

## THE BUSINESS CYCLE

If you open up a newspaper or turn on the television or radio, you are bound to read or hear somebody talk about the "boom" in the United States, the "recession" in Japan, or "inflation" in Russia. You might also hear analysts talk about what governments ought to do about some of these problems. They might suggest that the US Congress should pass a tax-cut, or that the Federal Reserve should increase interest rates, or that the Japanese government should boost spending, etc.

With so many things being discussed at once, so many different concepts being juggled in the air, it may all seem quite confusing. How can these analysts be so confident that the government should do x as opposed to y?

Well, you won't be surprised to learn that all these analysts are using a rather simple demand-and-supply model to come up with their "wise" pronouncements. In the back of their minds, they probably are working with the notorious Aggregate Demand-Aggregate Supply (AD-AS) model. All the things they are discussing are not as complex and intricate as they seem. They are actually very simple applications of this model.

The AD-AS model is rather simple and useful. Having already mastered the art of reading diagrams & shifting curves, you shouldn't find it too difficult to play with. The difficulty lies in interpreting what's going on.

## DEFINITIONS

Before we begin, it might be useful to keep these few concepts -- and their definitions -- at the front of your mind:

**Price Level:** The "price level" is an overall indicator of prices for goods and services in a domestic economy.

**Consumer Price Index (CPI):** The Consumer Price Index is a measure of the cost of a representative bundle of goods and services bought by a typical urban household in an economy relative to its cost in some base period. It is a common measure of the "**price level**".

**Gross Domestic Product (GDP):** Gross domestic product is the money value of all final goods and services produced and sold within a country in a given period of time (usually one year). GDP is simultaneously a measure of all income received and all spending in an economy.

**Real GDP:** Real GDP is GDP assessed at "constant prices". This is calculated by deflating GDP by a price index (such as the CPI) so that GDP becomes expressed in base-year dollars.

**Inflation:** Inflation is the percentage change in the price level over a given period of time.

**Unemployment:** The unemployment rate is the percentage of people able and willing to work who are not currently working.

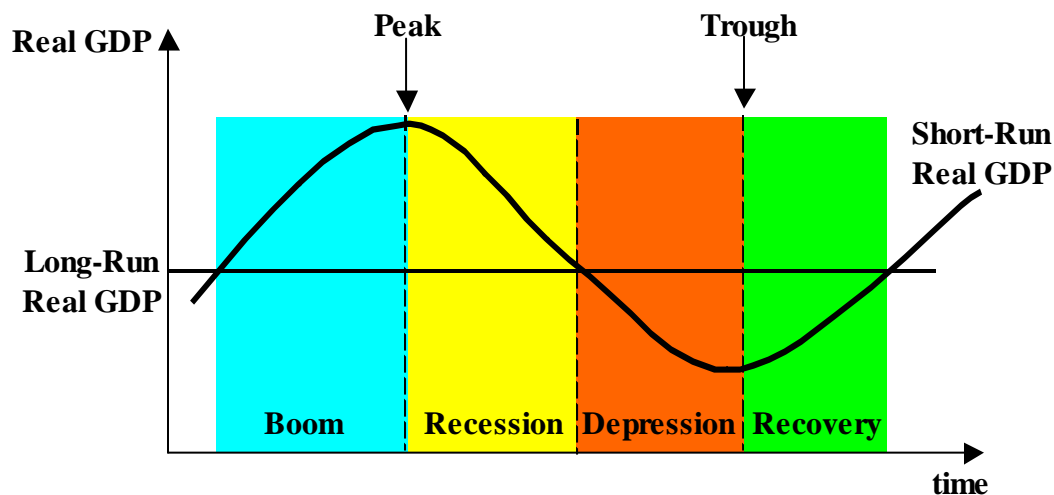
## THE BUSINESS CYCLE

Economists, businessmen, journalists, politicians and analysts often refer to the ups and downs of an economy as the "**business cycle**". The business cycle traces how actual real GDP fluctuates around its long-run trend.

Let's ignore the long-run trend, and focus on the fluctuations.

A picture of a typical business cycle is given in Figure 2. Here we have illustrated the *four phases* of the business cycle:

- (1) **Boom**: a period of time where real GDP is rising above its long-run level.
- (2) **Recession**: a period of time where real GDP is falling back down to its long-run level.
- (3) **Depression**: a period of time where real GDP is falling below its long-run level.
- (4) **Recovery**: a period of time where real GDP is rising back up to its long-run level.



**Fig. 2** - The Four Phases of the Business Cycle

[Note: some economists and newspapers refer to *both* Phases 2 and Phase 3 as "Recession", reserving "Depression" to refer only to an extraordinarily severe Phase 3.]

The **Peak** of a business cycle is point in time when the boom turns into a recession.

The **Trough** of a business cycle is the point in time when the depression turns into a recovery.

The phases of the cycle are not so evenly spaced out. How long each phase lasts can vary a lot. In general, in most western countries since World War II, the upward phase (recovery + boom) tends to rise gradually and last for a long time; while the downward phase (recession + depression) tends to be sharp and short.

[The National Bureau of Economic Research (NBER) has been tracking the American business cycle for quite a while. In the appendix, we have reproduced their dating of peaks and troughs of the US business cycle over the past century-and-half.]

- In the 1930s, the depression phase of the business cycle lasted an entire decade. Indeed, it lasted so long and was so severe that it became known as "**the Great Depression**". The fall was so steep that industrial production in the United States in 1932 was barely half of what it had been in 1929! On average, throughout the ten years, a fifth of American workers could not find a job.
- In the 1990s, the US experienced an extremely long upward phase of the business cycle -- ten years in length, from 1991 to 2001. The boom lasted so long and achieved such heights, that many people began doubting that a recession would ever come. As a result, some people dubbed it the "**New Economy**" because they thought the traditional business cycle pattern had been broken. But it finally hit its peak in March 2001 and turned down.
- In the 2000s, the US resumed another long upward phase, from 2001 until the subprime crisis of 2008. It then fell into very sharp and dramatic recession.

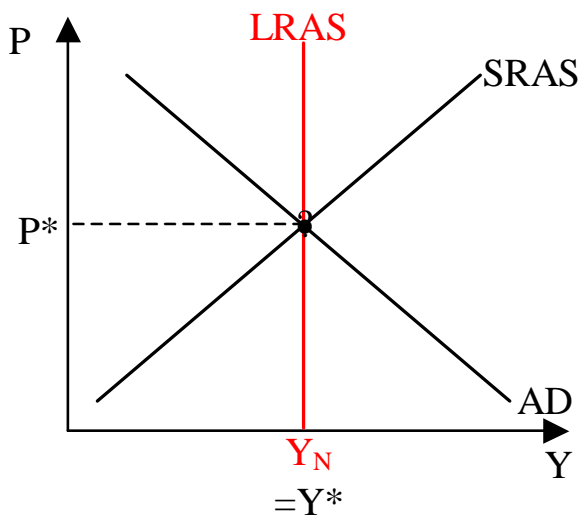
## THE AD-AS MODEL

The aggregate demand-aggregate supply (AD-AS) model is very useful for analyzing the business cycle. It is very easy and convenient to represent it in diagrammatic form.

We shall be using pictures quite intensively here. The two variables of interest are the total output of the economy and the overall price level and these will be represented on the axes. Our notation is the following:

- Y denotes total output of the economy (real GDP) and is measured on the horizontal axis
- P denotes the overall price level in the economy (the CPI) and is measured on the vertical axis.

The AD-AS model is depicted in Figure 3. Here, we have drawn a downward-sloping **Aggregate Demand (AD)** curve, an upward-sloping **Short-Run Aggregate Supply (SRAS)** curve and a vertical **Long-Run Aggregate Supply (LRAS)** curve.



**Fig. 3** - Aggregate Demand-Aggregate Supply Model

We will postpone our explanation of why these curves slope the way they do. Right now we are interested in seeing how the model can help us depict the business cycle.

- The LRAS curve pins down the *long-run* real GDP level. This is also sometimes called the *natural output level*. We shall denote it as  $Y_N$
- The **intersection** of the AD and SRAS curves yields the *short-run* real GDP level (which we shall denote as  $Y^*$ ) and the overall price level (which we shall denote as  $P^*$ ).

In Figure 3,  $Y^*$  happens to be the same as  $Y_N$ . This indicates that short-run real GDP ( $Y^*$ ) is equal to the long-run GDP level ( $Y_N$ ).

However, as we know, over the business cycle, the short-run real GDP fluctuates around the long-run GDP level. In these cases,  $Y^*$  will *not* be the same as  $Y_N$ . The AD-AS model helps us understand what causes these fluctuations and what their effects are.

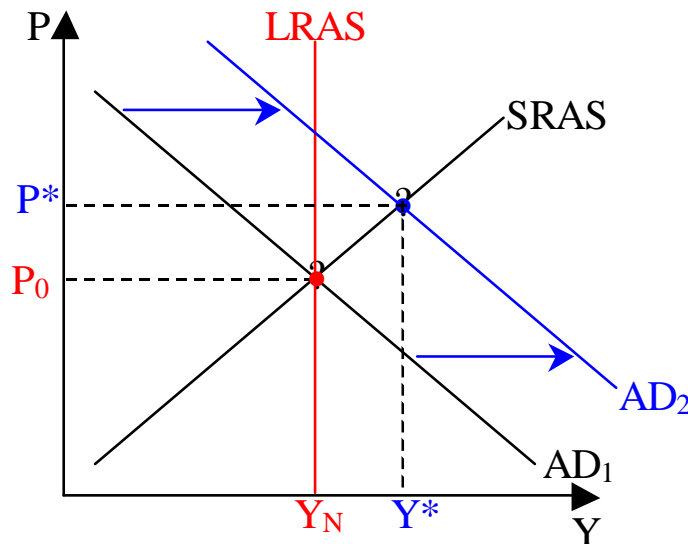
## MECHANICS OF THE BUSINESS CYCLE

We are going to use the AD-AS model to depict the mechanics of four phases of business cycle. We will do this by shifting the curves around. We will postpone our discussion of *why* they do so. For the moment, I just want to make sure you get an idea of the mechanics of the cycle.

### **Phase 1: Boom**

A "boom" will arise if, starting from the long-run real GDP level, aggregate demand *increases*. This is depicted in Figures 4.

- **Rising AD:** (Figure 4). An increase in aggregate demand will shift the aggregate demand curve to the right, from  $AD_1$  to  $AD_2$ . Notice that short-run real GDP ( $Y^*$ ) becomes *higher* than the long-run real GDP ( $Y_N$ ). This is the definition of a *boom*. Notice also that the short-run price level *increases* from its initial level  $P_0$  to the higher level  $P^*$ .



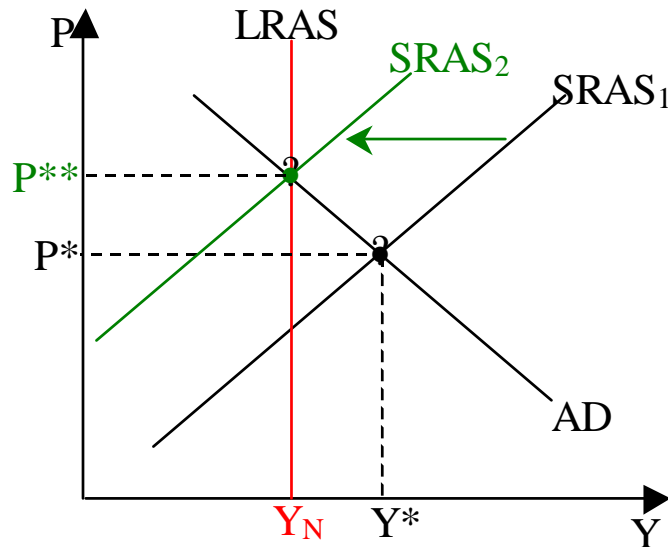
**Fig. 4 - Boom (caused by rising Aggregate Demand)**

### **Phase 2: Recession**

We defined a "recession" as the *fall* in real GDP that comes *after* a boom, i.e. something that brings short-run GDP *back* down to its long-run level.

Normally, this decline is caused by a *fall* in the short-run aggregate supply curve.

- **Falling SRAS** (Figure 5) *Starting* where short-run real GDP ( $Y^*$ ) is *above* long-run real GDP ( $Y_N$ ), a decline in short-run aggregate supply is represented by a leftward shift in the SRAS curve (from  $SRAS_1$  to  $SRAS_2$ ), driving real GDP back down to its long-run level  $Y_N$ . This, recall, is the definition of a recession. Notice also that the overall price level *increases* from  $P^*$  to the higher level  $P^{**}$ .



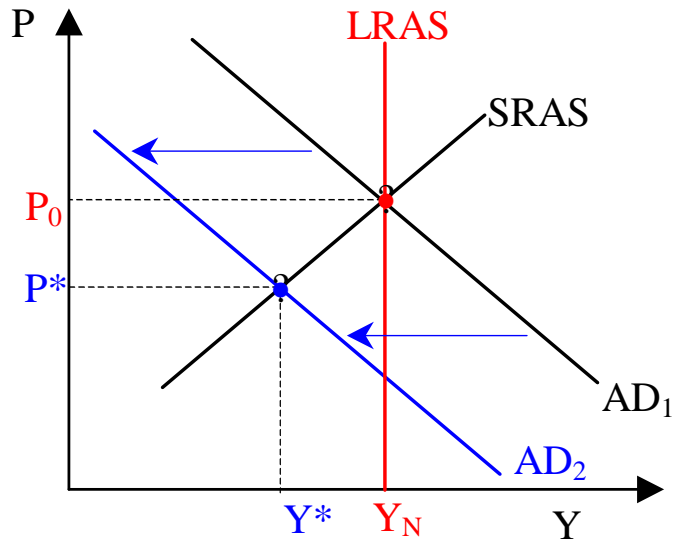
**Fig. 5** - Recession (caused by falling SRAS)

### **Phase 3: Depression**

A "depression" arises when, starting from the long-run real GDP level ( $Y_N$ ), aggregate demand *decreases*. This is shown in figure 6 below.

- **Falling AD:** (Figure 6). A decrease in aggregate demand will shift the aggregate demand curve to the left, from  $AD_1$  to  $AD_2$ . As a result, short-run real GDP ( $Y^*$ ) becomes *lower* than the long-run real GDP ( $Y_N$ ). This is the definition of a *depression*. At the same time, notice that the short-run price level *decreases* from its initial level  $P_0$  to a lower level  $P^*$ .



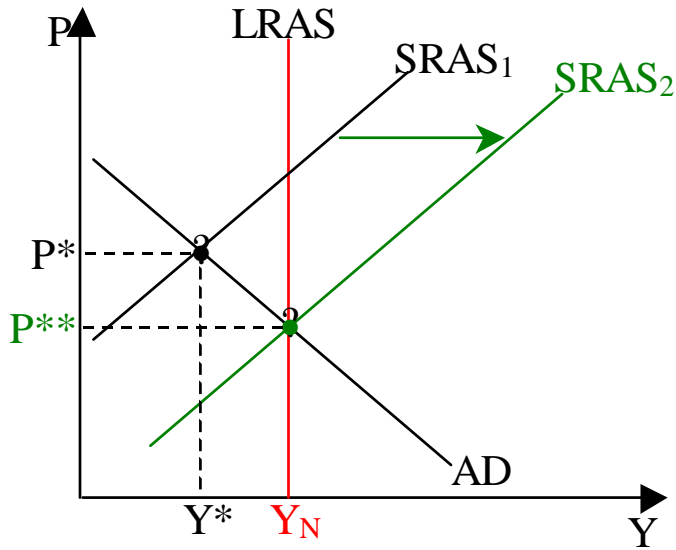


**Figure 6** - Depression (caused by falling AD)

**Phase 4: Recovery**

A "recovery" was defined as the rise in short-run real GDP that comes *after* a depression. Normally this is caused by an *increase* in short-run Aggregate Supply (i.e. a rightward shift in SRAS). An example of this is shown in Figure 7.

- **Falling SRAS** (Figure 7) *Starting* where short-run real GDP ( $Y^*$ ) is *below* long-run real GDP ( $Y_N$ ), a rise in short-run aggregate supply is represented by a rightward shift in the SRAS curve (from  $SRAS_1$  to  $SRAS_2$ ), driving real GDP back down to its long-run level  $Y_N$ . This, recall, is the definition of a "recovery". Notice also that the overall price level *decreases* from  $P^*$  to the higher level  $P^{**}$ .

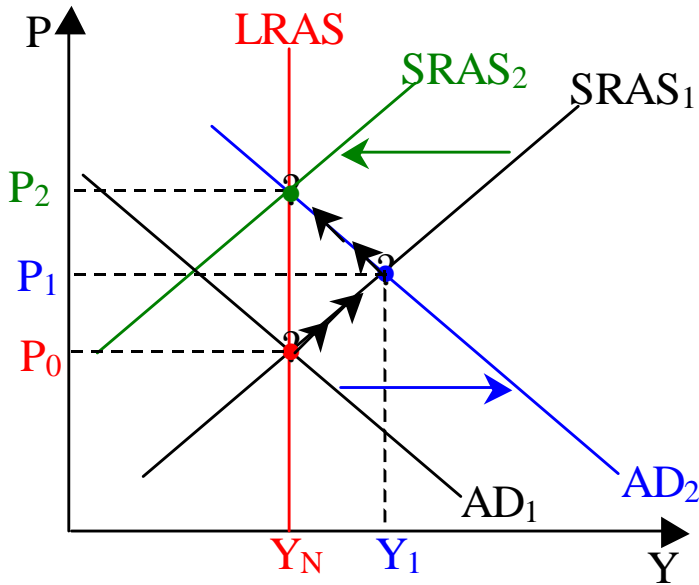


**Fig. 7 - Recovery (caused by increasing SRAS)**

### The Business Cycle: Altogether

Let us try to piece the four phases together in sequence. Let us start with depicting the *boom-recession* process together in the same picture (Figure 8) (Note: to avoid confusion, are dropping the stars \* and using numerical subscripts to show the sequence of shifts)

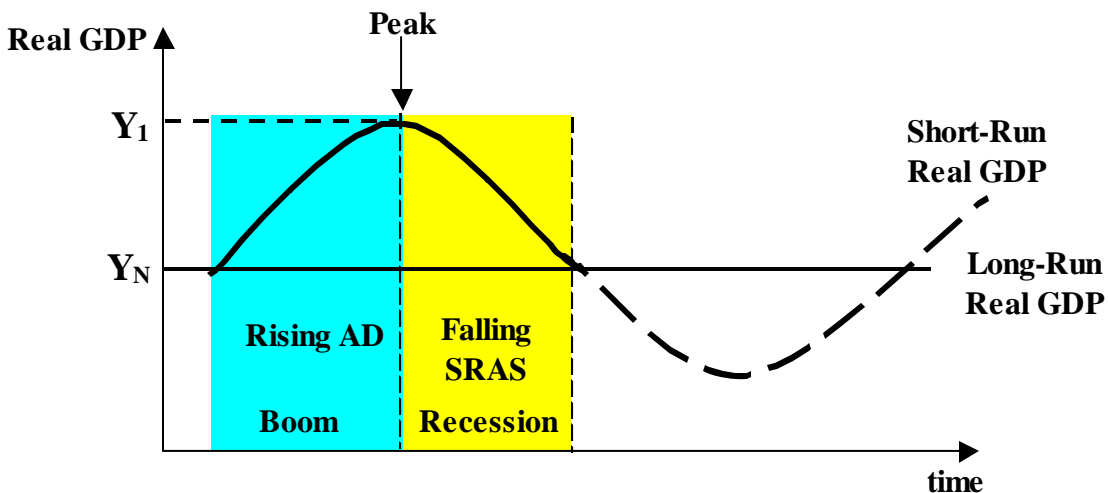
- Boom + Recession** (Figure 8): Suppose we start from the long-run output level,  $Y_N$ , and price level  $P_0$ , i.e. with curves  $AD_1$  and  $SRAS_1$ . Now, the boom begins: aggregate demand rises, so we shift  $AD_1$  to  $AD_2$  and short-run GDP rises from  $Y_N$  to  $Y_1$  and the price level rises from  $P_0$  to  $P_1$ . This is the *boom*. But now, after this, the short-run aggregate supply collapses from  $SRAS_1$  to  $SRAS_2$  so that short-run real GDP falls back down from  $Y_1$  to its long-run level,  $Y_N$  and the price level rises from  $P_1$  to  $P_2$ . This is the *recession*.



**Fig. 8** - AD-driven Boom followed by a SRAS-driven Recession

The interesting thing to notice about the boom-recession combination is that we actually don't end up exactly where we started. When everything finally settles down, short-run real GDP is back down to the long-run GDP we started with ( $Y_N$ ), *but* the price level has risen from  $P_0$  all the way up to  $P_2$ . In Figure 8, at the end of the recession, output is the same but prices are higher.

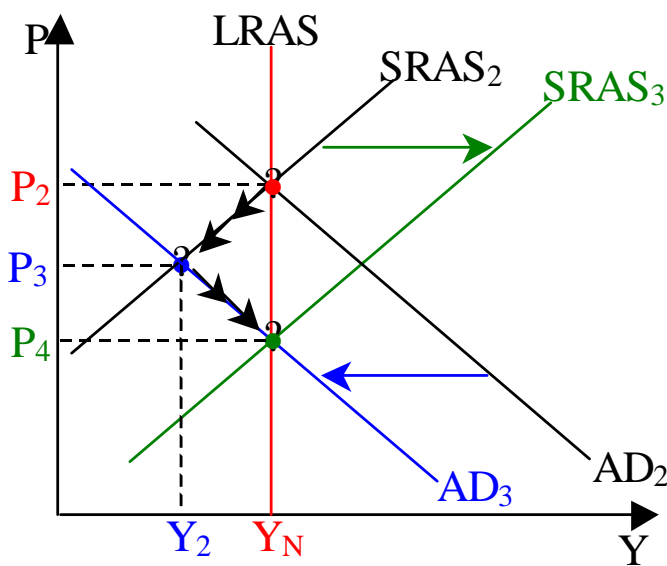
Notice that  $Y_1$  also represents the *peak* of the business cycle. In terms of our earlier diagram tracing real GDP over time, this is what we have just seen happen:



**Fig. 9** The Boom-Recession phases (with peak at  $Y_1$ )

But we want to go on and depict the rest of the cycle. So, *starting* from where we left of, let us proceed to show the depression-recovery phases together (Figure 10)

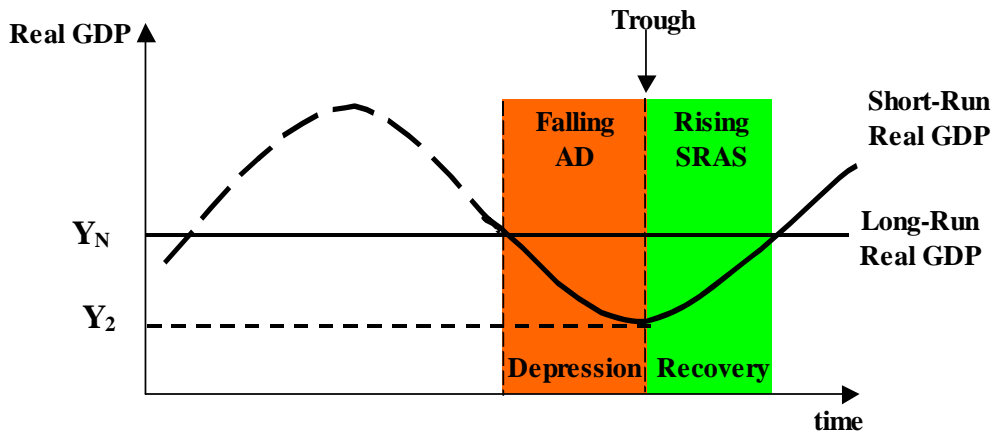
- **Depression + Recovery** (Figure 10): We ended our recession (previously) at the long-run output level ( $Y_N$ ) and the overall price level  $P_2$  (i.e. at the intersection of curves  $AD_2$  and  $SRAS_2$ ). So now the Depression begins. Aggregate demand falls, so we shift  $AD_2$  leftwards to  $AD_3$ . Now, short-run GDP falls from  $Y_N$  to  $Y_2$  and the price level falls from  $P_2$  to  $P_3$ . Once we hit  $Y_2$ , then the recovery kicks in: short-run aggregate supply increases (shifting  $SRAS_2$  to  $SRAS_3$ ) so that short-run real GDP *rises* back up from  $Y_2$  to its long-run level,  $Y_N$  and the price level falls further from  $P_3$  to  $P_4$ .



**Fig. 10** - AD-driven Depression + SRAS-driven Recovery

So when the depression-recovery combination works itself through, short-run real GDP is back to where it started (the long-run level,  $Y_N$ ). But the price level has *come down* from its height to  $P_2$  to  $P_4$ .

Finally, notice that  $Y_2$  is the *trough* of the business cycle, i.e. the lowest level of short-run real GDP that we reached. In terms of our earlier diagram tracing real GDP over time, this is what we have just seen happen in Figure 10:



**Figure 11** - The Depression-Recovery phases (with trough at  $Y_2$ )

In sum, we have seen a business cycle go through its motions. To summarize:

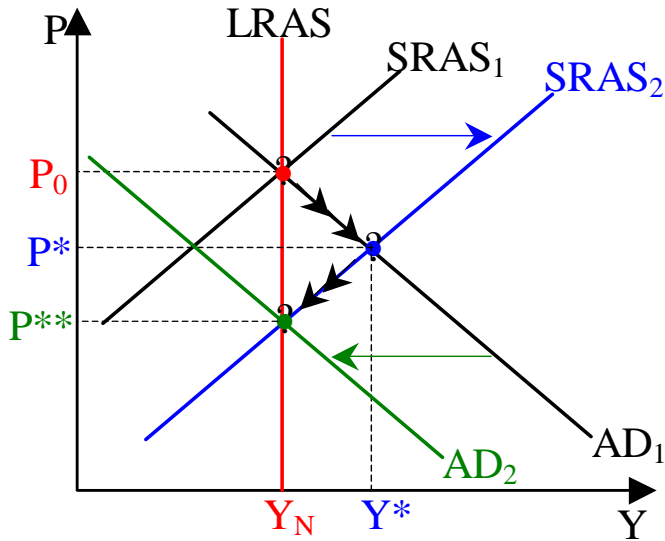
- (1) Boom: AD rises, driving real GDP up above the long-run level.
- (2) Recession: SRAS falls, bringing real GDP back down to the long-run level.
- (3) Depression: AD falls, dragging real GDP down below the long-run level.
- (4) Recovery: SRAS rises, pulling real GDP back up to the long-run level.

[Question: is the final price level at the end of the recovery ( $P_4$ ), the same as the price level we started out with at the *very* beginning of the cycle, before the boom ( $P_0$ )? Perhaps. Perhaps not. We really can't tell for certain. All we know for sure is that the final real GDP *will* be back at the long-run level ( $Y_N$ ) where it started. But the final price ( $P_4$ ) level may be above *or* below *or* equal to its initial level. ( $P_0$ )]

### An Alternative Business Cycle

The business cycle we have just shown is the most commonly accepted one. But is *always* the case that booms are driven by rising AD? Or recessions by falling SRAS? Why not the other way around? Why can't the boom be driven by, say, a rising SRAS and the recession by a falling AD? This alternative boom-recession scenario is depicted in Figure 12 below:

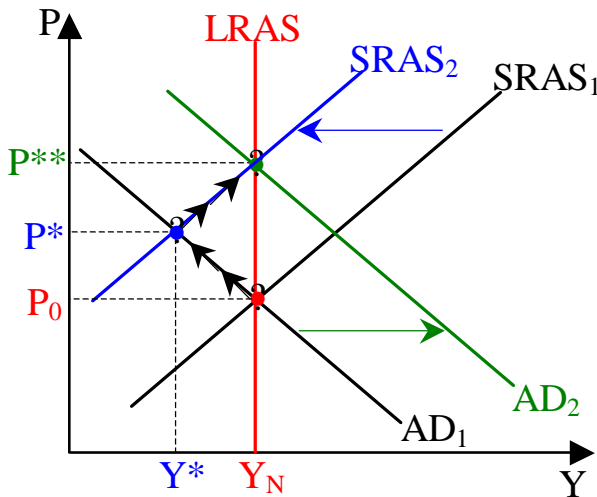
- **Alternative Boom-Recession:** (Figure 12) Starting at  $Y_N$  and  $P_0$ , the boom is caused by an increase in the short-run aggregate supply curve (rightwards shift from  $SRAS_1$  to  $SRAS_2$ ) while the recession which follows is driven by a leftward shift in the aggregate demand curve from  $AD_1$  to  $AD_2$ . The end result is that while real GDP returns to  $Y_N$ , the price level will have fallen from  $P_0$  to  $P^{**}$ .



**Fig. 12:** An Alternative: SRAS-driven Boom, AD-driven Recession.

Similarly, we might have a SRAS-driven depressions and an AD-driven recovery, which would be a different depression-recovery combination.

- Alternative Depression-Recovery** (Figure 13): Let us start from the long-run output level,  $Y_N$ , and initial price level  $P_0$ . Suppose short-run aggregate supply falls, so we shift  $SRAS_1$  to  $SRAS_2$  and short-run GDP falls to  $Y^*$  and the price level rises to  $P^*$ . This is the *depression*. After this, aggregate demand increases, shifting  $AD_1$  to  $AD_2$  and bringing real GDP back up to its long-run level,  $Y_N$ , and the price level up even further to  $P^{**}$ . This is the recovery. So, after the whole depression-recovery phases work themselves through, real GDP may be back where it started off, but the price level has risen.



**Fig. 13 - An Alternative: SRAS-driven Depression, AD-driven Recovery.**

These "alternative" cycle scenarios are possible. But many economists believe they are not very common. The "regular" business cycle, it is argued, is usually how we showed it earlier: AD-driven booms, SRAS-driven recessions, AD-driven depressions and SRAS-driven recoveries. That doesn't rule out other alternative combinations may exist and have indeed happened. But they're not as common.

**Up and Down**

"What goes up must come down." So we hear it is said. Suppose we accept the truth of that age-old wisdom. What does that tell us? It tells us that the *falling* SRAS (recession) is an *inevitability* if short-run real GDP is above the long-run GDP. OK. Let's go with that for the moment.

Let's propose a second old adage as a mirror of the first: "What goes down must come up". What does that tell us? Well, that a *rising* SRAS (recovery) is an *inevitability* if short-run real GDP is below the long-run GDP. Let's accept that too.

So, if we accept our two proverbs, then the shifts in the SRAS curves are merely "correcting" what was wrong (GDP too high, GDP too low).

But how did GDP get "too high" or "too low" to begin with? That was, recall, because of shifts in the AD curve (the boom & the depression). So *aggregate demand* is really the loose cannon in all of this, the underlying driver of all the ups and downs.

What does this suggest? Well, if we could get aggregate demand to "sit still", then we'd never have a boom or a depression. And if we had no booms or depressions, we would not have any need for "corrections" by SRAS. No boom started  $\Rightarrow$  no recession needed; similarly, no depression started  $\Rightarrow$  no recovery needed.

So, if our intuition is correct, it seems that a fickle aggregate demand is the really important thing here. Well, *what is* aggregate demand?

## AGGREGATE DEMAND

### (1) Foundations

"Aggregate demand" refers to total spending of everybody in the economy on final goods and services. We can divide this aggregate demand into four components:

**(1) Consumption (C):** consumption is spending done by **consumers** on goods like food, clothes, etc. The more **income** a consumer has, the more he spends. If **taxes** increase, then people have less income available to spend, so consumption falls. Also, if the value of people's **wealth** (money, stocks, houses, van Goghs, etc.) rises, people feel richer and so will be emboldened to consume a greater proportion of their current income.

**(2) Investment (I):** investment is the term economists use to describe the spending done by **firms** when they build new factories, hire more workers, expand existing plants, etc. It also includes spending by people on building new houses. (note: in this context, investment does *not* mean buying stocks, bonds or other financial instruments.) Investment plans of a firm are very sensitive to **interest rates**. If interest rates are very high, getting loans to finance an investment project or buy a house is expensive. As a result, many firms will cut back their investment plans and people will hold back from building new houses. If interest rates are very low, financing is cheap, so many firms will increase their investment spending and many more people will be tempted to go into housing. So investment spending increases when interest rates fall, and decreases when interest rates rise.

**Government Spending (G):** this is the expenditures done by government agencies. It will include things like hiring bureaucrats and soldiers, building roads, dams and libraries, buying tanks, guns and school textbooks, etc.

[Note: it does *not* include paying unemployment benefits or retirement pension; those are considered **transfers** of income from one part of the population to another; it is not a payment for services rendered to the government and so not "government spending".]

**Net Exports (NX):** this is the expenditure done by **foreigners** on domestic goods (i.e. exports) minus domestic purchase of foreign goods (i.e. imports). In fact, Net Exports is just another way of saying "Trade Balance". As we saw before, the amount of net exports is very sensitive to **exchange rates**. If the value of the US dollar rises relative to the value of the Japanese yen, then Americans consumers will find Japanese goods to be relatively cheap and so import more, while Japanese consumers will find American goods to be more expensive, and so will buy less of them (thus decreasing American exports to Japan). The opposite happens when the value of the US dollar falls and that of the Japanese yen rises. So, for the United States, net exports increase when the exchange rate value of the US dollar falls, while net exports fall when the exchange rate rises.



So, when we add all this up for the whole economy, we obtain:

Aggregate Demand = Consumption + Investment + Government Spending + Net Exports

or more compactly:

$$AD = C + I + G + NX.$$

If any of these spending categories increase for whatever reason, then aggregate demand rises.

## **(2) The Slope of the AD Curve Explained**

The Aggregate Demand (AD) curve plots aggregate demand for goods (real GDP) against the overall price level (CPI). As we saw, the AD curve is downward-sloping. *This implies that as the overall price level rises, aggregate demand falls.*

Why? Our temptation is to say that it's cause "when things are more expensive, people buy less". Well, not quite. That kind of reasoning is alright if we are talking about particular goods e.g. the demand for computers falls when the price of computers rises (why? because people will decide to buy something else, e.g. stereos, instead; or because their wages have not risen, they cannot buy as many computers).

But in our case, we are talking about a rising *overall* price level. The price of *every* good and service has gone up. And that (usually) means your wages have gone up as well. In *real* terms, you're not poorer: if the price of computers doubles from \$500 to \$1,000 *and* your wages double from \$10 to \$20 an hour, what has changed, really? Your real purchasing power is the same: it *still* takes fifty hours of work to pay for a computer.

So, we've got to go looking for another explanation of why, when the overall price level goes up, people spend less. Three common reasons are the following:

**(1) Wealth Effect:** as the price level rises, the value of people's *dollar-denominated* wealth (i.e. savings deposits, bonds, etc.) declines. If you have a \$5,000 in a savings account and the prices of all goods in the economy double overnight, then your \$5,000 in savings (your wealth) is clearly no longer worth as much as before. Because you are poorer as a result, you might decide to decrease how much you spend out of every paycheck in the future (hoping to build up the real value of your savings a little more). This fall in consumption spending will reduce aggregate demand.

- Thus, the wealth effect says *when the overall price level increases, the value of dollar-denominated wealth declines and so consumption spending declines and thus aggregate demand declines.*

**(2) Interest Rate Effect:** This is a bit more intricate. If the price level rises, people need more cash in hand just to continue buying what they were buying before. To get hold of money, they have to sell off other assets they hold, like bonds.

[Think about it this way: say you set aside \$100 every week in cash to pay for your weekly expenses; the rest of your savings you tie up in bonds. Now the price level doubles, everything that cost \$1 now costs \$2. So now you'll need \$200 in cash for the week, but you only set aside \$100. So to get out of your cash flow problem, you'll sell some bonds to get the extra cash you need right now.]

[Or think about it this way: banks need to hold a certain proportion of their assets in cash to meet their customers' daily withdrawal needs. This cash they hold in the bank vault. The rest they use to make loans or buy bonds. If the price level rises, and people start withdrawing more dollars from their bank accounts every day to pay the higher prices of things, banks may find that the cash they set aside in their vaults is not enough to meet daily withdrawal needs of their customers. So they acquire more cash by selling off some of their bonds.]

When people (and banks, and firms) start selling off bonds they own, this spells troubles for firms. When firms undertake new investment projects, they need to borrow money from people. They usually issue them a bond in return and pay interest on them. But if the price level rises, people don't want bonds any more, in fact, they want to get rid of the ones they already own and acquire cash. As a result, firms are forced to increase the interest rate on their bonds just in order to get people to hold on to them. If the interest they offer is high enough, you may be willing to reduce your desire for cash.

But not all firms can afford to promise such high interest rates. Some of the projects they were planning to undertake would simply not make enough profit to pay off the interest. As a result, many firms will just decide to forget the whole thing for now and just postpone or cancel their projects outright. So, on the whole, investment spending goes down.

- Thus, the interest rate effect says that when *price levels increase, interest rates rise and so investment spending declines and thus aggregate demand declines.*

**(3) Exchange Rate Effect:** A rise in the price level lowers net exports. There are two effects depending on whether the dollar floats or is fixed. (1) If exchange rate is fixed, then the impact is direct: a rise in the US price level simply means that American goods become more expensive for foreigners and so they will import less from the US, so net exports decline. (2) If the exchange rate floats, the effect is more long-winded, but reaches the same result. Namely, as just shown above, increasing prices lead to a rise in US interest rates, so American *assets* (bonds, etc.) become attractive to foreigners and net foreign investment increases. A rise in NFI, remember, raises the exchange rate value of the dollar, i.e. American goods are more expensive for foreigners -- so net exports decline.

- Thus, the exchange rate effect says that *when domestic price levels increase, net exports and thus aggregate demand falls.*

These three reasons, taken together, explain why a rise in the overall price level will decrease aggregate demand. This is how we explain the downward-sloping aggregate demand curve.

### **(3) Shifting the AD Curve**

When we were analyzing the business cycle, we shifted the aggregate demand curve back and forth a lot. What could cause *shifts* in aggregate demand?

AD curve **shifts to the right** if any of the spending components (consumption, investment, government spending, net exports) in aggregate demand rise.

AD curve **shifts to the left** if any of the spending components in aggregate demand falls.

Many things can cause these shifts to happen. Here are a few of the more important causes:

**(1) Consumer confidence:** a rising stock market, a general good mood, or any other thing that may increase consumer's confidence may lead to an increase in the proportion of income consumers spend. Increased consumer confidence shifts the aggregate demand curve to the right.

Conversely, a falling stock market, a generally pessimistic or cautious atmosphere may lead people to decide to save more and spend less. This decline in consumption means that the aggregate demand curve shifts to the left.

**(2) Government Fiscal Policy:** "Fiscal policy" refers to the taxing and spending policies of government. In the United States, most fiscal policy is the responsibility of Congress and the Treasury. We can differentiate between expansionary and contractionary fiscal policy.

*Expansionary:* If the government decides to build new highways and dams or buys more weapons or hires more military and civil service personnel, all this involves raising the level of government spending and thus will increase aggregate demand. If the government passes a tax cut, this means that consumers get to keep more of their income and so they will increase their consumption. Thus, expansionary fiscal policy will increase aggregate demand and shift the AD curve to the right.

*Contractionary:* If the government cuts back on its own spending or decides to raise taxes, aggregate demand will fall. Thus, contractionary fiscal policy will shift the AD curve to the left.

**(3) Government Monetary Policy:** "Monetary" policy refers to the manipulation of the money supply by a nation's central bank to influence interest rates. In the United States, the central bank is known as the Federal Reserve System.

**[Reminder: How the Fed sets Interest Rates**

The Fed usually conducts monetary policy by **open market operations**. The Federal Reserve can print cash and also has reserves of Treasury bonds that it holds in storage. It manipulates the amount of cash available on the overnight interbank money market ("Federal Funds Rate") by stealthy buying & selling of Treasury bonds from its storage to banks:

Expansionary Policy: Fed buys T-bonds from banks (i.e. increase money supply) → interest rates fall → investment spending by firms increases.

Contractionary Policy: Fed sells T-bonds to banks (i.e. decreasing money supply) → interest rates rise → investment spending by firms decreases

**Law of Money Markets:** Increasing the money supply (i.e. Central Bank buying up bonds) leads to *lower* interest rates; decreasing the money supply (i.e. Central Bank selling off bonds) *raises* interest rates.

So, when you read in the news that the Fed "lowered interest rates" what that really means is that the Fed decided to increase the supply of money *therefore* causing interest rates to fall. That is the gist of it. ]

So let's go back to aggregate demand. We can differentiate again between expansionary and contractionary monetary policy.

*Expansionary:* if the Federal Reserve increases the money supply, interest rates will fall. As we know, this will increase investment spending by firms. Thus, expansionary monetary policy will increase aggregate demand and thereby shift the AD curve to the right.

*Contractionary:* if the Federal Reserve reduces the money supply, interest rates will rise. As a result, investment spending by firms and thus aggregate demand will fall. Thus, contractionary monetary policy will shift the AD curve to the left.

**[Liquidity Traps:** In uncertain & fearful environments, financial markets are sometimes overcome by a panic feeling, when no one wants to lend to each other, no one wants to hold bonds or any long-term debt, everyone just wants to put all their savings in **cash** and wait it out. This "credit crunch" or "flight-to-cash" is often called a "liquidity trap". This complicates the operation of the Fed's monetary policy. Since everyone wants to hold cash, then the Fed's monetary policy is neutered. It can increase the money supply all it wants, but everyone just says thank you very much, and sits on the cash, stockpiling it rather than lending it out or buying bonds. As a result, interest rates *won't* fall. And if

interest rates don't fall, then investment spending won't rise. This is a very dangerous situation, since it means the Fed's monetary policy is rendered ineffective. We recently had this happen during 2008-09.]

## The Multiplier Story

There is one very special relationship we need to highlight in the aggregate demand story: that is the relationship between income and consumption, which generates a "feedback" effect that magnifies the impact of a change in aggregate demand.

Remember that one of the determinants of consumption spending was people's *incomes*. Now, people's incomes are derived from the sale of goods, i.e. from *output* (real GDP). When firms produce and sell stuff, they pay workers, shareholders, etc. the returns from those sales. So *any rise in output automatically raises incomes*.

But if people's incomes increase, then means that they, in turn, increase their consumption spending.

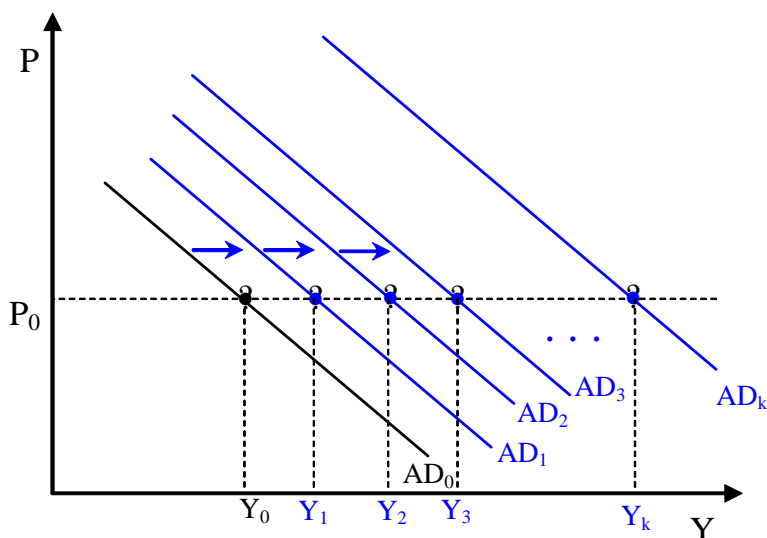
Notice that now we have a feedback loop built into the story. Look at the figure below. Let us ignore the SRAS curve for now. Or rather, assume it is perfectly flat (horizontal) at  $P_0$ . Suppose that, starting from  $AD_0$  interest rates fall and investment spending rises. In terms of the diagram, that means aggregate demand rises, from  $AD_0$  to  $AD_1$ . So, short-run real GDP rises from  $Y_N$  to  $Y_1$ .

Translation: firms want more buy a few more goods than usual (higher investment spending), so that means other firms rush to meet that extra demand by producing those extra goods, i.e. hiring more people, or having the people do extra shifts, etc. (and because we're temporarily assuming SRAS is flat, that means they can do that - lots of resource capacity, so no inflation,).

So far so good. Nothing different to what we said before. But now remember the income-consumption relationship. *Because* short-run GDP has risen from  $Y_N$  to  $Y_1$ , that means people's *incomes* are higher and so they will consume *more*, thereby increasing aggregate demand *again*. In the diagram, that income-induced consumption is represented by the *second* shift in the aggregate demand curve from  $AD_1$  to  $AD_2$ .

But we are not done. Far from it. That *second* shift from the extra consumption has *itself* raised short-run GDP from  $Y_1$  to  $Y_2$ . So incomes are even higher now. So even more consumption will be induced, shifting the aggregate demand curve yet again from  $AD_2$  to  $AD_3$ .

But we are still not done. The rise from  $AD_2$  to  $AD_3$  has increased output again from  $Y_2$  to  $Y_3$ . So there is more consumption -- and more shifting of AD curve, more output, more consumption, etc. The feedback loop continues on and on.



**Figure 14** - Multiplier Effect

Notice what happened. We had a boost in investment demand (the initial increase in AD) which has generated a whole endless cascade of further increases in AD because of an income-induced consumption effect that has created a feedback loop.

Is this feedback loop ever going to stop? Or are the AD curves going to be shifting rightwards on and on and real GDP rising on and on forever?

The answer is "No". This process *will* eventually wind down. The reason is that people don't spend *all* their extra income on consumption but save a bit of it. So the rightward shifts in AD get smaller and smaller and eventually slow down and come to a halt at a final position. In the diagram, this final position is represented by the final aggregate demand curve,  $AD_k$  (and thus real GDP is now  $Y_k$ ).

How can we be so sure this feedback process will grind slowly to a halt? Well, it takes a little math to show it. Suppose there is a \$100 injection from investment which increases AD and real GDP by \$100. That \$100 goes to the consumers as *income*, but only a certain proportion of it (say, 80%) is spent on consumption, the remainder (20%) saved away. So the \$100 increase in income leads to a rise in aggregate demand by \$80 *only*, saving the remaining \$20.

But that \$80 rise in AD means, as we have just explained, a further \$80 rise in income. So in the *next* round, 80% of *that* (\$64) will be spent, and the remainder (\$16) saved.

That \$64 in extra consumption expenditure is next round's income. So, 80% of \$64 (= \$51.20) will be spent, and the rest (\$12.80) saved.

And the \$51.20 of extra consumption spending becomes next round's income. So 80% of \$51.20 (= \$40.96) is spent, and the rest (\$10.24) saved.

And so on by that pattern.

So what is the *total* increase in aggregate demand (and thus the *total* increase in output (real GDP) that follow it)? Well it's the \$100 injection plus all the induced rounds of consumption, summed together:

$$\text{Total increase in AD} = \$100 + \$80 + \$64 + \$51.20 + \dots$$

and so on *ad infinitum*. What is this amount? We are summing an infinite series of numbers, so is the total sum infinite as well? No. Takes a little knowledge of math to figure it out. Remember that 80% of every addition to income is spent. So notice this sum can be rewritten as:

$$\begin{aligned} \text{Total increase in AD} = & \$100 + (0.8) (\$100) + \\ & (0.8)((0.8)(\$100)) + (0.8)(0.8)((0.8)(\$100)) + \dots \end{aligned}$$

Substituting  $c = 0.8$ , then we can rewrite this as:

$$\text{Total increase in AD} = \$100 + c(\$100) + c^2(\$100) + c^3(\$51.20) + \dots$$

where  $c = 0.8$ . This  $c$  is known as the **marginal propensity to consume**, which is defined as the proportion of every dollar of income that is spent on consumption.

Now, notice the sum can be rewritten as:

$$\text{Total increase in AD} = (1 + c + c^2 + c^3 + \dots) \times \$100$$

A mathematician should recognize this immediately. As  $c$  is a fraction, then the infinite sum  $(1 + c + c^2 + c^3 + \dots)$  is actually a finite number. And there is a simple formula for it:

$$(1 + c + c^2 + c^3 + \dots) = 1/(1-c)$$

(check a math textbook if you don't believe me). So, in conclusion:

$$\text{Total increase in AD} = [1/(1-c)] \times \$100$$

Or, for our example, as we know  $c = 0.8$ , then:

$$\text{Total increase in AD} = [1/(1-0.8)] \times \$100 = [1/0.2] \times \$100 = 5 \times \$100 = \$500$$

So there we have it. The *total* increase in aggregate demand from a \$100 injection going through all those rounds of income-induced consumption feedback is actually easy to determine: it is \$500.



So, in our diagram above, the *final* position of aggregate demand curve ( $AD_k$ ) is such that the short-run real GDP ( $Y_k$ ) is a full \$500 above the long-run GDP ( $Y_N$ ).

In sum, an extra injection of \$100 of investment spending does not merely increase real GDP by \$100. It increase real GDP by \$500. Five times as much impact. That is a lot of bang per buck.

Our initial injection came from more investment spending. But it could have come from more government spending. Or from lower taxes. Or from more net exports. Or from a wave of consumer confidence boosting consumption autonomously. *Anything* that increases aggregate demand -- any injection of spending -- will have a much greater impact on the economy than the amount actually injected. The general formula is:

$$\text{Total increase in AD} = [1/(1-c)] \times \text{injection of spending}$$

The factor  $1/(1-c)$  has a special name. It is known as **the multiplier**.

But there is a downside too. Just as any *increase* in spending has a magnified effect, so too does every *decrease* in spending have a magnified effect -- in the opposite direction. A \$100 *reduction* in investment spending will *reduce* total aggregate demand (and real GDP) by \$500.

(To tie it up: so long as the economy has plenty of extra capacity, the total real output (short-run output) will necessarily equal the total increase in AD. That only ceases being true when we approach the capacity constraint and we also start getting inflation. But for that we need to bring in SRAS, and we're focusing on AD right now.)

### **The Keynesian Revolution**

The multiplier was originally discovered by **John Maynard Keynes** back in 1936. It precipitated a veritable revolution in economics against the old Neoclassical/Neoliberal orthodoxy.

In the 1930s, all the western economies mired in the Great Depression, orthodox economists were at a loss: there were plenty of resources -- factories, workers, raw materials -- available, wages were low, why weren't people being hired & producing stuff? The only answer they came up with is that wages simply must not be low enough - - and so called for reductions in wages.

Keynes diagnosed the problem differently -- and used the multiplier to tell the story. People weren't being hired because firms weren't selling their output. And they aren't selling their output because people aren't buying stuff. But people aren't buying stuff because . . . their incomes are too low! Instead of *lowering* wages further, as the orthodox economists recommended, Keynes recommended everything must be done to *increase* people's incomes. Higher incomes, means more consumption, more consumption means more demand, more demand will lead to more sales. And once the

sales pick up, that's when firms start hiring again to produce more output -- which means workers get *more* income to buy *more* stuff, etc. It's that income-consumption feedback loop thing again.

The question is how to get the ball rolling, i.e. the initial injection. There were plenty of levers available to the government: it could lower interest rates (via the Central Bank) to try to spur private investment spending; or it could reduce exchange rates to boost net exports; or it could lower taxes (giving people an income boost); or, as happened in so many countries, it could just increase government spending (e.g. building roads, dams, airports, military, etc.)

In the 1930s, governments weren't waiting for Keynes to say what he said. They were doing it already. Franklin Delano Roosevelt's New Deal program was designed precisely along those lines. His numerous public works projects (building roads, dams, etc.) were an injection of government spending. Abandoning the Gold Standard (i.e. lowering the exchange rate) boosted net exports. Federal programs guaranteeing deposits, mortgages, etc. boosted consumer and firm confidence that, in turn, increased spending. His Social Security programs boosted the incomes of the retired & unemployed, getting them to spend more on consumption. The Federal Reserve lowered interest rates to rock bottom to boost investment spending.

All this was already underway before Keynes's *General Theory* was published in 1936. As one senator put it, after reading the book, "We already knew it was good policy. Now we know it is also good economics."

Did it work? Yes. There were a few mistakes -- notably, afraid of budget deficits, Roosevelt foolishly raised taxes as well (causing a brief recession). But, on the whole, it worked, particularly when the last (and biggest) boost of government spending finally kicked in -- the military spending for World War II.

The Keynesian logic has been followed by most governments since World War II -- and continues to be followed today. As a result, the business cycle was tamed a bit -- more on which we have to say later.

## The Paradoxes of Thrift

The multiplier story shows up two other fallacies which orthodox economists used to fall into. Saving -- or "thriftiness" -- used to be regarded as a "good" thing for the economy. If people saved more, the economy would grow more, they thought. The multiplier story shows this to be a fallacy.

**Paradox #1** - If you save more, you're making it harder for the economy to improve.

Consider two countries, say, US and Japan. Say the spendthrift US consumer saves a pittance, only 10% of his income (thus  $c = 0.9$ ), while the thrifty Japanese consumer saves a larger proportion, say 40%, of his income (thus  $c = 0.6$ ).

Say both economies are in recession and both the US and Japanese governments attempt to increase real GDP by increasing government spending by \$100. What is the effect?

In the US, the \$100 injection will increase real GDP by a factor of  $(1/(1-c)) \times \$100 = \$100/0.1 = 10$ , so  $10 \times \$100 = \$1,000$ .

In Japan, the \$100 injection will increase real GDP by  $(1/(1-c)) \times \$100 = \$100/0.4 = \$250$ .

So, although both the US & Japanese governments spend the same amount (\$100), the US gets a *lot* more bang-per-buck than Japan, \$1,000 vs. \$250, a *huge* difference.

So Japan would actually be a lot better off if its consumers were *less* thrifty.

In fact, this example is not too far from the truth. Japan has been stuck in a depression throughout most of the 1990s -- even though the Japanese government has tried everything in the Keynesian rule-book, from spending massive amounts of government programs, lowering taxes, driving interest rates to zero (even negative), but the economy has failed to budge. The culprit? Nobody is quite sure. But the fact that Japanese consumers have a rather low marginal propensity to consume has been a critical factor in making the Japanese government's policies have so little impact.

**Paradox #2** - If you try to save more, you *won't* end up with more savings.

This is really a paradox -- and takes some thinking to work through it. Consider the US-Japan case again in the previous example. Japanese were thriftier. Are their *total* savings greater? No.

To see this, reason through the following: US consumers are saving 10% of their income. From an injection of \$100, their total income increased by \$1,000. 10% of 1,000 is precisely \$100. So *total* US savings increased by \$100.

Now look at Japan. Japanese consumers were saving 40%. From the injection of \$100, total income increased by \$250. 40% of \$250 is . . . \$100. So *total* Japanese savings increased only by \$100 as well!

So, even though Japanese consumers *tried* to save more than Americans, they *didn't* end up with any more savings. On the whole, they saved *exactly* the same amount as the Americans!

Counter-intuitive, but true. We like to think that if *we* personally save more, we end up with more savings. But when we take into account how our thrifty behavior impacts other people and businesses in the economy, that is not quite the case. As Keynes liked to say, "Whenever you save a shilling, you put a man out of work for a day". And by putting *him* out of work, then *his* income is lower and *both* his consumption and his savings fall.

That's why we must be careful when looking at the economy as a whole. We must avoid reasoning by analogy to a single individual's situation.

### **In Sum**

We have discussed aggregate demand in some detail. We have shown the categories of spending -- consumption, investment, government spending and net exports -- that lies behind it. We have noted how things like consumer confidence, wealth, taxes, interest rates, exchange rates and so on impact aggregate demand. We have touched upon some policy options available to the government to boost or reduce aggregate demand.

We also discussed the multiplier, how an injection of spending is actually magnified, via an income-consumption loop, into a much larger amount of spending. That may have seemed like a detour from the AD-AS model. But it wasn't much of a detour. I was alerting you to the fact that when we say a bout of spending *shifts* the AD curve, we are actually *including*, within that shift, all the multiplier effects of the income-consumption feedback loop. So a shift in the AD curve is supposed to capture not merely the extra spending, but the *full* magnified, impact of that injection.

But now it is time to return to the other side of the AD-AS model.

## AGGREGATE SUPPLY

Real GDP refers to the total amount of goods and services produced and sold by firms in the economy. The way we have discussed it so far, it seems that *how much* is produced depends on aggregate demand. It does. But there are other things to take into consideration.

### The Short-Run Aggregate Supply Curve (SRAS)

Suppose the economy is deep in the middle of a depression -- say a quarter of workers are unemployed, half of the factories are empty, huge stocks of raw materials sit idly rotting in the warehouses. Why aren't these resources being put to use? Well, we know part of the answer: not enough demand for goods.

But suppose there is a burst of demand, say a huge and sudden increase in consumption spending or some other boost in aggregate demand. OK. So, like we said before, firms now start producing more -- hiring some of those unemployed workers, getting those factories back running, ordering those raw materials from the warehouses, etc. No problem.

But what if the economy *isn't* in a deep depression, but rather doing quite well. In other words, almost everybody who wants a job is employed, factories are all operating at or near full capacity, raw materials are being whisked into production as soon as they appear, etc.

*Now* suppose there is a huge and sudden increase in consumption spending. Firms will try to do as before, i.e. produce more to meet that extra demand. So, they'll go out and hire more workers, buy more raw materials, open up some more factories, etc. But, wait. There *aren't* many available workers or empty factories or stocks of raw materials out there that can be easily hired or bought. The economy is running *at* its full capacity already.

We know that. The firms know that. But it doesn't mean they're not going to *try* to increase production. An individual firm still thinks *it* can increase production if it can *outbid* other firms for those resources. Can't find workers? Lure them away from your competitors by offering them higher wages. Or have your workers do double shifts for extra pay. Need more raw materials? Outbid your competitors for them at the supply docks. No empty factories? Offer plant-owners a higher rent to evict your competitors and lease it to you. There's higher demand out there, there are extra sales to be made -- and you'll do what it takes to acquire those resources to get production up to make those extra sales.

Of course, even if *you*, an individual firm, don't want to increase production, you'll *still* have to do this because somebody *else* is trying to increase production. If you *don't* raise wages, you'll find all your workers lured away by other companies who will. So you

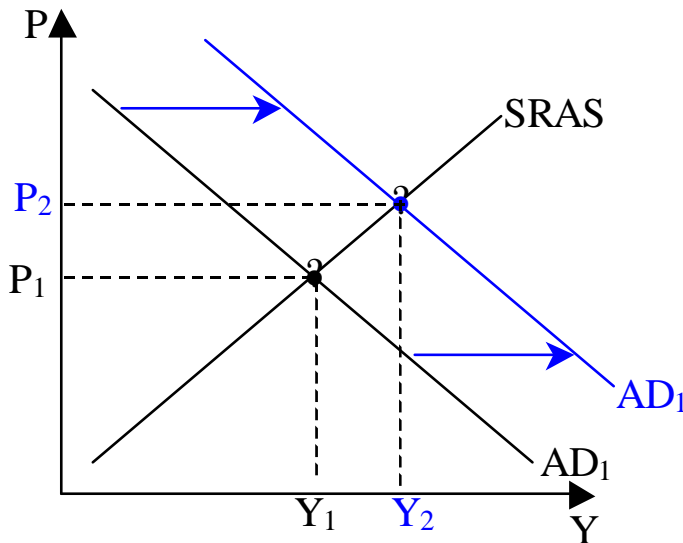
*have* to raise your workers wages just to get them to stay put. You *have* to pay more for raw materials just to keep receiving them and continue producing. You *have to* pay higher rent just in order to get your lease renewed.

Notice what is happening: the costs of production -- wages, rents, capital costs, etc. -- are *all rising everywhere*.

That's a big problem. Because if you were intent on, say, holding a 10% profit margin (the minimum which you need to satisfy your shareholders), that profit margin is being seriously squeezed now that all your wage costs, etc. are going up. What do you do? Well, you really have no choice. You have to keep that 10% profit. And the only way to do that now is to raise the prices at which you sell your output to consumers.

So, to summarize the story: when aggregate demand rises, firms will do everything they can to increase production. But if resource markets are tight, they'll be outbidding each other for them, thereby raising production costs. And if production costs rise, firms are forced to pass on those higher costs to the general public in the form of higher prices.

This is the reason why the short-run aggregate supply slopes upwards. It captures the fact that when aggregate demand rises, output rises, yes, but so do prices. Look at Figure 15 below. Starting from  $Y_1$  and  $P_1$ , an increase in aggregate demand from  $AD_1$  to  $AD_2$  will raise output to  $Y_2$ , but it will *also* raise prices to  $P_2$ .



**Fig. 15** - Rising output *and* prices as aggregate demand rises.

So this captures the idea that when aggregate demand rises and firms try to produce more, they can produce more. But at the same time, the resource markets get a little tighter and production costs rise a bit and some of that rise is passed on to buyers in the form of higher prices for goods. And the more everybody *tries* to produce (i.e. the greater the rise

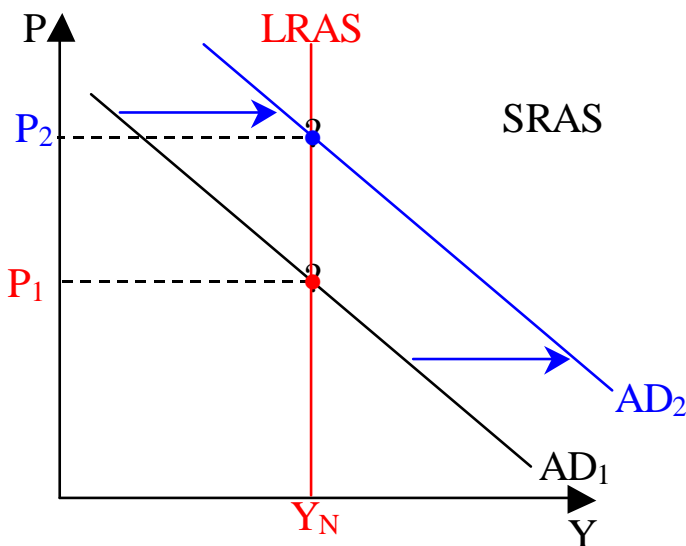
aggregate demand), the tighter those resource markets become and so the higher the prices that will be passed on.

So you should really think of SRAS as a curve which captures the increasing tightness of resource markets.

### The Long-Run Aggregate Supply Curve (LRAS)

Is there an upper limit? Is there a point where the resource markets are *so tight* that any increase in aggregate demand will lead to *no* increase in output but *only* higher prices? Yes. When there is **full employment**. That is what the *long-run* aggregate supply curve (LRAS) is supposed to capture.

Examine Figure 16, where we only have aggregate demand and the LRAS -- we have omitted the SRAS. Suppose we start at  $Y_N$  and price level  $P_1$ . When aggregate demand rises, from  $AD_1$  to  $AD_2$ , notice that output does *not* change at all, but prices rise from  $P_1$  to  $P_2$ .



**Fig. 16 - Full Employment**

The situation in Figure 16 represents the idea that the economy is at full employment. We are employing *all* the resources the economy has. Firms are simply *unable* to produce more. Any increase in aggregate demand simply *cannot* be met by higher output. All that happens is that prices rise to "stifle" that extra demand.

So the long-run real GDP -- or  $Y_N$  -- is sometimes also called the "full employment" level of real GDP. The economy *can't* produce more than that.

Or can it?

## Overemployment

You should be wary of what I just said. After all, didn't you just see earlier how, in a boom, real GDP rises *above* the long-run level? So there *must* be a way of increasing output, *even* if everybody and everything is fully employed.

First, let us be careful with what the word "fully employed" means. It means that practically everybody in the economy who wants a job has one and is working under "regular" conditions. In other words, that doesn't mean that everybody is being worked to the max. If they could somehow be induced to working two shifts instead of one, more could be produced. So we can produce *more* than the "full employment" level of production. It's just that those work conditions would be rather extraordinary.

Or consider another aspect of the definition: we said everybody who *wants* a job has one. But there are numerous people out there -- students, housewives, retirees, etc. -- who *aren't* really looking for a job. They prefer to be *out* of the labor market. But they *can* be convinced to work -- if the price is right. So, even if we're at "full employment", firms can nonetheless get more workers by inducing people who otherwise would prefer not to work by offering them really, really high wages and great work conditions.

So, firms *can* produce more output than the "full employment" level of output ( $Y_N$ ) -- by getting their own workers to work *more* than they normally do and hiring people who are *not* normally in the labor force. We can call such a situation as "more-than-full employment", or "overemployment".

That is what is happening in the boom. That is exactly how, as we see in in the figure below, we can produce at  $Y^*$ , a level of output *above* the full employment level.

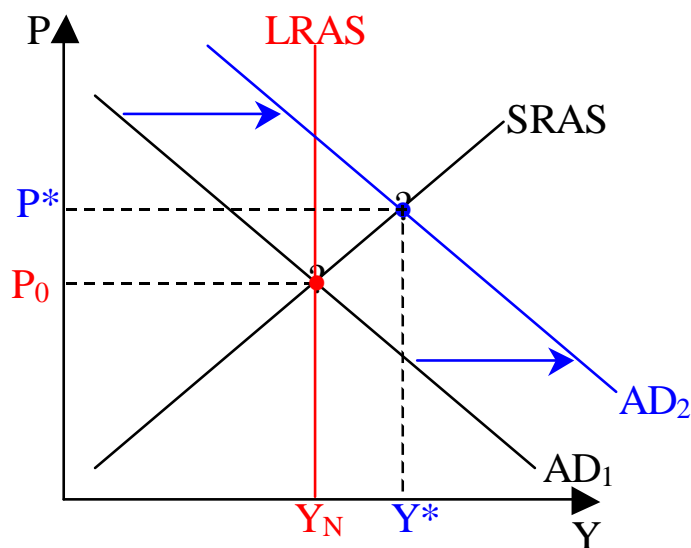


Fig. - Going into overemployment



## Fooling the People

But there is a catch. To get people to work "extra" or lure people who didn't even want to work, you have to pay *really* high wages, *higher* than you'd normally pay at regular full employment. That's the only reason they'd sacrifice the leisure time they'd normally spend with their families or doing the other things they wanted to do.

But how can you afford to pay those really high wages? Well, the truth is, you can't. At least not for very long. Your profits would be really squeezed. You'll have to pass on those higher wage costs in the form of higher prices.

But if the prices of goods increases, that *erodes* the value of the wages you're paying. So, if you convinced people to work double shifts by raising their wages from \$10 to \$12 an hour, but at the same time increased the prices of your goods by 20% (and all other firms did the same) then in terms of *real* purchasing power, *wages have not risen at all*.

There's the rub. You *fooled* your workers into working extra by letting them think you were paying higher wages, when, in truth, those wages *weren't* higher. They just *looked* higher.

Well, as Abraham Lincoln noted, "You can fool all people some of the time, but you can't fool all the people all of the time."

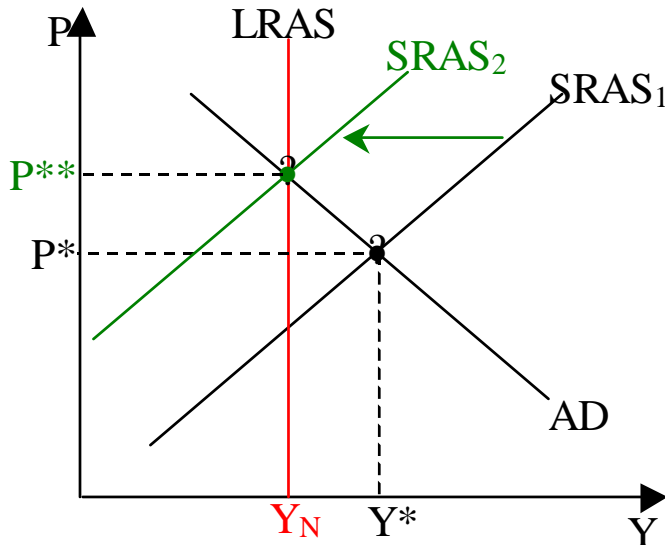
As long as your workers don't *notice* that their wages haven't really increased, they're willing to put in the extra work. But once they notice that prices everywhere have gone up, then the gig is up. When the labor contracts come up for renegotiation, they'll demand a *real* increase in wages -- meaning, an increase in wages which *already* takes into account the fact that inflation will probably be rising.

And you can't deny them that. After all, what are you going to do if they leave? Hire somebody else? There *isn't* anybody else out there, remember? The economy is more than fully employed. *Everybody* and their dog already has a job. You *must* relent and give them that real increase.

But that kind of increase in wages is one you cannot really afford to pay. Not in the long-run. Perhaps temporarily you may be willing to reduce your profit margin from, say, 10% to 7%, but you know that will get you in trouble with your shareholders and probably be fired yourself.

So, at some point, then, you must give up trying to produce at that over-high level. You can't afford the extra wages to put people on double shifts. So, everything goes back to single shift at normal wages, i.e. *you cut back production*.

This final step, then, is the beginning of the *recession*. This cut-back in production when you are no longer able to fool your workers into working extra-hard with no "real" increase in pay is the leftward-shift in the short-run aggregate supply curve that puts an end to the boom. You come back down to plain full employment.



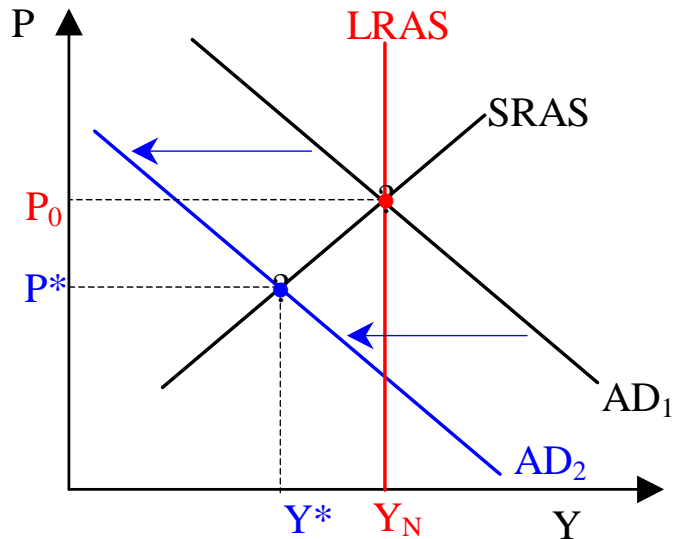
**Fig. - The Recession: the gig is up!**

(BTW, why do prices rise even more when output falls this time? Well, there's less stuff being produced now, remember? Prices go up for simple scarcity reasons. You've got to choke off that high demand now that you can no longer afford to produce stuff to meet it.)

### **The Unemployment Effect**

What about the other side? Suppose there is a depression caused by a sudden decrease in aggregate demand. Your inventory is now piling up unsold. There are two things you can do: (1) stop production altogether and wait for inventory to be sold off slowly over time; (2) keep producing, but sell off your accumulated goods at cut-rate prices. Chances are, firms will do a bit of both -- cut back some production and lower prices to help get rid of inventory. That's why, when aggregate demand falls, prices fall too.

[That's why when you see deflation, that's often a sign of serious trouble. It tells you that the recession is over -- and now you are entering a depression.]



**Fig. - The Depression**

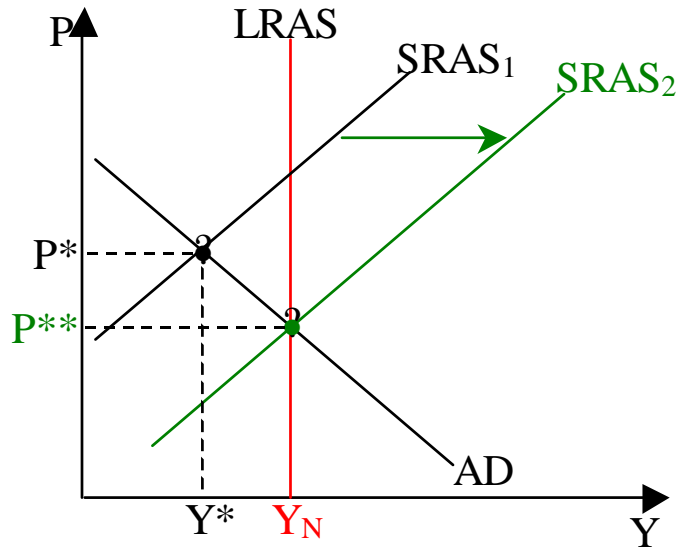
But if you lower the prices at which you are selling your goods, we're back to the old profit squeeze problem. But there's an easy fix: lower wages. The bosses are in a strong position now. Workers don't *want* to get fired. And they *know* their position isn't as secure anymore. As output falls below full employment, the unemployment rolls begin rising, they see, everywhere, lay-offs and factory closings. Eager to hold on to the jobs, they're willing to take pay cuts or give up on some benefits or perks. So that way, you can restore your profit margin to what it was.

But there is a bit of fooling going on around here too -- this time, it's the workers fooling the bosses. The workers everywhere agreed to a pay cut, yes. But prices everywhere are falling too. So, *in real terms*, workers are *not* getting paid less. Their paychecks are smaller, but every dollar goes a longer way than before.

Back to Lincoln's old adage: you can't fool the bosses for very long. They *know* they have the upper hand in the next round of wage negotiations -- and now it's the bosses that will demand *real* wage cuts, a stiff drop in wages, taking expected deflation into account.

When the real wage cuts kick in, profit margins are boosted up -- from, say, that just-enough 10% to a really bouyant 15% margin. With that much of a profit rate, firms have great incentives to start increasing production again, rehiring, etc. And workers, still cowed by unemployment, will not be demanding a higher wage immediately. The ability to increase output *without* raising wages is known as the **unemployment effect**.

That increase in production (while keeping workers wages low) is the beginning of the recovery. It is the *shift* in the short-run aggregate supply curve to the right that brings output back up to full employment.



**Fig. - The Recovery - the "unemployment effect"**

[Why do prices fall in the recovery? More stuff is being produced, so goods are less scarce, prices will fall.]

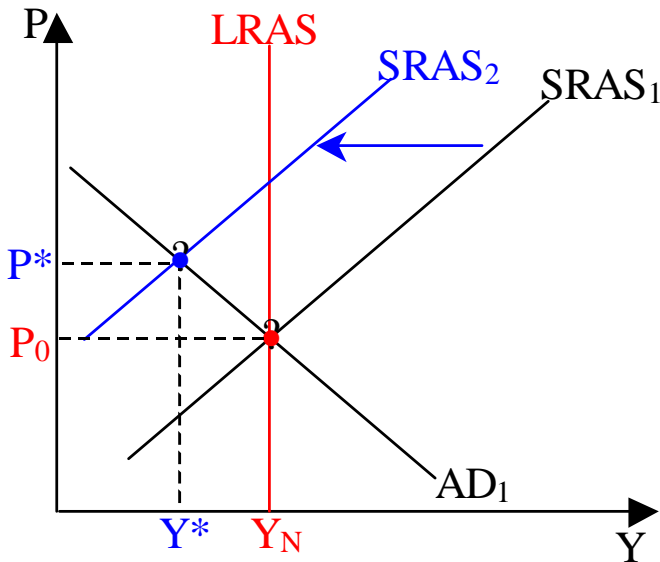
This is an explanation of the "corrections" -- the shifts in the short-run aggregate supply curve -- that ensure that what goes up, must come down; and what goes down, must come up.

### **An Alternative Depression: Inflationary Expectations**

We earlier spoke of "alternative" theories of the business cycle. In those theories, it is sudden shifts in the short-run aggregate supply that *cause* the booms and depressions. These are quite rare, but they happen sometimes.

The most important -- and perhaps best reported -- "alternative" cause of a depression is "inflationary expectations". If workers suddenly *expect* prices of goods tomorrow to rise (for whatever reason), they will demand higher wages now. But because prices have not yet risen, that means that firms will face higher wage costs but no higher sales revenue. To keep their profit margins, firms will be forced to cut back production. This will shift the short-run aggregate supply curve to the left. Notice that the end-result is that the price level will rise, so people's inflationary expectations will be vindicated.

- **Inflationary Expectations:** Let us start at the long-run real GDP level  $Y_N$  and price level  $P_0$  in the figure below. If workers expect prices to be higher tomorrow and press their wage claims now, then this will shift the short-run aggregate supply to the left, from  $SRAS_1$  to  $SRAS_2$ . As a result, output declines from  $Y$  to  $Y^*$ . This is a depression. Notice that prices end up rising from  $P$  to  $P^*$ , so there is a little bit of inflation.



**Fig. 9** - The Impact of Inflationary Expectations

By the way, when a depression is accompanied by a bout of inflation, this is called a "**stagflation**" (combining the words "stagnation" and "inflation"). Stagflations are not very common, but they happen.

Inflationary expectations are important in that they usually are things that happen *in addition* to other problems. If, for some reason, there is a little bout of inflation (as in the recession), inflationary expectations are often formed which will worsen the situation (i.e. turning what was a "corrective" recession into an outright depression of the stagflationary sort).

### Long-Run Shocks

We said that the full employment level of output,  $Y_N$ , represents the maximum level of production the economy can achieve under "normal" conditions. We have assumed, thus far, that it is constant.

How much is *possible* to produce depends on the resources available in the economy. By this we mean the total amount of **capital**, **labor** and **land** in the economy. It also depends on **technology** because the more efficiently firms can combine these resources, the more can be produced and sold.

Changes capital, labor, land and technological possibilities are driven by long-run trends. Business cycle theory focuses on *fluctuations* around this long-run trend, and so we felt we could abstract from changes in the trend itself. It is for this reason that we have assumed that the long-run real GDP is *fixed* at  $Y_N$ . This is not a realistic assumption, but it was one to make our analysis simple.

But really, it isn't constant. Changes in resource supplies means that the long-run aggregate supply curve (and thus the long-run, full-employment GDP) changes.

**Economic growth** is the most obvious case. Slowly, over time, most countries experience gradual increases in resources (e.g. population growth) and will have steady technological improvements in combining resources. Economic growth is represented as just a gradual "inching upwards" of the long-run aggregate supply curve.

But sometimes there can be sudden increases or decreases in resources. The following specific things may cause the LRAS to shift to the right:

- (1) Improvements in technology
- (2) Immigration
- (3) Discovery of cheap energy sources

The following will cause the LRAS (and SRAS) to shift to the left:

- (1) Rising energy prices.
- (2) Natural disasters
- (3) A drastic fall in the quality of education

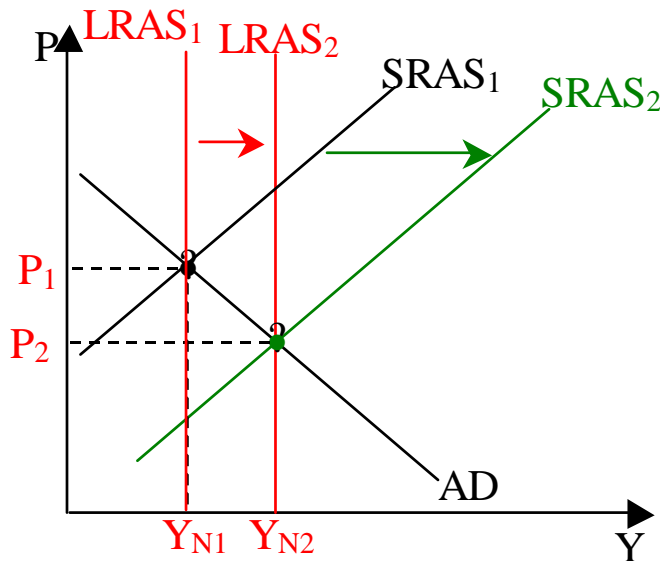
There are numerous other things we could have added to this list.

These things can *themselves* cause what *look like* booms or recessions -- only, the moves are *permanent*, and not transitory.

For instance, suppose (as many thought or earnestly *wanted* to believe) that the US was *really* in a "New Economy" in the 1990s. They argued that the internet was really an enormous technological improvement that *increased* the productivity and thus the capacity of the US economy, i.e. the LRAS shifted right, raising the "natural" or "full employment" level of output *above* the current level of output and thus making for a *higher* level of output as the point to where the cycle would go.

**Technological Improvement:** In the figure below, suppose we start where  $LRAS_1$  gives  $Y_{N1}$  as the full employment output. Furthermore, suppose aggregate demand (AD) and short-run aggregate supply ( $SRAS_1$ ) are centered on it (thus short-run GDP is  $Y_{N1}$  and the price level is  $P_1$ ). Now suppose there is some sudden technological improvement that *shifts*  $LRAS_1$  to  $LRAS_2$ . So, long-run GDP rises from  $Y_{N1}$  to  $Y_{N2}$ . But, at least temporarily, *short-run* real GDP is still at the old level ( $Y_{N1}$ ). So, short-run real GDP is *below* long-run real GDP. That is a situation reminiscent to the trough after a depression -- except that it is not a depression because output didn't *fall*, but rather that the long-run level *rose*. But the *mechanics* of the "recovery" are set in motion. In other words, the short-run GDP "catches up" with long-run GDP in the same way that recovery pulls us out of a depression -- by a rightward *shift* in the short-run aggregate supply curve (from

SRAS<sub>1</sub> to SRAS<sub>2</sub>). Short-run GDP will therefore *rise* to Y<sub>N2</sub>. And it won't come back down.



**Fig.** - Technological improvement

That's the great thing about things like productivity gains. It takes the economy *upwards* above its old full employment level (so many people think it is just a boom and that it will go back down). But it really *isn't* a boom. The mechanics of it are like a *recovery*. (and so GDP *won't* fall back down).

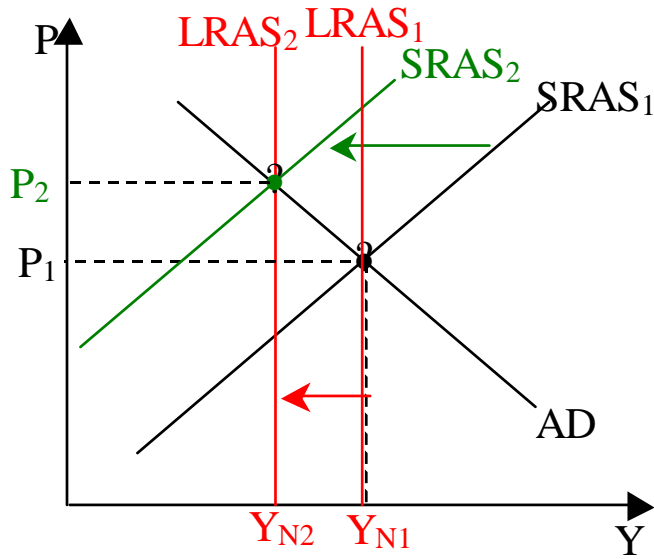
As mentioned before, that was one of the wishes of many commentators and analysts during the "New Economy" of the 1990s. Sober minded people warned that there were no real productivity gains, that it was really just another boom -- indeed, a "bubble" -- that would eventually come back down (as booms always do). But many argued that, no, it was a real productivity gain, and so it would *not* come back down.

The skeptics were right.

The converse side is a negative supply shock. The most famous case is that of the cut in oil supplies by OPEC in the 1970s. As oil is such an important resource in practically most businesses, it had a tremendous impact on the capacity of the American (and other western) economies.

**Supply shocks:** In the figure below, suppose we start where LRAS<sub>1</sub> gives Y<sub>N1</sub> as the full employment output and AD & SRAS<sub>1</sub> are centered there (thus short-run GDP is Y<sub>N1</sub> and the price level is P<sub>1</sub>). Now suppose OPEC cuts oil supplies that seriously diminishes capacity, so long-run GDP falls from Y<sub>N1</sub> to Y<sub>N2</sub>. Temporarily, *short-run* real GDP is still at the old level (Y<sub>N1</sub>). So, short-run real GDP is now *above* long-run real GDP. That is similar to a peak after a boom -- but, again, it's not a boom because output didn't rise; rather, the long-run level *fell*. So the *mechanics* of a "recession" are set in motion as

short-run GDP "falls down" to the new, lower, long-run GDP level. in the same way that a recession pulls us back down from a peak. -- by a leftward *shift* in the short-run aggregate supply curve (from  $SRAS_1$  to  $SRAS_2$ ). Short-run GDP will therefore *fall* to  $Y_{N2}$ . And it won't come back up.



**Fig. - A Supply Shock**



## GOVERNMENT INTERVENTION

### (1) The Debate: Keynesians vs. Monetarists

As mentioned earlier, in 1936, the British economist **John Maynard Keynes** published a book entitled *General Theory of Employment, Interest and Money* which analyzed the business cycle in terms of fluctuations in aggregate demand and aggregate supply. Most importantly, Keynes explained how governments can get involved. Although they may not be able to stop it entirely, **governments can influence and shape the business cycle**. It is possible for governments to shorten the recession and depression phases by hurrying up recovery, that it is possible to keep booms in check so that inflation does not get out of hand. Since the 1930s, governments have tried to "smooth out" the business cycle so that short-run GDP stays pretty close to long-run GDP most of the time. As the old phrase goes, they have tried to "shave the hills and fill in the valleys" of the business cycle.

Policy success depends on clearly understanding what the root cause of the problem is when so many things are going on at once, on careful timing and precision in execution. Although governments since the 1930s have used these policy tools to smooth out the business cycle, they have **not always been very successful** at this. If a mistake is made, policymakers might not even be able to find out about it until much later, after a lot of serious damage has already been done. And mistakes have happened.

In the 1970s, the economist **Milton Friedman** argued that because policy mistakes are so easy to make and so costly to the economy, perhaps the government should just give up trying to "smooth out" the business cycle and just let it run its course. It may not be very pleasant, but at least there is no danger of making things worse. This position is sometimes called the "**Monetarist**".

As a counterpoint, **Keynesian** economists point out that the simple fact that we have *not* had an economic crisis on the scale of the severe depressions that used to happen frequently before the 1940s proves that active government policy, while not perfect, is better than no policy at all.

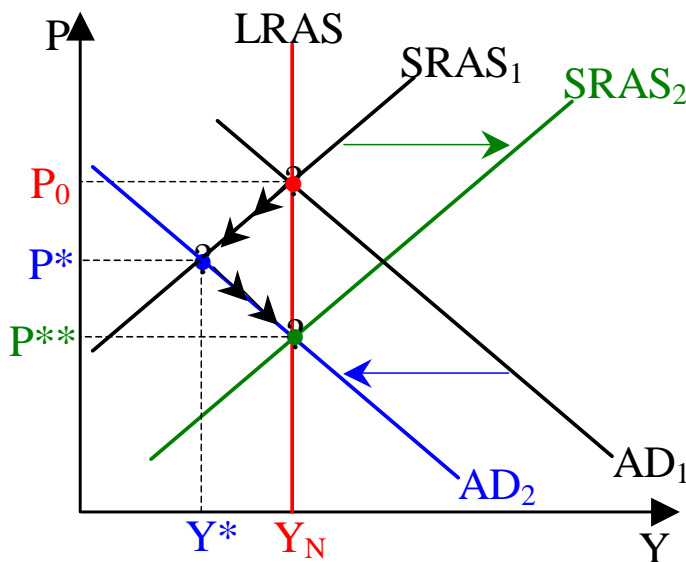
The Monetarists have faith in the natural corrective mechanisms, the shifts in short-run aggregate supply bringing the economy to its stable, long-run full employment level -- that those "fooling the people" and "unemployment effects" will work their magic swiftly.

But Keynesians wonder when exactly will they kick in, if at all, and with what force? High unemployment is a nightmare for a society to live through and, as history has proven, it may take a long time before the SRAS-led recovery kicks in. People may not be willing to wait and the government may be forced to intervene.

Let us consider the impact of government in three cases of depression with different causes:

### Case 1: Decline in AD

Starting at  $Y_N$  and  $P_0$  in the figure below, suppose the aggregate demand curve shifts to the left from  $AD_1$  to  $AD_2$ . This may be because consumer confidence plummeted, or the government increased taxes, or because interest rates rose, or any of the reasons we discussed earlier. As a result, output falls from  $Y_N$  to  $Y^*$  and the price level falls from  $P_0$  to  $P^*$ . We have a depression.



As explained earlier, the "unemployment effect" may kick in at this point and the short-run aggregate supply curve rise automatically from  $SRAS_1$  to  $SRAS_2$ , bringing output back up to  $Y_N$  and even lowering prices to  $P^{**}$ .

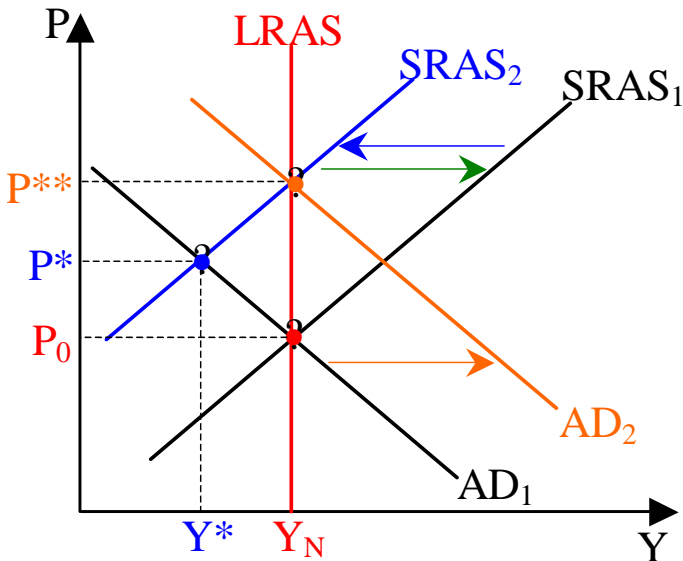
But suppose the government doesn't want to wait and decides to intervene at the depth of the depression (i.e. when output is at  $Y^*$ ). In this case, it can either use expansionary fiscal policy (i.e. increase government spending, reduce taxes) or expansionary monetary policy (i.e. decrease interest rates). Whichever it does, it will increase aggregate demand back up from  $AD_2$  to  $AD_1$ . Output will rise back up to  $Y_N$  and the price level rises back up to its initial position  $P_0$ .

By actively intervening, the government has short-circuited the process and hurried up the recovery. Notice that the only other difference between waiting for the unemployment effect and government action is that in the former, price level falls in the end, while in the latter, the price level remains unchanged.

On the whole, the case for government intervention is rather strong here. It is "restoring" the status quo quickly. It is not making the situation worse.

### Case 2: Decline in SRAS

Consider the case of an inflationary expectations-driven depression pictured below. Start at the long-run real GDP level  $Y_N$  and price level  $P_0$  and let inflationary expectations emerge, so the short-run aggregate supply curve shifts left, from  $SRAS_1$  to  $SRAS_2$  and output declines to  $Y^*$  and prices rise from  $P_0$  to  $P^*$  (unemployment + inflation = stagflation).



Now, the Monetarists, banking on the unemployment effect, are certain that output cannot remain for long below its long-run level. By the unemployment effect, wages will eventually decrease, thus leading the short-run aggregate supply curve to shift rightwards, from  $SRAS_2$  to  $SRAS_1$ . Notice that this reverses the initial move exactly. So we end up at the same position as we started with.

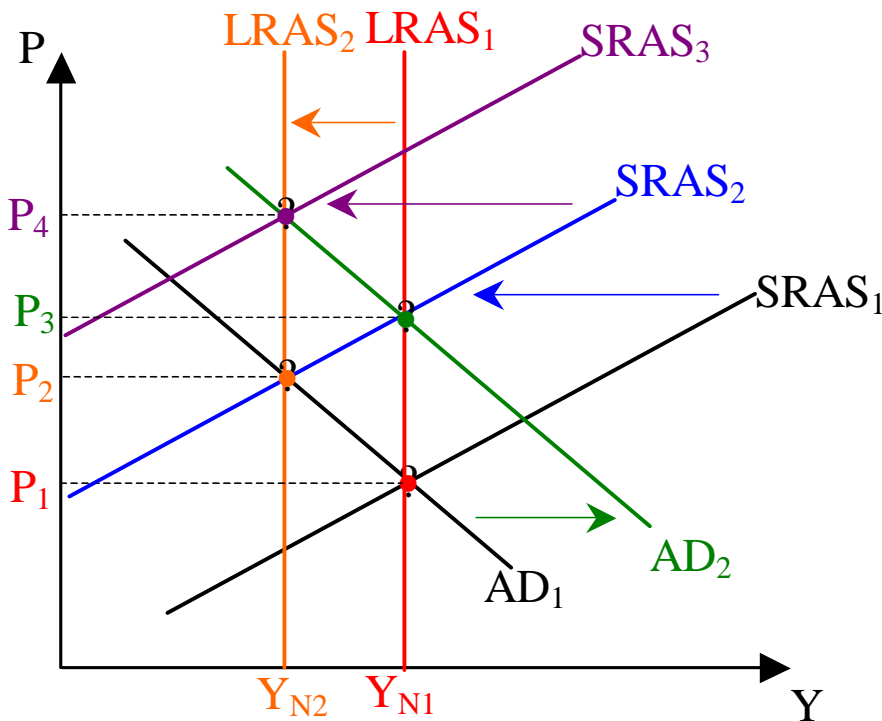
However, suppose once again that the government decides not to wait for the SRAS-induced recovery and to intervene instead immediately. Again, it has at its disposal are expansionary fiscal and monetary policy tools to boost aggregate demand. If it tries to apply these at the depth of this depression, then aggregate demand will shift from  $AD_1$  to  $AD_2$ . This brings output back up to the long-run level  $Y_N$ . But this faster recovery has a cost: it also raises the price level from  $P^*$  to  $P^{**}$ . Thus, government intervention in this case has induced an *extra* bout of inflation..

So the Monetarists seem to have a stronger point *against* government intervention in stagflationary situations -- as government exacerbates the inflation problem.

### Case 3: Supply Shock (LRAS falls)

As we explained, a change in the long-run aggregate supply means there is a permanent change in the long-run real GDP level. Although this is not a "business cycle", properly speaking, the forces that govern the business cycle will push the economy to the new long-run level.

To see, this, suppose there is a permanent rise oil prices or decline in productivity so the LRAS curve shifts to the left in the figure below from  $LRAS_1$  to  $LRAS_2$  so the long-run real GDP level declines from  $Y_{N1}$  to  $Y_{N2}$ . Temporarily, short-run real GDP might remain at  $Y_{N1}$ , the intersection of  $AD_1$  and  $SRAS_1$ . But this now replicates the case where short-run real GDP is above long-run real GDP, so, by the natural "corrective", the short-run aggregate supply curve will shift to the left to  $SRAS_2$  and short-run real GDP climbs down to the new long-run level  $Y_{N2}$  and the price level rises from  $P_1$  to  $P_2$ . If nothing else happens, this is the new long-run position.



**Fig.** A Long-Run Shock -- followed by a government mistake!

Now, suppose the government makes a *mistake*. Suppose that the government did not realize that long-run real GDP had declined. The government will only see the fall in real GDP data, so it might think that what is going on is a SRAS-induced depression. In reaction, it might try to increase aggregate demand (by reducing taxes, raising spending, reducing interest rates, etc.) in order to raise aggregate demand and bring real GDP back up to what *it thinks* is the long-run real GDP level,  $Y_{N1}$ . This is shown in the figure by the increase in aggregate demand from  $AD_1$  to  $AD_2$ . This reaction will bring real GDP up to  $Y_{N1}$  and raise the price level further from  $P_2$  to  $P_3$ .

But of course, this is not sustainable. The underlying "corrective" pressures which exist when real GDP is above its long-run level will still be there. Thus, there will be *another* decline in the short-run aggregate supply curve from  $SRAS_1$  to  $SRAS_2$ , bringing real GDP back down to  $Y_{N2}$  and raising the price level further from  $P_3$  to  $P_4$ . The government's action has been foiled!

If the government *still* doesn't realize what's going on and tries to increase aggregate demand again, then this whole thing will work itself through again. It will keep pushing the economy in one direction, while the forces of the economy are pushing in the opposite direction. The only result, in the end, of the government's efforts is to keep raising the price level again and again, i.e. sustained price inflation.

At some point the government might realize what is going on and stop, and let the economy slide down to its natural  $Y_{N2}$ . But the damage is done: the price level will remain at a very high level.

Some people say that the inflationary problems of the 1970s were caused precisely by the government fruitlessly trying to bring GDP back up in the face of a decline in long-run real GDP induced by OPEC's oil price hike.

The basic lesson is that, in the long-run, the government can do little with standard policy tools to keep real GDP above the long-run level. Whatever it tries will permanently increase the price level, but it will not permanently change real GDP.

## THE BOTTOM LINE

Business cycles can be described as fluctuations in real GDP around its long-run trend. The AD-AS model can be used to explain the cause of economic fluctuations

- If left to its own devices, the regular business cycle usually goes through four phases as follow: (1) boom (from rising aggregate demand), (2) recession (from falling short-run aggregate supply), (3) depression (from falling aggregate demand); (4) recovery (from rising short-run aggregate supply).
- At the root of aggregate demand is consumer spending, investment spending, government spending and net exports. Changes in the price level, wealth, taxes, government expenditure policies, interest rates, exchange rates, confidence and a myriad of other things will lead to changes in aggregate demand.
- Changes in aggregate demand are the most common causes of booms and depressions; changes in short-run aggregate supply (recessions and recoveries) can be seen as "corrections".
- At the root of the short-run aggregate supply is the degree of tightness of resource (e.g. labor) markets.
- Real GDP can only be temporarily above or below long-run GDP. Eventually the pressures of the degree of unemployment on wages will lead short-run real GDP to return to the long-run level. Booms turn into recoveries because the extra bargaining power of workers acquired in a boom tends to drive up real production costs; depressions turn into recoveries because the extra bargaining power of firms acquired in a depression drives down real production costs.
- Prices, however, have no long-run level and can be permanently pushed up or down by changes in aggregate demand or short-run aggregate supply.
- Inflationary expectations may be an independent, supply-side cause of a peculiar kind of depression-inflation combination, known as "stagflation".
- The long-run aggregate supply can change if there are changes in the supply of capital, labor, land and technology. When these grow steadily and gradually, it is called long-run economic growth.
- Sometimes there can be sharp changes in the long-run aggregate supply, such a sudden technological improvements and supply shocks. They generate changes which are similar-looking to certain phases of the regular cycle. In practice, it is hard to detect the difference between these and regular cyclical movements -- and mistakes, sometimes very costly ones, have been made by confusing them.

- Governments can use fiscal and monetary policy to counter the effects of economic fluctuations and speed up the return to its long-run GDP level, but it cannot permanently keep real GDP level away from its long-run level.