

Aggregate Demand and Aggregate Supply

Adding Swings in the Overall Price
Level to our Model of the Economy

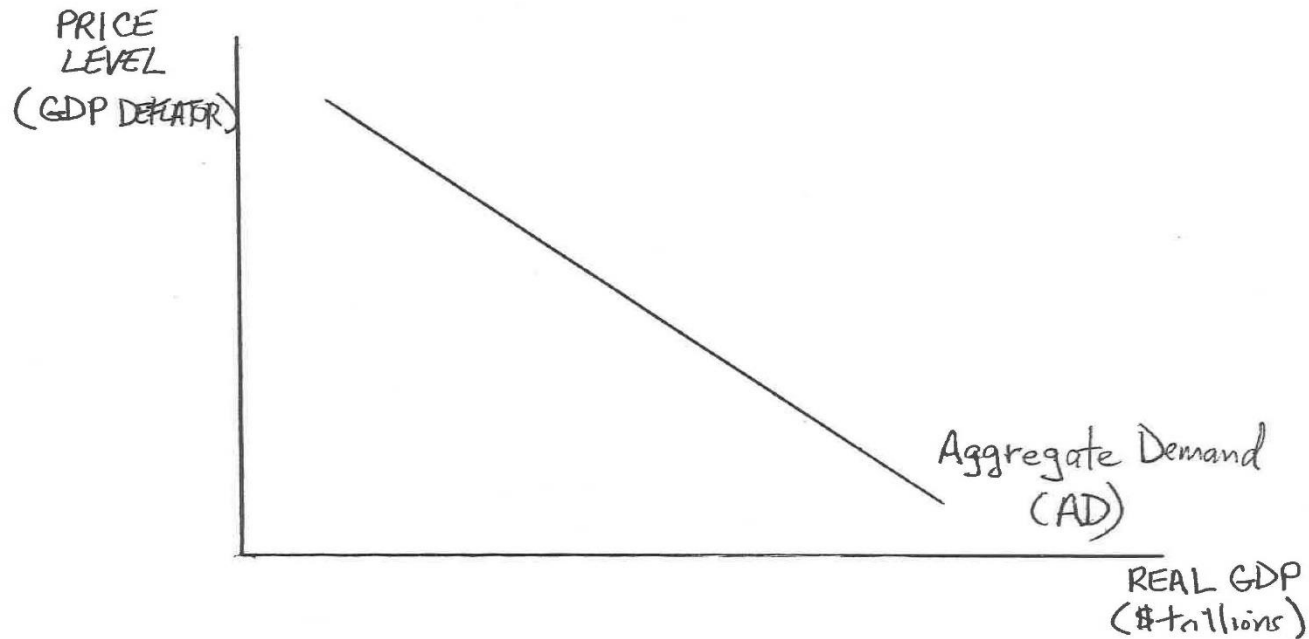
October 23rd, 2019

AS/AD Model: Links **output changes** to **changes in the price level**

- Powell driving the bus. Targeting output and prices.
- AE model looks only at output swings.
- How do **changes in demand** affect aggregate output **and the price level**?
- How do **changes in supply** affect aggregate output **and the price level**?
- How do **changes in the price level** affect aggregate **demand** and aggregate **output**?

A Downward Sloping AD Curve:

(As the overall price level falls, the level of output rises)



Is it due to the **Substitution Effect?**

Demand curves, for specific goods,
are downward sloping:

- As we travel down a demand curve we discover:
 - the quantity demanded rises, as the price falls
 - ASSUMING ALL OTHER PRICES ARE STABLE!**
- When the price of the good falls people buy more,
 - Because the good is now CHEAPER THAN OTHER GOODS

A micro example, demand curves working, for an individual market.

- Microeconomic theory teaches us:
 - When the price of an individual good falls, demand rises (the law of demand).
- If the price of solar power falls, and the price of oil and coal stay the same, the demand for solar power will rise.
- We **substitute** solar power for coal power, due to the fall in the price of solar power.

The AD Curve: **Substitution Effects** Cannot Explain the Downward slope of the AD Curve

- The Aggregate Demand Curve depicts the effects on **OVERALL DEMAND**, given a change in the **PRICES OF ALL GOODS AND SERVICES**.
- Clearly substitution of one good for another cannot explain a shift in **overall demand** given a shift in **overall prices**.

Why Does the **Aggregate Demand** Curve Slope **Downward**?

(Why Is a Fall in the Overall Price Level, Associated with Higher Output?)

- **The Wealth Effect:**

“Household consumption is most strongly determined by income, but it is also affected by wealth.

Some household wealth is held in *nominal assets*; so as price levels rise, the real value of household wealth declines. This results in less consumption.”

- **The Interest Rate Effect:**

- “When prices rise, households and firms need more money to finance buying and selling.
- This increase in demand for money causes the “price” of holding money (the interest rate) to rise, discouraging firm investment.”

The **Wealth Effect**:

- Ernie has **SAVED** \$20,000, held in a local bank.
- A moped cost \$8,900. A 12 foot flat screen TV costs \$9,200. A vacation to Paris for a month cost \$9,700. He contemplates buying two of these three items, after graduation.
- Prices, however, leap (inflation is 20%, in 2018). New prices:
Moped=\$10,680 TV=\$11,040 Vaca.=\$11,640
- Ernie now can buy only one of the items.

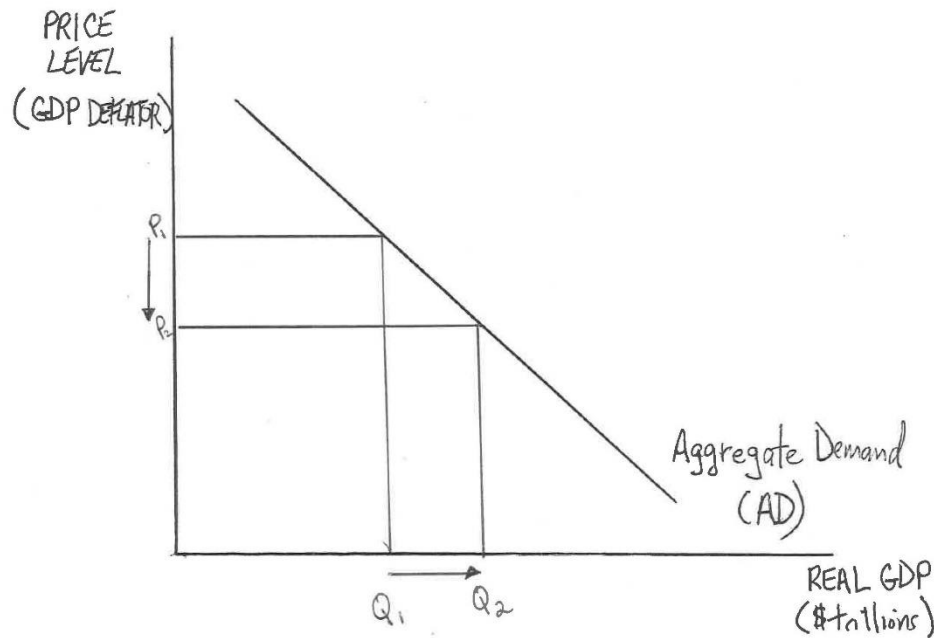
The Interest Rate Effect (theoretical)

- Households keep their financial wealth in various places: cash, bonds, stocks
- Households hold enough cash to make it easy to pay their bills
- If prices jump, households must sell some bonds and stocks to increase their cash holdings
- Sell bonds, prices fall, interest rates rise
- Higher interest rates means less investment

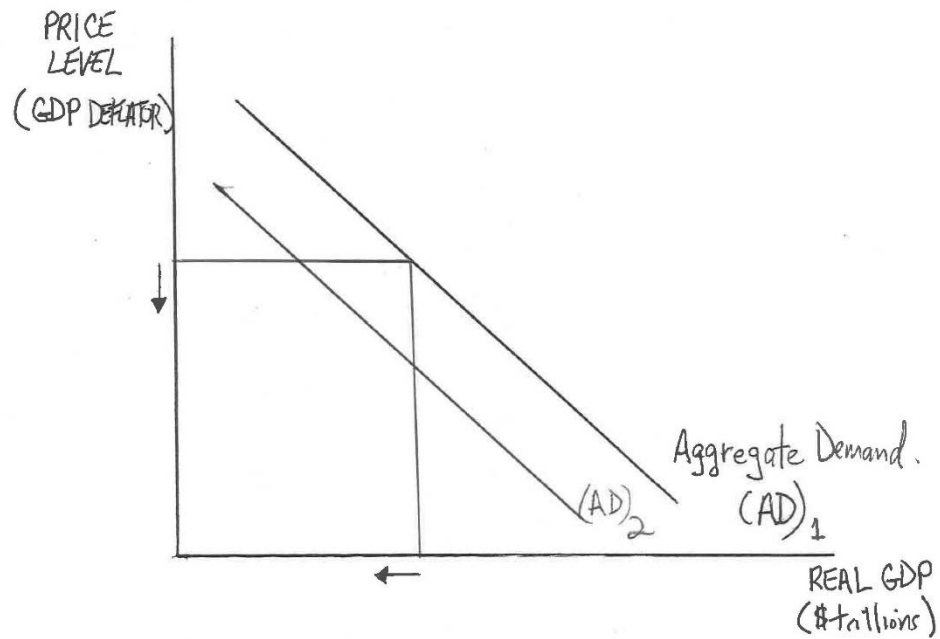
The Interest Rate Effect Explained (A Sesame Street Example)

- Bert, Ernie, Big Bird, Miss Piggy and the Count all keep , on average, \$5,000 in their checking account, to pay bills.
- Prices fall(inflation is -1% in 2015)
- They each decide they only need \$3,000 in their accounts now, to pay bills.
- They all buy bonds, the prices rise, and yields fall.
- The lower real interest rates boosts home building.

A movement along the AD Curve: the price level falls and output rises



A shift in the AD Curve:



AE Model to AD-AS Model

a simple derivation

- Our AE model assumes the overall price level is fixed.
this reflects our assumption that there is enough capacity to increase output
- We relax that assumption.
- Prices jump from period 1 to period 2
- The AE line falls, at any level of output less in demanded.
- Equilibrium is now lower.
- Thus we can 'derive' the AD line, by manipulating our AE model

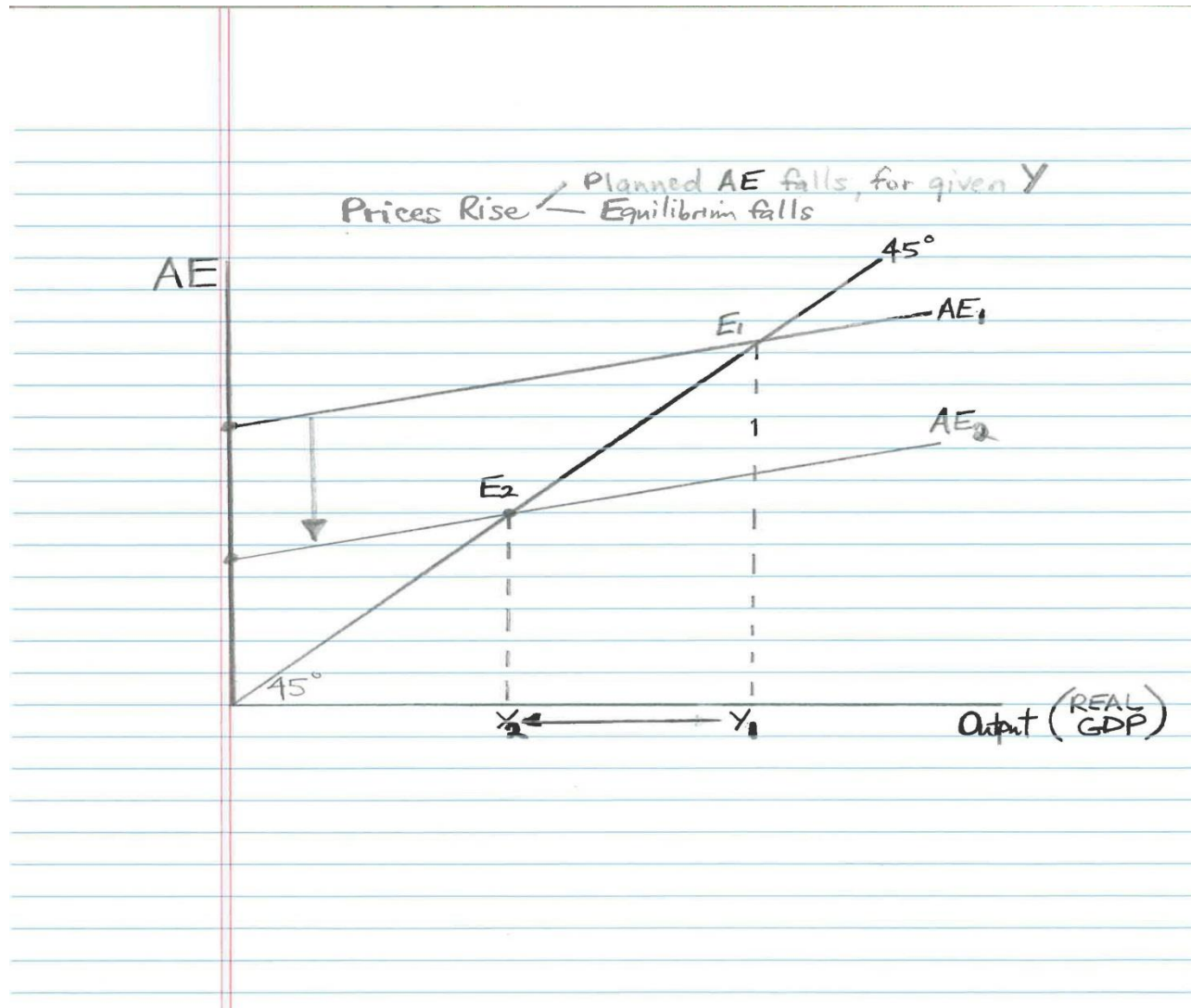
The AE Model: 'Embedded' in the AD-AS Model

Suppose inflation jumps. The price level rises to 110, from 100.

Wealth effect and interest rate effect push down AE, for a given level of Y (AE_1 falls to AE_2)

at $P = 100$, equilibrium level for $Y = Y_1$

at $P = 110$, equilibrium level for $Y = Y_2$, lower than Y_1

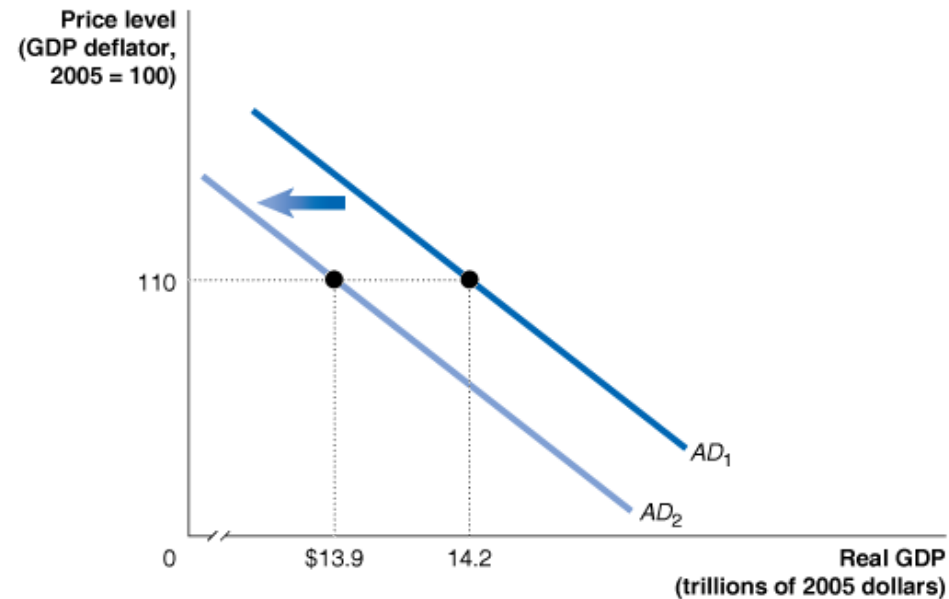
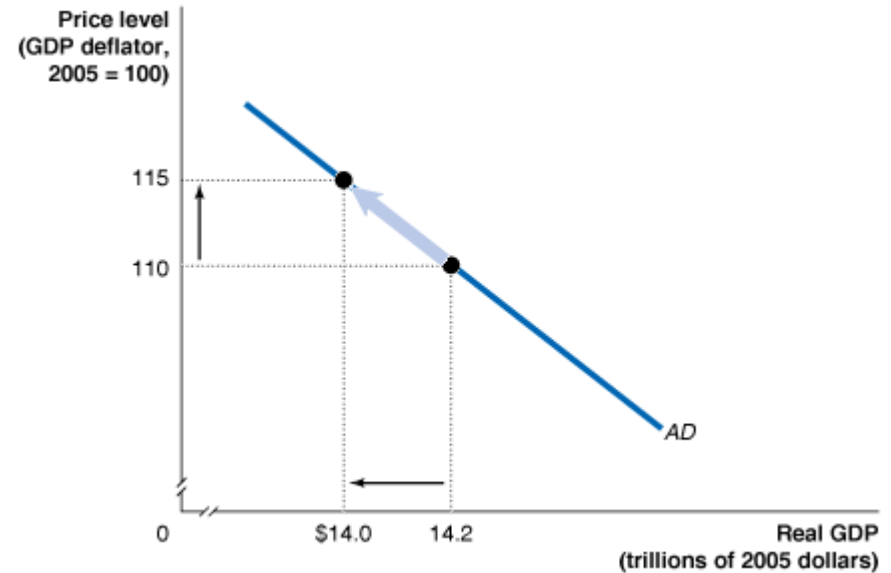


Shifts of the AD curve, vs. movements along it

The AD curve: relationship between the price level and real GDP demanded, *holding everything else constant*.

A change in the price level not caused by a component of real GDP changing results in a movement along the AD curve.

A change in some component of aggregate demand, on the other hand, will shift the AD curve.



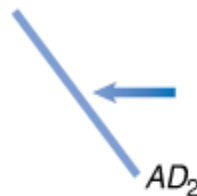
AD shifts: changes in fiscal policy

Budget policy: The White House and the Congress can choose to increase spending or cut taxes, as they did late in 2017. Other things equal, this will raise demand as it shifts the AD curve outward.

In contrast, Senate Majority Leader Mitch McConnell's recent calls to cut social security and Medicare payments, other things equal, would cause the AD curve to shift inward.

A decrease in spending shifts the aggregate demand curve inward

Table 13.1



AD shifts: changes in monetary policy

Monetary policy: Chair Powell at the Federal Reserve can choose to change interest rates, (think Phillips Curve) to pursue macroeconomic policy objectives.

If the Federal Reserve lifts *interest rates*, investment spending falls;
if the Fed lowers interest rates, investment spending rises.

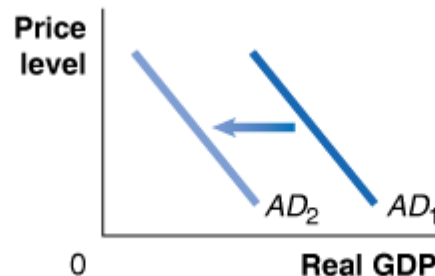
An increase in...

shifts the aggregate
demand curve...

because...

Table 13.1

interest rates



higher interest rates raise the cost to firms and households of borrowing, reducing consumption and investment spending.

AD shifts: changes in expectations

Trump promises a business friendly environment: Households or firms become more optimistic about the future, increasing consumption or investment respectively.

N. Korea bombs Guam, The opposite would clearly occur.

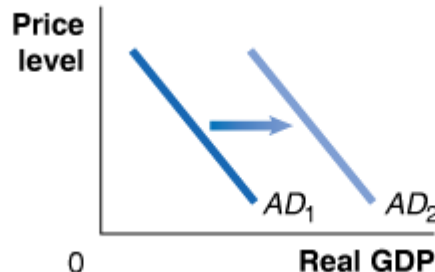
Table 13.1

An increase in...

shifts the aggregate demand curve...

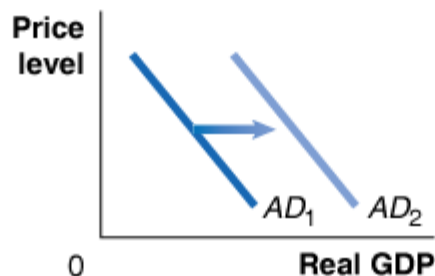
because...

households' expectations of their future incomes



consumption spending increases.

firms' expectations of the future profitability of investment spending



investment spending increases.

AD shifts: think 2015 Developing World vs. USA

Brazil and many emerging economies, in 2015, fell into recessions. Their incomes and spending shrunk. Their imports of U.S. goods fell.

Brazil's exchange rate fell sharply. U.S. exports became more expensive, so foreigners bought less of them (and we bought more imports, also).

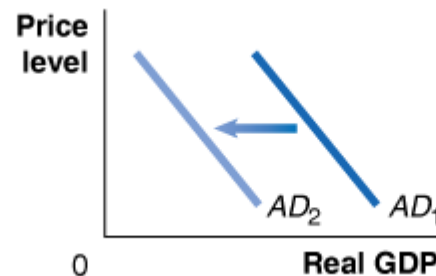
Table 13.1

An increase in...

shifts the aggregate demand curve...

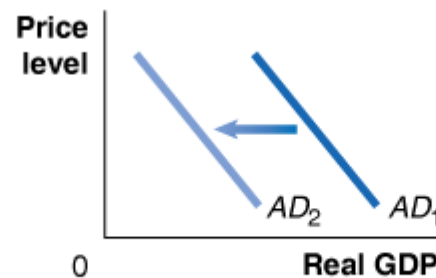
because...

the growth rate of domestic GDP relative to the growth rate of foreign GDP



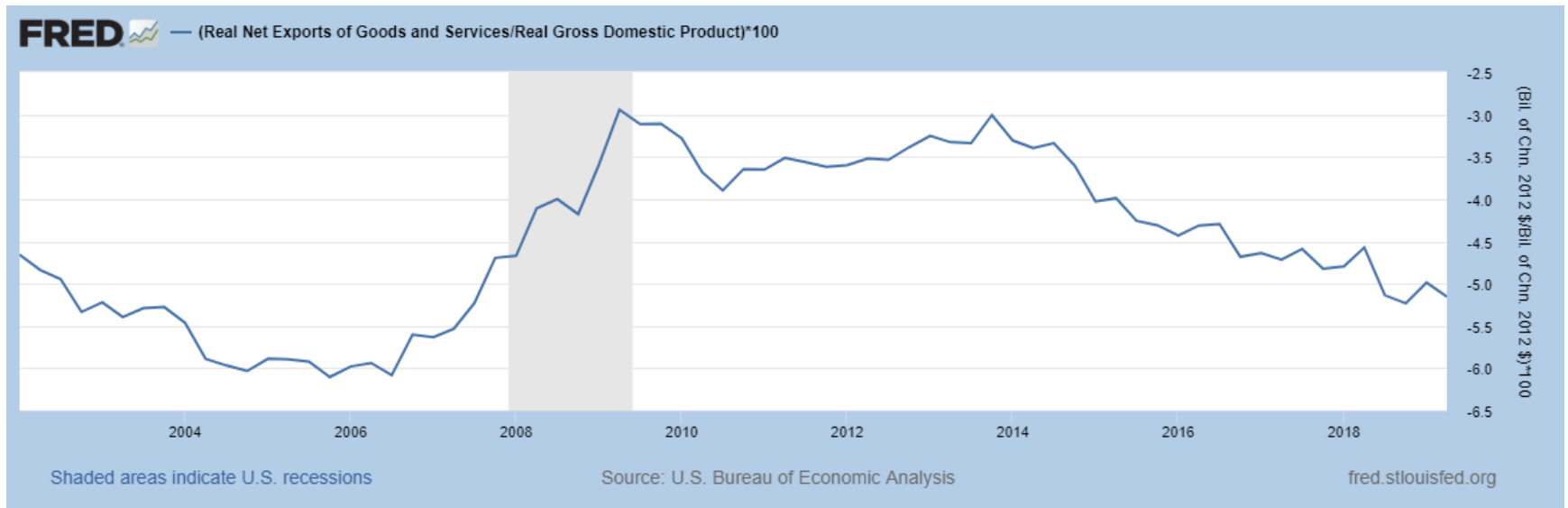
imports will increase faster than exports, reducing net exports.

the exchange rate (the value of the dollar) relative to foreign currencies



imports will rise and exports will fall, reducing net exports.

The change in the U.S. real net exports in 2016-2019Q2: Subtracted 0.5% from real GDP



Aggregate supply and time frame

Aggregate supply refers to the quantity of goods and services that firms are willing and able to supply.

The relationship between this quantity and the price level is different in the long and short run.

So we will develop both a short-run and *long-run aggregate supply curve*.

Long-run aggregate supply curve: A curve that shows the relationship in the long run between the price level and the quantity of real GDP supplied.

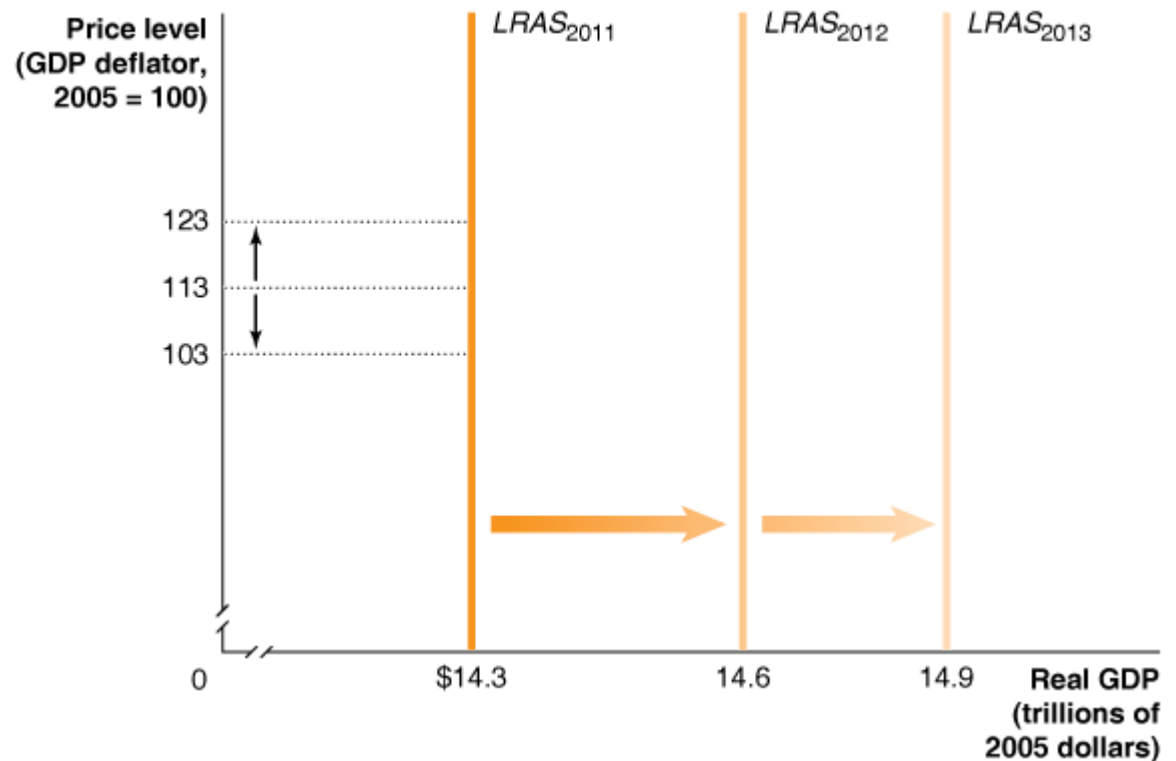
Long-run aggregate supply curve

In the long run, the level of real GDP is determined by the number of workers, the level of technology, and the *capital stock* (factories, machinery, etc.).

None of these elements are affected by the price level.

So the long-run aggregate supply curve does not depend on the price level; it is a vertical line, at the level of *potential* or *full-employment GDP*.

Figure 13.2



The vertical long run supply curve: You can't get more output if you allow more inflation

The same concept as the Phillips Curve:
there is **no LONG RUN inflation/unemployment tradeoff**

- In the short run, there is evidence that an economy can produce more stuff, if you ignore a rising price level.
- Chair Powell, driving the bus, could say,
'to hell with high inflation, I'll accept it to get stronger growth and lower unemployment.'

But the LONG TERM trajectory for output cannot be lifted by allowing prices to rise faster.

As we learned:

LTSG = %Δ in Labor Productivity + %Δ in Labor Force

The Short run Aggregate Supply Curve: Why is it Upward Sloping?

- Who provides us with the output(the supply)?

FIRMS

- What drives firm decisions?

PROFITS

- The Simplest Profits formula?

Profits = Revenues - Costs

Profits per item sold

- Profits = Revenues - Costs
- Profits/pizza = (Revenues/pizza) – (Cost/pizza)
- Revenues/pizza = the price of the pizza
- Cost/pizza: 80% are labor costs (wages)

Wages are sticky

if the price level is rising, and wages are sticky, you make more money per unit sold

If you make more money/unit, why do you increase production?

- Same question as,
 ‘why do supply curves slope upward?’
- Pizza’s cost is largely the labor cost to make pizza
- At \$15 per pizza I **make** money with 5 workers
- At \$15 per pizza I **lose** money with 8 workers
- At \$20 per pizza I **make** money with 8 workers

If I can **raise my prices** and **not pay my people more**,
I find **its profitable to make more pizza**

(Note: with 8 workers, labor costs per pizza rise to \$9.85, up from \$8.00)

		pizzas	cost per	non labor		total				profit
# of	# of	sold	worker	costs per	total	non-labor	total	price per	cost per	or loss
ovens	workers	per day	per day	pizza per day	labor costs	costs	costs	pizza	pizza	per pizza
1	5	50	\$80	\$2	\$400	\$100	\$ 500	\$11	\$ 10.00	\$1.00
1	8	65	\$80	\$2	\$640	\$130	\$ 770	\$11	\$ 11.85	(\$0.85)
1	8	65	\$80	\$2	\$640	\$130	\$ 770	\$15	\$ 11.85	\$3.15

In conclusion: why the SRAS curve is upward-sloping

Contracts make some wages and prices “sticky”

Prices and wages are said to be “sticky” when they do not respond quickly to changes in demand or supply.

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Firms are often slow to adjust wages

Annual salary reviews are “normal”, for example.

Also, firms dislike cutting wages—it’s bad for morale.

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Shifts in the SRAS Curve

(Short run aggregate supply curve)

- The SRAS shifts if:

Nominal wages shift

Labor productivity shifts

Commodity prices shifts

A shift in nominal wages

- Recall that **SHIFTING the SRAS** curve means we look at the **change** in the relationship **between** a given **overall price level** and the **quantity produced**.
- What happens if the government raises the minimum wage?
- What happens if you must pay \$100/day instead of \$80/day?

What happens to pizza output?

		pizzas	cost per	non labor		total				profit	
# of	# of	sold	worker	costs per	total	non-labor	total	price per	cost per	or loss	total
ovens	workers	per day	per day	pizza per day	labor costs	costs	costs	pizza	pizza	per pizza	profits
1	5	50	\$80	\$2	\$400	\$100	\$ 500	\$11	\$ 10.00	\$1.00	\$50.00
1	8	65	\$80	\$2	\$640	\$130	\$ 770	\$11	\$ 11.85	(\$0.85)	-\$55.00
1	8	65	\$80	\$2	\$640	\$130	\$ 770	\$14	\$ 11.85	\$2.15	\$140.00
1	8	65	\$100	\$2	\$800	\$130	\$ 930	\$14	\$ 14.31	(\$0.31)	-\$20.00
1	5	50	\$100	\$2	\$500	\$100	\$ 600	\$14	\$ 12.00	\$2.00	\$100.00

SRAS shifts: unexpected changes in prices of resources

A *supply shock* is an unexpected event that causes the short-run aggregate supply curve to shift.

Example: Oil prices increase suddenly. Firms immediately anticipate rising input prices, and as a consequence will only produce the same amount of output if their own prices rise.

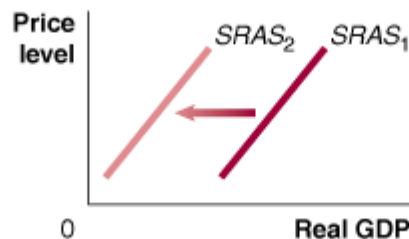
Unexpected input price increases decrease SRAS; unexpected input price *decreases* would shift SRAS to the right instead.

Table 13.2

An increase
in...

the expected price of
an important natural
resource

shifts the short-run
aggregate
supply curve...



because...

costs of producing output rise.

What happens if natural resource prices change?

- Oil prices fall, and final goods prices don't change.
- This is the same as a fall for labor costs, with no change in final goods prices.
- You produce more for a given price, so the AS curve shifts to the right.

What happens if we experience a big change in labor productivity (a technology shock)?

- Let's go back to the pizza parlor:

		pizzas	pizzas
# of	# of	sold	per
ovens	workers	per day	worker
1	5	50	10
1	8	64	8
1	8	80	10

Labor productivity jumped cost/pizza fell

we increase pizza production and still are profitable

		pizzas	cost per	non labor		total				profit	
# of	# of	sold	worker	costs per	total	non-labor	total	price per	cost per	or loss	total
ovens	workers	per day	per day	pizza per day	labor costs	costs	costs	pizza	pizza	per pizza	profits
1	8	64	\$100	\$2	\$800	\$128	\$ 928	\$14	\$ 14.50	(\$0.50)	-\$32.00
1	8	80	\$100	\$2	\$800	\$160	\$ 960	\$14	\$ 12.00	\$2.00	\$160.00

The AS Curve and the Productivity shock?

- Output per worker jumped
- Cost per pizza per worker fell
- We are now profitable making more pizzas
- The AS curve shifts Out:
 - There is more output at a given final goods price level

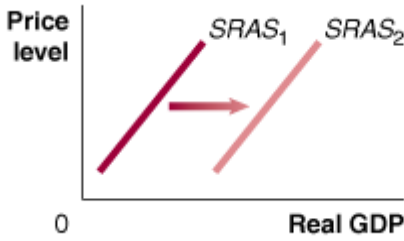
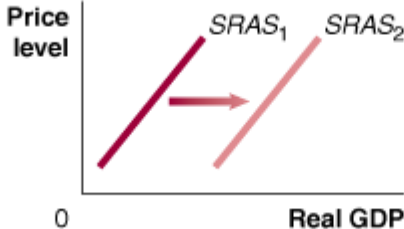
SRAS shifts: factors of production, and technology

An increase in the *availability of the factors of production*, like labor and capital, allows more production at any price level.

A decrease in the availability of these factors decreases SRAS.

Improvements in technology allow productivity to improve, and hence the level of production at any given price level.

Table 13.2

An increase in...	shifts the short-run aggregate supply curve...	because...
the labor force or the capital stock		more output can be produced at every price level.
productivity		costs of producing output fall.

Long-run macroeconomic equilibrium

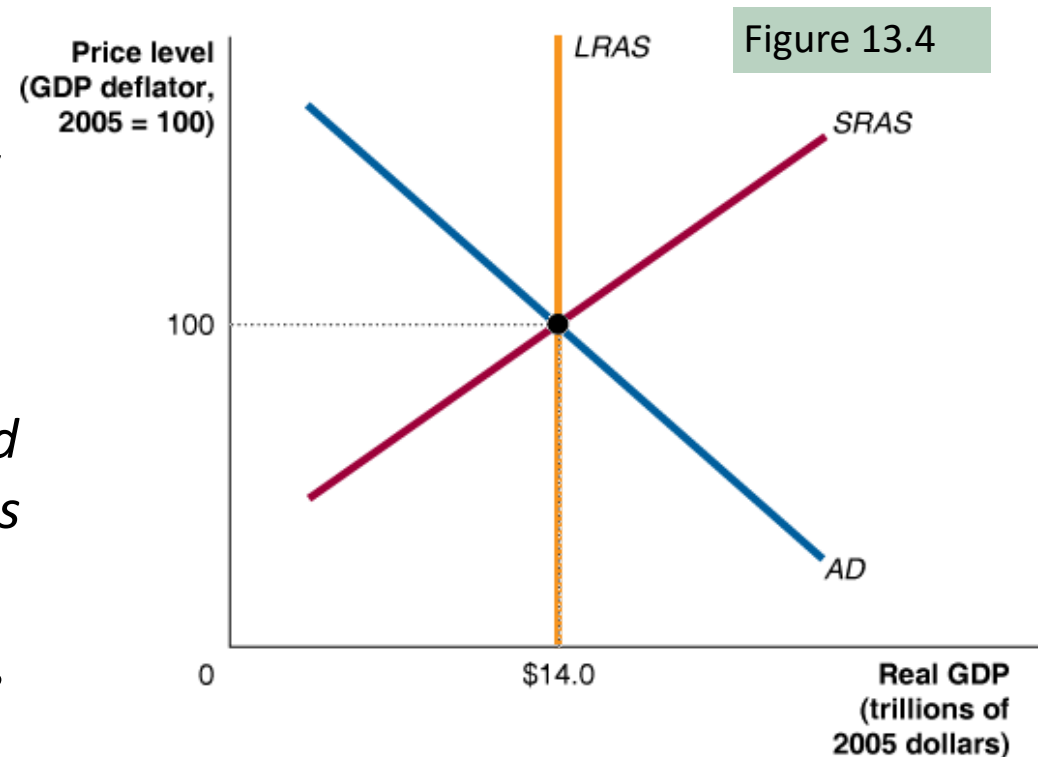
In the long-run, we expect the economy to produce at the level of potential GDP—i.e., the LRAS level.

So the long-run macroeconomic equilibrium occurs when the AD and SRAS curves intersect at the LRAS level.

Our next task is to explain why long-run macroeconomic equilibrium cannot occur at any other level of output.

For simplicity, assume:

- 1. No inflation; the current and expected-future price level is 100.*
- 2. No long-run growth; i.e. the LRAS curve is not moving.*



Static vs. dynamic model

Our model of aggregate demand and aggregate supply so far has been *static*, in the sense that:

- Price levels were constant (no inflation)
- There was no long-run growth (output constant)

We will now form a *dynamic aggregate demand and aggregate supply* model, incorporating:

- Continually-increasing real GDP, shifting LRAS to the right
- AD also ordinarily shifting to the right
- SRAS shifting to the right except when workers and firms expect high rates of inflation

How policymakers and business people think about a world in **equilibrium**

- We don't have **a stable price level.**
- **We have a stable inflation rate.**
- We don't have **a stable output level.**
- **We have a stable growth rate.**

What constitutes a dynamic equilibrium?

- We posited, a few lectures ago:
long term sustainable growth rate = 2%

We now posit that an ideal inflation rate is 2%

Dynamic Equilibrium:

Output and prices are shifting so that prices are rising 2% per year and output is growing 2% per year.