THE KEYNESIAN AGGREGATE EXPENDITURE MODEL

As Chapter 11 illustrates, the central elements of Keynesian economics can be presented within the framework of the *AD–AS* model. An alternative framework—an aggregate expenditure model—can also be used to present these ideas. We will present this alternative model in this section and also illustrate its relationship to the *AD–AS* model more explicitly.

All models make simplifying assumptions. As we develop the *aggregate expenditure (AE) model*, we want to be explicit about several of the key assumptions. First, as with the *AD–AS* model, the *AE* model assumes that there is a specific rate of output associated with full employment. Second, following in the Keynesian tradition, the *AE* model assumes that wages and prices are completely inflexible until full employment is reached. Once full employment is achieved, though, additional demand will lead only to higher prices.

The key to understanding the *AE* model is the concept of *planned* aggregate expenditures. As in the case of aggregate demand, the four components of *planned* aggregate expenditures are consumption, investment, government purchases, and net exports. Let's consider each.

PLANNED CONSUMPTION EXPENDITURES

The largest component of planned aggregate expenditures is *planned* consumption (*C*). Keynes believed that people's current income primarily determines their consumption spending. According to Keynes, disposable income—one's income after taxes—is by far the most important determinant of current consumption. If disposable income increases, consumers will increase their planned expenditures.

This positive relationship between disposable income and consumption spending is called the **consumption function**. **Exhibit 1** illustrates this relationship for an economy. At low levels of aggregate income (less than $9 trillion), the consumption expenditures of households will exceed their disposable income. When income is low, households *dissave*—they either borrow money or draw from their past savings to purchase consumption goods. As income increases, consumption will also increase, but not as rapidly as income. This indicates that the marginal propensity to consume is less than one; some fraction of additional income is allocated to saving. At $9 trillion, current consumption and

Consumption function

The relationship between disposable income and consumption. When disposable income increases, current consumption expenditures rise, but by less than the increase in income.
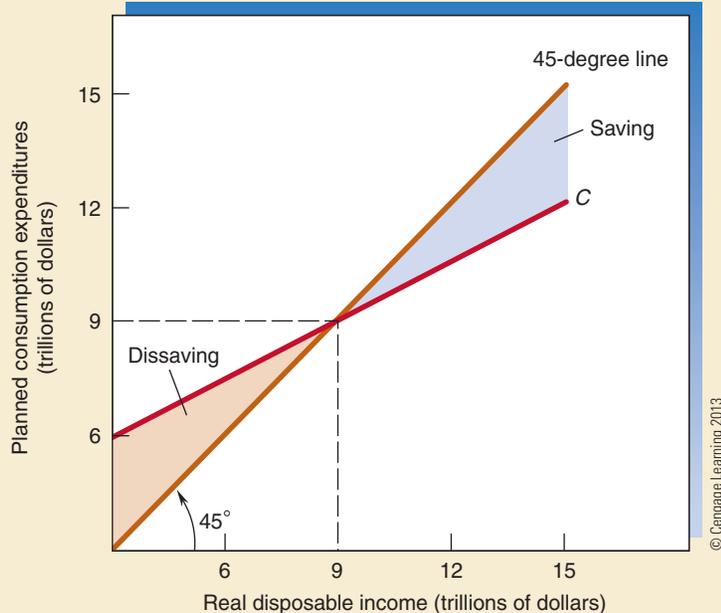

Exhibit 1

Aggregate Consumption Function

The Keynesian model assumes that there is a positive relationship between consumption and income. However, as income increases, consumption expands by a smaller amount. Thus, the slope of the consumption function (line C) is less than 1 (less than the slope of the 45-degree line).

Note: Some instructors will want to assign this feature along with Chapter 11, "Fiscal Policy: The Keynesian View and Historical Perspective."

income are equal. As income expands beyond $9 trillion, household income will exceed consumption and saving will be positive. Note that the consumption function is flatter than the 45-degree line. This indicates that as income expands, households increase their consumption by less than their increase in income.

PLANNED INVESTMENT EXPENDITURES

Autonomous expenditure

Expenditures that do not vary with the level of income. They are determined by factors such as business expectations and economic policy.

Investment (*I*) encompasses (1) expenditures on fixed assets, such as buildings and machines, and (2) changes in the inventories of raw materials and final products not yet sold. Keynes argued that, in the short run, investment is best viewed as an **autonomous expenditure**, one that is independent of people's income. In other words, business investment decisions, at least in the short run, don't hinge on people's current income and spending. Instead, investment is primarily a function of current sales relative to plant capacity, expected future sales, and the interest rate. To isolate the forces pushing an economy toward an equilibrium level of output, the Keynesian model assumes that the planned level of investment expenditure is constant with respect to current income.

PLANNED GOVERNMENT EXPENDITURES

Like investment, planned government (*G*) expenditures in the basic Keynesian model are assumed to be independent of income. These expenditures need not change with the level of income. In the Keynesian model, government expenditures are a policy variable determined by the political process—not consumers' income or spending. Governments can, and often do, spend more than they receive in taxes. As we proceed, we will analyze how changes in government expenditures influence output and employment within the *AE* model.

PLANNED NET EXPORTS

Exports are dependent upon spending choices and income levels abroad. These decisions are, by and large, unaffected by changes in a nation's domestic output level and spending. Therefore, as **Exhibit 2** illustrates, exports remain constant (at $1.2 trillion) when income changes. In contrast, increases in domestic income will induce consumers to purchase more foreign as well as domestic goods. So the level of imports increases as income rises. Because exports remain constant but imports increase as aggregate income expands, a nation's net exports (*NX*) will decline as income rises (see Exhibit 2). Thus, Keynes theorized that there is a negative relationship between a nation's net exports and its aggregate income. When its aggregate income rises, its net exports fall; when its aggregate income falls, its net exports rise.

PLANNED VERSUS ACTUAL EXPENDITURES

Now let's explain the difference between planned and *actual* expenditures. Planned expenditures reflect the choices of consumers, investors, governments, and foreigners, *given*

Exhibit 2

Income and Net Exports

Because exports are determined by income abroad, they are constant at $1.2 trillion. Imports increase as domestic income expands. Thus, planned net exports fall as domestic income increases.

Total Output (Real GDP in Trillions)	Planned Exports (Trillions)	Planned Imports (Trillions)	Planned Net Exports (Trillions)
$13.4	$1.2	$1.00	$0.20
13.7	1.2	1.05	0.15
14.0	1.2	1.10	0.10
14.3	1.2	1.15	0.05
14.6	1.2	1.20	0.0

their expectations about the choices of other decision-makers. Planned expenditures, though, need not equal actual expenditures. If buyers spend a different amount on goods and services from what firms anticipate, the firms will experience unplanned changes in inventories.

Consider what would happen if the planned expenditures of consumers, investors, governments, and foreigners on goods and services were less than what business firms thought they would be. If this were the case, business firms would be unable to sell as much of their current output as they had anticipated. Their *actual* inventories would increase as they unintentionally made larger inventory investments than they *planned*. On the other hand, consider what would happen if purchasers bought more goods and services than businesses expected. The unexpected brisk sales would draw down inventories and result in less inventory investment than business firms planned. In this case, *actual* inventory investment would be less than what was *planned* for by business decision-makers.

Actual and *planned* expenditures are equal only when purchasers buy the quantity of goods and services that business decision makers anticipated they would purchase. Only then will the plans of buyers and sellers in the goods and services market harmonize.

KEYNESIAN EQUILIBRIUM IN THE *AE* MODEL

Equilibrium is present in the Keynesian **AE** *model when planned aggregate expenditures equal the value of actual output.* When this is the case, businesses are able to sell the total amount of goods and services that they produce. There are no unexpected changes in inventories. Thus, producers have no incentive to either expand or contract their output during the next period. In equation form, Keynesian macroequilibrium is attained when

$$\underbrace{\textbf{Total output}}_{\textbf{Real GDP}} = \underbrace{\textbf{Planned } C + I + G + NX}_{\textbf{Planned aggregate expenditures}}$$

For an example of Keynesian macroeconomic equilibrium, let's take a look at the hypothetical economy described by **Exhibit 3**. First, look at columns 1 and 2. At what level of total output is this economy in Keynesian macroeconomic equilibrium? Stop now and attempt to figure out the answer.

The answer is $14 trillion, because only the total output is exactly equal to planned aggregate expenditures. When real GDP is equal to $14 trillion, the planned expenditures of consumers, investors, governments, and foreigners (net exports) are precisely equal to the value of the output produced by business firms. To see this, note that only at $14 trillion do columns 3, 4, and 5 combined equal column 1. At $14 trillion in output, the spending plans of purchasers mesh with the production plans of businesses.

What happens at other output levels? At any output other than equilibrium, the plans of producers and purchasers will conflict. If output is $13.7 trillion, for example, planned aggregate expenditures will be $13.85 trillion—$150 billion more than the current level of output. When expenditures (purchases) exceed output, inventories will decline. Firms will then expand their output to get their inventories back up to normal levels. Therefore, when

TOTAL OUTPUT (REAL GDP) (1)	PLANNED AGGREGATE EXPENDITURES (2)	PLANNED CONSUMPTION (3)	PLANNED INVESTMENT + GOVERNMENT EXPENDITURES (4)	PLANNED NET EXPORTS (5)	TENDENCY OF OUTPUT (6)
$13.4	$13.70	$9.1	$4.4	$0.20	Expand
13.7	13.85	9.3	4.4	0.15	Expand
14.0	14.00	9.5	4.4	0.10	Equilibrium
14.3	14.15	9.7	4.4	0.05	Contract
14.6	14.30	9.9	4.4	0.00	Contract

Note: All figures are in trillions of dollars. Column 2 equals the sum of columns 3, 4, and 5.

Exhibit 3

Example of Keynesian Macroeconomic Equilibrium

All figures are in trillions of dollars. Column 2 equals the sum of columns 3, 4, and 5.

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aggregate expenditures exceed current output, there will be a tendency for output to expand toward the equilibrium output ($14 trillion).

Conversely, if aggregate expenditures are less than current output, firms will cut back on production. For example, if output is $14.3 trillion, it will be greater than planned aggregate expenditures, and excess inventories will accumulate. Of course, business firms will not continue to produce goods they cannot sell, so they will reduce production, and output will recede toward the $14 trillion equilibrium.

EQUILIBRIUM AT LESS THAN FULL EMPLOYMENT

Because Keynesian equilibrium hinges on planned aggregate expenditures and output being equal, it need not take place at full employment. *If an economy is in Keynesian equilibrium, there will be no tendency for output to change—even if output is well below full-employment capacity.*

To see this using our example, assume that full employment is at an output of $14.3 trillion, in Exhibit 3. Given the current planned spending, the economy will fail to achieve full employment. The rate of unemployment will be high. In the Keynesian *AE* model, neither wages nor interest rates will decline in the face of abnormally high unemployment and excess capacity. Therefore, output will remain at less than the full-employment rate as long as insufficient spending prevents the economy from reaching its full potential.

This is precisely what Keynes thought was happening during the Great Depression. He believed that Western economies were in equilibrium at an employment rate substantially below capacity. Unless aggregate expenditures increased, therefore, the prolonged unemployment had to continue—and, in fact, it did, throughout the 1930s.
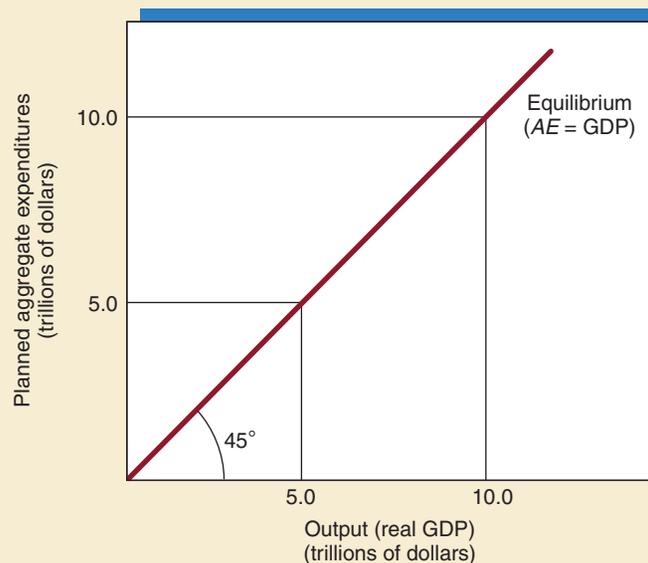
KEYNESIAN EQUILIBRIUM—A GRAPHIC PRESENTATION

The Keynesian analysis is presented graphically in **Exhibit 4**. Notice that planned aggregate consumption, investment, government, and net export expenditures are measured on the *y*-axis, and total output is measured on the *x*-axis. The 45-degree line that extends from the origin maps out all the points at which aggregate expenditures (*AE*) are equal to total output (GDP).

Because aggregate expenditures equal total output for all points along the 45-degree line, the line maps out all possible equilibrium income levels. As long as the economy

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Exhibit 4

Aggregate Expenditures (*AE*)

Aggregate expenditures will be equal to total output for all points along a 45-degree line from the origin. The 45-degree line thus maps out potential equilibrium levels of output for the Keynesian model.

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Aggregate Expenditures and Keynesian Equilibrium

Here the data of Exhibit 3 are presented within the Keynesian graphic framework. The equilibrium level of output is $14.0 trillion because planned expenditures $(C + I + G + NX)$ are just equal to output at that level of income. At a lower level of income, $13.7 trillion, for example, unplanned inventory reduction would cause business firms to expand output (right-pointing arrow). Conversely, at a higher income level, such as $14.3 trillion, accumulation of inventories would lead to lower future output (left-pointing arrow). Given current aggregate expenditures, only the $14.0 trillion output would be sustainable in the future. Note that the $14.0 trillion equilibrium income level is less than the economy's potential of $14.3 trillion.
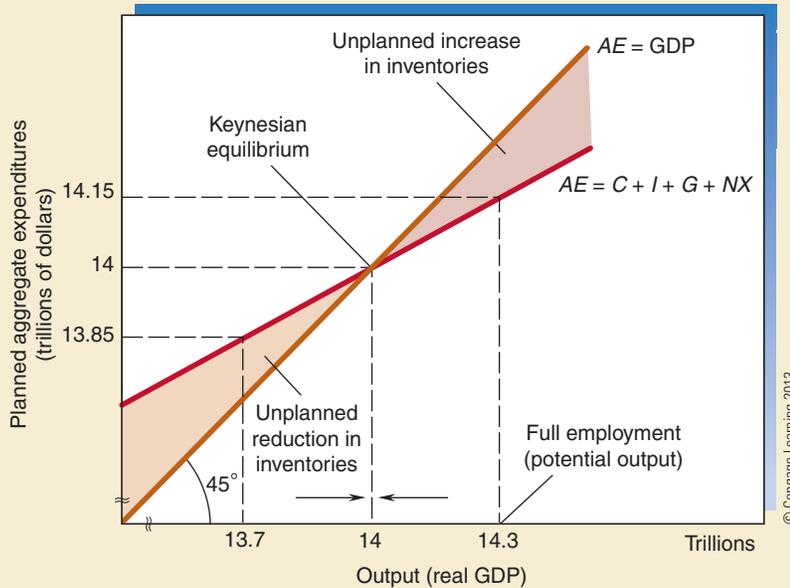
is operating at less than its full-employment capacity, producers will produce any output along the 45-degree line that they believe purchasers will buy. Producers, though, will supply a level of output only if they believe planned expenditures will be large enough to purchase it. Depending on the level of aggregate expenditures, each point along the 45-degree line is a potential equilibrium.

Using the data of Exhibit 3, **Exhibit 5** shows the Keynesian equilibrium in our hypothetical economy. The $C + I + G + NX$ (AE) line indicates the total planned expenditures of consumers, investors, governments, and foreigners (net exports) at each income level. Remember, the aggregate expenditure (AE) line is flatter than the 45-degree line because, as income rises, consumption also increases, but by less than the increase in income. Therefore, as income expands, total expenditures increase by less than the expansion in income.

The equilibrium level of output will be $14.0 trillion, the point at which total expenditures (measured vertically) are just equal to total output (measured horizontally). Of course, the aggregate expenditures function $C + I + G + NX$ will cross the 45-degree line at the $14.0 trillion Keynesian equilibrium level of output. As long as the aggregate expenditures function remains unchanged, no other level of output can be sustained. When total output exceeds $14.0 trillion—for example, when it's $14.3 trillion—the aggregate expenditure line $(C + I + G + NX)$ lies below the 45-degree line. Remember, when the height of the $C + I + G + NX$ line is less than the height of the 45-degree line, total spending is less than total output. People aren't willing to buy as much as is produced. Excess inventories will accumulate, leading businesses to reduce their future production. Employment will subsequently decline. Output will fall back from $14.3 trillion to the equilibrium level of $14.0 trillion. Note that the change in total spending, followed by changes in output and employment, is what will restore equilibrium in the Keynesian model, not changes in prices.

In contrast, if total output is temporarily below equilibrium, there will be a tendency for aggregate income to rise. Here's how: Suppose output is temporarily at $13.7 trillion. At that output level, the $C + I + G + NX$ function lies above the 45-degree line. At this point, aggregate expenditures exceed aggregate output. Businesses are selling more than they currently produce. Their inventories are falling. Excess demand is present. They will react by hiring more workers and expanding production. This will increase the nation's aggregate income. Only at the equilibrium level—the point at which the $C + I + G + NX$ function crosses the 45-degree line ($14.0 trillion)—though, will the spending plans of consumers, investors, governments, and foreigners equal the output of firms. Only this level of output can be sustained.

Notice (from Exhibit 5) that the economy's equilibrium output of $14.0 trillion is less than the full employment output level ($14.3 trillion). At $14.3 trillion, though, aggregate expenditures are insufficient to purchase the output produced. In the Keynesian model, neither falling wages nor declining interest rates will direct the economy back to full employment. Given the aggregate expenditures function, output will remain below its potential. Unemployment will persist. Within the Keynesian *AE* model, equilibrium need not coincide with full employment.

HOW CAN FULL EMPLOYMENT BE ACHIEVED?

If full employment is going to be attained, there must be an increase in aggregate expenditures. As **Exhibit 6** illustrates, full employment can be achieved, if the aggregate expenditure schedule shifts upward to AE_2. Expansionary fiscal policy can be used to achieve this objective. An increase in government spending (holding taxes constant) would directly increase *AE*. Correspondingly, a reduction in taxes could be used to increase the net income

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Exhibit 6

Shifts in Aggregate Expenditures and Changes in Equilibrium Output

When equilibrium output is less than the economy's capacity, only an increase in expenditures (a shift in *AE*) will lead to full employment. If consumers, investors, governments, or foreigners would spend more and thereby shift the aggregate expenditures schedule to AE_2, output would reach its full-employment potential ($14.3 trillion). Once full employment is reached, further increases in aggregate expenditures, like those shown by the shift to AE_3, will lead only to higher prices. Nominal output will expand (the dotted segment of the *AE–GDP* schedule), but real output will not.

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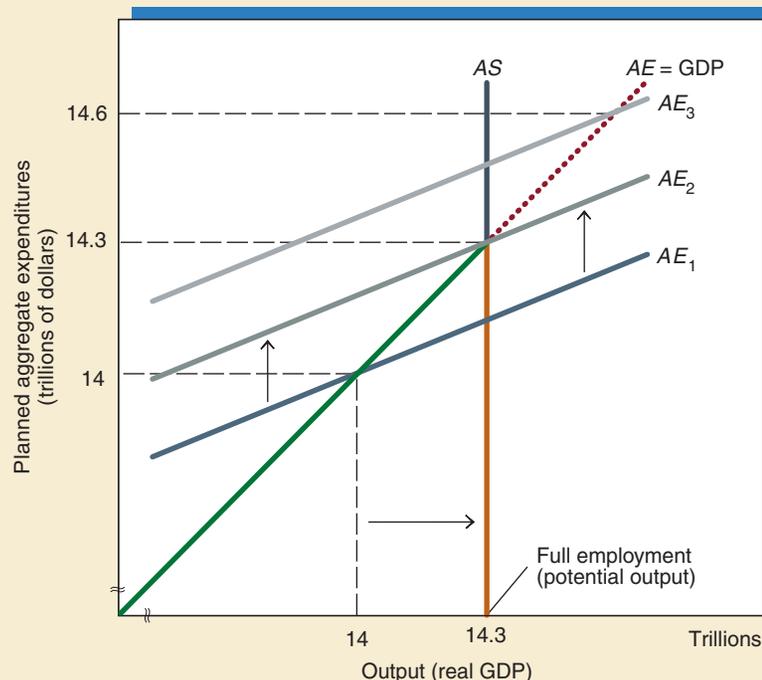
of households and businesses and thereby stimulate the consumption and investment components of AE. Thus, the AE model indicates that expansionary fiscal policy can increase total spending and direct an economy to the full-employment rate of output.

What would happen if aggregate expenditures were to exceed the economy's production capacity? For example, suppose aggregate expenditures rose to AE_3. Within the basic Keynesian model, aggregate expenditures in excess of output lead to a higher price level once the economy reaches full employment. Nominal output will increase, but it merely reflects higher prices, rather than additional real output. Total spending in excess of full-employment capacity is inflationary within the Keynesian model.

Aggregate expenditures are the catalyst of the Keynesian model. Changes in expenditures make things happen. If the economy is operating below full employment, supply is always accommodative. An increase in aggregate expenditures, caused, for example, by an increase in government expenditures, will thus lead to an increase in real output and employment. Once full employment is reached, though, additional aggregate expenditures lead merely to higher prices.

Keynesians argue that control of aggregate expenditures is the crux of sound macroeconomic policy. If we could ensure that aggregate expenditures were large enough to achieve capacity output, but not so large as to result in inflation, then maximum output, full employment, and price stability could be attained. This central point of Keynesian analysis is easily observable within the framework of the aggregate expenditure model.
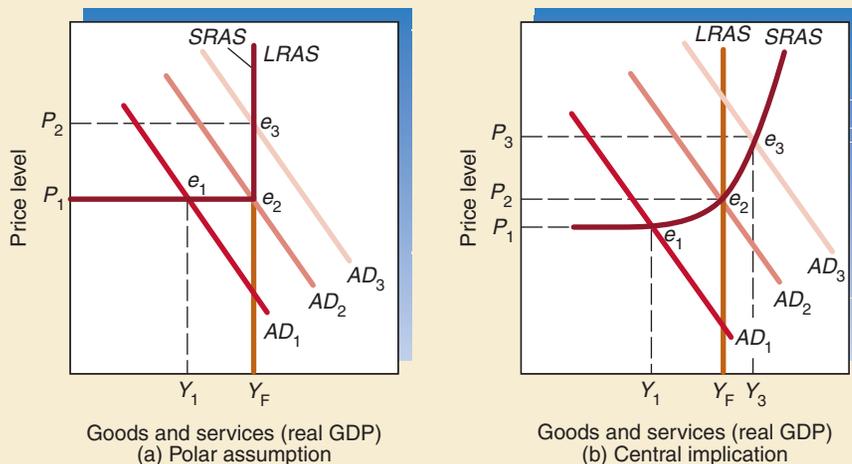
THE AGGREGATE EXPENDITURE AND *AD–AS* MODELS

The key implications of the aggregate expenditure model can also be shown within the aggregate demand/aggregate supply (*AD–AS*) framework. The assumptions of the aggregate expenditure model imply that the short-run aggregate supply curve (*SRAS*) will have a distinctive shape. Part (a) of **Exhibit 7** illustrates this point. Note that the *SRAS* is completely flat at the existing price level until full-employment capacity is reached. This is because the Keynesian model assumes that, at less than full-employment output levels,

Implications of the *AE* Model within the *AD–AS* Framework   Exhibit 7

As is shown in part (a), the assumptions of the aggregate expenditure model imply that the *SRAS* will be horizontal until full employment is reached, at which time it becomes vertical. When output is less than capacity (for example, Y_1), an increase in aggregate demand, shown by the shift from AD_1 to AD_2, will expand output without increasing prices. However, increases in demand beyond AD_2 (like the shift to AD_3) lead only to a higher price level (P_2). Part (b) relaxes the assumption of complete price inflexibility and short-run output inflexibility beyond Y_F. Notice that in part (b), the *SRAS* curve turns from horizontal to vertical more gradually. Part (b) is more realistic of what happens in the real world.

Goods and services (real GDP)
(a) Polar assumption

Goods and services (real GDP)
(b) Central implication

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prices (and wages) are fixed, because they are inflexible in a downward direction. Economists sometimes refer to this horizontal segment as the *Keynesian range* of the aggregate supply curve. However, just as in the *AE* model, once full employment has been reached, real output cannot be expanded beyond the economy's full-employment capacity. Thus, both *SRAS* and *LRAS* are vertical at the full-employment rate of output (Y_F).

Part (a) of Exhibit 7 clearly illustrates the importance of aggregate demand within the Keynesian analysis. The assumptions of the aggregate expenditure model imply that the *SRAS* will be horizontal until full employment is reached, at which time it becomes vertical. When aggregate demand is less than AD_2 (for example, AD_1), the economy will languish below potential capacity. Because prices and wages are inflexible downward, below-capacity output rates (Y_1, for example) and abnormally high unemployment will persist unless there is an increase in aggregate demand. When output is below its potential, any increase in aggregate demand (for example, the shift from AD_1 to AD_2) brings previously idle resources into the productive process at an unchanged price level. Of course, once the economy's potential output constraint (Y_F) is reached, increases in demand beyond AD_2 (such as the shift to AD_3) lead only to a higher price level (P_2).

In the real world, prices are unlikely to remain unchanged when output is substantially below capacity as is implied by a horizontal aggregate supply curve. Similarly, in the short run, an unanticipated increase in demand is unlikely to lead to only higher prices as is implied by the vertical portion of the aggregate supply curve.

Part (b) of Exhibit 7 relaxes the polar assumption of complete price inflexibility until full employment is reached and short-run output inflexibility beyond Y_F. Thus, the *SRAS* curve turns from horizontal to vertical more gradually. This reflects a more realistic view of how real-world changes in aggregate demand will influence output and employment under alternative economic conditions. When an economy is operating well below capacity, the primary impact of an increase in aggregate demand will be on output rather than the general level of prices. Therefore, ***under conditions like those of the 1930s—when idle factories and widespread unemployment were present—increases in aggregate demand will exert a strong impact on output. In contrast, however, when an economy is already operating at or near full-employment capacity, additional aggregate demand (for example, the shift to AD_3) will predictably exert its primary impact on prices rather than on output.***