will (according to this model) seek to "cool off" the economy through contractionary policy.  

We can summarize the chain of events just described with the following diagram:

Fed sees inflation rising $\rightarrow$ Raises interest rates $\rightarrow$ Investment is discouraged $\rightarrow$ Aggregate demand falls $\rightarrow$ Equilibrium GDP falls

The negative slope of the ADE curve, moving from a low inflation rate to a higher one, shows how the Fed attempts to "cool off" an inflationary economy by raising interest rates.

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2 If you have taken a lot of math you might be tempted to try to read this graph as showing that “a change in output leads to a change in inflation” since in math class you measure $x$ on the horizontal axis and $y$ (which is a function of $x$) on the vertical axis. This, however, is not the appropriate interpretation here. Economists use the AD curve to illustrate the how, due to Fed policy targets, output might be seen to respond to (that is, be a function of) inflation. The causal relationship between the variables on the two axes is the reverse of the usual.
The story about the inverse relation between inflation and output would also hold if we had started with the inflation rate falling. A falling inflation rate is often a sign that an economy is going into a slump (as also discussed in Stylized Fact #2 in Chapter 9). In this case, stabilization goals require that the Fed undertake expansionary monetary policies, lowering the interest rate, and seeking to raise aggregate demand and output as described here:

Fed sees inflation falling → Lowers interest rates → Investment is encouraged → Aggregate demand rises → Equilibrium GDP rises

So the negative slope of the ADE relationship also says—this time, moving from a high inflation rate to a lower one—that the Fed will use relaxed monetary policy to help the economy avoid a recession. This is a sensible strategy for the Fed to the extent that it is concerned about employment and output in the economy in the near term (or what economists call the "short run").

The aggregate demand model (of Chapters 9, 10 and 11) illustrates how equilibrium real income, output, and spending might be determined in an economy in which changes in the price level are not an issue. The two curves in that model are the AD curve and the 45° line. The ADE curve (introduced here) expands on that model, illustrating how, given reactions of the Fed to variations in prices, levels of aggregate demand and equilibrium output may vary with the rate of inflation.

1.2 Shifts of the ADE Curve: Spending

The downward-slope of the ADE curve shown in Figure 12.3 is based on the short-run Fed Reaction Rule, but, because the position of the curve relies on the Keynesian AD relation, the position of the ADE also reflects specific levels of
government spending, taxation, autonomous consumption, autonomous investment and net exports. Changes in these variables cause the curve to shift.

For example, if the government were to undertake expansionary fiscal policy, this would shift the ADE curve to the right, as illustrated in Figure 12.4. At any level of inflation, there would now be aggregate demand sufficient to support a higher level of output.

An increase in autonomous consumption or investment would have a similar effect, as would an increase in net exports. Recall that autonomous consumption is the part of household spending that does not depend on income, and autonomous investment is the part of business spending that does not depend on the interest rate. These are often taken to represent consumer and business “confidence.” Thus an increase in consumer or investor confidence could also cause the rightward shift in Figure 12.4. Conversely, of course, contractionary fiscal policy, drops in consumer or investment confidence, or drops in net exports would shift the ADE curve to the left.

![Figure 12.4 The Effect of Expansionary Fiscal Policy or Increased Confidence](image)

If government spending increases, taxes decrease, consumers or investors become more confident, or net exports increase (at the existing levels of inflation and the interest rates), demand for goods in the economy rises.

1.3 Shifts of the ADE Curve: Fed Interest Rate Targets

The sorts of monetary policy the Fed executes when, on a month-to-month basis, it tries to keep inflation near some initial level is a rather passive sort of monetary policy. Such policy reacts to immediate issues concerning the economy overheating or slowing down, and is reflected in the inverse slope of the ADE curve. A more active form of Fed policy occurs when the Fed’s leaders decide that the economy should move to a lower target inflation rate over the long run (Goal #2). A change in the target rate signals a major shift in monetary policy.

Suppose the economy is experiencing, say, steady 10% inflation. If the Fed’s target rate for inflation is also 10%, then, according to this model, it will undertake the
sort of month-to-month passive policy we discussed earlier in order to support this target. The Fed would apply some contractionary pressure when it sees inflation rising above 10%, or some expansionary encouragement when the rate drops below 10%.

Contrast this to the case where the Fed decides on a new target inflation rate. Figure 12.5 shows what would happen in this model if, instead of trying to keep the inflation rate at 10%, the Fed chooses a lower inflation rate target of 5%. The ADE curve would shift down, showing that the Fed now believes that a lower inflation rate would be better for the economy and will use "tight money" policies as necessary to achieve this. (Will the Fed achieve its goal of lowering inflation? What will happen to employment and output? These issues are the subject of Section 3.5 below.) Conversely, of course, if the Fed decided to aim for a higher target inflation rate, this would shift the ADE curve up.

To summarize:

- The ADE curve indicates levels of equilibrium GDP at different possible rates of inflation, assuming that the Fed responds to increases in inflation by tightening monetary policy and to decreases in inflation by loosening monetary policy.
- The ADE curve can be shifted by changes in levels of autonomous consumer spending, autonomous investment, fiscal policy, net exports, or by changes in the Fed’s target inflation rate.

Discussion Questions

1. "The negative slope of the ADE curve says that higher levels of output will lead to lower levels of inflation." Is this statement correct or not? Discuss.

2. Does the Fed always want the inflation rate to be as low as possible? Why or why not?
2. Capacity and the Aggregate Supply Response

If you've been a very alert student, you may have early on noticed a problem with the models of aggregate demand we've worked with so far: In theory, it seems, policies should be able to raise output infinitely high! In a graph like Figure 12.2, for example, there is nothing in the model that would seem to prevent expansionary policies from just shifting the AD curve, and output, up and up and up.

Obviously, this can't be true in the real world. At any given time, there are only certain quantities of labor, capital, energy and other material resources available for use. The U.S. labor force, for example, comprises about 150 million people. The U.S. simply can't, then, produce an output level that would require the work of 200 million people. This is a hard capacity constraint: What happens as an economy runs at levels close to, or far away from, maximum capacity can be modeled using the Aggregate Supply Response (ASR) curve. The ASR curve shows combinations of output and inflation that can, in fact, occur within an economy, given the reality of capacity constraints.

2.1 The Aggregate Supply Response Curve

Figure 12.6 shows the theoretical Aggregate Supply Response relationship between inflation and output. Starting from the right, at high output levels, we can identify four important, distinct regions of the diagram.

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**Figure 12.6 The Aggregate Supply Response (ASR) Curve**

*The ASR curve shows the relationship between inflation and an economy's physical capacity to produce. As production levels approach maximum capacity, inflation rises due to bottlenecks and wage-price spirals.*
First, the vertical **maximum capacity output** line indicates the hard limit on a macroeconomy's output. Even if every last resource in the economy were put into use, with everybody working flat out to produce the most they could, the economy could not produce to the right of the maximum capacity line.

**maximum capacity output**: the level of output an economy would produce if every resource in the economy were fully utilized

Just below a maximum capacity level of output, the ASR curve has a very steep, positive slope. This indicates that, as an economy closely approaches its maximum capacity, it is likely to experience a substantial increase in inflation. If lots of employers are all trying to hire lots of workers and buy lots of machinery, energy, and materials all at once, workers' wages and resource prices will tend to be bid upwards. But then, to cover their labor and other costs, producers will need to raise the prices they charge for their own goods. Then, in turn, if workers see the purchasing power of their wages being eroded by rising inflation, they will demand higher wages...which lead to higher prices, and so on. The result is a phenomenon called a **wage-price spiral**, in which pressure to produce very high levels of output leads to a steep rise in self-reinforcing inflation.

**wage-price spiral**: when high demand for labor and other resources creates upwards pressure on wages, which in turn leads to upwards pressure on prices and, as a result, further upwards pressure on wages

In the real world, such steep increases in inflation are usually the result of dramatic pressures on producers, such as often occur during a national mobilization for war. During World War II, for example, the United States government pushed the economy to very close to its maximum capacity—placing big orders for munitions and other supplies for the front, and mobilizing the necessary resources by encouraging women to enter the paid labor force, encouraging the recycling of materials on an unprecedented scale, encouraging the planting of backyard gardens to increase food production, and in general pushing people's productive efforts far beyond their usual peacetime levels. Measured unemployment plummeted. The government, knowing that such pressures could lead to sharply rising inflation (as shown in the wage-price spiral region of Figure 12.6), kept inflation from getting out of hand by instituting **wage and price controls**—direct regulations telling firms what they could, and could not, do in the way of price or wage increases.

**wage and price controls**: government regulations setting limits on wages and prices, or on the rates at which they are permitted to increase

The shaded area to the left of the wage-price spiral region in Figure 12.6 indicates, as it has in past chapters, a range of full employment levels of output. While it is controversial to say just exactly where that level may be, it is thought of as being an output level high enough that unemployment is not considered to be a national problem. And because it must be low enough to allow for at least some small measurable level of
transitory unemployment, the full employment level of output is distinct from, and lower than, the maximum capacity level of output.  

Within the full employment range, Figure 12.6 shows a gently rising ASR relationship. This is because, even well before an economy approaches the absolute maximum capacity given all of its resources, producers may tend to run into "bottlenecks" in the supply of some resources. Agricultural workers may be plentiful, for example, but professional and technical workers may be in short supply. Or fuel oil may be plentiful, but there may be a shortage of natural gas. Shortages in the markets for particular kinds of labor and other inputs may lead to speed-ups in inflation in some sectors of the economy. Since the measured inflation rate looks at the average over the economy as a whole, some aggregate increase in inflation may be observed. This sort of increase in inflation that comes along with high (but not extremely high) production is what economists expect to happen when the economy nears a business cycle "peak." Notice, however, that the ASR curve has been drawn as nearly flat in part of the $Y^*$ range, indicating that combinations of full employment and stable inflation may also be possible.

When output is below its full employment level the economy is, of course, in a recession. The flat ASR line shown in Figure 12.6 for this region indicates that, in this model, there is assumed to be no tendency for inflation to rise or fall. Since a considerable amount of labor and other resources are unemployed, there is no pressure for inflation to rise. Since wages and prices tend to be slow in adjusting downwards, inflation won't fall either—at least right away.

2.2 Shifts of the ASR Curve: Inflationary Expectations

When people have experienced inflation, they tend to come to expect it. They then tend to build the level of inflation they expect into the various contracts they enter. If a business expects 5% inflation over the coming year, for example, it will add 5% to the selling price it quotes for a product to be delivered a year into the future, just to stay even. If workers also expect 5% inflation, they will try to get a 5% Cost of Living Allowance (or COLA), just to stay even. A depositor who expects 5% inflation and wants a 4% real rate of return will only be satisfied with a 9% nominal rate of return. In this way, an expected rate of inflation can start to become institutionally “built in” to an economy. As a first approximation, it is reasonable to assume that people expect something like the level of inflation they have recently experienced (an assumption economists call "adaptive expectations").

Since different contracts come up for renegotiation at different times of the year, the process of building in particular inflationary expectations will only take place over

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3 Sometimes you will also read about potential output. Usually what economists mean by this is the level of output an economy could produce if it weren't in a recession, and they relate this to issues of how an economy grows over time (see Chapter 14). Generally what they have in mind is a full employment output level, even though they may also use the term capacity in describing potential output.
Because of the time it takes for prices and wages to adjust, we need to make a distinction between short-run and medium-run aggregate supply responses.

The ASR curve in figure 12.6 was drawn for a particular level of expected inflation in the short run. In the short run, before people have caught on to the fact that the inflation rate might be changing, their expectations of inflation will continue to reflect their recent experience. The rate of inflation at which the ASR curve becomes horizontal is the expected inflation rate. In this model, an economy in recession, or in the flattish part of the ASR curve in the full employment range, will tend in the short run to roll along at pretty much the same inflation rate it has experienced in the past. Only tight labor and resource markets caused by a boom will tend to increase inflation, which will come as a surprise to people (and will not immediately translate into a change in expectations). For the purposes of this model, you might think of the short run as a period of some weeks or months.

Over a longer period of time--the medium run--however, a rise in inflation due to tight markets will tend to increase people's expectations of inflation. If they expect 5% inflation, but experience 7% inflation, the next time they renegotiate contracts they may build in a 7% rate. Figure 12.7 shows how the ASR curve shifts up as people's expectations of inflation rise. Note that the maximum capacity of the economy has not changed—nothing has happened that would affect the physical capacity of the economy to produce. All that has happened is that now, at any output level, peoples expectations of inflation are higher.

Similarly, if people experience very loose markets for their labor or products, over the medium run the expected inflation rate may start to come down. Employers may find they can still get workers even if they offer lower COLAs in the new contracts. Producers may raise their prices less this year than last year, because they are having trouble selling in a slow market. When people start to observe wage and price inflation tapering off in some sectors of the economy, they may change their expectations about inflation. As people react to the sluggish aggregate demand that occurs during a recession, they will
tend, over time, to lessen their expectations about wage and price increases. The graph for this would be like Figure 12.7, but would show the ASR curve shifting downward instead of upward.

2.3 Shifts of the ASR Curve: Supply Shocks

The Aggregate Supply Response relation in the macroeconomy also changes when the capacity of the economy changes. A supply shock is something that changes the ability of an economy to produce goods and services. Supply shocks can be beneficial, as when there is a bumper crop in agriculture or a new invention allows more goods or services to be made using a smaller quantity of resources. Increases in labor productivity also allow an economy to produce more goods and services.

In such cases, the real capacity of the economy expands, as shown in Figure 12.8. The line indicating maximum capacity shifts to the right, showing that the economy can produce more than before. We model the beneficial supply shock as moving the ASR curve both to the right and downward. It moves to the right because capacity has increased. It moves downward because beneficial supply shocks are often accompanied by decreases in prices. As computer technology has improved, for example, the price of any given amount of computing power has dropped rapidly. To the extent that computers play a significant role in the economy, this tends to undermine inflation.

![Figure 12.8 A Beneficial Supply Shock](image)

A beneficial supply shock, such as unusually high agricultural production or an improvement in technology, increases the economy's capacity to produce and generally lowers inflation.

Supply shocks can also be adverse. In fact, economists were forced to first start theorizing about supply shocks because of the oil embargo and resulting steeply rising oil prices that occurred in the early 1970s. Natural occurrences such as hurricanes or droughts, and human-made situations such as wars that destroy capital goods and lives, are other examples of adverse supply shocks. These reduce the economy's capacity to produce, and, by concentrating demand on the now more limited supplies of resources that remain, tend to lead to higher inflation. These would be illustrated in a graph like Figure 12.8, but with the direction of all the movements reversed.
Discussion Questions

1. Describe in words how the ASR curve differs from the ADE curve. What does each represent? What explains their slopes?

2. Do you get "cost of living" raises at your job, or know people who do? Why does this practice have important macroeconomic consequences?

3. Putting the ASR/ADE Model to Work

Economists invented the ASR/ADE model to illustrate three points about the macroeconomy:

1. Fiscal and monetary policies affect output and inflation:
   - Contractionary fiscal and monetary policies tend to push the economy toward lower output. Inflation is unlikely to fall quickly, but a persistent recession will tend to lower inflation over the long term.
   - Expansionary fiscal and monetary policies tend to push the economy towards higher output. If the economy is approaching its maximum capacity, they will also cause inflation to rise.

2. Supply shocks may also have significant effects:
   - Adverse supply shocks lower output and raise inflation.
   - Beneficial supply shocks raise output and lower inflation.

3. The levels of investor and consumer confidence also have important effects on output and inflation.

We will see how this model has helped economists explain some of the major macroeconomic events of the last several decades.

3.1 An Economy in Recession

In Figure 12.9, we bring together the ASR and ADE curves for the first time. The (short run) equilibrium of the economy is shown as point E₀, at the intersection of the two curves. Depending on how we place the curves in the figure, we could illustrate an economy that is in a recession, at full employment, or in a wage-price spiral.

In this specific case, the fact that E₀ is to the left of the full employment range of output indicates that the economy is in a recession. Private spending, as determined in part by investor and consumer confidence, along with government and foreign sector spending, are not enough to keep the economy at full employment. The fact that the curves intersect on the flat part of the ASR curve indicates that inflation (in the short run) is stable. So in this situation unemployment is a problem. What can be done?
Figure 12.9 An Economy in Recession
At point $E_0$, the inflation rate is stable, but the economy is in a recession with output below full employment.

Figure 12.9 models the real world situation of the United States economy in the early 1960s (as well as during other periods). In 1963 inflation was quite low but unemployment was above 5%, as shown in Figure 12.10. Policymakers at the time felt that this unemployment rate was excessive.

Figure 12.10 Unemployment and Inflation in the United States, 1963-1965
In 1963, the rate of inflation was very low, but the economy was in a recession, with unemployment above 5%. The Kennedy tax cuts stimulated the economy in 1964-1965, reducing unemployment but also causing a small increase in inflation.

Source: Economic Report of the President. The measure of inflation used is the Implicit Price Deflator.

The administration of President John F. Kennedy undertook to get the economy out of the recession. It pushed for expansionary tax cuts which were enacted in 1964. The result, in terms of the empirical data, is shown in Figure 12.10. During the period shown, the unemployment rate dropped by over one percentage point while inflation rose by less than one percentage point.
This historical sequence can be understood using the ASR/ADE model as shown in Figure 12.11. Expansionary fiscal policy shifts the ADE curve to the right. Now that we also have the supply side of the story in place, we can see the effects of such a shift on equilibrium output and inflation. According to this model, a shift of the size shown could put the economy well into the full employment range, while—because the new equilibrium is on the gently sloping part of the ASR curve—leading to only a small rise in inflation.

![Figure 12.11 Expansionary Fiscal Policy When the Economy Starts in a Recession](image)

Expansionary fiscal policy shifts the ADE curve to the right, restoring full employment with only a small rise in inflation.

The path traced out by the equilibrium points on the theoretical graph can be regarded as essentially a mirror image of the empirical graph. It is a mirror image because while unemployment rises as we go to the left in Figure 12.11, it rises as we go to the right in Figure 12.10.

While we will return to other issues concerning this policy later, at the time the success of the Kennedy tax cuts in creating an economic expansion led to great optimism about the ability of macroeconomists to “fine tune” the economy using appropriate policies.

### 3.2 An Overheated Economy

The tax cuts were not the only thing going on in the 1960s, however. High government spending, and particularly spending for the Viet Nam war, meant that fiscal policy continued to be expansionary well after the 1964 tax cuts. Monetary policy during this period tended to accommodate the fiscal expansion. The effects of these continued expansionary policies on inflation and unemployment are traced in Figure 12.12. Unemployment continued to fall by about one percentage point after 1965, to under 4%. But inflation rose steeply over the second half of the decade, reaching 5% in 1969. This
curve may look familiar to you—it is the Phillips Curve you derived from the underlying data back in Chapter 2.

![Figure 12.12 Unemployment and Inflation in the United States, 1963-1969](image)

*Continued high government spending, particularly for military purposes, drove unemployment down but led to steeply rising inflation in the latter years of the 1960s.*

This period of history is modeled in Figure 12.13. The ADE curve shifts out further due to the increases in government spending. It shifts from ADE₀, which corresponds to a full employment equilibrium, to ADE₁, which crosses the ASR curve in the wage-price spiral range. The economy became overheated, moving beyond full employment to a point like (the new) E₁.

![Figure 12.13 Expansionary Fiscal Policy When the Economy is at Full Employment](image)

*Expansionary policy causes the economy to “heat up.” In the short run, people respond by increasing output, but tight markets for labor and other resources cause inflation to rise as well.*
As you can see, the equilibrium points in the theoretical graph trace out a mirror image of the Phillips curve. This is no coincidence. The models that economists developed during the 1960s grew out of observing such a pattern of unemployment and inflation rates, and trying to explain why it occurred. The Phillips Curve relationship seemed to suggest that policymakers could "trade off" inflation and unemployment—that they could, by use of policies, choose to settle the economy at any point along the curve. Policymakers could push up inflation in order to keep unemployment low, or perhaps sacrifice some employment in order to push down inflation—or so it was thought for a while.

### 3.3 Stagflation

The occurrences of the early 1970s came as a shock to Phillips-curve-minded economists and policy makers. Figure 12.14 shows the pattern of unemployment and inflation movements during these years. From 1969 to 1970 unemployment and inflation both rose, and both stayed fairly high through the 1970-1973 period. This combination of economic stagnation (recession) and high inflation came to be known as "stagflation."

| stagflation: a combination of rising inflation and economic stagnation |

![Figure 12.14 Unemployment and Inflation in the United States, 1963-1973](image)

*In the early 1970s, the economy entered a period of stagflation, with inflation and unemployment both high.*

What happened? In 1968, worried by rising inflation, President Lyndon Johnson got Congress to enact an income tax surcharge. In our model, we show this contractionary fiscal policy as a leftward shift of the ADE curve in Figure 12.15.

This policy move is widely regarded as being “too little, too late” to curb consumer and investor spending. By the time the economy started to cool off, inflationary expectations had become firmly implanted. Having recently experienced a wage-price spiral, people had built expectations of higher inflation into their wage and price contracts. As one economist commented, inflation is like toothpaste – once you squeeze it out of the tube, you can’t get it back in. While the fiscal cutbacks contributed
to falling GDP and rising unemployment, they didn't bring down inflation due to this institutional "ratcheting up" of inflationary expectations.

**Figure 12.15 Contractionary Fiscal Policy and Rising Inflationary Expectations**

A tax surcharge should cool off the economy, as shown by the ADE shift. However, the policy action won't bring down inflation if inflationary expectations have risen, as shown by the ASR shift.

The combination of the contractionary fiscal policy and the rise in expectations is shown as moving the economy from a boom point of $E_0$ in Figure 12.15 (like the United States economy in 1969) to a recessionary, high inflation point of $E_1$ (like 1970-71).

### 3.4 The Oil Price Shock

Economists in the early 1970s were just getting used to the idea that inflation and unemployment could not necessarily be “traded off” over the long run when the worldwide economy got hit by another big surprise. As mentioned in Chapter 1, in 1973-74 the countries belonging to the Organization of Petroleum Exporting Countries (OPEC) cut production, drastically increased the price at which they sold their oil, and even temporarily stopped shipping oil to certain countries. The price of oil, a key input into many production processes, suddenly quadrupled. What effect did this have on the macroeconomy? Figure 12.16 shows that both inflation and unemployment rose dramatically from 1973 to 1975. (Note that we have changed the scale on this graph—the top value for inflation is now 10% instead of the 6% used in earlier graphs, and the top value for unemployment is now 10% instead of 8%.) Later, in 1976, the inflation rate came back down to its 1973 level, while employment recovered slightly.
We can explain the immediate effect of the adverse oil supply shock of the early 1970s in terms of the ASR/ADE model shown in Figure 12.17. The economy starts off in a recession at point E₀, which is substantially to the left of the initial maximum capacity line. The cut in foreign oil production meant that the United States (and many other oil-importing countries) now suffered from a reduced capacity to produce goods, as shown by the maximum capacity line and ASR curves shifting to the left. Even if labor resources were fully employed, an economy with reduced access to other inputs would not be able to produce as much.⁴ At the same time, the rise in oil prices had an immediate and direct effect on inflation, shifting the ASR curve up as well, as also shown in Figure 12.17.

Figure 12.16 Unemployment and Inflation in the United States, 1963-1976
*A sharp rise in petroleum prices in sent both inflation and unemployment skyrocketing from 1973 to 1975. Inflation eased off in 1976.*

\[ \text{Inflation rate (\(\pi\))} \]
\[ \text{Output (\(Y\))} \]

Figure 12.17 The Immediate Effect of the Oil Price Shock
*With a vital input now harder to get, the economy cannot produce as much, shifting the maximum capacity line and ASR curve to the left. The rise in the price of oil also has an immediate and direct effect on the inflation rate, shown by upward shift in the ASR curve. The economy moves deeper into recession, with higher inflation.*

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⁴ Remember that throughout the chapters in this Part of the textbook, we are abstracting from GDP growth. In a growing economy, an adverse supply shock deals the economy a setback, but output can eventually return to—and then surpass—its original level if growth is strong.
Now that the economy is in recession, what will happen? After the initial dramatic hike in oil prices in 1974, the price of oil remained fairly steady through 1978. So there was no impetus for increasing inflation coming from further oil price hikes during this period. Because of this, and the fact that economy was suffering from unemployment, we can think of Figure 12.18 as modeling the macroeconomy during the years 1975-76, when actual and expected inflation came down.

3.5 A Hard Line Against Inflation

However this was still not the end of the story. Oil prices jumped again in 1978 and 1979. By 1979 the price of oil was ten times higher than it had been in 1973. The overall inflation rate in the U.S. was over 9% for the year 1979—and up into the double digits (measured at an annual rate) during some months.

A number of economists thought that the high rates of inflation experienced in the late 1970s—even if they would become predictable, after a while—were unhealthy for the economy. Even though the economy was already in a recession with an unemployment rate above 7%, Paul Volcker, who became Chair of the Fed in 1979, took deliberate—and many would say drastic--action to bring the long-term inflation rate down. The effects of Volcker’s “tight money” policies during the early 1980’s can be seen empirically in Figure 12.19.
The Fed’s tight monetary policies in the early 1980s brought the inflation rate down, but at the cost of increasing unemployment.

As discussed earlier, in the ASR/ADE model a reduction in the target inflation rate shifts the ADE curve down. This is shown in Figure 12.20. This model predicts that the immediate effect of this policy will be to send the economy even deeper into a recession, with output falling even farther below its full employment level.

This contractionary policy was accompanied by many stories in the media about how Volcker was really committed to bringing down inflation, no matter what the cost. Because people found this commitment to be credible, their expectations of inflation also came down. The effect of this decrease in inflationary expectations is shown in Figure 12.21. Such a recession with falling inflation is, in fact, what happened during the Volker contraction. By 1983, the inflation rate had been reduced to 4%, but at a significant
human and economic cost. Unemployment during 1982 and 1983 had risen to nearly 10%.

![Diagram showing the Medium-Run Effect of a Lowered Inflation Target](image)

**Figure 12.21 The Medium-Run Effect of a Lowered Inflation Target**

As inflationary expectations fall, the ASR curve shifts down. As the Fed continues to take a hard line on inflation, ADE continues to fall. Inflation falls, and output says low.

This is a point about macroeconomic social behavior that can be quite puzzling and frustrating. The vast majority of individual people and organizations don’t want a recession and unemployment. Yet, as we saw earlier, the major reason why a given rate of inflation persists in an economy is that people get used to it and build it into their contracts and ways of doing business. Wouldn’t it be much easier if we could just get everyone to agree to use a new, lower level of inflation when making their plans? Something like this had been tried earlier, during the administration of President Gerald Ford. He attempted to change people's attitudes with his 1974 “Whip Inflation Now” speech. “WIN” buttons appeared on the lapels of public leaders. This attempt at moral suasion, however, is generally agreed to have been a dismal failure. So debates persist about whether the costs in jobs and livelihood of a deliberate policy to bring down inflation by causing (or deepening) a recession are worth the benefits of a lower inflation rate.

Fed chair Ben Bernanke, appointed in 2005, is known as a strong supporter of using target rates for inflation. He has sometimes been quoted as saying that a 2% target rate would be appropriate. What is not known, at the time of the writing of this textbook, is how this will play out given future—unpredictable—shocks to the economy.

### 3.6 Technology and Globalization

Following the substantial recession and disinflation of the early 1980s, output began to recover again. Figure 12.22 shows how inflation and unemployment have fluctuated until recently. Such fluctuations continued, though within narrower bands than
during the earlier years. From 1984 to 2004, unemployment varied from 4% to about 8%, and inflation from 1% to about 4%.

We will choose one last period to focus on in detail—the expansion of the 1990s. From 1992 through 1998, unemployment rates and inflation rates steadily fell, as shown in Figure 12.23. (Note that the scale of the graph has been changed again.) In 1998, unemployment was 4.5%, the lowest it had been since 1965. Inflation was running at 1.1%, as low as it had been way back in 1963. This was clearly the best macroeconomic performance that had been seen in decades. Unemployment continued to fall on into 1999.

During the 1990s, the United States economy experienced a prolonged recovery, with falling unemployment and falling (or low) inflation.
What caused this sustained recovery? Alan Greenspan, then chair of the Federal Reserve, commented in January 2000 that

When we look back at the 1990s, from the perspective of say 2010…[w]e may conceivably conclude from that vantage point that, at the turn of the millennium, the American economy was experiencing a once-in-a-century acceleration of innovation, which propelled forward productivity, output, corporate profits, and stock prices at a pace not seen in generations, if ever.5

Most economists agree with Greenspan that innovation--particularly enormous leaps in information technology including the advent of widespread use of the Internet and information systems for business supplies, deliveries, and product design--is important in explaining this period of superior macroeconomic performance. This can be modeled as a period of beneficial supply shocks, as shown in Figure 12.24.

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![Figure 12.24 The Effects of Technological Innovation](image)

*Figure 12.24 The Effects of Technological Innovation*

*During the 1990s, innovations—particularly in information technology—increased the productivity of the economy, creating a series of beneficial supply shocks.*

Many economists also point to increasing global competitiveness as a factor in the rising productivity of this period. Competition from foreign firms, they argue, made U.S. firms work harder to become efficient. Meanwhile, competition from foreign workers weakened the power of domestic unions. This helped keep wage and price inflation low (though it also had consequences for the U.S. distribution of income, as described in Chapter 3).

The strong performance of the macroeconomy in the 1990s made optimism run high. A number of commentators wondered if we might be entering a "New Economy"

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in which business cycles would become a thing of the past. However, as Greenspan also noted in the same speech as quoted above,

Alternatively, that 2010 retrospective might well conclude that a good deal of what we are currently experiencing was just one of the many euphoric speculative bubbles that have dotted human history. And, of course, we cannot rule out that we may look back and conclude that elements from both scenarios have been in play in recent years.

Greenspan’s last remark, in retrospect, seems to have been the most prescient. Just two months after he spoke, the stock market crashed as the "dot.com" speculative bubble burst. About a year later, the economy slid into recession. We have not, apparently, entered some new, business-cycle-free, "recession-proof" state of history. On the other hand, the real productivity gains made during the 1990s did not go away, and the effects of that part of the expansion persist to this day.

Discussion Questions

1. This section mentions several cases in which the real-world macroeconomy seemed to develop in ways predicted by the macroeconomists of the time, and in the directions desired by policymakers. What were these cases?

2. This section mentions several cases in which the real-world macroeconomy seemed to develop in ways counter to what would have been predicted by the macroeconomists of the time, and/or which were not what policymakers had hoped for. What were these cases?

4. Competing Theories

So far, the ASR/ADE model has given us a way to gain insight into some of the major macroeconomic fluctuations of the last several decades. But there remains much room for controversy. Was it necessary to enact expansionary fiscal policy in order to get the economy out of the slump of the early 1960s? Was it a good idea for the Federal Reserve to move so vigorously to fight inflation in the early 1980s? Economists differ greatly in their views on these issues, and their theoretical backgrounds tend to inform their answers to these and other more contemporary questions. We will review two of the major theories, one that calls for a minimum of government activity, and another that calls for more active government involvement in macroeconomic stabilization. Additional theories—some of which take positions between these two poles—are reviewed in the appendix to this chapter.

4.1 Classical Economics

As discussed in previous chapters, economists with ties to the Classical school tend to believe in the self-adjusting properties of a free market system. Classical labor
markets clear at an equilibrium wage (Chapter 7). Classical markets for loanable funds cause savings and investment to be equal at an equilibrium interest rate (Chapter 9). In theory, then, a smoothly functioning economy should never be at anything other than full employment.

In terms of the ASR/ADE model, the Classical theory implies an Aggregate Supply Response curve that is quite different than the one we have been working with, as shown in Figure 12.25. In such an economy, output would always be at its full employment level (now shown as a distinct value, rather than a range). The level of aggregate demand would determine the inflation rate, but nothing else. The rationale for this vertical ASR curve is as follows. At the full employment level, people are making their optimizing choices about how much to work, consume, and so on. If for some reason the economy were to produce at less than the full employment level, the unemployed workers would bid down wages and full employment would be restored. If for some reason the economy were to produce at more than its full employment level, wages would be bid up, and employment would drop back to its full employment level. Such processes are assumed to work so quickly and smoothly that the economy is virtually always right at full employment.

![Figure 12.25 The Classical Aggregate Supply Curve](image)

Classical economists assume the economy will virtually always be at a full employment level of output. The level of aggregate demand only influences the inflation rate.

What, in the Classical model, is the effect of aggregate demand management policies? As we can see in Figure 12.25, expansionary fiscal or monetary policy can have no effect on the output level. Classical economists believe that increased government spending just "crowds out" private spending, particularly spending on investment. With a "fixed pie" of Y*, more spending by government just means less spending by other actors. Monetary expansions are believed to lead only to increased inflation. The central bank should just choose a certain growth rate of the money supply or level of the interest rate to support and stick to it, they say, and not concern itself about unemployment and output. Classical theory tends to support politically conservative policies emphasizing small government and strict rules on monetary policy. Classical economists would tend to say that the fiscal expansionary policies of the early 1960s were unnecessary for the
purposes of macroeconomic stabilization, but that the Volcker contraction of the early 1980s was a good idea.

4.2 Keynesian Macroeconomics

The original Keynesian belief was that market economies are inherently unstable. The Keynesian notion of the influence of "animal spirits" on investment refers to the tendency of private decision-makers to get over-optimistic and create booms in investing and production. Many business cycle theorists believe that this is due to something intrinsic to human nature. And the higher the boom, the deeper the crash. Firms that have overextended and overproduced during an upswing need time to regroup, sell off inventory, and so on, before they will be ready to go on the upswing again. Households that have overextended and overspent during a boom also need to regroup, and perhaps pay down debt, before they will be willing to restart an optimistic spending bandwagon.

In Chapter 9 we started the discussion of macroeconomic stabilization policy with a stylized graph of the business cycle, showing fluctuations in GDP over time. That figure is repeated here as Figure 12.26(a). Now we can see what this looks like in terms of the model we've developed. We can see business cycles as fundamentally caused by an ADE curve that is perpetually on the move, swinging outward and back as investor and consumer confidence wax and wane, as shown in Figure 12.26(b). Peaks are indicated by point A in both graphs, and troughs by point B. In between, the level of GDP swings through—but does not stop at—the full employment range. If the world works this way, then government action to tone down the peaks and raise aggregate demand in the troughs—to try to keep the ADE curve more stable by counteracting the swings in private autonomous demand—makes sense.

If firms and households are prone to alternating bouts of confidence and caution, the economy will have a fundamental tendency to swing between peaks (point A) and troughs (point B).
This view of perpetual business cycles is, we cannot stress too strongly, a fundamentally different worldview from those which presume a "settling down" of the economy at a full employment equilibrium. Keynes did not believe that macroeconomic phenomena could be explained by assuming rational, optimizing behavior by individuals and then extrapolating from models of individual markets to the macroeconomy. He believed that important macroeconomic factors, such as large scale waves of optimism and pessimism, or the way that occurrences in one market might carry over into other markets, could only be explained on a societal rather than an individual level. His theory of "animal spirits" also suggests that we might need to be somewhat skeptical about the assumption that people always act rationally, if we want to understand real world macroeconomic phenomena.

Nothing in the traditional model of Keynesian business cycles prepares an economist to deal with new events such as supply shocks and sustainability issues. These require models that are flexible enough to address new issues as they arise. Such models are best built on the understanding that economies are subject to a variety of forces, many of which, much of the time, swamp those particular forces that would be expected to lead to a classical situation of full employment equilibrium.

Discussion Questions

1. It has become popular in some circles to think of Keynesian macroeconomics as simply equivalent to Classical macroeconomics, with the added assumption that downward wage and price adjustments tend to be slow ("sticky wages"). (See "The Classical-Keynesian Synthesis" in the appendix.) From the description of Keynesian theory above, would you say this characterization is accurate?

2. Which do you think gives a better description of economic realities, Classical or Keynesian macroeconomic theory?

5. Are Stabilization and Sustainability in Conflict?

These past four chapters have emphasized how a high level of aggregate demand is necessary to support a high output level, keeping income levels up and unemployment down. But there are three goals that a macroeconomic system should aim for, and maintaining living standards and stabilization are only the first two. As outlined in Chapter 1, achieving financial, social, and ecological sustainability is also important.

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6 Some suggest that the links between microeconomic and macroeconomic phenomena involve a fundamental "phase shift," as the concept is used in the physical science. For example, if you cool water, the water behaves one way until it reaches a certain temperature, and then behaves in a very different way as it begins to turn into ice. You cannot explain the properties of ice by studying liquid water. Similarly, economic behavior may create one sort of pattern at the level of individual agents and markets, but new behavior may emerge as we look at behavior economy-wide.
5.1 Examining Goals and Assumptions

Taking the models we have built at face value, it would seem that stabilization goals (particularly the goal of low unemployment) and ecological sustainability goals are in direct conflict. Stabilization would seem to require maintaining a rapid rate of "throughput"—that is, of conversion of material and energy resources into goods and services for consumption, as measured by GDP. Consumption, investment, government spending and net exports need to stay high, according to these models, in order to generate the level of aggregate demand that supports full employment.

Ecological sustainability, on the other hand, is threatened by high rates of throughput that deplete nonrenewable (or only slowly renewable) resources and lead to other problems such as global climate change and species extinction. It is becoming increasingly clear that any serious movement towards ecological sustainability will require consuming less of some things we are used to, particularly fossil-fuel energy resources. The oil supply shock of the 1970s might just have been the proverbial "shot over the bow" regarding capacity constraints—an early warning sign that societies would do well to pay attention to. But would aiming for a sustainable economy therefore mean having to accept large scale recession, income loss, and unemployment?

Some of this apparent conflict is due to the simplifying assumptions we have made in developing our macroeconomic model. To the extent these assumptions may not be true, the conflict may not be as large as it seems. For example, in the models developed starting in Chapter 9, we have assumed:

- More employment is always better, because it gives people money incomes and unemployment is stressful and demoralizing. High levels of overall production are needed to keep employment high.
- Only the levels of consumption, investment, government spending, and net exports are important. The composition of this spending in terms of the types of goods and services produced, or the production method used in generating GDP, are not important.

Let us examine these assumptions more closely.

5.2 What Do We Really Want from Employment?

There is no doubt that needing a job and not being able to find one can be very tough on the unemployed. Besides the lack of income—which can throw a worker and his or her family into real hardship and poverty—unemployment can also have severe psychological repercussions. People often feel demoralized and depressed when they find they aren't wanted. Studies of the effects of business cycle swings on health and mortality show, unambiguously, that suicide rates rise during economic downturns. Clearly, a humane society should want to keep such suffering at a minimum, to the extent possible.
Beyond alleviating such situations, however, what we want from high national employment is a little less clear. Is more always better, when it comes to work at paid jobs? More work does tend to give people higher incomes. In Chapter 13, we will examine the long-term relationship between people's incomes and their health and well-being—and see that the relationship is not as strongly positive as is often supposed. What might be even more surprising, however, is that employment and measures of well-being do not always seem to be positively associated with each other over the business cycle. While, as mentioned above, suicides tend to rise during downturns, in general mortality rates tend to fall when the economy slows down and rise during economic upswings, in industrialized countries.7

It may seem counterintuitive that death rates rise when the economy is "doing well," but several facts about the population in general (not just the unemployed population) can help to explain this. For example, during an upswing construction jobs, which tend to be some of the most dangerous in the economy, are especially likely to increase. During upswings, many new and inexperienced people are put to work in industries like logging and manufacturing, and inexperienced people are especially likely to be injured or killed on the job. Thus mortality from on-the-job accidents tends to rise during an upswing (and fall during a downturn). During an upswing, people also tend to drive more miles. Since traffic accidents are a major killer, this also contributes to a higher mortality rate. Higher deaths from cardiovascular disease during booms may be related to longer hours and a faster pace of work. There also is some evidence that people tend to exercise more, maintain a better body weight, and drink less heavily when the economy is in a downturn—perhaps because reduced incomes and reduced hours encourage a wider variety of activities.

Rather than just thinking about "employment" and "unemployment," then, perhaps macroeconomists should be thinking more about the quality, types and intensity of employment an economy offers, and what these mean for people's well-being. Being entirely pushed out of the wage-earning system is clearly injurious to the involuntarily unemployed, and being deprived of sufficient income is very tough on the working poor. But the solution need not mean that everyone should always work 40 (or more) hours a week in order to produce the most they can, using up large amounts of energy and materials in the process. As discussed in Chapter 7, people also benefit from hours they spend away from paid employment, because of the opportunity this affords them to do unpaid work including family care, and the opportunity for leisure activities. It may be possible to keep employment levels high while reducing material and energy throughput, if we, as a society, think creatively enough about what sorts of employment we really want.

In France, for example, the standard workweek was cut back from 39 hours to 35 hours for many employees beginning in 2000. Partly, this was due to the governments' wish to cut unemployment levels by spreading work more broadly. A number of unions lobbied for the cut in hours, arguing that it would improve workers' quality of life. The French Green (ecological) party supported the legislation as well. While the law has

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undergone some modifications since it was enacted, and the question of how well it worked in achieving its goals is debated, this is one example of innovative macroeconomic policy that takes into account both stabilization and sustainability concerns.

5.3 What Do We Really Want from Production?

The model we have developed works only with the level of output, $Y$, and says nothing about the composition of output. From a sustainability perspective, however, the composition of output makes a very big difference. Some things we benefit from and enjoy require relatively little use of material and energy inputs. Eating locally grown produce, taking a bike ride with friends, or downloading a new tune from the Internet, for example, may put rather little stress on the natural environment. Other activities, such as heating and furnishing a very large house, driving an SUV, or chemically maintaining a perfect lawn tend to have more negative impacts. Shifting away from producing those goods and services that are most damaging to ecological systems, and shifting toward producing goods and services that are less destructive—or even environmentally beneficial—could allow an economy to maintain consumption, investment, and employment in a less environmentally damaging way.

For example, one thing that has to happen for the world's economies to become ecologically sustainable is that the global population must cease to grow. But a stabilizing population is necessarily, at least for a considerable period of transition, also a graying population. The United States and many countries in Europe are already experiencing a growing ratio of older people to active workers. Many elderly people need extra medical care and personal care. This suggests that while an economy may need to release some workers from high-throughput jobs for sustainability reasons, there will also be a shrinking supply of workers, and an increased demand for workers in medical and social services. These demographic shifts suggest that excessive unemployment may not be the result of changes made to pursue sustainability goals, if these are well-managed.

Similarly, while some opportunities for investment would die out in a more sustainable economy, many more would open up. Investments in energy-saving infrastructure for transportation, in wetland restoration, and in conversion of residential and commercial buildings to more environmentally-friendly patterns of energy and chemical use, for example, would create jobs, not destroy them.

The way in which products are produced and distributed—that is, the composition of inputs into production—is also important. When music recordings first became popular, a record was a substantial piece of petroleum-derived vinyl. These days, a recording is a stream of electrons that may be downloaded onto a device that fits in your pocket, and the need for vinyl in the music industry has been correspondingly reduced. Sometimes producers and consumers have a hard time thinking beyond their usual ways of doing things, simply because we tend to be creatures of habit. Thinking seriously about environmental macroeconomics should encourage people to look at production
methods in new ways. In a study of dangerous chemicals such as industrial solvents in the waste stream, for example, it was found that manufacturers could sometimes cut their emissions and save on expenses by instituting fairly simple changes in their procedures. Simply being aware of the issues can be a substantial first step.

The problems of transitioning to a more sustainable macroeconomy should not be minimized. People who build SUVs today, for example, cannot just start building solar panels tomorrow—changes in human and manufactured capital must take place first. But neither should these problems be enlarged out of all proportion. Scientific evidence suggests that a conversion to a less resource-greedy economy is not a matter of if, but rather a matter of when and how. And the longer the conversion is put off, the more difficult it is likely to be.

5.4 Policies for Stabilization and Sustainability

In Chapter 10, we saw how government spending and taxing policies can contribute to stabilization, and in Chapter 11 we looked at issues of money and credit. A society committed to both stabilization and sustainability could find ways to use these standard macroeconomic tools work towards both goals. For example, many economists recognize that fossil fuel products are currently priced at less than their full social cost, and advocate putting extra taxes, sometimes called carbon taxes, on them in order to encourage a more socially efficient pattern of use. Such a tax could be part of a "cooling off" policy, or revenues from such a tax could be used, for example, to fund government investments in projects to preserve and enrich natural capital, or to stimulate similar private investments by offering investment tax credits or subsidized interest rates.

The failure, up to this point, of economists and government decision makers to fully incorporate sustainability goals in their discussions of macroeconomic policy is disturbing to those who take a long-term, multi-generational view of social well-being. But it is not the case, as you may sometimes hear it argued, that the basic principles of macroeconomics require that environmental concerns be dismissed. On the contrary, adequate macroeconomic policy requires considering long term goals, including environmental ones, as well as short term stabilization goals. In the next chapter, we switch from a focus on relatively short term business cycles to a focus on long term growth and development.

Discussion Questions

1. Cutting the length of the standard full-time workweek could be one way to keep people employed while cutting down on the "through-put" of materials and energy. Can you think of other policies that might also have this effect?

8 In 1997, over 2500 economists including eight Nobel Laureates signed the "Economists' Statement on Climate Change," which suggested, among other things, the institution of carbon taxes.
2. Suppose you work 30 hours a week and rely on a bicycle or public transportation, but everyone you know works 40 hours a week and drives a car or truck. Compare this to a situation in which everyone has work and transportation patterns that are similar to yours. Which situation do you think you would find more comfortable? Does this suggest something about a need for public action?

Review Questions

1. What is the "Fed Reaction Rule"? Explain in words and show in a graph.
2. What does the ADE curve represent, and why is it downward sloping?
3. What shifts the ADE curve?
4. What does the ASR curve represent, and why does it have the shape it has?
5. What shifts the ASR curve?
6. Describe, using the ADE/ADR model, the consequences of President Kennedy's 1964 tax cuts.
7. Describe, using the ADE/ADR model, the consequences of continued fiscal expansion during the high-employment late 1960s.
8. Describe, using the ADE/ADR model, a combination of events that might cause an economy to suffer from "stagflation."
9. Describe, using the ADE/ADR model, the immediate impact of an adverse supply shock.
10. Describe, using the ADE/ADR model, what happens over time, after a one-time adverse supply shock has thrown an economy into a recession.
11. Describe, using the ADE/ADR model, how a committed Fed policy might bring down inflation over time.
12. Describe, using the ADE/ADR model, the effects of a series of positive supply shocks.
13. What does the ASR curve look like in the Classical model, and why?
14. What underlying dynamic did Keynes believe is behind the business cycle? Illustrate in graphs.
15. Is it necessary to have continual high spending and "throughput" to have an economy with healthy, employed people? Why or why not?
16. Are there some types of production an economy would need more of, or different techniques of production that could be used, if economies move towards ecological sustainability?

Exercises

1. For each of the following, indicate which curve in the ASR/ADE model shifts, and in which direction(s):
   a. a beneficial supply shock
   b. an increase in government spending
   c. a monetary contraction designed to lower the long-run inflation rate
   d. an increase in taxes
e. an adverse supply shock
f. a fall in people's expectations of inflation
g. a decrease in consumer confidence

2. Suppose the inflation rate in an economy is observed to be falling. Sketching an ASR/ADE model for each case, determine which of the following phenomena could be the cause. (There may be more than one.)
   a. the federal government gives households a substantial tax cut
   b. agricultural harvests are particularly good this year
   c. businesses are confident about the future and are buying more equipment
   d. the Fed is trying to move the economy towards a lower long-run inflation rate

3. Suppose an economy is currently experiencing full employment, and inflation is only slightly higher than had been expected.
   a. Draw and carefully label an ASR/ADE diagram that illustrates this case. Label the point representing the state of this economy $E_{(a)}$.
   b. Suppose that investors' confidence is actually only in the middle of an upswing. As investor confidence continues to rise, what happens to inflation and output? Add a new curve to your graph to illustrate this, as well as explaining in words. Label the point illustrating the new situation of the economy $E_{(b)}$.
   c. What sort of tax policy might a government enact to try to counteract an excessive upswing in investor confidence? Assuming this policy is effective, illustrate on your graph the effect of this policy, labeling the result $E_{(c)}$.

4. Suppose an economy is in a deep recession.
   a. Draw and carefully label an ASR/ADE diagram that illustrates this case. Label the point representing the state of this economy $E_0$.
   b. If no policy action is taken, what will happen to the economy over time? Show on your graph, labeling some new possible equilibrium points $E_1$, $E_2$ and $E_3$. (Think about which curve shifts over time, and why, when the economy stagnates. Assume that no changes occur in investor or consumer confidence or in the economy's maximum capacity output level.)
   c. Suppose the changes you outlined in (b) were to occur very rapidly and dramatically. Would it seem, then, that government policy is necessary to get the economy out of the recession?
   d. Write a few sentences relating the above analysis to the dispute between Classical and Keynesian macroeconomists.

5. Many environmental scientists warn that inadequate attention to the genetic diversity of agricultural crops (and thus their resistance to pests and disease), the depletion of underground aquifers in the Midwestern U.S. could reduce the agricultural and food-processing capacity of the U.S. in years to come. According to the ASR/ADE model, how would this be expected to affect the economy's maximum capacity, future output, and inflation? Draw a graph.
6. The data for the empirical graphs in this chapter were taken from the *Economic Report of the President*. Go to [http://www.gpoaccess.gov/eop/](http://www.gpoaccess.gov/eop/) and locate tables for the "civilian unemployment rate" and "price indexes for gross domestic product." Jot down data on the *seasonally adjusted* unemployment rate and the *percent change in the GDP implicit price deflator* for recent periods. Plot a few points on an empirical graph like those in this chapter to show how the economy has performed recently. (Sometimes data may be presented for months or calendar quarters, rather than for years. For the purposes of this exercise, you may simply average the numbers within a year to get a number for the year.)

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. relates inflation rates to the economy's physical capacity</td>
<td>i. COLAs</td>
</tr>
<tr>
<td>b. relates inflation rates and interest rates</td>
<td>ii. output approaching its maximum capacity level</td>
</tr>
<tr>
<td>c. a completely vertical ASR curve</td>
<td>iii. stagflation</td>
</tr>
<tr>
<td>d. characterized the U.S. economy during the 1960s</td>
<td>iv. carbon tax</td>
</tr>
<tr>
<td>e. a way that inflationary expectations get institutionalized</td>
<td>v. suicide rates</td>
</tr>
<tr>
<td>f. rises during economic booms</td>
<td>vi. a Classical assumption</td>
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<td>g. a cause of rising inflation</td>
<td>vii. ASR curve</td>
</tr>
<tr>
<td>h. characterized the U.S. economy during most of the 1990s</td>
<td>viii. Fed Reaction Rule</td>
</tr>
<tr>
<td>i. a cause of falling inflation</td>
<td>ix. rising inflation and falling unemployment</td>
</tr>
<tr>
<td>j. relates inflation rates to economy-wide spending levels</td>
<td>x. Keynes' theory</td>
</tr>
<tr>
<td>k. rises during recessions</td>
<td>xi. a prolonged recession</td>
</tr>
<tr>
<td>l. a policy to encourage more efficient resource use</td>
<td>xii. falling inflation and falling unemployment</td>
</tr>
<tr>
<td>m. characterized the U.S. economy in 1974-75</td>
<td>xiii. used by the government during World War II</td>
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<tr>
<td>n. a very shifty and unstable ADE curve, due to changes in confidence</td>
<td>xiv. ADE curve</td>
</tr>
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<td></td>
<td>xv. mortality rates</td>
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8. (Appendix) Suppose that Rational Expectations theory is correct. If the Fed decides to set a lower target inflation rate, and announces and carries through on this in a credible fashion, how would inflation and output be affected? Draw a graph. Compare and contrast this outcome to the actual response to the Volcker contraction, described in the body of the chapter.
Appendix: More Schools of Macroeconomics

A1. New Classical Economics

Faced with the empirical evidence of widely fluctuating output and unemployment rates, modern day classical economists—often called "New Classical" economists—have come up with a number of theories that seek to explain how Classical theory can be consistent with the observed fluctuations.

At the most Classical extreme, some economists have sought to redefine full employment to mean pretty much whatever level of employment currently exists. Assuming that people make optimizing choices and markets work smoothly, one might observe employment levels rise and fall if, for example, technological capacities or people's preferences for work versus leisure shift over time. Some New Classical economists, who have worked on what is called real business cycle theory, have suggested that "intertemporal substitution of leisure" (that is, essentially, people voluntarily taking more time off during recessions) could be at the root of the lower employment levels observed during some historical periods.

**real business cycle theory:** the theory that changes in employment levels are caused by change in technological capacities or people's preferences concerning work

Economists of the rational expectations school (influential during the 1970s and ‘80s) proposed a theory as to why monetary policy should only affect the inflation rate, and not output. This model can be explained by using the ASR/ADE model developed in this chapter to illustrate changes due to policies and expectations, while also adding the Classical ASR from Figure 12.25 to show that the economy remains at full employment. Suppose that the full employment level of output really corresponds to that shown in Figure 12.27, and the economy starts at point $E_0$. But suppose that the central bankers believe that full employment will not be achieved unless output is higher. (Recall that the level of "full employment" unemployment is controversial.) The model we have been using predicts that the Fed will use expansionary policy to try to shift the ADE curve to the right, as shown.

**rational expectations school:** a group of macroeconomists who theorized that people's expectations about Fed policy would cause predictable monetary policies to be ineffective in changing output levels
But the rational expectations school economists said that people use all economically available information in making their decisions and plans, including available information about economic models (like the one we've been studying) and reports about attitudes of and actions taken by leaders of the Fed. Therefore, if they think those leaders feel that current output is too low, they will know from their economic model that the Fed will undertake expansionary policy. Correctly anticipating the Fed's move, they will immediately incorporate higher inflation into their inflationary expectations. This immediate rise in expected inflation, shown by the shift up in the curved ASR curve, will cancel out the expansionary effects of the policy. Output won't change, and the economy stays on the Classical ASR curve.

Other New Classical economists accept that unemployment is real, and very painful to those it affects. However, they see aggregate demand policies as useless for addressing it. Rather, they claim that unemployment is caused by imperfections in labor markets (the "Classical Unemployment" described in Chapter 7). To reduce unemployment, New Classical economists may prescribe getting rid of government regulations (such as rigorous safety standards or minimum wages) that restrict how firms can do business, restricting union activity, and/or cutting back on government social welfare policies that make it attractive (according to the New Classicals) to stay out of work. Market pressures, they believe, will be enough on their own to support full employment—if given free rein.

A2. The Classical-Keynesian Synthesis and New Keynesian Macroeconomics

Somewhere in the middle ground is what has been called the Classical-Keynesian synthesis. In this way of looking at the world, Keynesian theory, which allows for output to vary from its full employment level, is considered to be a reasonably good description
of how things work in the short run and medium run. However, this view holds that the Classical world prevails in the long run.

You may have noticed that in the exposition of the ASR/ADE model above, we talked about the short run and the medium run, but did not mention the long run. This is because in more decidedly Keynesian thought (to be discussed below), the economy is really a succession of short and medium runs. Shocks to the economy are so frequent and so pronounced, and price and wage adjustments (especially downward ones) so slow, that the economy never has a chance to "settle down." In the Classical-Keynesian Synthesis, on the other hand, it is assumed that the economy, if left to its own devices for long enough, would settle back at full employment, due to the (eventual) success of Classical wage and price adjustments. Models built on this basis would use an analysis much like that presented in the ADE/ASR model used in the body of this chapter, but add a vertical ASR curve such as that shown in Figure 12.27, labeling it the "long run aggregate supply response."

To the extent that Classicals and many Keynesians agree on this model, then, debates come down to a question of how long it takes to get to the long run. New Classical economists tend to emphasize that excessive unemployment is merely temporary, and believe that (at least if government regulations would get out of the way) the long run comes fairly soon. Some Keynesian economists, often called New Keynesians, have accepted the challenge from Classically-minded economists to present all their analysis in terms of individual optimizing behavior, micro-level markets, and possible "imperfections." They have built up theories (like efficiency wage theory and insider-outsider theory, discussed in Chapter 7) to explain why wages don't just fall during a recession. They tend to work within the Classical-Keynesian synthesis, but claim that due to institutional factors the long run may be a long, long way away. They believe that government action, then, is often justified.

**New Keynesian macroeconomics:** a school which bases its analysis on micro-level market behavior, but which justifies activist macroeconomic policies by assuming that markets have "imperfections"

A3. Post Keynesian Macroeconomics

**Post Keynesian** economists believe that modern economies are basically unstable, and do not accept the idea of a long-run equilibrium at full employment. Post Keynesian economists tend to stress the view that history matters in determining where the economy is today. They believe that the future, while it will depend to some extent on the actions we take now, is fundamentally unpredictable due to the often surprising nature of economic evolution and world events.

**Post Keynesian macroeconomics:** a school which stresses the importance of history and uncertainty in determining macroeconomic outcomes
For example, one argument that some make is that high unemployment, like high inflation, may also be "toothpaste" that it is very difficult to get back into the tube. When people are unemployed for a long time, they tend to lose work skills, lose work habits, and may get demoralized. If this is true, then government action to counter unemployment is even more needed, since high unemployment now may tend to lead to high unemployment in the future, even if the demand situation recovers. Post Keynesian economists would tend to say that the fiscal expansionary policies of the early 1960s were a good idea, because they do not believe that an economy left to its own devices will naturally return to full employment, even "in the long run." On the other hand, they would tend to see the Volcker contraction of the early 1980s as unnecessarily harsh, because of their emphasis on the detrimental and persistent effects of high unemployment.

9 Economists tend to refer to this idea that future levels of unemployment (or any other economic variable) may depend on past levels as "hysteresis" or "path dependence."