Aggregate Supply

Aggregate Supply in the Short Run

From the Short Run to the Long Run

Changes in Aggregate Supply

Aggregate Supply in Short Run

- **Aggregate supply is the relationship between**
  - **the price level in the economy**
  - **aggregate output firms are willing and able to supply**
  - **other things constant**

- **Constant factor**
  - **Resource prices**
  - **State of technology**
  - **Set of formal and informal institutions that structure production incentives**

Supply of Labor

- **Labor**
  - **most important resource**
  - **Accounting to 70% of production costs**

- **The supply of labor depends on**
  - **The size and abilities of the adult population, and**
  - **Household preferences for work versus leisure**

Supply of Labor and Wage Rate

- **Along a labor supply curve,**
  - **Quantity of labor depends on the wage rate**
    - **Higher wage→ more people are willing and able to work**

- **Purchasing power of given nominal wage depends on price level**
  - **Higher price level→ Purchase less**
  - **and vice versa.**

Nominal and Real Wage

- ***Nominal wage*** **measures the wage in current dollars**

- **Real wage measures the wage in constant dollars → dollars measured by the goods and services they will buy**

Real and Nominal Wages

- **Workers and employers care more about the real wage than nominal wage**

- **The labor contract is in terms of nominal wages (based on the *expected price level)***
  - **Price level→ Consensus view of inflation for the upcoming year**
  - **firms and resources suppliers reach agreement on resource prices like wages**

Potential Output

- If price-level expectations are realized,
  - Agreed-upon nominal wage translates into the expected real wage
  - The resulting level of output is referred to as the economy's potential output:
    - *The amount produced when there are no surprises associated with the price level*
  - Workers are supplying the quantity of labor they want to
  - Firms are hiring the quantity of labor they want to

Potential Output

- Potential output can be thought of as the economy's maximum sustainable output level, given the
  - Supply of resources
  - State of technology
  - Formal and informal production incentives
- Often called
  - Natural rate of output
  - Full-employment rate of output

Natural Rate of Unemployment

- ***Natural rate of unemployment***
  - **Occurs when the economy produces its potential GDP**
  - **Cyclical unemployment is zero**
  - **Number of job openings is equal to the number unemployed for frictional, structural, and seasonal reasons**

- **Summary:** ***when the actual price level turns out as anticipated, the expectations of both workers and firms are fulfilled ➔ economy produces its potential***

Actual Price Higher than Expected

- **What happens in the short run to aggregate output supplied?**
  - **The short run is a period during which some resource prices remain fixed by contract**

- **Firms welcome a price level is higher than expected**
  - **Selling price (thus revenue) of products, on average, are higher than expected**
  - **Resource costs remain constant**

- ***Firms have an incentive in the short run to expand production beyond the economy's potential level***

Actual Price Higher than Expected

- **Note that potential output does not mean zero unemployment**
  - ***It means actual unemployment rate =natural rate of unemployment***

- **Potential GDP can be thought of as the economy's *normal capacity***

- **Firms and workers are able*, in the short run,* to push output beyond the economy's potential**

Actual Price Higher than Expected Why Costs Rise

- **As output expands above potential GDP, the cost of producing additional output increases**
  - **Additional workers are harder to find**
  - **Some workers are not properly prepared**
  - **Resources with flexible price will increase reflecting their increased scarcity**

Actual Price Higher than Expected Why Costs Rise

- ***Because the prices of some resources are fixed by contracts, the price level rises faster than the per-unit production cost → firms find it profitable to increase the quantity supplied***

- **When the actual price level exceeds the expected price level, the real value of an agreed-upon nominal wage declines**

Summary

- **If the price level is higher than expected,**
  - **Firms have a incentive to increase supply**
  - **The per-unit cost of additional output increases**
  - **Real value of an agreed-upon nominal wage declines**

Actual Price Lower than Expected

- **Production is less attractive to firms**
  - **Average prices received for are lower than expected**
  - **Production costs, such as the nominal wage, do not fall**
  - **➔ firms reduce their quantity supplied**
  - **➔ the economy's output is below its potential**
- **Some workers are laid off and capital resources go unused**
- **Some resources become unemployed**

Summary

- **If the price level is higher than expected**
  - **Firms increase the quantity supplied beyond the economy's potential**
  - **The per-unit cost of additional production increases**
- **If the price level is lower than expected**
  - **Firms reduce output below the economy's potential output**

- ***A direct relationship in the short run between the actual price level and real GDP supplied***

Short-Run Aggregate Supply Curve

- What what have just described can be used to trace out the <u>short-run aggregate supply curve</u> – SRAS

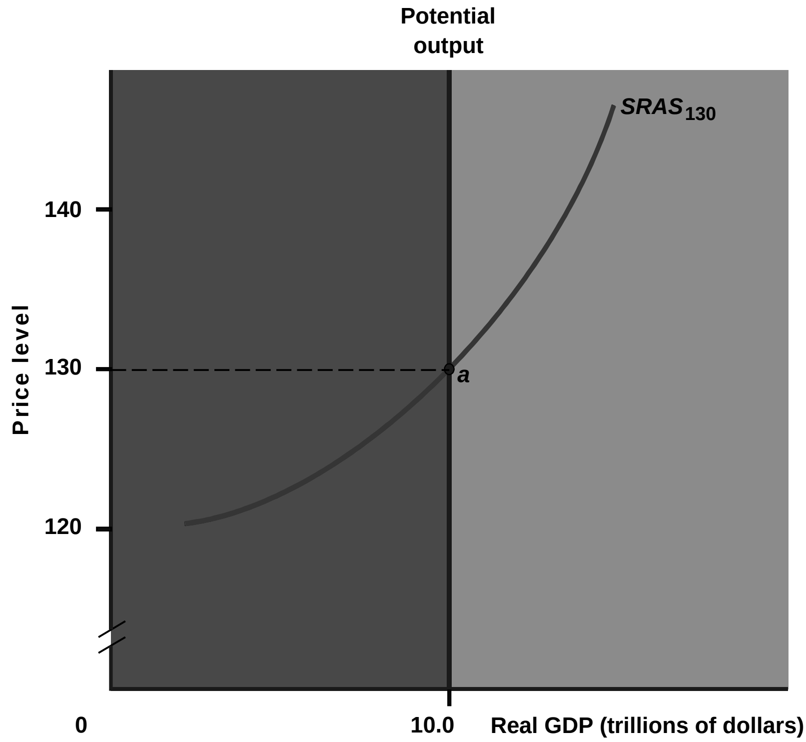
- ***SRAS shows the relationship between the actual price level and real GDP supplied, other things constant***

- **The *short run* is the period during which some resource prices are fixed by either explicit or implicit agreement**

Short-Run Aggregate Supply Curve

The expected price level is 130: SRAS is based on that expected price level.

If the price level turns out to be 130 as expected, producers supply the economy's potential level of output, \$10.0 trillion.

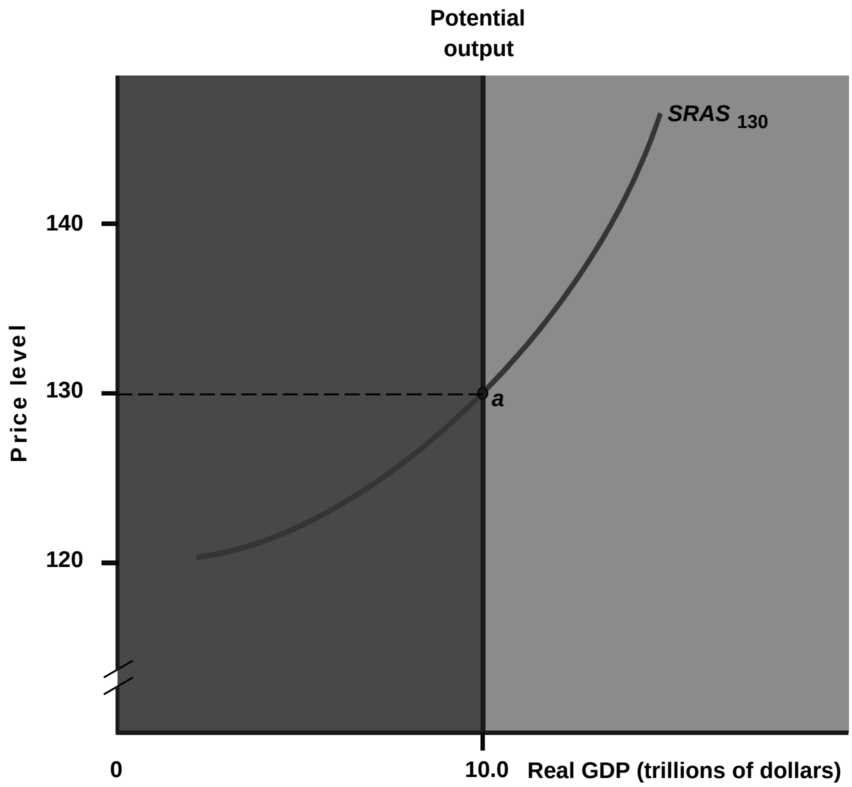


Short-Run Aggregate Supply Curve

Output<potential output: red
Output> potential output: blue

The slope of the SRAS depends on how sharply the cost of additional production rises

If increases in per unit costs are modest, SRAS will be relatively flat, and vice versa.



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Changes in Aggregate Supply

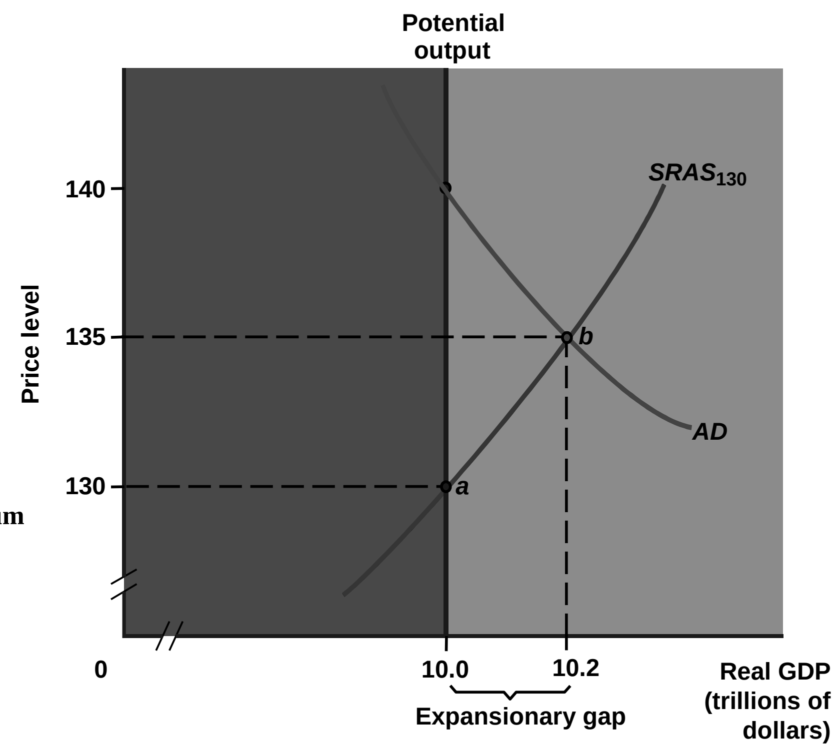
From the Short Run to the Long Run

- **The *long run:***
  - **long enough for firms and resource suppliers to renegotiate agreements based on the actual price level**
  - ***No surprises* about the price level**
- **Begin with a short-run equilibrium that is higher than expected to see what happens in the long run**

Expansionary Gap

At initial: Given SRAS$_{130}$

If AD is greater than expected,
Short-run equilibrium: b
Price level=135
real GDP=$10.2 trillion
➔ Actual price level is higher than expected and the level of output exceeds the economy's potential.



The amount by which short-run equilibrium output exceeds the economy's potential is often referred to as the *expansionary gap*, which in our example is $0.2 trillion.

Expansionary Gap

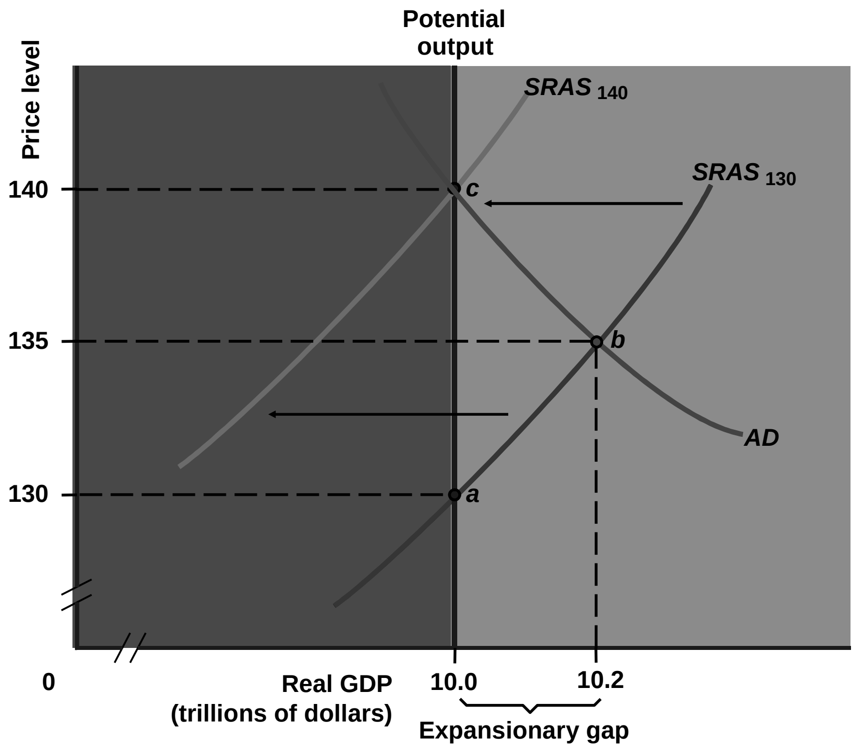
*Actual unemployment rate is below its natural rate.
*The real wage is lower than expected.

In the long run

Firms and resource suppliers renegotiate their agreement to increase resources price.

SRAS shifts to $SRAS_{140}$ at point *c*, Actual price level= expected price level.

Actual output can exceed the economy's potential in the short run, but not in the long run.



Long-Run Equilibrium

- The equalities hold in long-term equilibrium
  - Actual price level= expected price level
  - The quantity supplied in the short run
    =potential output
    =quantity supplied in the long run
  - Quantity supplied=quantity demanded

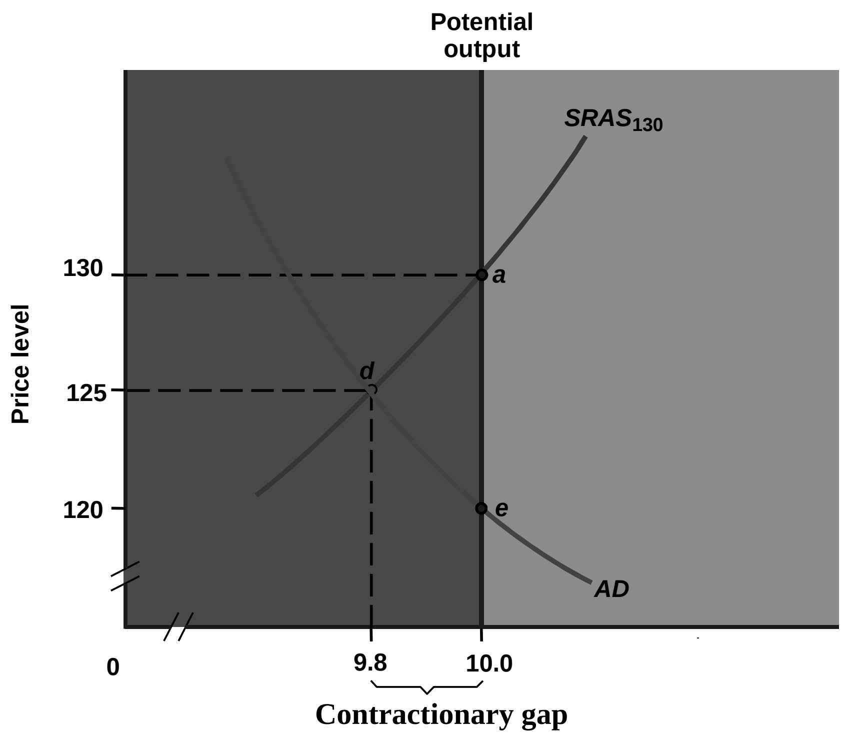
Long-Run Equilibrium

- ***Long-run equilibrium*** **at point *c* is no different in real terms at point *a***

- **At both points**
  - **Firms supply the economy's potential level of output**
  - **The same amounts of resources are employed**
  - **The real wage and real return to resources are the same even though nominal wages and payments are higher**

Contractionary Gap

Suppose AD intersects the SRAS at point *d:*
production is less than the economy's potential.



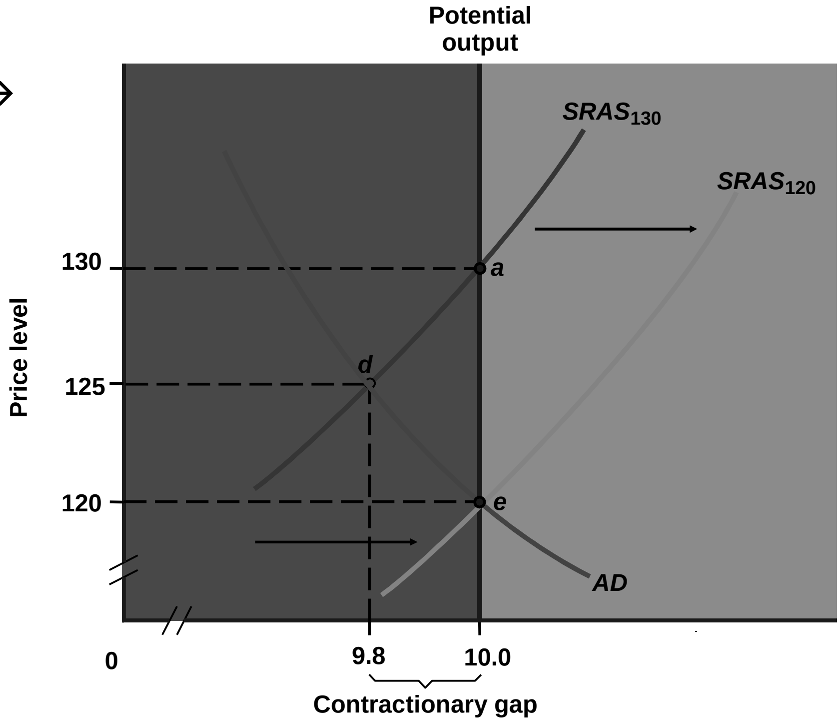
Actual output falls short of potential GDP is called the contractionary gap, which in our case is $0.2 trillion.

Unemployment exceeds the natural rate.

The lower than expected price level translates into a higher real wage in the short run.

Contractionary Gap

Higher unemployment rate→ Workers are competing for jobs→ putting downward nominal wage → costs of production decline



The SRAS curve shifts rightward until the economy produces its potential output at $SRAS_{120}$.

The economy will reach long-run equilibrium at point *e*.

Contractionary Gap

- **The key to closing a contractionary gap is the flexibility of wages and prices**
- **If wages and prices are not very flexible,**
  - **Adjust slowly to a contractionary gap**

    ➔ shifts in the SRAS occur slowly

    ➔ Economy can be stuck at an output and employment level below its potential

Long-Run Aggregate Supply

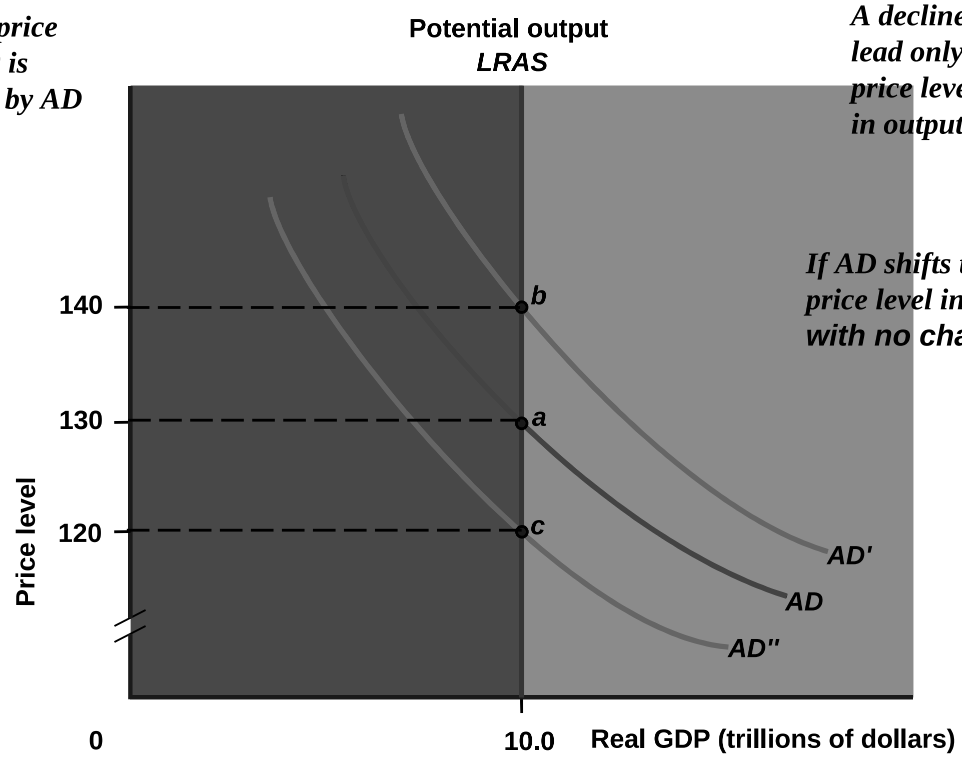
- The long-run aggregate supply curve, LRAS, depends on the
  - supply of resources in the economy
  - level of technology
  - production incentives provided by the formal and informal institutions of the economic system
- As long as wages and prices are flexible, the economy's potential GDP is consistent with any price level

Long-Run Aggregate Supply Curve

The initial price level of 130 is determined by AD

A decline from AD to AD'' lead only to a fall in the price level with no change in output.

If AD shifts to AD′, price level increase to 140, ***with no change in output.***



Wage Flexibility and Employment

- **Is there an evidence**
  - **Vertical line drawn at the economy's potential GDP and long-run aggregate supply curve**

- **Except during the Great Depression,**
  - **unemployment varying from year to year, has typically returned to natural rate of unemployment**

Wage Flexibility and Employment

- **An *expansionary gap***
  - **a labor shortage**
  - **results in a higher nominal wage and a higher price level**

- **A *contractionary gap:***
  - **Not necessarily generate enough downward pressure to lower the nominal wage**
  - **Nominal wages are slow to adjust to high unemployment**
  - **Tend to be *sticky* in the downward direction**

Wage Flexibility and Employment

- **Since nominal wages fall slowly**
  - **Natural supply-side adjustment to close a contractionary gap is ineffective**
- **However, an actual decline in the nominal wage is not necessary to close a contractionary gap**
  - **All that is needed is a fall in the real wage**
  - **The real wage will fall as long as the price level increases**

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Changes in Aggregate Supply

Changes in Aggregate Supply

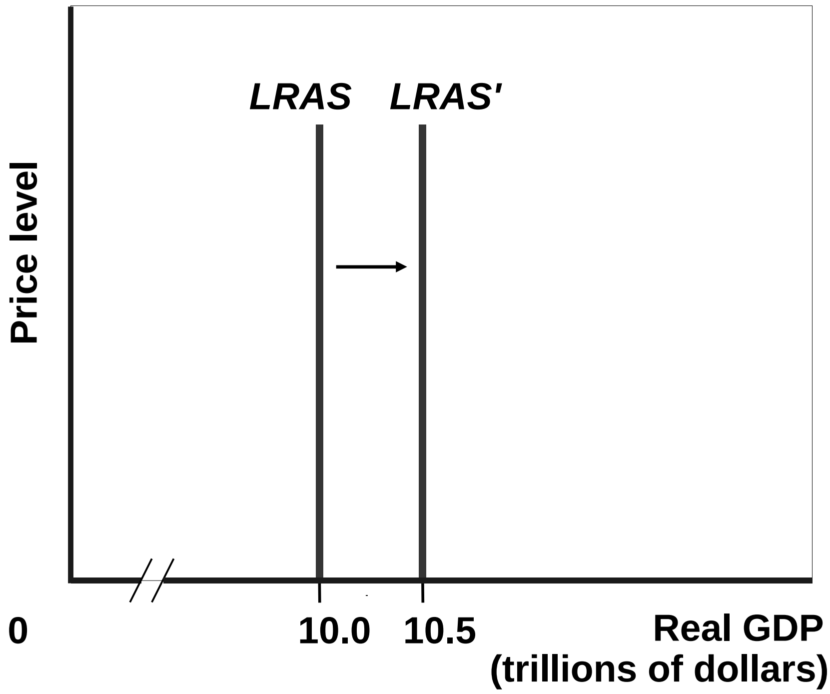
- **Consider factors other than changes in the expected price level**
- **We must distinguish between**
  - **long-term trends in aggregate supply,**
  - ***supply shocks*,**
    - **unexpected events**
    - **often only temporary**

Increases in Aggregate Supply

- **The economy's potential output is based on the**
  - **willingness and ability of households to supply resources**
    - **in the size, composition, or quality of the labor force**
    - **in household preferences for labor versus leisure**
  - **level of technology**
  - **institutional underpinnings of the economic system**

Change in the Supply of Resources

A gradual increase in the supply of resources increases the potential level of real GDP from LRAS to LRAS'

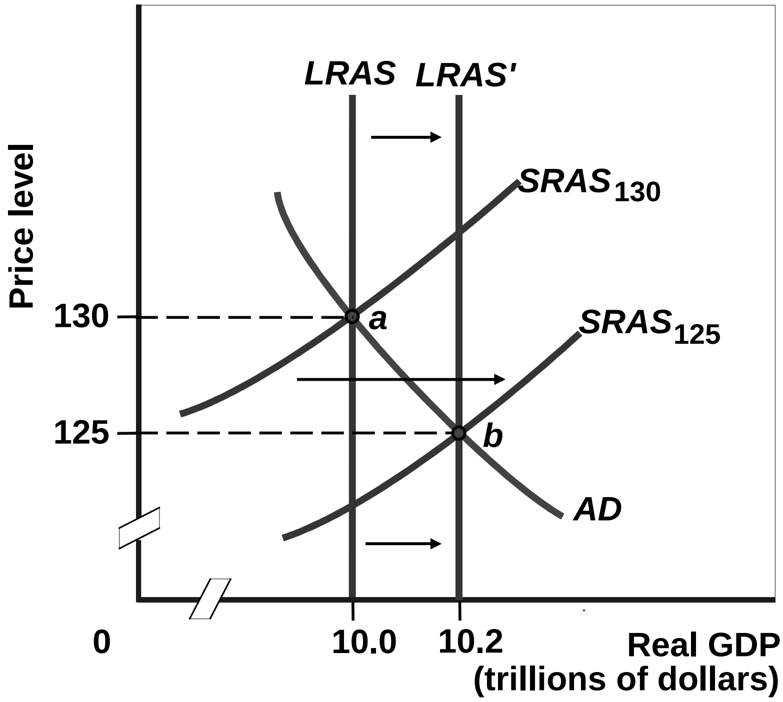


Supply Shocks

- ***Supply shocks***
  - **unexpected events**
  - **sometimes only temporarily**
- ***Beneficial supply shocks***

  Ex:
  - **Increase the supply of food**
  - **Discoveries of natural resources**
  - **Technological breakthroughs**
  - **Sudden changes in the economic system that promote more production**

Beneficial Supply Shock



Assumed a technological breakthrough occurs,
Short run:
$SRAS_{130} \rightarrow SRAS_{125}$
Long-run:
LRAS→LRAS´.

For a given aggregate demand curve, a beneficial supply shock leads to an increase in output and a decrease in the price level.

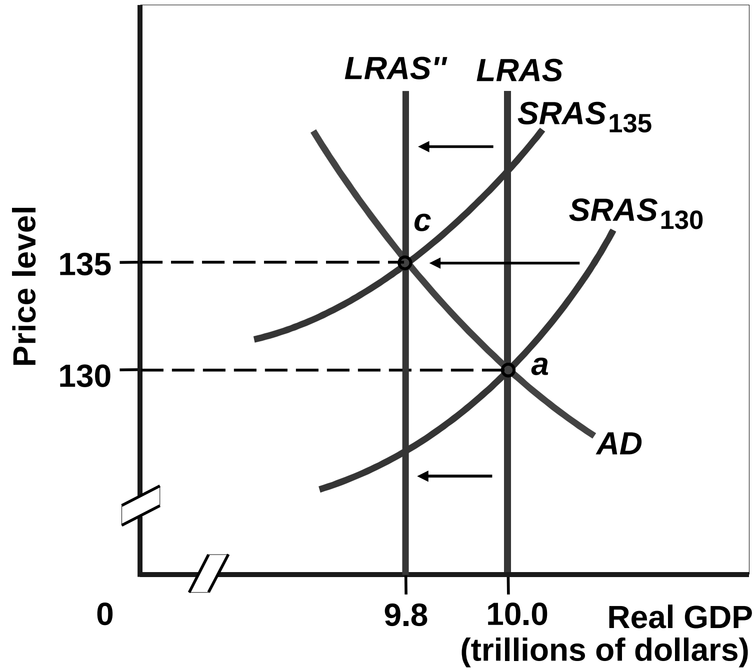
Decreases in Aggregate Supply

- ***Adverse supply shocks***
  - **unexpected events that reduce aggregate supply,**
  - **only temporarily**
- **Ex:**
  - **Drought(乾旱) could reduce the supply of a variety of resources**
  - **Government instability**
  - **Terrorist attacks**

Adverse Supply Shock

Leftward shift of both the short and long-run aggregate supply curves

The price level increases and the level of output declines ➔ stagflation as equilibrium moves from point *a* to point *c*



課堂報告

- 請解釋何謂 real wages 和nominal wages
- 請解釋何謂 potential output
- 請解釋何謂Expansionary gap
- 請解釋何謂Contractionary gap

Homework

- 16 Analyze the relation between potential output and the natural rate of unemployment