Chapter 13

How does money affect the economy?

In the previous chapter, we explored where our money comes from, and how the supply of money is largely controlled by the Fed. In this chapter, we will see how changes in the money supply, or more accurately, changes in the growth rate of the money supply, affect the entire economy. Money may not make the world go around, but it sure makes the economy go up and down.

Before we start to understand how money affects the economy, it is worth noting that the Fed can only change three things - the reserve ratio, the discount rate, and open market operations. While these three tools greatly influence the growth rate of the money supply, the Fed's control on the money supply is not as simple or as direct as simply twisting a knob, pulling a lever, or hitting a key on a keyboard. As mentioned in chapter 10, banks' willingness to make loans, and their desire to keep more reserves than they might be required to keep, will also influence the growth of the money supply. So, too, will the desire of the public to hold their money as currency rather than bank deposits. The Fed can estimate the effects of these factors on its actions, but cannot control them.

How does growth in the money supply affect interest rates?

Ultimately, an interest rate is merely the price in a market for loans or loanable funds, which we unimaginatively call the loanable funds market. We discussed this in chapter 9. By the way, the picture is not really much different if the interest rate we are talking about is a real interest rate or a nominal interest rate.

Since supply and demand for loans are really doing the heavy interest rate making, the Fed does not set interest rates, but rather influences them. The Fed can set one sort of interest rate, the discount rate, but it is ultimately the willingness of lenders to make loans, as well as the demand for those loans, that determine the interest rate. Also, the Fed generally changes the reserves available to banks through open market operations, not by changing the discount rate.

Supply in the loanable funds market can be influenced by things that the Fed does. As we discussed in chapter 9, most of the loanable funds supply comes from people who save and deposit their savings in banks. Banks then create loans, using the deposits as the source of reserves, as we discussed in chapter 10. The Fed can act to augment the "raw materials" the banks have to work with, by increasing bank reserves. We also discussed this in chapter 10. The increased reserves of banks allow them to make more loans. As banks increase their loaning activity, the supply of loanable funds increases. As the supply of loanable funds increases, the real interest rate will most
likely start to fall, to induce borrowers to take out the increased amount of loans available. As the banks increase their lending, and as more loans are taken out by borrowers at the lower interest rates, the amount of money increases. The process that creates new money (bank expansion) also lowers interest rates.

Of course, the opposite happens when the Fed reduces the money supply, or its growth rate.

We can also view the link between money supply growth and interest rates in another way. People have a demand for money itself. People desire to hold some portion of their incomes and wealth as money to meet their everyday expenses, either as cash or as checking account deposits. However, holding money in forms that don't pay interest, or pay very little interest, has an opportunity cost. That opportunity cost is the (higher) interest rate that could be earned by making some other investment, such as buying an interest-paying bond, rather than keeping cash or large checking account deposits. If we think of the interest rate as the price of holding money, then the demand for money is the relationship between the interest rate and the quantity of money people desire to hold. The supply of money in this view is independent of the interest rate, and is just the amount of money that is around. So, we get a "market" as pictured to the left.

At a higher supply of money, people will find themselves with more money than they desire to hold at the current interest rate (the original interest rate on the diagram), so they will invest in bonds and other investments. When more bonds are purchased, the prices of bonds rise, thus lowering their return or implicit interest rate. Similarly, when other investments are made, the prices of those other investments will be driven up. At a higher price to buy into any investment, the return (rate of interest implicitly paid by the investment) will start to decline.

**demand for money** - the relationship between the opportunity cost of holding money (the interest rate) and the quantity of money people desire to hold.

**supply of money** - the amount of money in circulation
**What is monetary policy?**

Because of its effect on real interest rate, and spending overall, changes in the growth rate of the amount of money (or the money supply, as it is also known), will affect aggregate demand, and thus the economy. When the Fed attempts to change the economy by increasing or decreasing the growth rate of the money supply, it is called **monetary policy**.

If the Fed wishes to reduce unemployment and increase the growth of real GDP, it will increase the growth rate of the money supply in an effort to reduce real interest rates. Such an action is called **expansionary monetary policy**. Sometimes, increasing the growth rate of the money supply is also called a "loose" monetary policy.

If the Fed wishes to reduce inflation, it will decrease the growth of the money supply to increase real interest rates. Such an action is called **restrictive monetary policy**, or a "tight" monetary policy.

**What happens with expansionary monetary policy?**

If the economy starts at a situation of long run equilibrium (point 1 on the diagram), when the Fed increases the money supply, banks will increase their lending activity. When the supply of loans goes up, the real interest rate will fall. As the interest rate falls, aggregate demand will increase (move to the right). The following short run equilibrium results.

In this short run equilibrium, which is shown as point (2):
1. the price level is higher than what was expected (it’s 110 instead of 105)
2. the price level is higher than in the (previous) long run equilibrium
3. as a result of the higher price level, producers will produce more output in the short run than in the previous long run equilibrium, since resource costs will not keep up with the higher price level for products (see below)
4. output (real GDP) will be higher than in long run equilibrium (and higher than the potential, sustainable, full employment level).

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**monetary policy**- using changes in the growth rate of the money supply to influence the economy.

**expansionary monetary policy**- increasing the growth rate of the money supply in an attempt to increase real GDP growth and reduce unemployment. Also called a "loose" monetary policy or "loose" money policy.

**restrictive monetary policy**- reducing the growth rate in the money supply, in an attempt to control inflation or slow economic growth. Also called a "tight" policy.
5. employment is greater than full employment
6. unemployment is lower than the natural rate (this can occur temporarily)
7. cyclical unemployment is negative (which can happen temporarily)
8. the real values of wages and resource prices will be lower than their lower than their long run equilibrium levels (due to the higher than expected price level)
9. real interest rates will be lower than long run equilibrium values (due to Fed action)

**What happens in the long run?**

This short run equilibrium will affect the resource market. As the aggregate demand begins to move rightward, producers expand their production in response, and thus increase demand for resources. Real wages and resource prices will be bid up, decreasing short run aggregate supply. As this occurs, the price level will rise, raising the real interest rate back to the long run equilibrium level.

Eventually, a new long run equilibrium will be established, reflecting the restored real wages and resource prices.

At the final long run equilibrium (3),

1. the price level is as expected (it’s 117 now, and that’s consistent with expectations)
2. the price level is higher than in the (previous) long run equilibrium
3. even though the price level is higher than the previous equilibrium, producers do not want to produce more than the long run potential GDP, since resource prices have caught up with product prices.
4. output (real GDP) will be the potential, sustainable, full employment level.
5. employment is equal to full employment
6. unemployment is at the natural rate
7. cyclical unemployment is zero
8. real wages return to their original level, even though nominal wages are higher than before.
9. real interest rates will rise back to their original level, as the economy slides up the aggregate demand curve to the new long run equilibrium.
What happens with restrictive monetary policy?

Suppose the economy is in long run equilibrium (point 1). Then the Fed acts to reduce the money supply. This will lead to banks issuing fewer loans, lowering the supply of loanable funds, which will raise the real interest rate. As a result, the aggregate demand curve will fall (move to the left).

In this short run equilibrium, which is shown as point (2):

1. the price level is lower than what was expected (it's 103 instead of 105)
2. the price level is lower than in the (previous) long run equilibrium
3. as a result of the lower price level, producers will produce less output in the short run than in the previous long run equilibrium, since resource costs will not fall along with the falling price level for products (see below)
4. output (real GDP) will be lower than in long run equilibrium (and lower than the potential, sustainable, full employment level).
5. employment is less than full employment
6. unemployment is higher than the natural rate (this can occur temporarily)
7. cyclical unemployment is positive
8. the real values of wages and resource prices will be higher than their long run equilibrium levels (due to the lower than expected price level)
9. real interest rates will be higher than long run equilibrium values (due to the Fed's action)

What happens in the long run?

Once again, the short run equilibrium will affect the resource market; only these effects are the reverse of those that occur when the aggregate demand increases.

As the aggregate demand begins to move left, producers reduce their production in response, and thus reduce demand for resources. Eventually, resource prices will start to fall in real terms, although it may take quite a long time for this to happen, since people do not like to have their salaries or wages cut.

The fall in real resource prices will cause the short run aggregate supply to rise (move to the right). It will also result in less unemployment of resources (a return to full employment).

Eventually, a new long run equilibrium will be established, reflecting the restored real wages and resource prices.
At the final long run equilibrium (3),
1. the price level is as expected (it's 98 now, and that's consistent with expectations)
2. the price level is lower than in the (previous) long run equilibrium
3. even though the price level is lower than the previous equilibrium, producers do not want to produce less than the long run potential GDP, since resource prices have fallen by the same proportion as product prices.
4. output (real GDP) will be the potential, sustainable, full employment level.
5. employment is equal to full employment
6. unemployment is at the natural rate
7. cyclical unemployment is zero
8. real wages return to their original level, even though nominal wages are lower than before.
9. real interest rates will fall back to their original level, as the economy slides down the aggregate demand curve to the new long run equilibrium.

Is there another way to view the effects of the money supply?

Mathematically speaking, the effect of the money supply on the economy can be summarized by the formula

\[ M \times V = P \times Q \]

in which \( M \) is the money supply, \( V \) is velocity (the number of times each dollar is spent on GDP), \( P \) is the price level (or the ratio of the current year’s prices to the base year), and \( Q \) is real GDP.

The above equation, called the “equation of exchange,” must always be true. The first part, \( M \times V \), is spending. The second part, \( P \times Q \) is nominal GDP. They have to be equal because spending on GDP has to equal GDP.

**velocity (of money)**: the number of times in a year that each dollars is spent on something that counts in GDP

**equation of exchange**: the formula showing the relationship between the money supply, velocity, the price level and real GDP. Specifically, \( M \times V = P \times Q \)
In terms of changes or growth rates (also called percentage changes or \( \%\Delta \) for short), this formula means that:

\[
\%\Delta M + \%\Delta V = \%\Delta P + \%\Delta Q
\]

or, the growth in the money supply plus the growth in velocity equals inflation plus the growth in real GDP.

This is the **growth rate version of the equation of exchange**, which also always is true.

Since velocity is an important part of the equation, and since we haven't discussed it much, here are a few details about what determines it:

- Other things equal, velocity will increase (people will spend each dollar more times) if:
  - interest rates on non-money investments increase (people hold less money)
  - expected inflation increases (it's more costly to hold onto money)
  - people decrease their demand to hold wealth as money

The usefulness of the equation of exchange formula can be expanded by realizing that the changes in the growth rates follow a pattern over time. The pattern can be seen in the aggregate demand/aggregate supply model, but the pattern also can be seen if you think of the economy as sort of a train.

In this “money train,” the locomotive is the money supply. Velocity acts as a shock absorber, and the cars in the train are real GDP and the price level, in terms of which car moves first:

![Money Train Diagram]

When the growth rate of the money supply is changed, the first effect is that velocity's growth rate changes in the opposite direction (to absorb the shock) for a few months. Then, velocity springs back, pulling real output along (in the same direction as the change in M’s growth rate) about six months to a year later. Prices move very little in this time. As real output catches up to the speed of M, eventually the price level is pulled along, 18 months to three years after the change in M. In the period that prices are catching up to the rest of the train, real output may stop moving or even appear to move backwards in comparison to the rest of the train.

While we are adding up numbers involving real and nominal values, remember that we have previously done this with interest rates:

\[
\text{nominal interest} = \text{inflation} + \text{real interest}
\]

Real interest rates fall as the money supply increases (and more loans are made) but will rise as the price level rises (since the demand for loans will rise with higher prices).

**growth rate equation of exchange** - the relationship between the growth rates of the money supply, velocity, the price index and real GDP
Using the view of the equation of exchange, the sequence of changes when monetary policy is undertaken is something like the following (with some overlaps):

**Initially,** M growth changes

**Immediately,**
velocity changes (in the opposite direction from the M growth change)
real interest rates change (in the opposite direction from the M growth change)

**In the short run,**
velocity starts to change back (even goes in the direction of the M growth change)
real GDP changes (in the same direction as M growth change)
real wages change (opposite direction from M)
price level changes somewhat (same direction as M)

**As the self-correcting mechanism takes hold,**
price level changes (same direction as M)
real interest return to original levels
real wages return to original levels
real GDP returns to original level

**In the long run,**
all real values have returned to original levels; only the price level and nominal values have changed permanently.

All of this is assuming that no other changes occur as the economy settles back to a long run equilibrium.

Here is a diagram showing the effects of a one-time increase in the money supply over time.
Can monetary policy fix a broken economy?

Thus far, we have shown the effects that monetary policy can have on an economy that starts at long run equilibrium. Understanding those basic short run and long run effects will help us grasp how monetary policy might be used to change the economy when it is not in long run equilibrium. The use of monetary policy to speed up a slow economy or to circumvent high inflation is a controversial topic, and requires consideration of things such as time lags and expectations.

Is it true that timing is everything?

Many people desire that the Fed would use monetary policy to stabilize the economy. This means that the Fed would act to counteract changes in aggregate demand, and keep the economy in a more or less permanent state of long run equilibrium. Such policy is known as activist monetary policy, and its proponents are sometimes called activists. When the aggregate demand is falling, due to any of the factors mentioned in chapter 9, activist policy would require that the Fed increase the growth rate of the money supply. This would increase consumer spending and move aggregate demand back to the right. In the figure at the right, the economy might remain at point 1 instead of moving to point 2, or may go to point 2 and quickly return to point 1. Most activists would also favor trying to control the high inflation that accompanies higher aggregate demand by having the Fed reduce the growth rate in the money supply when aggregate demand increases. By doing so, the Fed would reduce spending and send the aggregate demand curve back to the left, where it started.

One practical problem with using monetary policy to correct the economy is that it is difficult to know that aggregate demand is changing until real GDP growth or unemployment have started to change. The delay in recognizing that action is needed is sometimes called the recognition lag. If the Fed takes action only after it is clear that a

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**stabilizing the economy**- counteracting the changes in the economy's aggregate demand and supply in order to maintain full employment, steady growth, and low inflation.

**activist monetary policy**- a policy of counteracting the ups and downs in the economy to maintain stability of prices, unemployment, and economic growth.

**activists**- economists or policy makers who favor an activist monetary policy

**recognition lag**- the delay in realizing that policy is needed to correct a change in the economy.
change has occurred in the economy, the action may be too late, or may make the situation less stable.

For example, suppose that there is a decrease in aggregate demand, moving the economy from long run equilibrium point 1 to short run equilibrium point 2 in the diagram shown in the figure to the left. As aggregate demand starts to fall, real GDP growth will start to fall, and unemployment will start to rise. After the officials at the Fed notice this, the Fed might try to hasten the return to long run equilibrium by using monetary policy to move the aggregate demand curve back to the right, attempting to return the economy to long run equilibrium point 1. However, the higher unemployment and slow growth in the economy will also trigger the self correcting mechanism, and declining resource prices will start to move the short run aggregate supply to the right. Thus, it is quite possible for the new short run equilibrium to end up overshooting the long run equilibrium. The result would be a short run equilibrium at point 3. This would lead to a less-stable economy with wild fluctuations in real GDP and unemployment.

Notice, if the Fed is to correct for fluctuations in the economy, it must act before the slowdown in real GDP occurs, and before unemployment increases trigger the self-correcting mechanism. Similarly, if the Fed is to act to slow the economy, and prevent inflation due to increases in aggregate demand, it must do so before the changes in aggregate demand are felt in the economy.

People who worry that the timing of policy may interfere with the self-correcting mechanism and keep the economy from reaching long run equilibrium (without overshooting it) say we should not use monetary policy to counteract events in the economy. The policy they favor is called non-activist monetary policy, sometimes called monetarist policy. Monetarist economists stress that the lags involved in making monetary policy are long and variable, so the chances of overshooting long run equilibrium are great. Monetarists favor a steady growth in the money supply consistent with the average growth of the economy. This steady growth is called the monetary rule.
and it suggests that the money supply should grow at between 3 and 5 percent. They claim that this will prevent the sort of over-correction we have described, and will also lead to low or no inflation over time.

**How much do expectations matter?**

You may remember from our discussions in chapter 9 that the aggregate demand curve and the short run aggregate supply curve are partly determined by the expectations of decision makers concerning inflation and the price level. Indeed, the short run equilibrium is based on resource sellers and others incorrectly anticipating the inflation rate and price level. This means that if monetary policy is to have even short run effects, the monetary policy’s effects on inflation have to be unanticipated. That is, at least some of the effects of money supply growth on inflation has to come as a surprise to decision makers, and they must fail to account for it in their decisions.

People will experience some unanticipated inflation if they expect the price level and the inflation rate to be similar to what they were in the recent past. When people behave this way, we say they have **adaptive expectations**. With these kind of expectations, monetary policy can be effective, causing changes in the short run real GDP, real wages, real interest rates, and the unemployment rate. Indeed, since chapter 9, we assumed that decision makers had adaptive expectations that took time to change.

However, if people more or less fully account for inflation in making their decisions (if inflation is anticipated), then there is no short run increase in real GDP at all, and that no other real changes result from monetary policy. In effect, the economy gets to the long run equilibrium right away.

On the figure to the right, an increase in aggregate demand created by an increase in money supply growth would lead to a short run equilibrium indicated at point 2, but only if the short run aggregate supply does not change. However, if decision makers can anticipate the inflation that will result from the increased supply of money, the aggregate demand curve will quickly move to the position shown, "with altered expectations." The economy moves to the long run equilibrium point (3 on the diagram) almost immediately, without a stopover at point 2. If all changes in the price level are acted upon immediately, then we say the **policy is anticipated** (or fully an-
Fully anticipated inflation does not require incredible foresight or sophistication on the part of decision makers. In labor contracts, the effects of inflation could be anticipated through automatic cost of living adjustments, raising people's salaries in step with inflation automatically. Adjustable rate loans, with interest rates changing automatically with inflation, are another method for people to anticipate inflation, even if they are not exactly sophisticated about the effects of policy.

If people make decisions with understanding and anticipation about how policy will affect inflation, then we say they have rational expectations. With these kinds of expectations, all policy effects are anticipated and nothing real changes with monetary policy. Only the price level will change. This conclusion is called the policy ineffectiveness theorem. While the evidence is still inconclusive, it seems that the rational expectations effects do exist. To the extent that monetary policy is predictable, its real effects are greatly lessened.

Notice, whether you believe that people have adaptive expectations or that they have rational expectations, the long run effect of monetary policy is higher prices. In the long run, no real variables, such as real GDP, will change. The only difference between the two views of expectations is how long it will take to reach the long run.

Why does this matter?

In macroeconomics, our understanding of the economy comes from studying the past. One event from which we have learned a great deal is the Great Depression of 1930-1941. One thing we learned from the Depression is that monetary policy matters.

You may have heard that the stock market crash of 1929 caused the Great Depression. In fact, you probably read it in some history book. Well, unfortunately, economists are not historians and historians are not economists. Since the stock market crash came in October of 1929, just a few months before the Depression started, many people around at the time (and no, that does not include me) thought that they were related. In a way they were, but not in the way people thought.

In 1929, new Fed Chairman Adolf Miller announced that he thought that stocks were overvalued, and that the Fed would take action to remedy the situation, partly by raising the discount rate. Fear that the Fed would cut the money supply in the months ahead set off a panic that people who bought stock with borrowed funds would be forced to sell (as indeed they would), and that the economy as a whole would slow down in the following years (as indeed happened). This caused the stock market to crash in October 1929. The crash resulted from fear of the coming events; it was not the cause of them.

<table>
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<th>fully anticipated policy</th>
<th>rational expectations</th>
<th>policy ineffectiveness theorem</th>
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<td>when the effects of policy on inflation are anticipated, so that any inflation that occurs as a result of policy is immediately factored into decisions concerning salaries and interest rates.</td>
<td>the theory that the inflationary effect of policy is anticipated by decision makers, and thus is immediately included in their decisions. The rational expectations theory would predict that monetary policy has no effects on real variables such as real GDP, even in the short run.</td>
<td>the conclusion (consistent with rational expectations) that monetary policy will have no real effects on the economy, even in the short run.</td>
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After the 1929 crash, Fed chairman Miller seemed to have changed his mind, and did not do as he had threatened. As a result, the stock market rebounded to early 1929 levels by the middle of 1930. However, in the middle of 1930, the Fed chairman's promises were kept, and the Fed's monetary policies became very restrictive. The Fed actually reduced the money supply, using all three of its "tools" we discussed in the last chapter. The reduction in the money supply moved the aggregate demand curve to the left, as shown on page 141.

**Why didn't the self-correcting mechanism work?**

Tax increases in 1932 may have slowed down the process that normally would have restored long run equilibrium, since those who did have income had to pay a lot more of it in taxes, and had a lot less to spend. But the self-correcting mechanism was short-circuited by the Fed, which kept a lid on reserves.

Remember how banks work. Even though each dollar of bank deposits is only backed up by a small fraction of reserves. The system works and the bank deposits are safe, as long as people do not panic and try to withdraw all of their money. By 1933, a few banks discovered that they could not meet their required reserve requirements. When this news spread, people did panic. Their attempts to take all of their money out of the banks, called bank runs, caused the collapse of many banks, even those that would have had enough reserves otherwise. The depositors' money was not, of course, actually in the banks. The banks had kept a fraction of it to back up deposits and had loaned the rest out. As long as depositors were content to leave their deposits in the banks, all was well. However, when a large number of depositors started to pull their deposits out, they had to be paid with the few reserves that were backing up everyone's deposits, and the banks were then in trouble. The Fed refused to lend reserves to banks, and it did not increase reserves by buying bonds, so more banks failed. With them, went nearly one-third of the money supply.

Gradually, from 1934 to 1936, people adjusted to the lower money supply, and the economy inched back towards long run equilibrium. Then, in 1937 and 1938, the Fed struck again. It raised reserve requirements, in an attempt to weed out the remaining weak banks. It slowed down the meager growth in bank reserves, which had been building up since 1934. These actions effectively counteracted the self-correcting mechanism that had started to restore real GDP to long run equilibrium. The Depression went on for three more years.

One good web site to see some of this is at the San Francisco Fed:


**Could it happen again?**

Well, some people think it almost did.

In 1987, new Fed Chairman Alan Greenspan announced that he thought that stocks were overvalued, and that the Fed would take action to remedy the situation, partly by raising the discount rate. Fear that the Fed would cut the money supply in the months ahead set off a panic that the economy as a whole would slow down in the following years. This caused the stock market to crash in October 1987.

Just a day after the 1987 crash, Fed chairman Greenspan announced "The Federal Reserve, consistent with its responsibilities as the nation's central bank, affirmed today its readiness to serve as a source of liquidity to support the economic and financial system." In other words, he backed off. Unlike the Fed of 1929 and 1930, the Fed chairman of 1987 and 1988 really did not change his mind, and never put into place the restrictive monetary policy he hinted at.

Apparently, the Fed can learn from studying the past as well.
Questions for Review and Practice

1. What effect will each of the following have on the quantity of M1 money people want to hold, ceteris paribus?
   A. An increase in the interest rate on checking deposits
   B. An increase in the expected rate of inflation
   C. An increase in income
   D. An increase in the differential interest rate between money market mutual funds and checking deposits
   E. An increase in bond prices

2. Why does expansionary monetary policy often produce increases in real output, at least in the short run?

3. How will an unanticipated increase in the money supply affect the real interest rate, real output, and employment in the short run? How will the effect differ if the policy is anticipated?

4. If the Fed begins a more restrictive or tight monetary policy, it will usually sell bonds in the open market. Which of the following is likely to increase (in the short run)?
   A. The reserves available to banks
   B. Household spending on consumer durables
   C. The exchange rate value of the dollar
   D. Net exports
   E. The prices of stocks and real assets like apartment or office buildings
   F. Real interest rates
   G. Real GDP
   H. Unemployment

5. Suppose the President pressures the Fed to expand the money supply more rapidly so that interest rates can be reduced. What is the likely effect, assuming the expansion is not anticipated?

6. Countries in which the money supply growth is rapid tend to have higher interest rates than other countries. Why is this so?

7. Suppose there are long and somewhat unpredictable time lags between a change in monetary policy and the policy's impact on output, employment, and prices. How will such lags affect the usefulness of monetary policy as a method of stabilizing the ups and downs in the economy?

8. Why do periods of high interest rates and periods of high inflation often occur together?

9. What are the differences between adaptive expectations and rational expectations? Which view of expectations would allow monetary policy to be effective in changing real variables in the economy?

10. Why do many nonactivists favor a monetary rule, such as expansion of the money supply at a constant annual rate? What is a major practical problem with a monetary rule (such as requiring a 3% to 5% growth in the money supply)?

11. During the Great Depression, what happened to the economy's self-correcting mechanism?