CHAPTER 2
THE AGGREGATE SUPPLY - AGGREGATE DEMAND MODEL

The first formal macroeconomics model introduced by the text is called the **Aggregate Supply - Aggregate Demand Model**, which will hereafter be referred to as the **AS/AD** model. The **AS/AD** model is useful for evaluating factors and conditions which effect the level of **Real Gross Domestic Product** (GDP adjusted for inflation) and the level of **inflation**.

The model is an aggregation of the elementary microeconomic supply-and-demand model discussed in the previous chapter. Like the microeconomic model, the AS/AD model is a comparative statics model. The model's insights, therefore, are obtained by identifying and initial equilibrium condition, then "shocking" the model by charging one or more of the parameters, then evaluating the resulting new equilibrium.

Introduction to the Aggregate Supply/Aggregate Demand Model

Now that the structure and use of a basic supply-and-demand model has been reviewed, it is time to introduce the Aggregate Supply - Aggregate Demand (AS/AD) model. This model is a mere aggregation of the microeconomic model. Instead of the quantity of output of a single industry, this model represents the quantity of output of an entire economy (or, in other words, national production).

Refer to **Figure 2.1** for an example of the **AS/AD** model. As can be seen, two variables are represented by the model. The quantity variable on the horizontal axis is now represented by real gross domestic product (**Y**). This is the measure of the true value of annual national production, and is adjusted for inflation. The level of price inflation is represented on the upright axis. A suitable economic statistic for this value would be the rate of inflation as determined by the **Implicit Price Deflator**, the value used to compute real GNP from nominal, inflated GNP.[1]

The equilibrium level of real national output (real GDP) is determined by the interaction of the AS and AD curves. This equilibrium also determines the national inflation rate.

Figure 2.1

The **Aggregate Demand (AD)** curve has its traditional negative slope. This implies that, given any amount of nominal income, purchasers will be able to buy more real goods at lower prices than they would at higher prices. Aggregate demand is simply the total of all levels of spending in the national income accounts; consumption, investment, government purchases, and net exports.

The Capacity Utilization Rate and the AS Curve

Look carefully at the slope of the **Aggregate Supply (AS)** curve. As can be seen, it is relatively flat for a considerable part of its length, then turns sharply upward, turning nearly vertical past some point. The relatively flat region of the **AS** curve is the non-inflationary region, whereas the nearly vertical portion is the inflationary region of the AS curve.
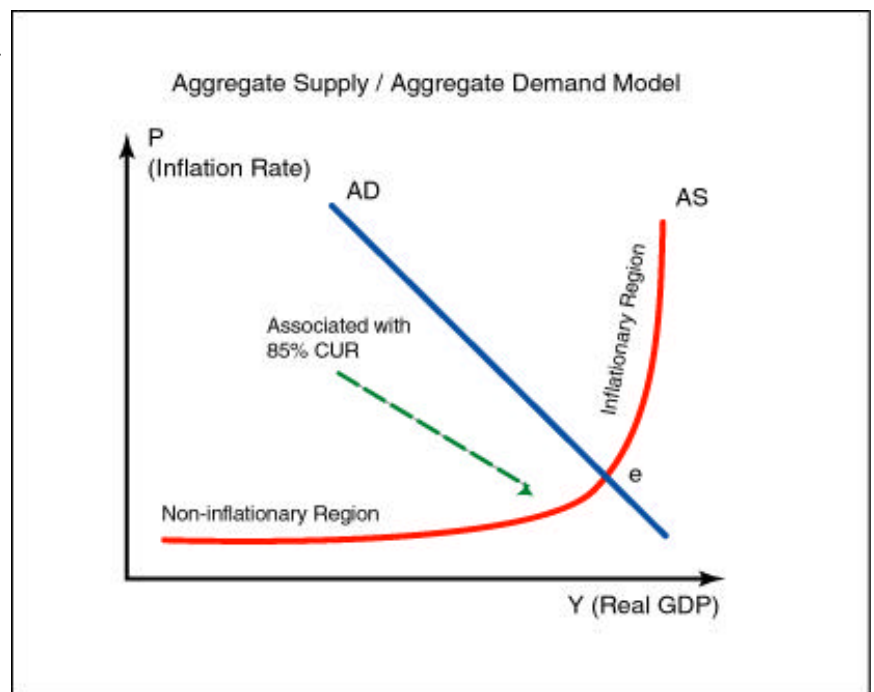
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[1]Some versions of this model use the price level instead of the inflation rate to make the model more consistent with its microeconomics counterpart. Using the inflation rate, as is done here, produces results that are a little more realistic.

The sharp bend in the curve can be associated with an economic statistic called the **Capacity Utilization Rate**. This statistic is a crude measure of the percent of capacity being used by the nation's manufacturers. Theoretically, if an industry is running at 100 percent capacity, all available productive assets are being used. Although certain industries can run at 100% capacity or even above for brief periods of time, the national average, which this statistic represents, is seldom above 90%, and in a typical non-recession year will be between 80% and 85%. Since the 1960s, during recessions it has dropped below 80%. In the recession that ended in 1982, it fell to below 70%.

Why might the economy begin to experience symptoms of inflation when the capacity utilization rate goes above 85%? This figure is a national average, and when the average is this high, certain "heated" industries are likely to be well above 90%. These particular industries are likely to be facing serious pressures on costs as they encounter resource bottlenecks or labor shortages. They may be paying workers overtime, paying higher prices for their raw materials, or encountering costly production inefficiencies. These rising costs eventually translate into higher prices for finished goods, and as this becomes true for more and more industries, price increases become more widespread.

By no means is the capacity utilization rate a perfect indicator of the economy's movement from a non-inflationary environment to an inflationary environment. For one thing, it includes a measure of only manufacturing capacity and hence excludes the important service sector. It could not forewarn, for example, of inflation in the medical services sector. Nonetheless, it can serve as a crude first approximation of the inflationary turning point. If the capacity utilization rate is around 80% or below, inflation is not very likely, where as when this statistic is above 85%, a continued growth in aggregate demand is much more likely to be associated with rising inflation.[2]

Factors Effecting Aggregate Supply and Aggregate Demand

Like the microeconomic supply-and-demand model, changes in equilibria in the **AS/AD** model are caused by changes in the variables that effect supply and demand. Refer to **Figure 2.2**. Again, the variables that are likely to effect supply or demand are listed. The presumed direction of influence is shown with a **(+)** or **(--)** sign, as was done with the microeconomics model.

Again, the relationship between **AS**, **AD** and price are represented by the slope of the **AS** and **AD** curves; changes in all other variables cause the curves to shift right or left.

A review of the list shows some overlap or redundancy. For example, both interest rates and credit availability are related of course, and one might be used to the exclusion of the other. Despite the fact that these are related, there is a difference between them. For example, credit extended by credit cards became more readily available to consumers in the late 1970s and throughout the 1980s because computerization lowered transaction costs. This is an institutional reason for credit availability and would be reflected in a model concerned with showing the effects of this institutional change.

Factors that Effect Aggregate Supply and Aggregate Demand				
Aggregate Demand		**Aggregate Supply**		
1. Income	(+)	1. Costs	(−)	
2. Wealth	(+)	(a) Labor (wages)		
3. Population	(+)	(b) Resource		
4. Interest rates	(−)	2. Investment (prior)	(+)	
5. Credit availability	(+)	3. Productivity	(+)	
6. Government demand	(+)	4. Interest rates	(−)	
7. Taxation	(−)	5. Credit availability	(+)	
8. Foreign demand	(+)	6. Foreign supply	(−)	
9. Investment	(+)	7. Expectations		
10. Expectations		(a) Profits	(+)	
(a) Inflationary	(+)	(b) Inflationary	(?)	
(b) Income	(+)	(c) Interest rate	(?)	
(c) Wealth	(+)	8. Taxation	(−)	
(d) Interest rate	(+)			

(+): An increase in this factor causes the curve to shift **right**.
(−): An increase in this factor causes the curve to shift **left**.

Figure 2.2

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[2]It is worth noting that policy-makers at the Federal Reserve System, the nation's monetary authority, watch this statistic very carefully.

The list shown is not all-inclusive, but is certainly a good starting point. Some of the factors and their respective signs are self-evident and will not, therefore, be discussed further. Others, though, require some comment.

Wealth and Wealth Expectations

It should be obvious that income would be strongly correlated with aggregate demand since that is primarily how demand is financed, but the effect of wealth and expectations of future wealth (and for that matter income expectations) is perhaps not so obvious. The argument here is that consumer perceptions of their own wealth, which is linked to income but not the same thing, and expectations of future wealth will effect their consumption behavior. A reasonable measure of wealth would certainly include consumer savings (including bank deposits and ownership of liquid financial assets, such as stocks and mutual funds) but would also include more abstract and less liquid categories of wealth, such as home equity. Consumers, in other words, with considerable equity (the difference between the market value and what is owed on the loan balance) in their homes have more latitude for spending than consumers who do not. This is especially true if they expect that equity to grow.

One might ask how consumers can increase their spending if the source of wealth is illiquid (not easily converted to cash) or is based upon expected rather than realized income and wealth. One source of potential demand is obvious; savings. The general availability of consumer credit is another. Consumers expecting an increase in income can finance purchases immediately with credit cards or installment credit (such as that used to purchase automobiles) and make payments from future income. Likewise, consumers living in states like New York and California, having experienced substantial increases in home equity (at least up until 1989) perceived that their wealth had grown and could raise their standard-of-living with the popular home equity loans.[3]

In summary, when savings are ample or credit is readily available, spending is not directly restricted by immediate, realized income, and aggregate demand can respond to consumer perceptions of wealth, expected income, or expected wealth.

Government Demand and Taxation

Government demand in this context is the equivalent of Government Purchases of Goods and Services in the national income account. The treatment of *transfer payments* like Social Security, which merely pass income from one private party, the taxpayer, to another, the recipient, must depend on how item 7, taxation, is treated. If transfer payments are excluded from government demand, then so must the proportion of taxation used to finance transfer payments.

Taxation has a negative sign for aggregate demand for two reasons: (1) it reduces disposable income for consumers and, (2) because it lowers business profits, it lowers any investment that might have been financed by those profits. Because from the perspective of business taxation is yet another cost of doing business, at least to some degree, it has the same effect upon aggregate supply as other cost categories. An increase in taxation tends to reduce aggregate supply.

On net then, government spending tends to stimulate demand whereas taxes tend to retard demand. Therefore, a government running a balanced budget would have a roughly neutral effect on aggregate demand and a government running a budget deficit (where expenditures exceed revenues) would have a stimulating effect.[4]

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[3]There are considerable tax advantages of using home equity loans to encourage this activity as well. Interest paid on home equity loans are deductible from taxable income, reducing the consumer's income tax burden.

[4]Unfortunately, nothing is ever quite so simple as this. Some theories claim, for example, that even a balanced budget stimulates the economy. The reader might refer to any discussion of the balanced budget multiplier in any introductory economic textbook.

In the case of deficit spending, there may be some crowding out of private spending because of the impact in the finance markets. This is discussed in the next chapter.

Costs and Productivity

An increase in any category of costs will tend to shift the aggregate supply curve upwards. This might include costs of raw materials, transportation or energy costs, labor costs, or even business taxes.[5]

To help understand the impact of costs upon aggregate supply, refer to **Figure 2.3**. That diagram shows the aggregate supply curve shifting left because producers are facing higher costs. To understand the justification for this, ask the question, "Choosing any level of production, such as **Yx**, at what price will producers be willing to supply that amount given rising costs?". That answer must be, "At a higher price". Generalized, the leftward shift of the aggregate supply curve implies that producers will be willing to supply any given level of output, such as **Yx**, only at higher prices when faced with rising costs. The failure to increase prices to cover rising costs will otherwise drive some producers out of business.[6]
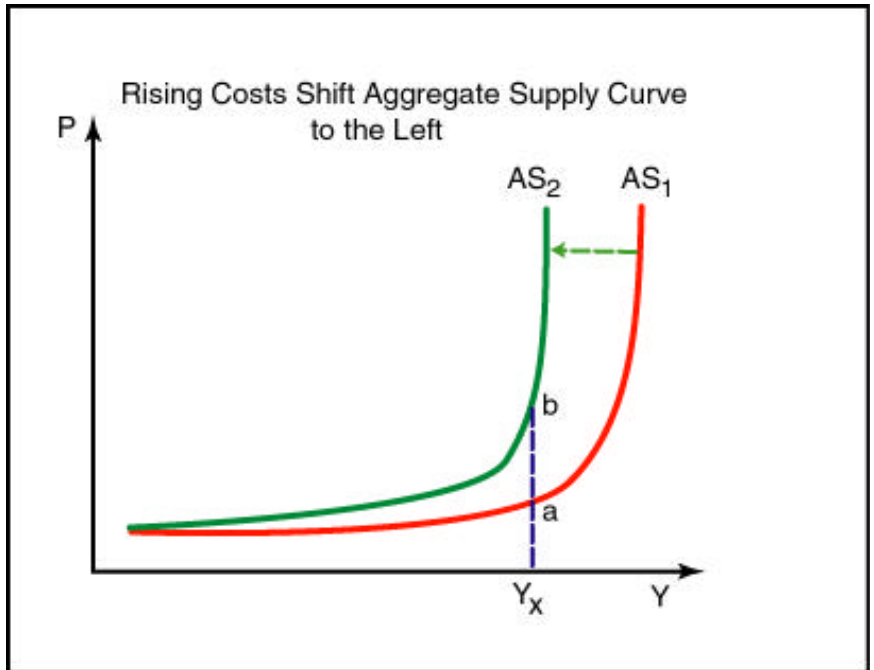
Consider now the impact of an increase in economic productivity. This effect is shown in **Figure 2.4**. Generally, anything which increases the level of output given the level of resources used is increasing productivity.

Figure 2.3

Labor productivity is increased when more output is obtained from the same or less labor. For example, if the automobile industry is able to manufacture more automobiles with few workers, this is said to reflect an increase in labor productivity.

In a mature industrial economy, an increase in productivity is primarily a technological phenomenon. Applied research and development, resulting in automation, new technology and better engineering will raise productivity. This is especially true of labor productivity, where automation allows more output per worker. Nor are productivity increases restricted to the manufacturing sector. Significant gains have been made in the service sector by the widespread use of, for example, computers, telecommunications equipment, and modern office equipment. The productivity of secretaries has been increased by word-processing computers and high-speed, efficient duplicators. Salesmen can be made more efficient with FAX machines and cellular telephones. Because of computerization, services ranging from retail trade to banking have seen significant increases in productivity through the 1980s.

By inspection it can be seen that increases in productivity shift the aggregate supply curve to the right. The implication is obvious and significant. It implies that technological improvement, better engineering, adequate levels of research and development, and anything else that might raise productivity tends to allow an increase in the standard of living, at least as

[5]The incidence of various types of taxes upon costs is a very complicated issue and is normally considered in the context of microeconomics. Sales taxes, for example, will have a different impact than corporate income taxes. Any detailed discussion of this is beyond the scope of this text. Here it is being assumed that business taxes have the same general effect upon supply as costs.

[6]This explanation requires one more qualification. Since the inflation rate is being represented on the vertical axis, it is more accurate to say that an increase in the rate of cost inflation will shift the aggregate supply curve to the left.

measured by real national output, while at the same time working against inflationary pressures. Productivity gains provide the ultimate long-run salvation for a mature economy.

Consider, for example, the impact of demands for higher wages in an economy that is not experiencing productivity gains compared to one that is. Workers have the right to expect an increase in their standard of living over time, and they will try to raise their incomes through wage increases.

Wage increases will raise income and, hence, cause aggregate demand to rise (shifting the aggregate demand curve to the right in the model). Because wages are part of the cost structure of doing business, the aggregate supply curve should shift right. As **graph (a)** of **Figure 2.5** demonstrates, if the wage increases occur when the economy is running at near-full-capacity (i.e. in the inflationary range of the aggregate supply curve) and there is no productivity gain, the result is almost pure inflation with no substantial increase in the standard of living. Worker's expectations of higher real income are then disappointed by inflation. Nominal wages rise, but purchasing power is eroded by general inflation.[7]

However, if productivity gains have been sufficient enough to offset the impact of rising wage costs, the aggregate supply curve will shift right, as shown in **graph (b)** of **Figure 2.5**. In this case the economy experiences non-inflationary growth, and worker expectations for higher real income (and a higher standard of living) are satisfied.

A rather important economic lesson is congealed in this example. Aspirations for a higher standard of living are common in a mature economy, and can manifest themselves in ways ranging from agitation for higher wages to the extensive use of credit. Despite the avenue chosen and the best of intentions, though, the aggregate desire to raise the standard of living by
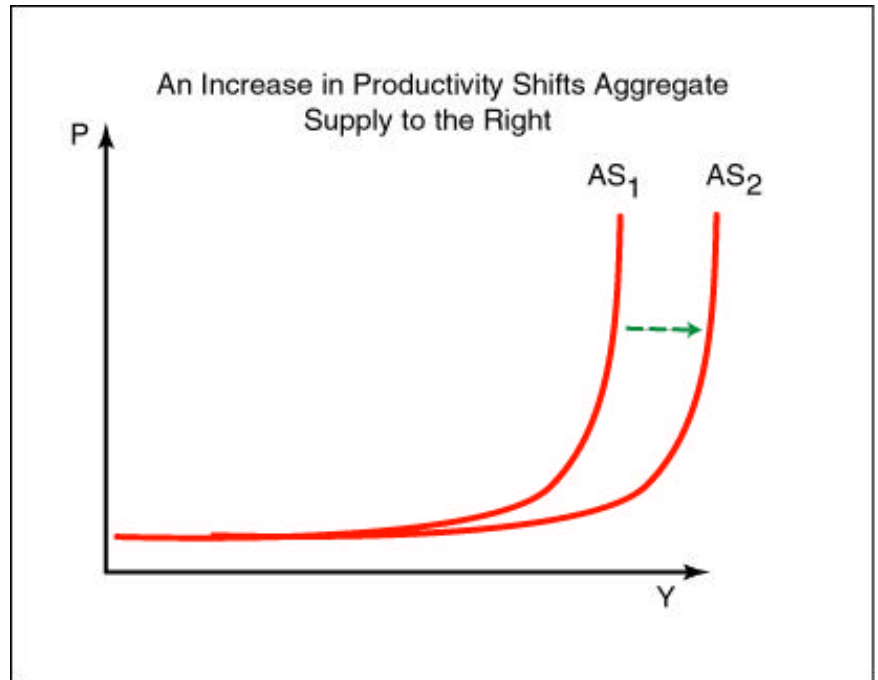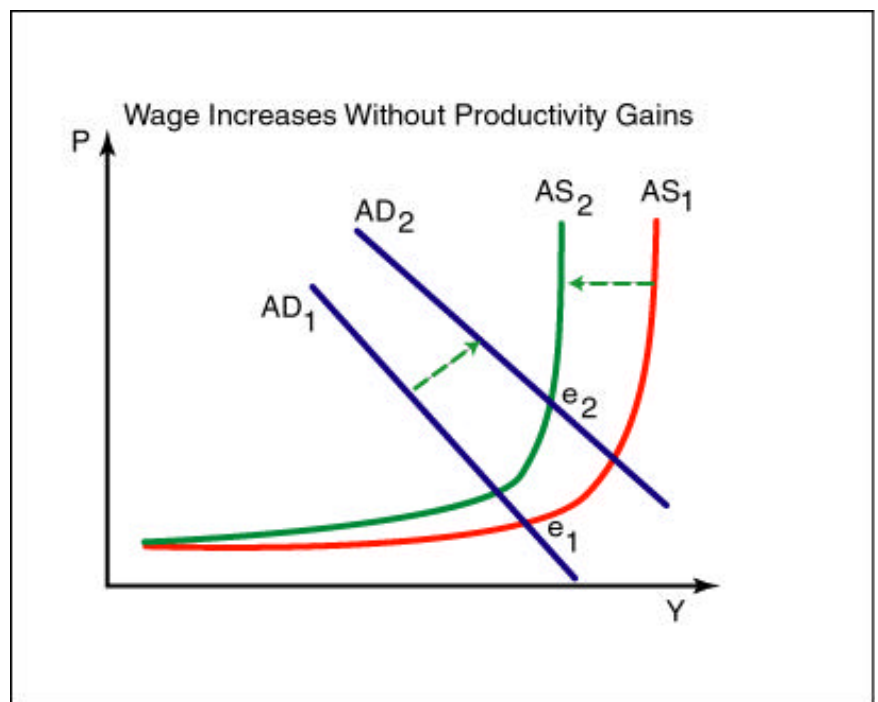

Figure 2.4

Figure 2.5 Graph (a)

[7]Note that this argument depends upon the aggregate demand curve being located in the inflationary region of the aggregate supply curve. If the aggregate demand curve were located well back on the non-inflationary range of the aggregate supply curve, when the capacity utilization rate is, say, below 70%, this argument would not obtain. Wage increases or other stimulants to aggregate demand may very well be justified in a severe recession or depression. Under such circumstances the economy has a lot of latitude for non-inflationary growth.

"demand-side" means will only result in inflation and unless the economy is expanding its means to produce higher levels of output. As will be seen later, this tension does play a partial role in modern business cycles.

Although most of the emphasis in this discussion has been on the productivity variable, another in the list, previous investment, plays a nearly identical role. Obviously productivity and previous levels of business investment are strongly related.

One final comment should be made. To say that productivity gains are necessary does not imply that economic growth must be associated with the ever-larger production of resource-intensive commodities. In an age of resource depletion and serious environmental concerns, future productivity gains will (or should) be of the sort that enhances the level of economic service provided by the economy while using fewer natural resources. Progress in this area is

Figure 2.5 Graph (b)

already well underway. Automobiles are better and safer now, for example, than two decades ago, yet they weigh less, burn less fuel, and waste fewer resources. Growth, in other words, can be accomplished with resource savings. That is what productivity measures.
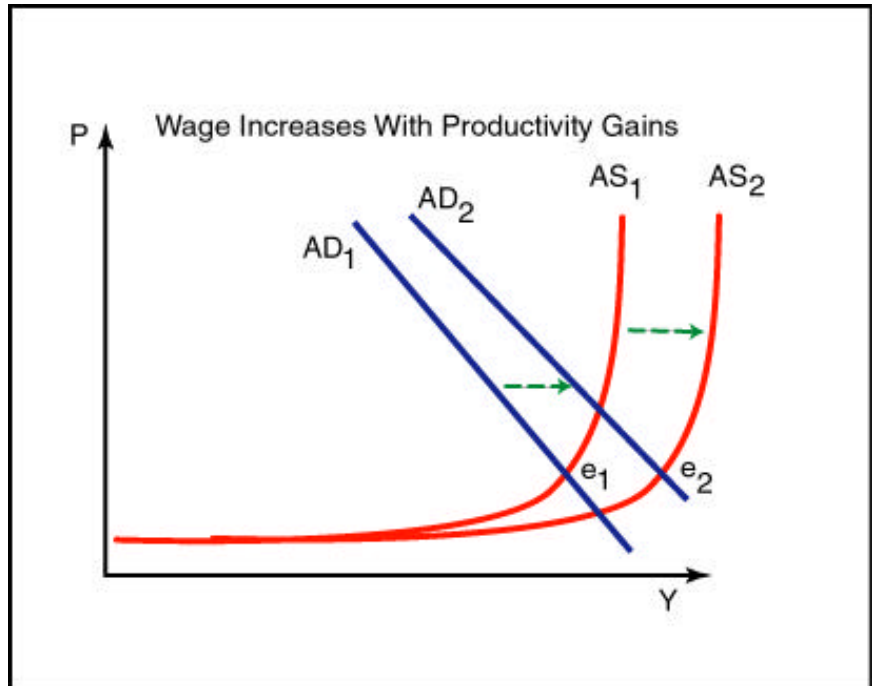
Expectations and the Aggregate Supply Curve

When referring to the list of factors that effect the aggregate supply curve, it can be seen that both inflationary and interest rate expectations have an ambiguous effect upon the aggregate supply curve, hence the **(?)** sign associated with them. The effect of these expectations upon production decisions will probably depend upon the type of business. Businesses with large inventories, for example, might accelerate production in an environment of inflationary expectations (or accelerate purchases if running large resource inventories for their production). Business with low or no inventories but experiencing labor shortages may, in contrast, cut back production (or avoid expansion) if they expect their labor costs to rise. In the case of interest-rate expectations, real estate construction might slow if interest rates were expected to rise (because high interest rates discourage final sales), but in capital goods formation, businesses might accelerate their debt-financed expansion plans in order to finance at current lower rates rather than anticipated higher rates. Therefore the net effect of these expectations upon aggregate supply is ambiguous.

Applications of the AS/AD Model to
Business Cycle Analysis

Now that the **AS/AD** model has been developed, it can be applied to certain economic questions that are asked in the evaluations of business cycles. The examples provided below are typical. More will be provided in their proper context throughout the text.

In this section, for each issue considered, a question will be posed and then addressed using the **AS/AD** model. Again the reader is reminded that a model will not provide the final, decisive answer on a complex question. The model will instead provide perspective and insight.

Here are the questions that will be considered in this section:

1. How is a business cycle represented by this model?
2. Will a stimulation to aggregate demand cause growth or inflation?
3. How can a business cycle result from disappointed consumer expectations?

4. How can stagflation be explained by this model?

This series of questions is not all-inclusive. Certain policy questions can be addressed by this model, but those will be presented in the chapters on policy.

1. How is the business cycle represented by this model?

Refer to **Figure 2.6**. The business cycle in the **AS/AD** model is shown by the movement of equilibria over time as the **AS** curve, the **AD** curve, or both shift over time. **Figure 2.6** shows only a plotting of equilibrium points. The **AS** and **AD** curves are not shown (only their intersections). It should be remembered that aggregate demand is usually more volatile than aggregate supply, so most of the shift in equilibria would like come from movements of the **AD** curve.

Economic expansion is shown as a movement of the equilibrium from left to right because such a movement represents growth in real GNP. A recession, in contrast, is shown as a movement in the opposite direction, from right to left, because that represents a contraction of real GNP (real GNP is falling, which implies the growth rate is negative). An upward movement of the equilibrium represents an increase in the rate of inflation, whereas a movement down represents a decline in the rate of inflation.
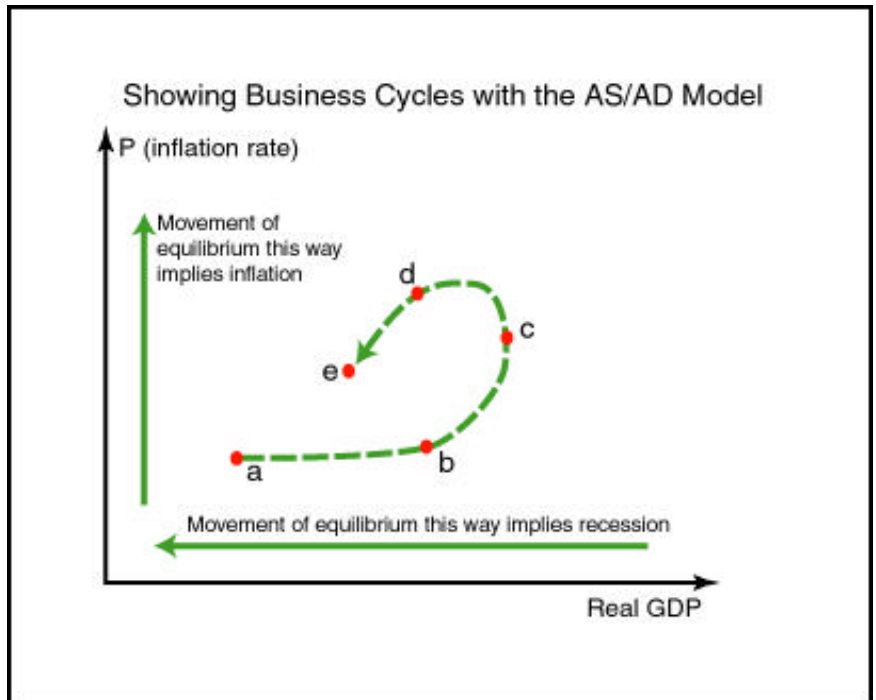

Figure 2.6

Consider point 'a' in **Figure 2.6** as the beginning point for a recovery, near the trough of the recession. The movement from 'a' to 'b' represents the normal and healthy phase of recovery and expansion. There is substantial growth in real GNP and a moderate increase in price inflation. The latter condition need not necessarily be present - it is conceivable that the rate of inflation could remain constant or even decline under unusual circumstances. What is shown is the more typical case. This movement from 'a' to 'b' would normally be mostly due to a shift right in **AD** as demand grows (and would be reflected in an increase in the capacity utilization rate) but there would also be some shift to the right by the **AS** curve as investment and productivity gains increased the economy's capacity to provide goods.

If the late phase of the expansion moved into a strongly inflationary phase (as often the case as not), this would be reflected by a movement in equilibria such as that from 'b' to 'c'. In this late phase of the expansion, there is less real growth and higher inflation rates. Obviously the **AD** curve has moved into the inflationary range of the **AS** curve. At point 'c' maximum real growth has been reached and the cycle is at its peak.

What happens next depends upon whether inflation continues for awhile after the economy begins to recess (the typical case in the modern era) or whether it immediately begins to abate. The former case is represented in **Figure 2.6** as the movement from 'c' to 'd'. There is a recession because real GNP is falling, but the inflation rate continues to rise. Finally, past point 'd' the inflation rate abates as the recession continues. In a mild recession, the final "leftward" resting point of the equilibrium will be far to the right of the original point 'a' and probably point 'b'. Only in a severe depression would real GNP fall back as far as the starting point of the previous recovery. Remember, recessions are relatively mild compared to expansions.

The path shown is meant to be representative. Each historical cycle would be a little different. Certainly in all business cycles there is first a movement in the equilibrium from left to right during the expansion, then a movement from right to left during the contraction. The mix of inflation with the cycle varies from cycle to cycle, however which would alter the shape of this path from one cycle to the next.

2. Will a stimulation of Aggregate Demand Cause Growth or Inflation?

As stated above, historical inflation rates are not perfectly consistent over the phases of different cycles. Inflation, nonetheless, is intricately related to the dynamics of the cycle. Because aggregate demand is relatively volatile compared to aggregate supply and is so easily stimulated by policy, the question posed above is strongly related to business cycle dynamics.

An inspection of the list of factors that can effect aggregate demand in **Figure 2.2** expose many candidates for a stimulation to aggregate demand. In the area of policy, for example, either an increase in government spending or a decrease in taxes can shift the **AD** curve right. Expansionary monetary policy, increasing credit availability and reducing interest rates, can do the same. So can a growth in consumer confidence, represented by an increase in income expectations. In any of these cases, the **AD** curve would shift sharply right.

For the sake of discussion, assume the stimulation came from expansionary monetary policy. With such a stimulus, interest rates would drop and both credit and money supply growth rates would surge. Aggregate demand would respond by shifting right.

Figure 2.7 Graph (a)

Would this necessarily cause an inflation? Simplistic theories about the connection of monetary growth rates to inflation rates say yes - inflation is caused by "too much money chasing too few goods". Therefore, if the money supply growth rate is high, inflation will follow.

Complicated economic relationships are seldom well represented by simple ideas or slogans, however. **Figure 2.7** shows why this is true when considering the relationship between expansionary monetary policy (and high credit and money supply growth rates) and inflation.

If a strong stimulus to aggregate demand, such as an expansionary monetary policy, is applied near the trough of a recession, as is shown in **graph (a)** of **Figure 2.7**, there is plenty of room for non-inflationary real growth with very little inflation. If the starting point, in other words, is well back on the non-inflationary range of the **AS** curve, inflation is not likely to be a problem.
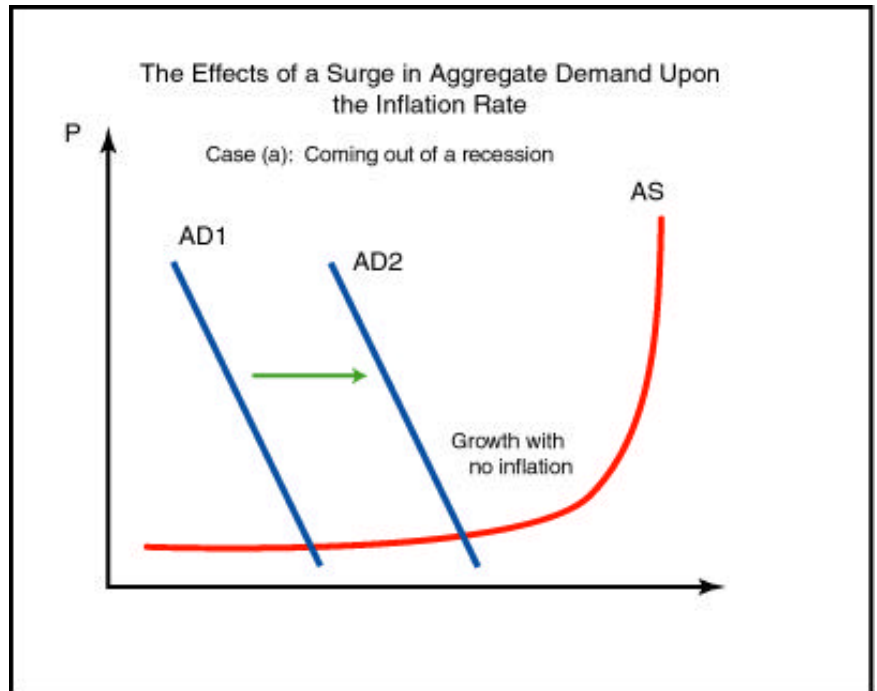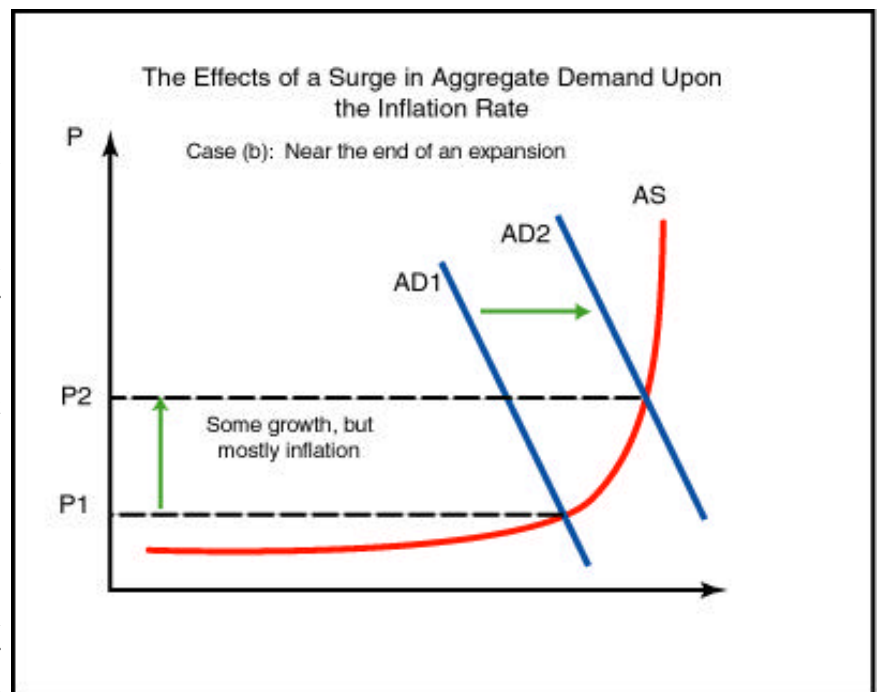
Figure 2.7 Graph (b)

In the real economy this might imply that the capacity utilization rate, at the starting point of the stimulus, is unusually low - perhaps below 70%. Likewise the unemployment rate is likely to be high and resources available. There would not be many bottlenecks, labor shortages or severe cost constraints in the economy. With their excess capacity, manufacturers could satisfy the resulting surge in sales by utilizing existing capacity. Inflationary pressures would not emerge.

If on the other hand, the same monetary stimulus were applied well into the expansionary phase of the cycle, as is shown in **graph (b)** of **Figure 2.7**, where excess capacity is diminished, resource and labor constraints are emerging, or, in other words, when the economy is moving into the inflationary region of the **AS** curve, inflation will be the result. The stronger the stimulus, the higher will be the inflation rate and the less will be the growth of real GNP.

Furthermore, if the expansion is inflationary, as shown in **graph (b)**, the result obtained there is not the end of the story. The movement into the inflationary range of the **AS** curve implies that in the real economy, inflation would gradually be experienced by the general population. According to the theory of adaptive inflationary expectations, robust inflationary expectations would be formed as consumers experienced more inflation. This might transpire over a few months. This would likely provide a secondary stimulus to aggregate demand (and might possibly effect aggregate supply as well, contracting it). The final result is shown in **Figure 2.8.**

The initial inflation caused by the monetary stimulus is shown as the movement in the **AD** curve from **AD** to **AD2**. It results in an increase in the inflation rate from **P1** to **P2**. As inflationary expectations begin to be formed from this experience, however, a secondary, additional stimulus effects aggregate demand, moving the **AD** curve out to **AD3**. This continued surge in inflation, from **P2** to **P3**, reflects the effect of inflationary expectations. Such expectations, therefore, have the effect of compounding the inflation.

This particular scenario, as it was described, assumed the formation of adaptive expectations, which are formed from experience. Had national expectations been assumed (probably not appropriate in this context), the final effect would have been the same, but the result would have transpired in far less time. Instead of learning from inflation, the inflationary effects of the monetary stimulation would have been deduced directly and immediately, and the expectations would have been formed and demand shifted over a very short period of time.
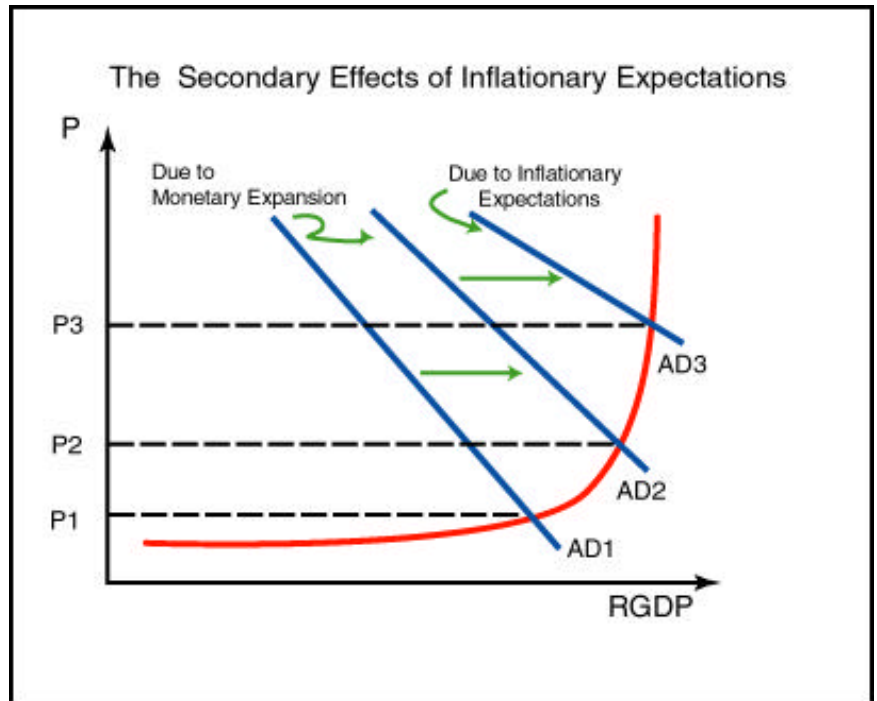

Figure 2.8

These are two general lessons to be learned from this application. First, the impact of a demand-stimulating policy (or any other condition that stimulates aggregate demand) will depend upon the economic context in which the stimulation takes place. To be more particular, if the stimulation occurs deep in a recession, the effect is almost entirely helpful, whereas in the heated phase of the cycle, it is harmful.

Second, the dynamics of an inflationary phase are complex because of the role played by expectations. Expectations tend to compound economic problems, as they have here, making solutions more elusive. This example provides one of the reasons why the Federal Reserve System, the nation's monetary authority, considers it wiser strategy to try to prevent an inflation, which might involve erring on the side of caution, rather than to let the inflationary dynamics begin and then try to cure the inflation.

3. How can a Business Cycle Arise from Disappointed Consumer Expectations?

As described before, the formation of expectations can strongly effect the dynamics of a business cycle. Expectations can both initiate a cyclical trend or can amplify or mitigate the amplitude of the cycle, making a recession worse or milder, depending upon the types of expectations and how they are formed. Without question expectations will effect the timing of a cycle.

Figure 2.9 provides an example. In this case, the formation of consumer expectations of rising income and wealth provide the dynamics of the cycle.[8]

The Effect of Disappointed Consumer Expectations

(a)

Heated economic expansion causes income to grow rapidly, producing high income expectations. Rising prices build home equity values, producing high wealth expectations.

(b)

Expecting both income and wealth to continue to grow rapidly, consumers borrow heavily and spend. AD grows more. Wealth and income rise, but not as much as debt, and are not equal to expectations.

(c)

Consumers experience high debt-to-income ratios (see graph d) and cut back on spending to lower the debt burden. Economy goes into recession (from **c** to **d**) and expectations are disappointed. Because expectations are disappointed and because the debt-to-income ratio does not improve, spending falls further (from **d** to **e**).

(d)

When consumers finance with debt, debt-to-income ratios rise, as from **a** to **b**. If expectations of income are robust, consumers continue their borrowing (from **b** to **c**). If wealth and income expectations are disappointed, resulting in a decline in spending, as represented in graph (**c**), the debt to income ratio still rises (from **c** to **d**) because income falls faster than debt. This has the potential to add to the depth of a recession. The ratio only falls (to **e**) if debt growth is cut severely.
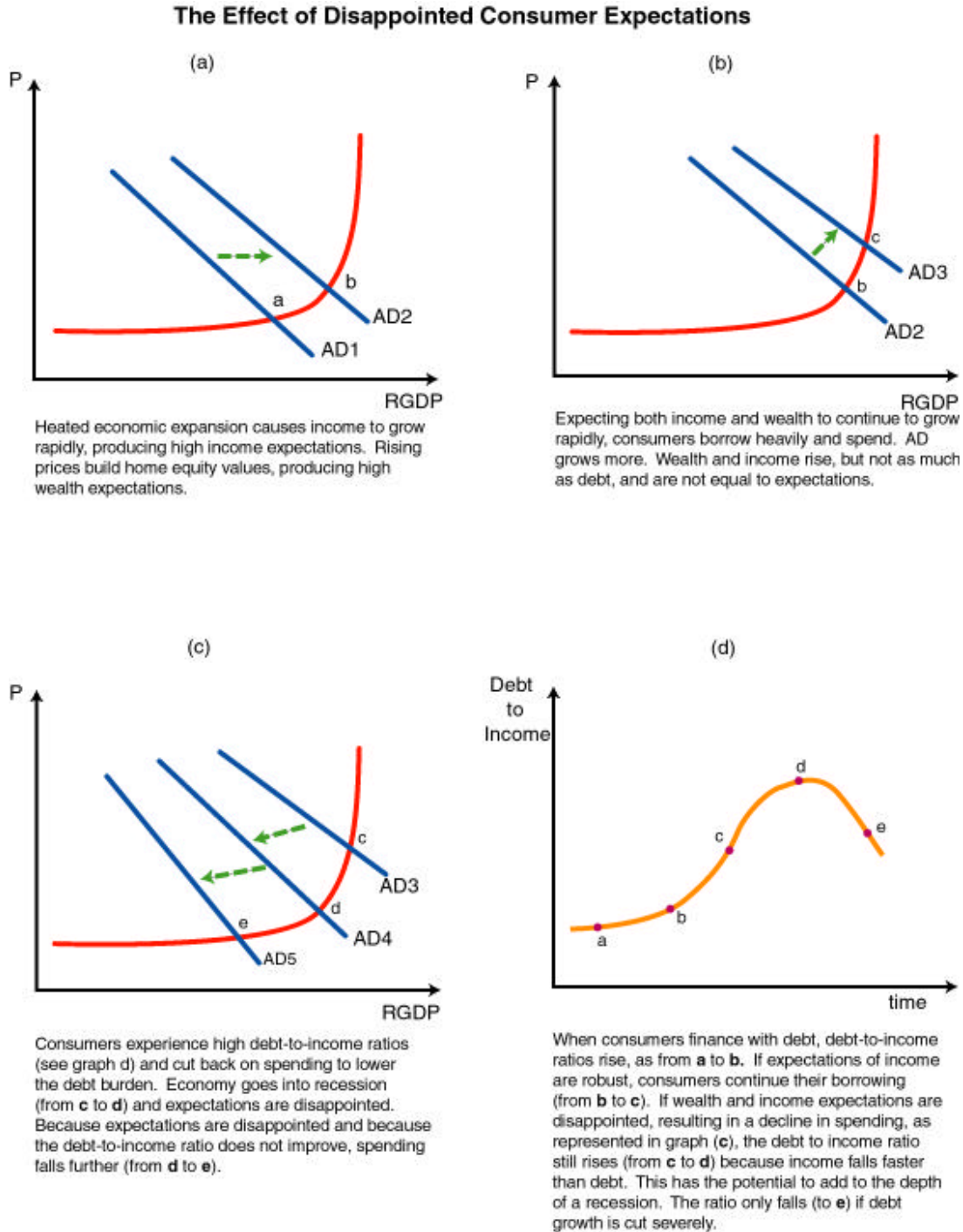
Figure 2.9

Suppose in the final months of the expansion demand growth is very high for traditional reasons - all sectors are spending freely. This is shown in **graph (a)**. It is during this phase that the economy and incomes are growing very rapidly,

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[8]There is some evidence from preliminary data that the recession beginning in 1990/91 followed, roughly at least, the scenario described below.

perhaps above 5% in real terms. Consumers slowly develop adaptive expectations that their incomes will continue to rise at these high rates. Prices are also beginning to rise. Suppose the price increases are not evenly spread and prices for homes are rising higher than prices on average. Consumers who own homes see their equity grow (which is perceived as wealth) and this contributes to the formation of higher wealth expectations.

In **graph (b)**, both income and wealth expectations are now robust, and consumers begin to borrow heavily to finance many of their purchases, especially of consumer durable goods, home improvements, vacations, and similar discretionary expenditures. In some cases they borrow against the equity in their homes. As shown, the economy becomes more heated. Fewer of the gains, however, are in real income. The inflation rate rises.

If consumer expectations have been unrealistic, their debt/income ratios will be rising over this phase of the cycle. This means, of course, that consumer debt is outpacing their income, and the burden of servicing that debt, normally through monthly payments, takes a growing percentage of disposable income. This is shown in **graph (d)**, where the rates of debt-to-income is charted over the cycle. When the economic equilibrium moved from '**b**' to '**c**' in **graph (b)**, the debt-to-income ratio moved from '**b**' to '**c**' in **graph (d)**.

With their income expectations disappointed and heavily indebted, consumers begin to feel burdened by their debt, especially when they see that their incomes are not rising fast enough to allow them to easily service their debt. Their equity (hence wealth) may still be rising, but this does not provide them with the cashflow to service debt. Therefore, they try to reduce their debt by cutting back on spending. If this is an endemic problem in the economy, demand can fall enough to initiate a recession, as is shown in **graph (c)** by the movement of the **AD** curve from **AD3** to **AD4** and the equilibrium from point '**c**' to point '**d**'.

Unfortunately, this is not the end of the story. As the rate of inflation falls, wealth expectations are also disappointed, since equity growth either stabilizes or actually falls. This further discourages spending.

More important, even through consumers are trying to rectify their debt-to-income ratios by reducing debt through reducing spending, it is ironically possible in this kind of environment for the debt-to-income ratio to continue to rise, contrary to consumer desires. This is because the fall in income due to the recession is greater than the reduction of debt that caused the recession. Mathematically, for the ratio of debt to income, although the numerator (debt) is falling, the denominator (income) is falling faster, causing the ratio to rise. This unwanted development is shown in **graph (d)** as the movement in the debt/income ratio from '**c**' to '**d**'. Again, this is happening during the recession. Therefore, there is a secondary effect on spending, and the recession becomes deeper, moving from equilibrium '**d**' to '**e**'. At some point the recession stabilizes (perhaps for some other reason, such as anti-recession policy), income stabilizes, the debt-to-income ratio stabilizes (graph (**d**), point '**e**') or even drops, and the retraction stops.

The leverage in this recession is caused in part because when consumers try to reduce their debt/income ratios they inadvertently increase it. This paradox of results being different from intentions, commonly found in economics, might best be explained by the example of a single family. Suppose in a family both husband and wife work and the husband occasionally works overtime. Family income rises and their home equity rises. Feeling their new prosperity, the couple make home improvements, buy a new auto, some furnishings, and finance a vacation partly with debt, including a home equity loan. They eventually discover their debt burden is far higher than they anticipated and they have trouble making payments. Perhaps the husband's overtime is reduced. They decide to cutback sharply on spending to pay off some of their debt. If this problem is, however, endemic, and many consumers are doing it, a recession results. The effect filters back to this family. Overtime is eliminated and perhaps one or both are temporarily unemployed. Certainly there is a loss of income. Well into the recession the family realizes, much to their grief, the debt burden is heavier than ever, and this is true for millions of consumers.

Why Expectations are Sometimes Wrong

The previous example depended upon the theory of adaptive expectations for the explanation. Expectations were slow to form and were learned from experience. Consumers formed expectations of rising incomes upon their recent experiences of income growth. This is a somewhat "impressionistic" view of the formation of expectations.

Critical to the dynamics of the cycle scenario just described was the point that consumer expectations were too optimistic - their expected future wealth and income did not materialize. This introduces the question, "How could such a large group of consumers be so incorrect?"

Figure 2.10 provides the answer to this question. If the theory of adaptive expectations is correct, if the consumers experience a few months or years depending upon the variable) of high growth rates of some key variable, they will begin to

expect more of the same. **Figure 2.10** is generalized to refer to any cyclical variable that might give rise to adaptive expectations. Suppose for the sake of discussion, the variable in question is consumer income. As the illustration shows, if consumers experience a few years of high income growth, represented by the movement from '**a**' at time 't_0' to '**b**' at time 't_1' (say five years later), they will expect income to continue to grow at approximately the same rate, expecting it to be at level '**ce**' at time 't_2' (a few years in the future). They then adjust their economic behavior to these expectations. If the growth rate of income then tapers off for any reason, and '**ca**' is the actual level of income realized at time 't_2', then consumer expectations are disappointed.

As shown in the bottom of **Figure 2.10**, expectations can work both ways. If income growth, to use that example, has been flat for a few years, then expectations will be weak, as shown. Then if income begins to rise, it is perceived as a windfall.

Obviously, the shorter the time horizon for the formation of adaptive expectations, the more strongly expectations are likely to be influenced by recent experience and short-run trends. Consequently, short-sighted or myopic expectations are likely to add volatility to normal cyclical events.
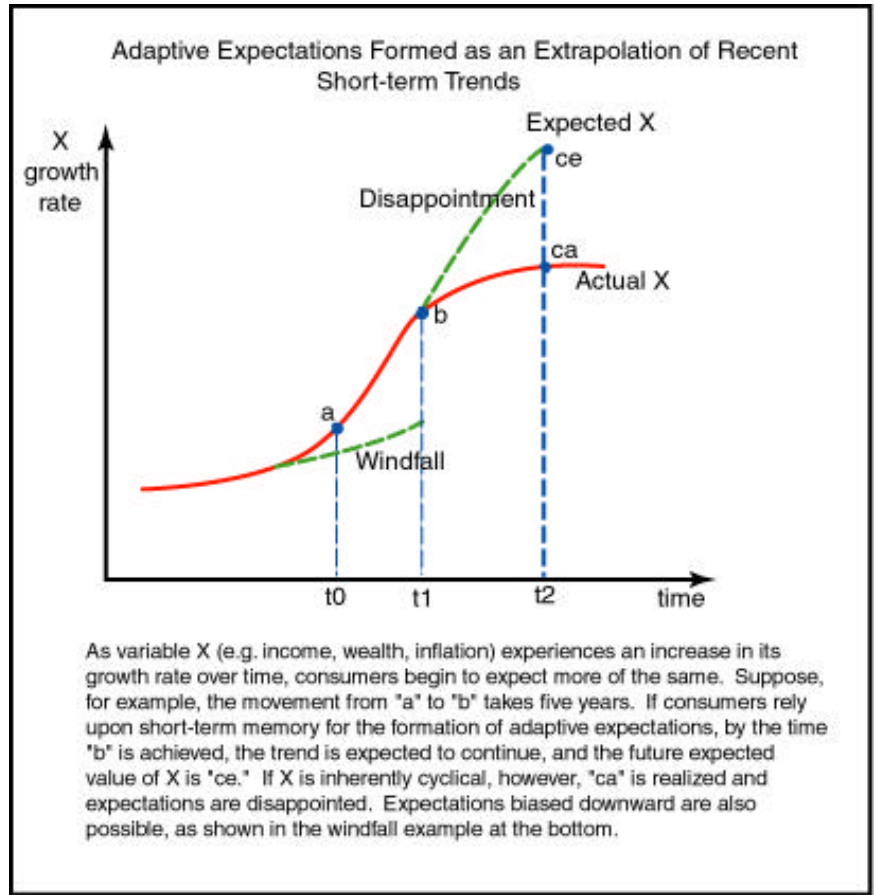

Figure 2.10

4. How Can Stagflation by Explained by this Model?

Stagflation is the combination of inflation and recession and is, hence, the worst possible combination in the cycle. At least during an ordinary recession, prices tend to fall. However in some recessions inflation peaks near the trough of the cycle.

The combination of inflation and recession is relatively easy to explain with the **AS/AD** model however. Refer to **Figure 2.11**. The **AS** curve is shown shifting backwards, from **AS**, to **AS2**, causing the economic equilibrium to move from '**a**' to '**b**'. As can be seen, the new equilibrium is associated with a higher inflation rate and a reduction in real output (by definition, a recession). This combination is called stagflation.

The shift backward in the **AS** curve would be regarded as a rare and unusual event.
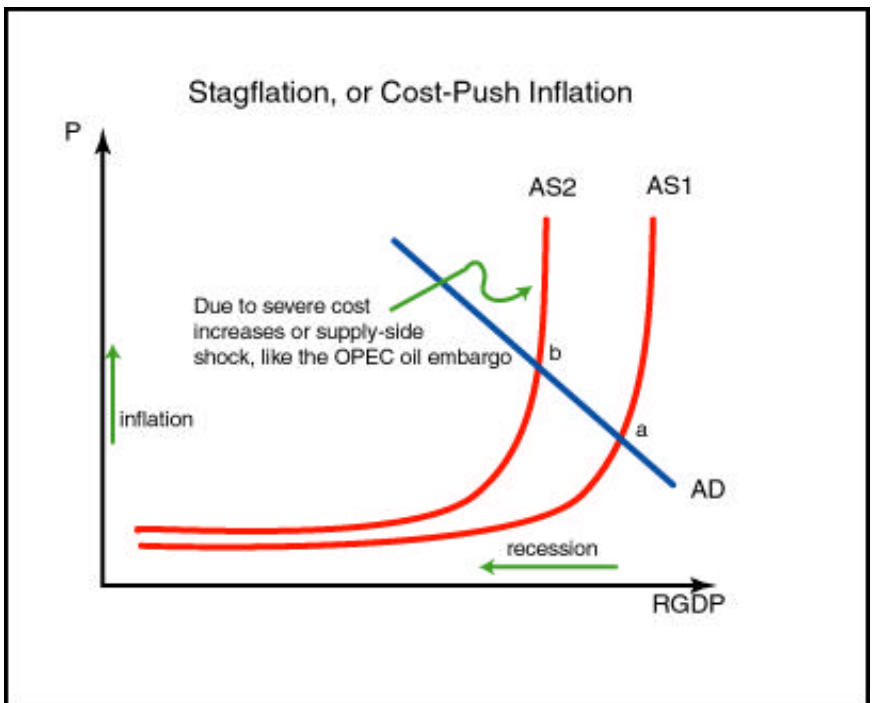

Figure 2.11

As stated previously, the **AD** can be regarded as relatively volatile, but the **AS** curve is much more stable. Normally it drifts to the right over time as investment and productivity expand the economy's capacity to supply goods and services. Any sizeable contraction would be unusual.

A huge short-run impact upon costs, however, can have this effect. The OPEC petroleum embargo in the 1970s, for example, may have had this effect. The first full embargo was in 1973 and the second in 1979, both coming just prior to recessions. The embargo restricted supplies of petroleum coming into the United States, and prices for energy, gasoline and other petroleum fuels, synthetic made from petroleum, and so forth, shot up sharply. Petroleum and energy is such an integral part of the economy that the cost structure was "shocked" to some degree.

Any severe resource constraint can have this effect. If there is, for example, a critical shortage of skilled labor in the future, pushing up wage costs, stagflation might return and would be explained in much the same way as the explanation provided in **Figure 2.11**. At a regional rather than national level, such as in the Western States, a severe shortage of water might have the same effect.

A Cautionary Note

Other applications of the **AS/AD** model will be shown in later chapters. The reader is reminded that the model can't possibly provide a full explanation for cycle phenomena. It is merely a template which frames up the discussion and offers insight. The application on stagflation, for example, hardly provide an exhaustive explanation of the complicated causes of the recessions in the 1970s and early 1980s, for example. It does suggest, however, that the petroleum embargo contributed to the unusual character of those recessions. So long as the model's limits are recognized and results interpreted as suggestive rather than definitive, the **AS/AD** model can be a useful tool of analysis.

As a courtesy but not as an obligation, the author would like to informed by email at *evans@hmc.edu* of any use of this chapter in a classroom context, and would appreciate comments suggestions for improving the content.