Topic 2 – Aggregate Demand, Supply, and Equilibrium

Agenda

- What are we trying to do?
- Flow diagrams
- Short-run Economic Equilibrium
- Aggregate Demand
- Aggregate Supply
- Long-run Economic Equilibrium

The economy is great!

- The important question

  How can we tell?

- However, some smaller questions:
  - What do we even mean by economy?
  - What interactions are important?
  - What interactions are unimportant?

What are the main components of an economy?

An agricultural example – picking oranges

- Assume the only item in our economy which we can purchase is an orange
  - Who produces them?
  - Where do we buy them?
  - How are they gathered?

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Who are we?

Workers

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Who produces the oranges?

Workers

Farm

Where do we buy them?

Workers

People pay store

Farmer's Market

Farm

Farm gets money from store
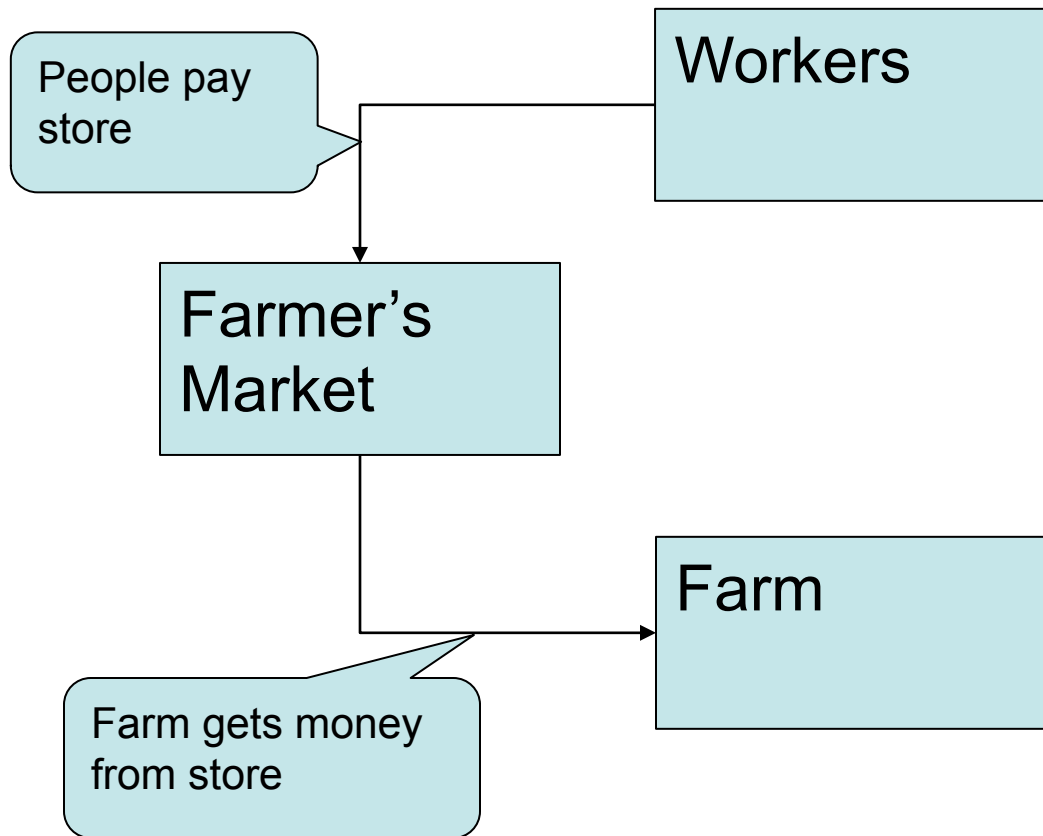
Note: For all flow diagrams, arrows show the flow of money, not goods.

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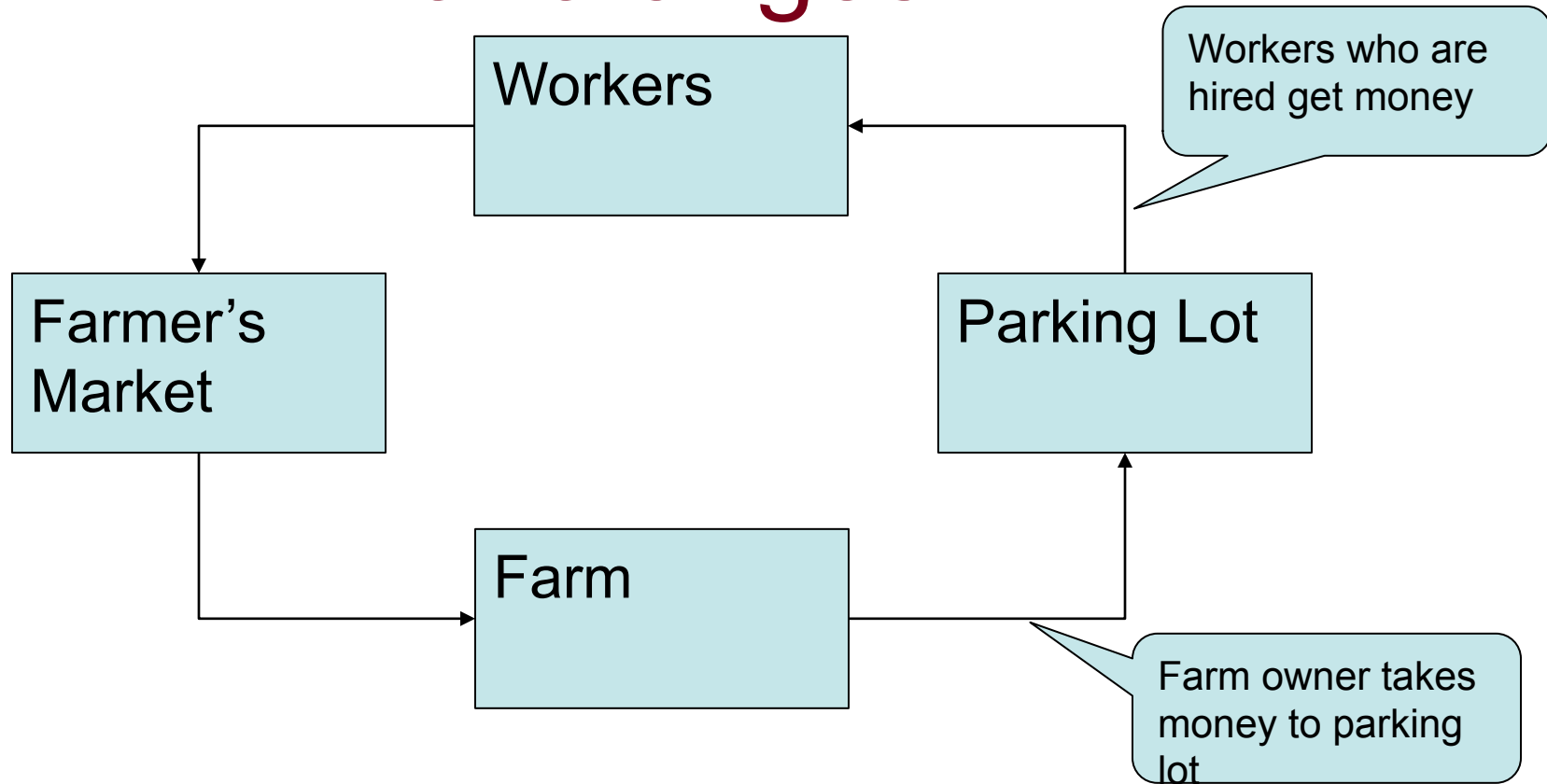
The complete economy
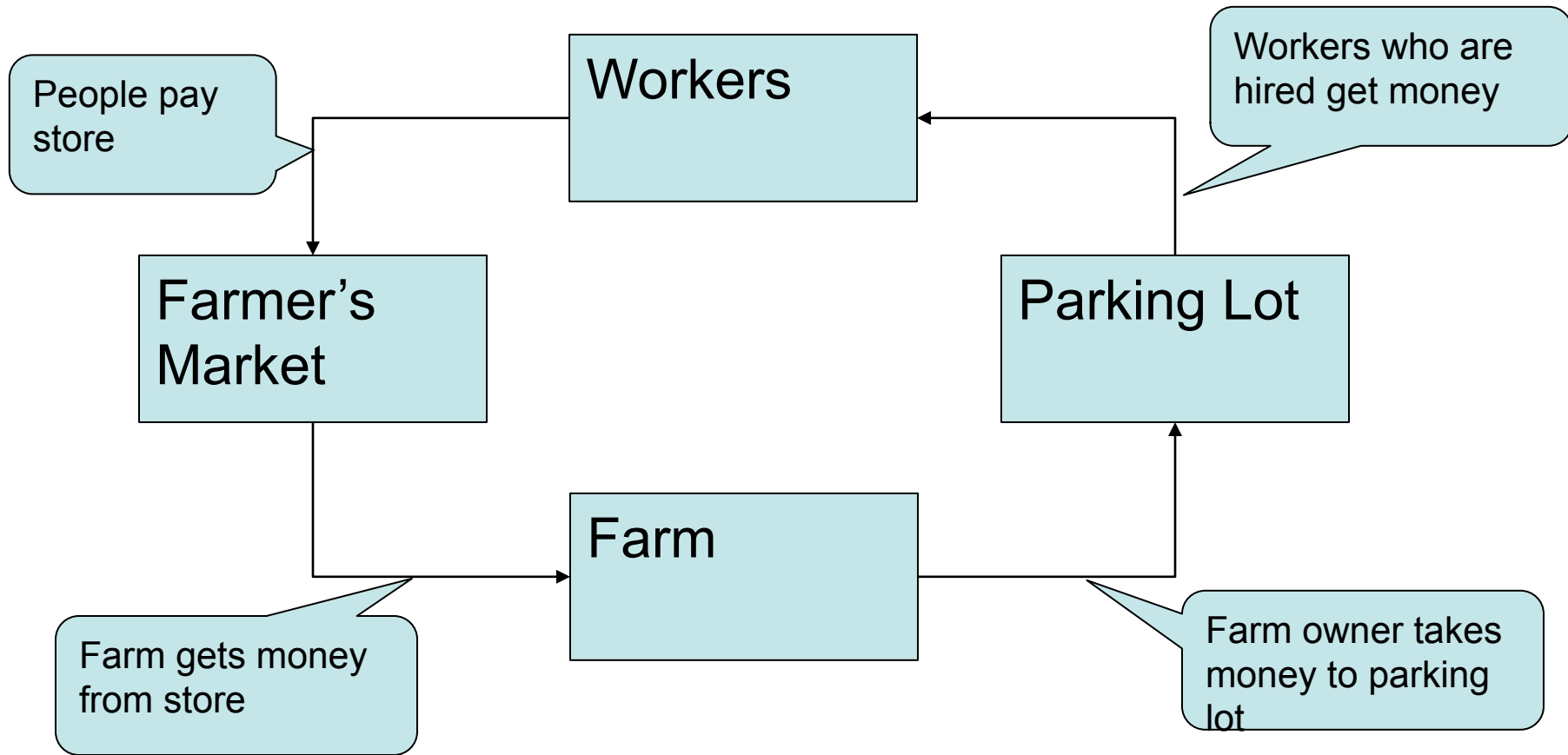
More general term we can use instead of "workers"?

- We are also **consumers** (meaning: we buy and "use" goods/services)

- So really what are we, in one word?

- Households (we live in houses, we go to the parking lot to be workers, we go to the farmer's market to be consumers)

How else can households earn income?

- Hint: farms don't own stuff in this model
- So farms will rent from households…
  - Machines (tractors, pickup truck, etc.)
  - Buildings (grain mill, etc.)
- These are called **factors of production** or **capital**
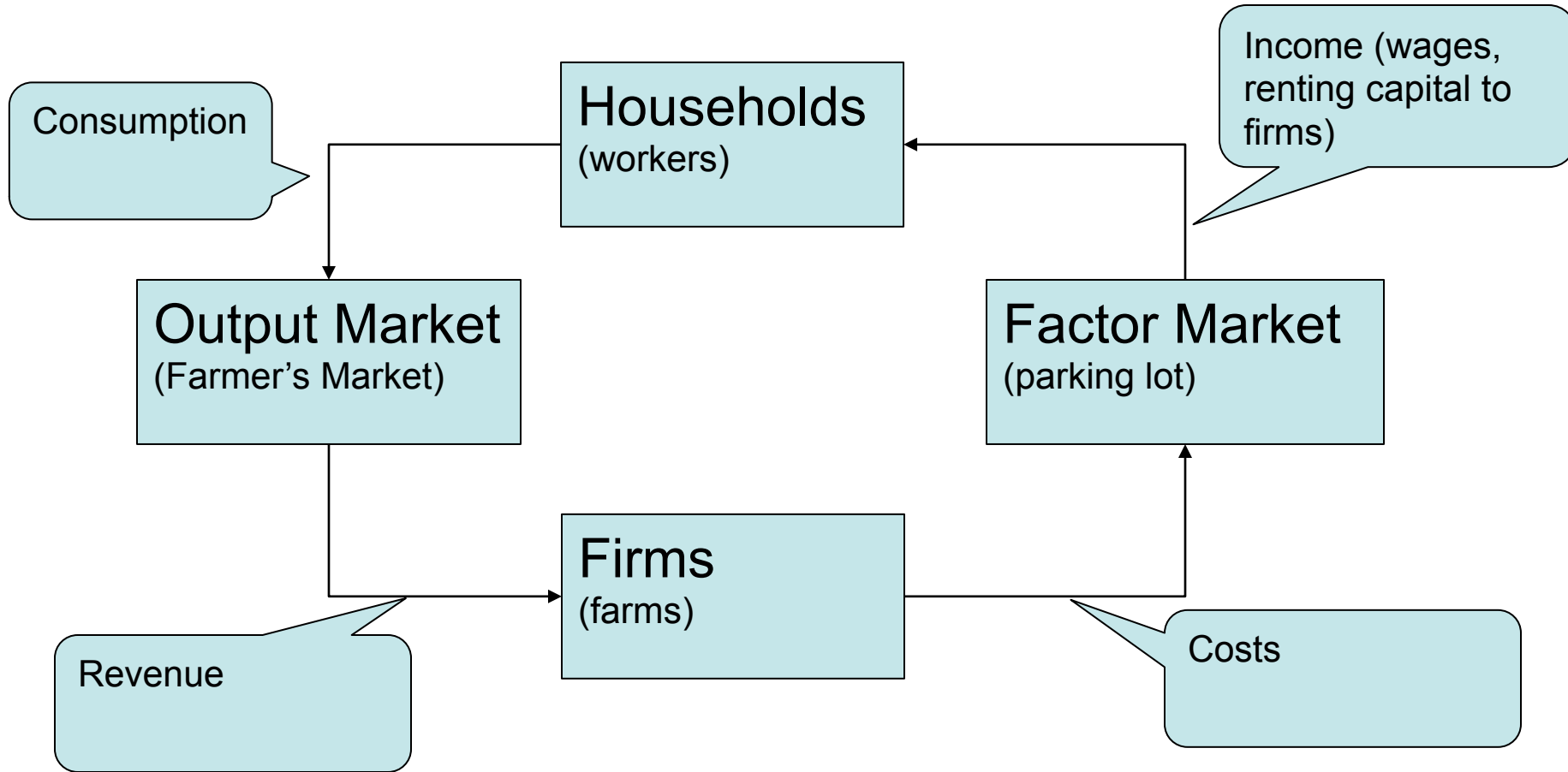- Other sources of income coming up…

Two general kinds of markets

- **Output Market:** All of the markets for goods and services
  - Firms sell, households buy
- **Factor Market:** All of the markets for factors of production, i.e. labor and capital (machines, buildings, etc.)
  - Households sell, firms buy
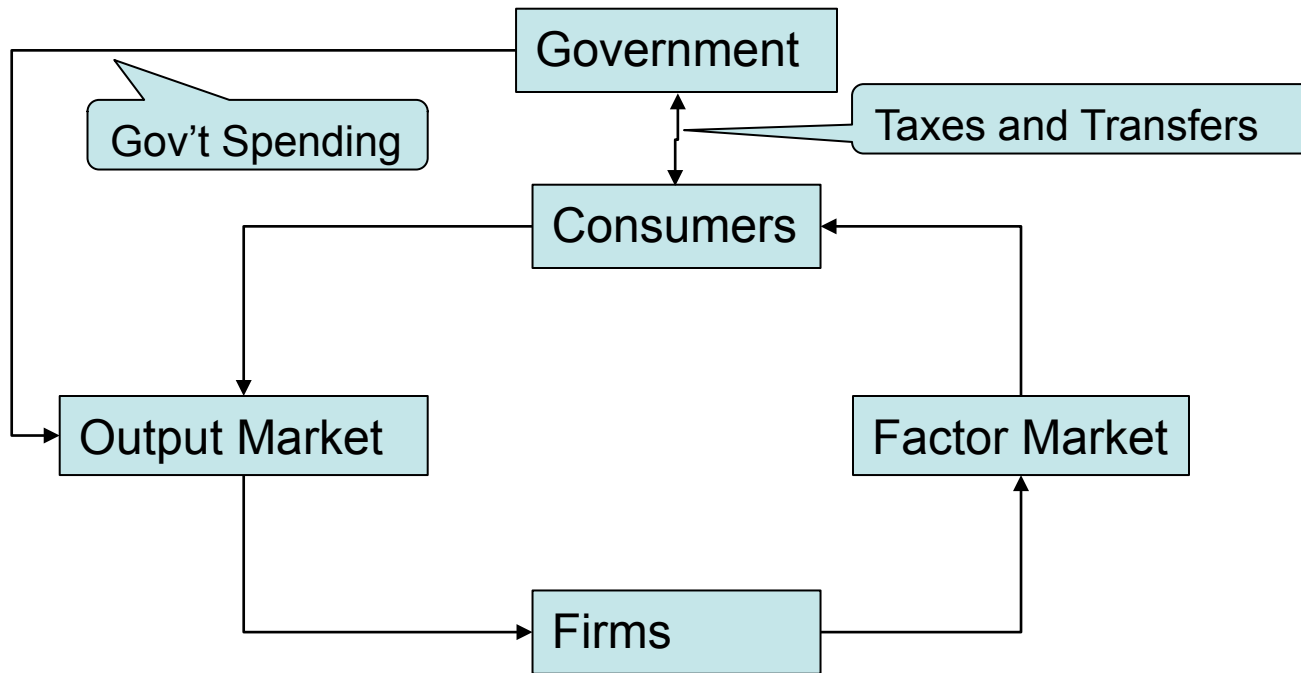
Now we generalize

What are we missing?

- Republicans and Democrats
- The top 1%
- A lot of firms own machines right?
- Technology
- Wall Street
- Everyone else (as in, other countries)

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Government taxes, transfers and spends

Government

Gov't Spending

Taxes and Transfers

Consumers

Output Market

Factor Market

Firms

Note: We assume taxation only on people, not on firms

The rich get dividends and earn profits
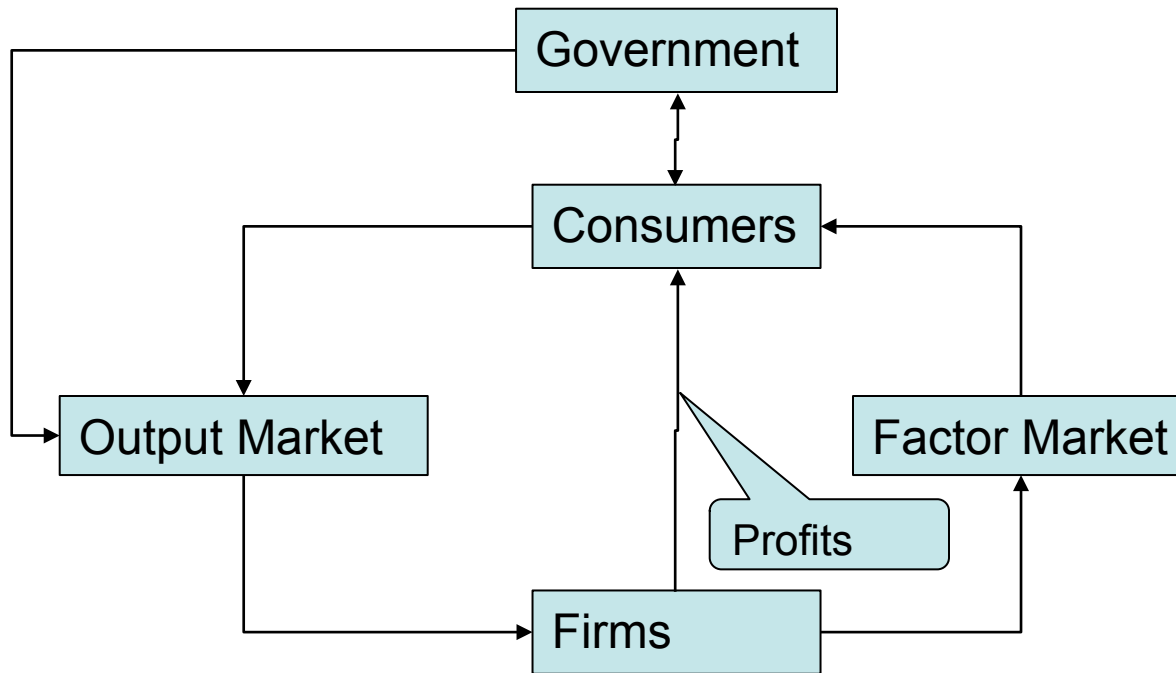
Buying machines can make firms more productive
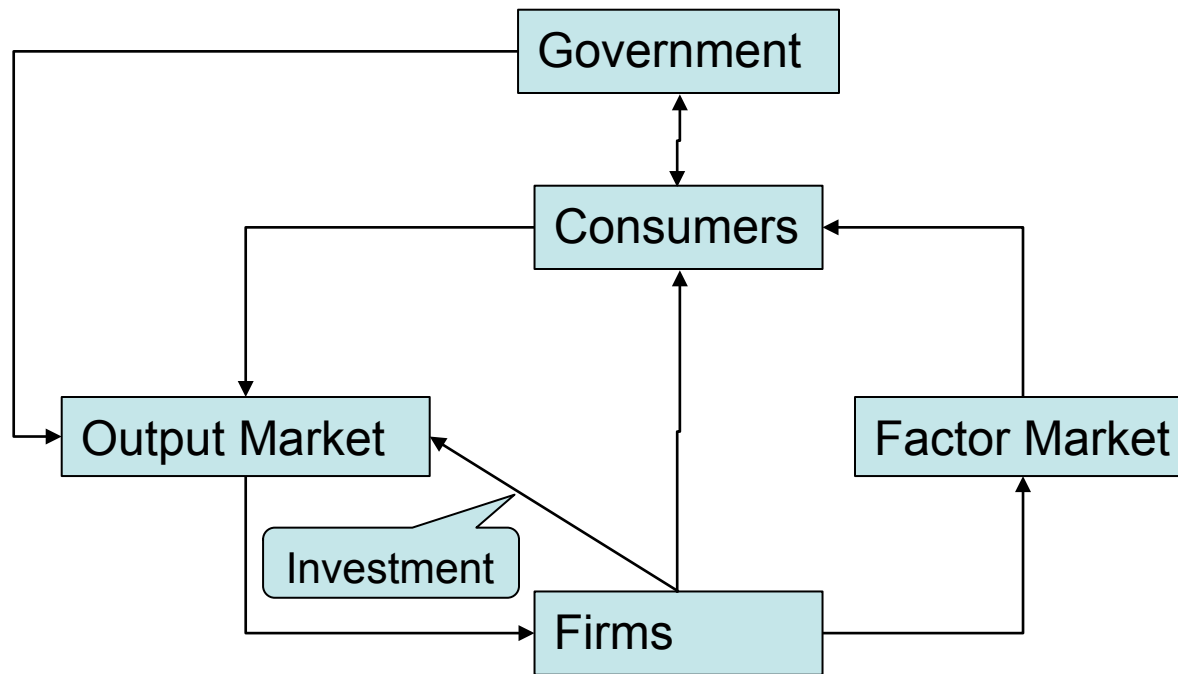
Banks and markets allow for borrowing and saving

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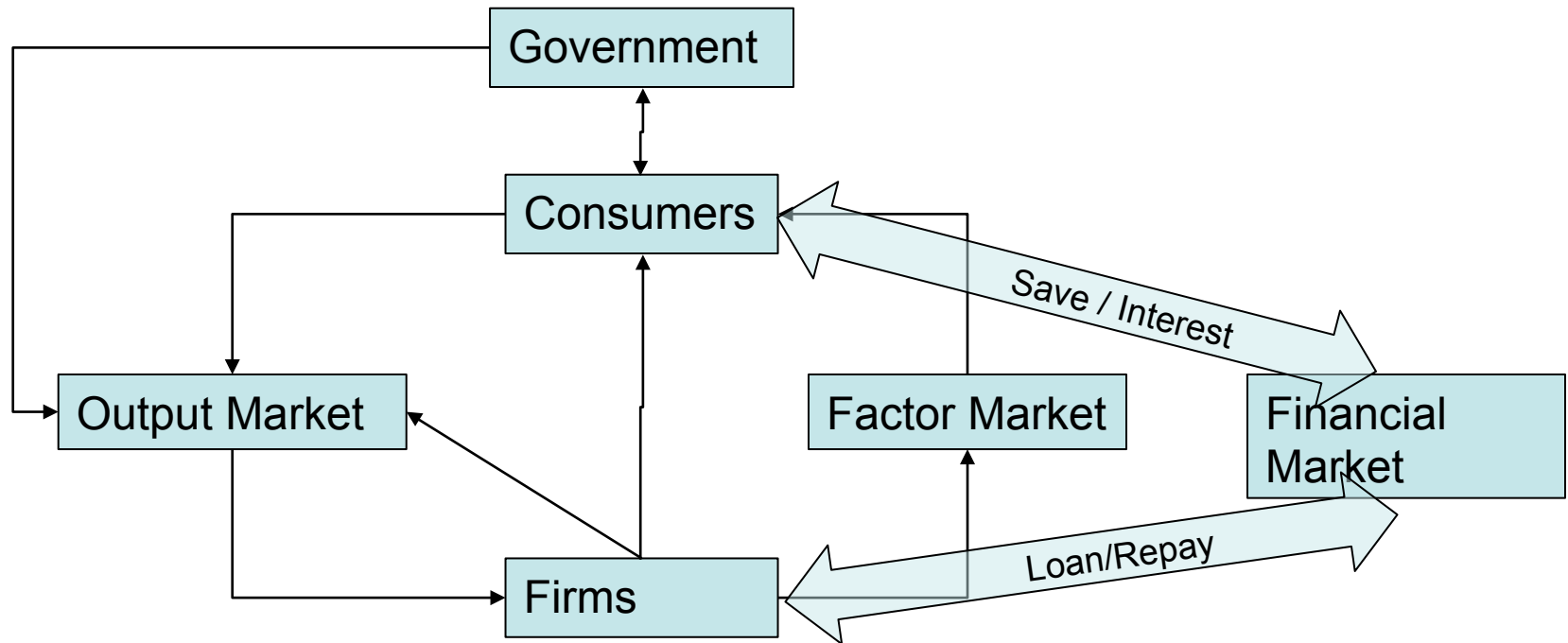
Trade with other countries
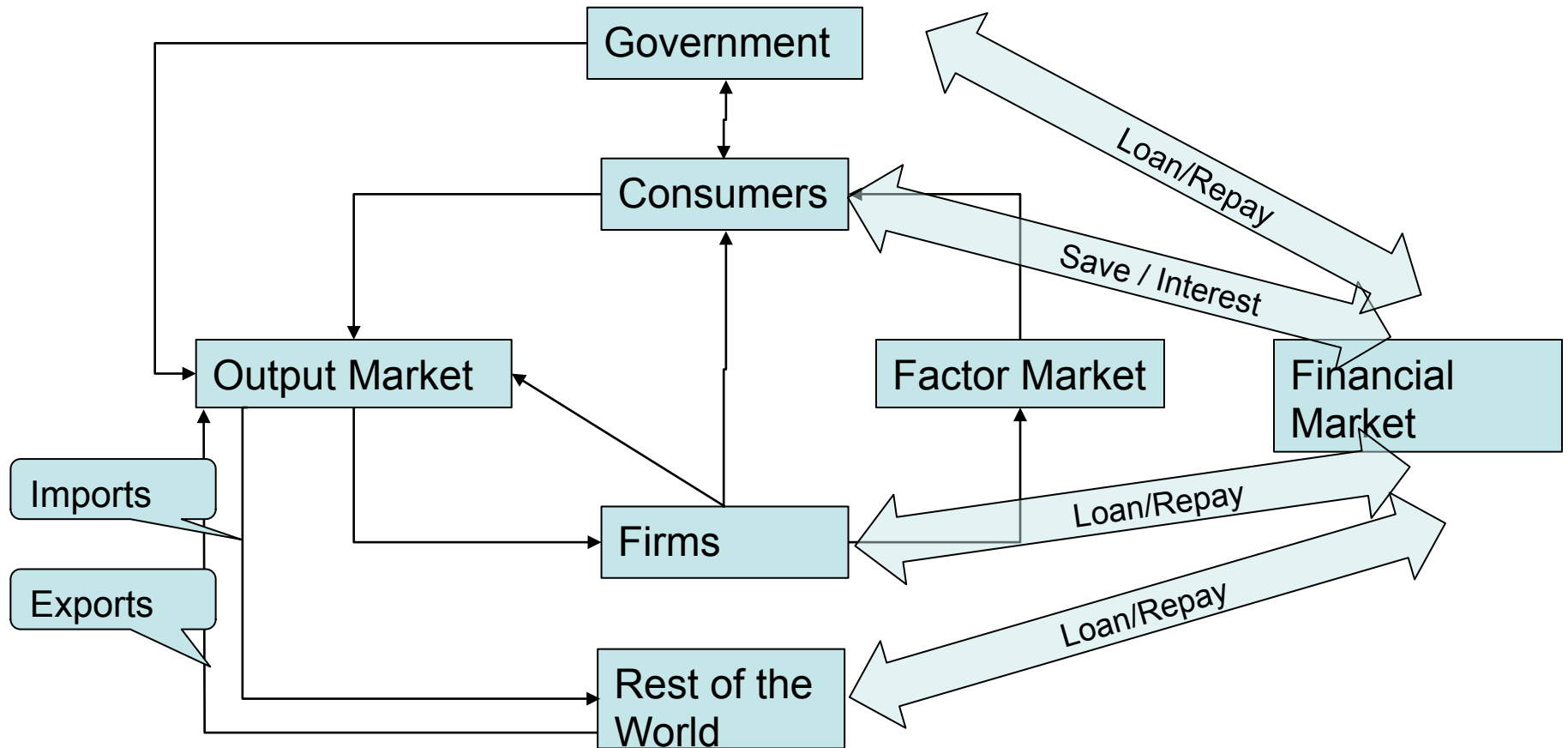
Finally, the complete economy

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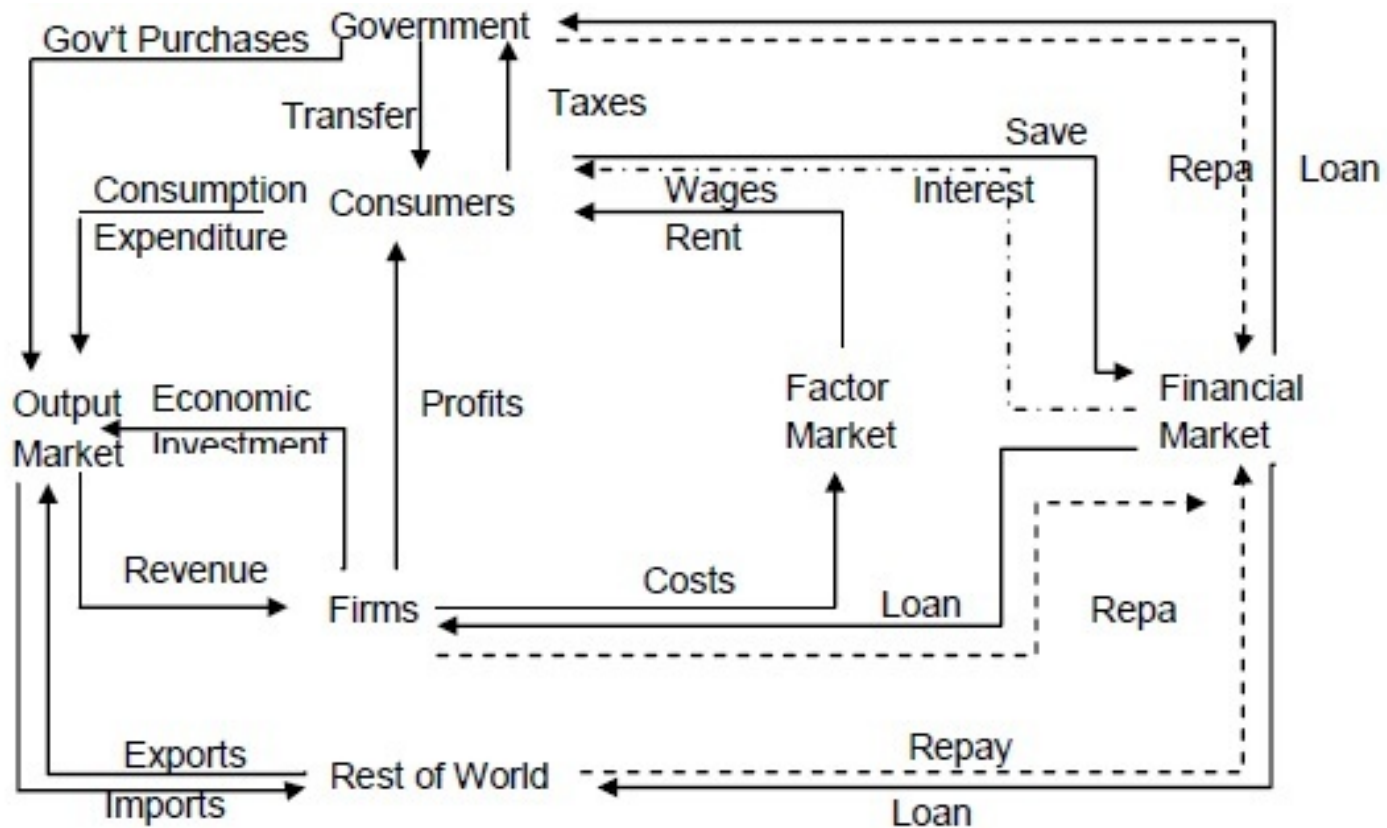
But how does this help in answering the question?

i.e. We have a model, but how do we use it to tell if the economy is doing well?

First a couple of definitions

- Short Run: Prices are "not correct". Input prices (wages, price of flour) are fixed, output prices (price of bread) can vary.
  - Consider a few weeks or months
  - Ex. Can you renegotiate your wage every day?
- Long Run: Prices are fully flexible and adjust to the "correct" level
  - Consider a few months or years
  - Ex. Are wages fixed for ever? Can you get fired?

So when is an economy doing well?

- If the total amount of goods being produced in the short run is the same as that which would ideally be produced in the long run

The U.S. "economy"
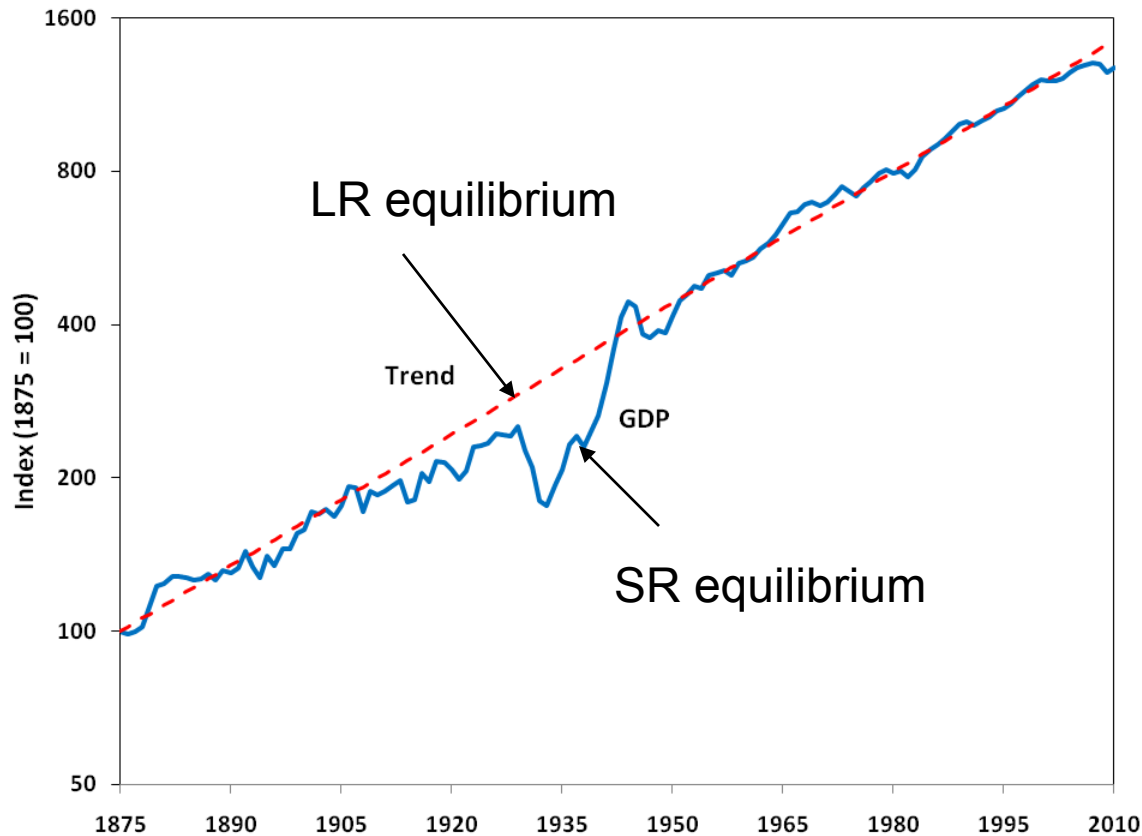
So what is SR equilibrium?
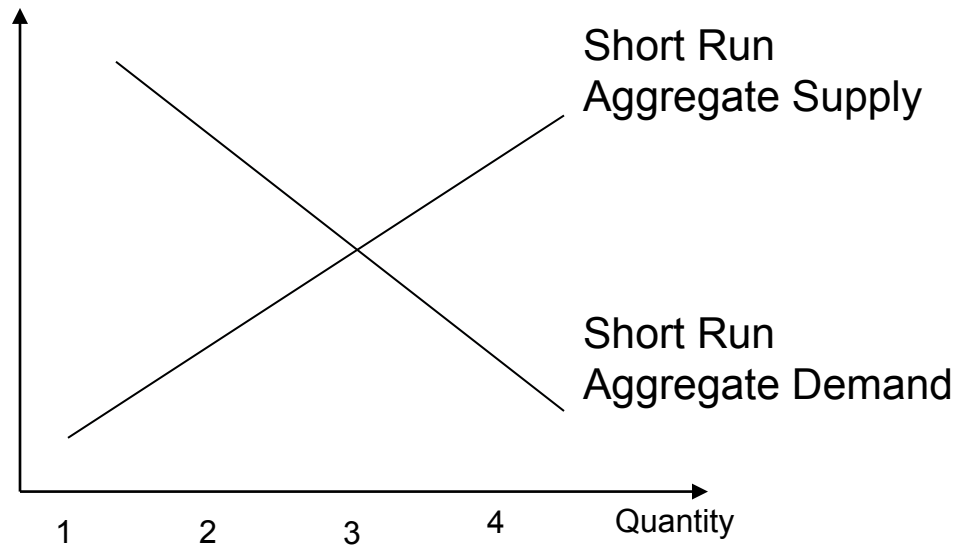
But what exactly is aggregate demand?

(and Aggregate Supply, for that matter)

First some assumptions

- About individuals
    1. People are rational (they maximize utility)
        - If people know what they want and how to get it, they will try to get it if benefits exceed costs
    2. People have unlimited wants
    3. People have limited income
- Recall scarcity and opportunity costs

More assumptions

- Mistakes are allowed as long as at that point in time, you made the best decision you could.

  - Ex. You can lose money on the stock market because you thought it would go up. Didn't have enough info.

- Law of Demand: All other things equal, as the price for a good goes up, the demand for that good goes down

Why do these matter?

Falsify Assumption	Effect of Price drop on demand
Maximize Utility	?
Unlimited Wants	Depends on if desire for good is satiated
Limited Income	None. Always buy an infinite amount of goods

Falsify Assumption	Effect
No Mistakes	Unrealistic. Model would not reflect "reality"
Law of Demand	Simplification. Some goods do not exhibit this behavior, but the majority do.

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Back to Aggregate Demand

- Consider the following. We have four consumers (A,B,C,D) and demand:

Price level	A	B	C	D
$10	40	40	10	10
$20	40	25	5	10
$30	30	25	0	5

- Draw the demand curve for consumer C

But we want to consider *aggregate* demand (AD)

- Recall our flow diagram. Who demands goods and services?

- AD is determined by
  1. Consumption Expenditures (by Households)
  2. Investment Spending (by Firms)
  3. Government Spending (by Government)
  4. Net exports (by Rest of World)

- This is exactly the total of the output market!

Consider the previous example in the macro context

Price level	Consumers	Firms	Government	Net Exports
$10	40	40	10	10
$20	40	25	5	10
$30	30	25	0	5

- What is total demand at each price level?

Price level	Aggregate Demand
$10	40+40+10+10=100
$20	40+25+5+10=80
$30	30+25+0+5=60

- Draw the AD curve

Why does the demand curve slope downwards?

- In Micro:
  - Substitution Effect: If price of one good goes up, consumers purchase more of a substitute good
  - Income Effect: If price of good increases, I can't afford the same number of items.
    - I am "poorer" and therefore purchase less

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The substitution and income effects are not as relevant in Macro

- **Substitution Effect:** If average price of ALL goods in the economy goes up, you can't start buying goods that are not in the economy – the substitution effect doesn't work

- Income Effect: If average price increases, then average revenue firms receive increases. This yields higher wages or profits – so consumers income increases as well

There are three effects that cause AD to be downward sloping

1. Price and Consumption ("Wealth Effect") – Decrease in the price level tends to increase the *real* value of financial assets with a fixed monetary value
   – Ex. Stock market boom yields to increase retirement savings so people save less and consume more

2. Price and Investment ("Interest Rate Effect") – If money supply is fixed, an increase in prices will cause an increase in interest rates
   – Ex. Food prices increase. Less disposable income for savings. Less loans available. Higher interest rates, less investment. Therefore, less demand.

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Downward sloping AD (contd.)

3. Price and Net Exports: ("Exchange Rate Effect") – If real prices of domestic goods decrease relative to foreign goods: a) foreigners buy more domestic goods; and b) locals buy less foreign goods

   – So, more aggregate demand (domestic) given the lower price.

Downward sloping AD (contd.)

- Note: Short-term price changes cause shifts along the demand curve.

AD can also shift left or right

- Two causes:
    1. Change in determinants (consumption, investment, gov't spending, NX)
    2. Multiplier Effect (will see in a few slides)

1. Change in Determinants

- Changes in Consumption
  - Wealth, Expectations, Borrowing, Taxes
- Changes in Investment
  - Interest Rate, Expected Returns
- Changes in Gov't Spending
  - fiscal policy changes

Determinants (contd.)

- Changes in Net Exports
  - Income or Wealth in Foreign countries
  - Exchange Rates
  - Tariffs, etc.

2. Multiplier Effect

- Multiplier Effect: The additional shifts in aggregate demand that result from a change in spending in the output market

- Marginal Propensity to Consume (MPC): The fraction of extra income that a household consumes rather than saves
  - Ex. MPC=1 means consumer spends all income (i.e. doesn't save)
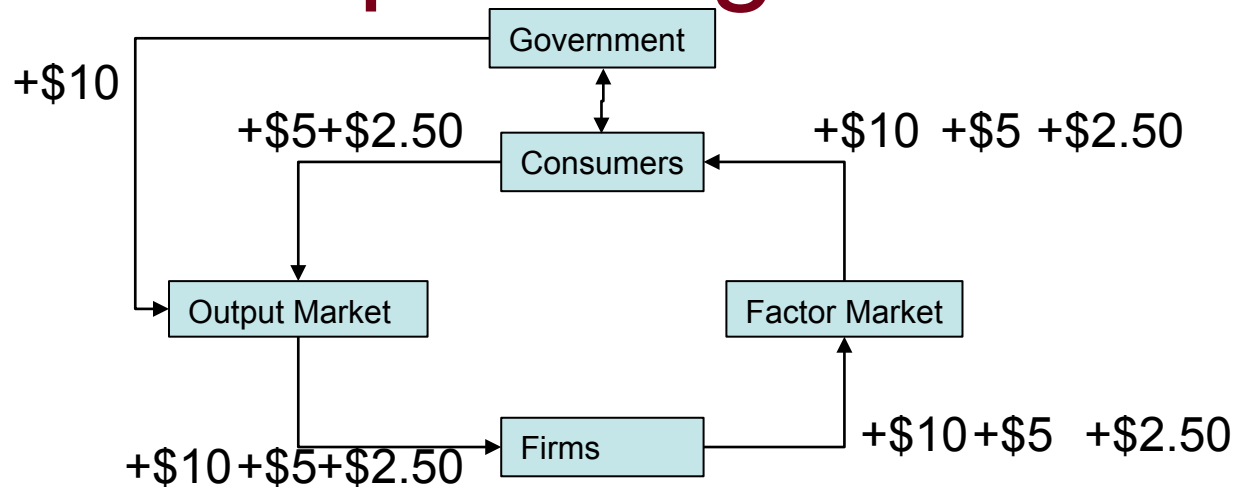
What causes changes in spending in the output market?

- Changes in government spending and tax policy
  - Fiscal Policy
- Changes in Investment
  - Monetary Policy
- Changes in NX
  - Exchange rates, interest rates, etc.

Let's consider government spending

- Assume MPC=0.50 (different from notes)

	Change in C (MPC=0.50)	Total Increase in AD
Gov't Spends $10		$10
First Round	$10*0.50 = $5.00	$10+$5 = $15
Second Round…	$5*0.50 = $2.50	$15+$2.50 = $17.50
Third Round…	$2.50*0.50 = $1.25	$18.75 etc

Finding the AD Multiplier

- In general, AD Multiplier = $1/(1-MPC)$
  – Our example=$1/(1-0.5)=2$

- Total Change in AD
  = Change in Initial Spending in
     Output Market * AD Multiplier
 – Our example: Total Change in AD =$10*2= $20

Change in Initial Spending in the Output Market (CISOM)

- What matters is the size of this change

- When government spends $10, the CISOM is $10

- What happens if instead, government gives $10 to consumers in the form of a tax rebate? (Hint: look at the flow chart to determine the first amount to "hit" the output market)

Effect of tax change on AD

- Assume MPC=0.50 (different from notes)
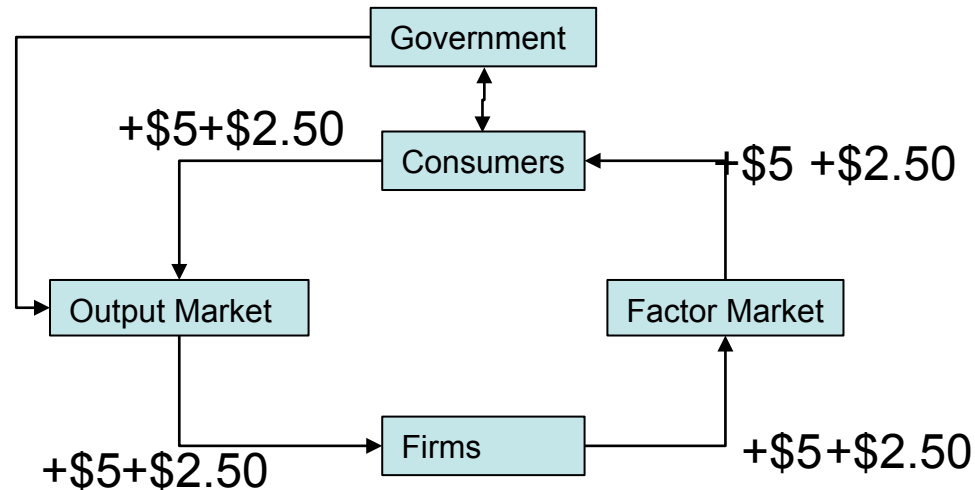
	Change in C (MPC=0.50)	Total Increase in AD
Gov't Gives $10	$10*0.50 = $5.00	$5
Second Round…	$5*0.50 = $2.50	$5+$2.50 = $7.50
Third Round…	$2.50*0.50 = $1.25	$8.75 etc.

Total: 5/(1-0.5) = 10

Aside: Fiscal Policy

- By previous calculations, what is the effect on GDP if government reduces spending by $10 and reduces taxes by $10?

  – Is this a problem?

- Note some implicit assumptions of the multiplier effect

  – No change in investment

  – All spending is on domestic goods (no change in NX)

  We will not worry about this in this class

What is aggregate supply?

Do firms in aggregate behave differently than they do individually?

Some assumptions

- About firms
  1. Firms maximize profits
     - Similar to "people are rational"
  2. Firms produce goods with a technology that requires resources
     - ex. Labour, Capital, Natural Resources (land)
  3. Resources are limited
     - Similar to people having limited income

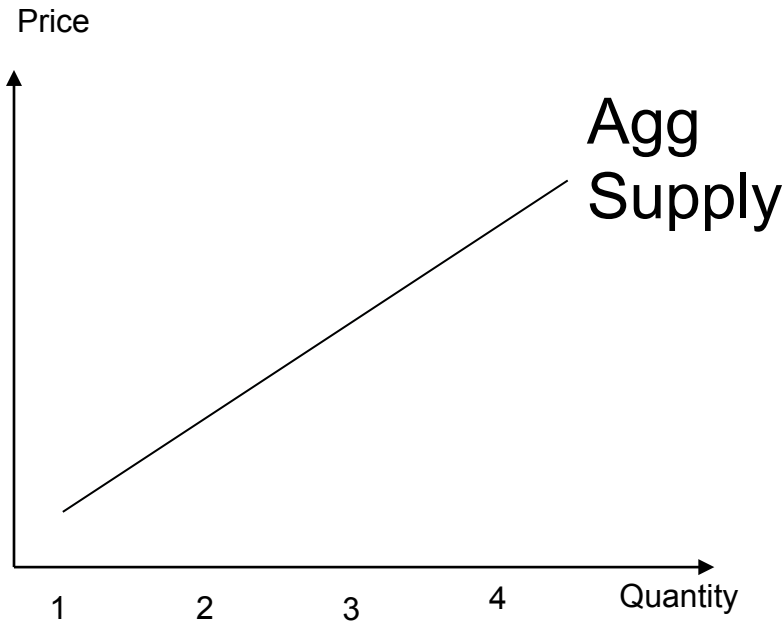UNIVERSITY OF MINNESOTA
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Aggregate Supply (AS) is the supply of the entire economy

- Short-Run: Law of supply holds
  - Law of Supply: All other things equal, as the price for a good goes up, the supply of that good goes up

- Long-Run: All other things equal, the economy will produce the same aggregate quantity, regardless of price
  - Why? In long run the firms can produce a "natural" amount given the available labor, capital, natural resources, and capital. Nominal prices adjust so AD equals this amount.

- This level is known as the Natural Rate of Output

AS graphs

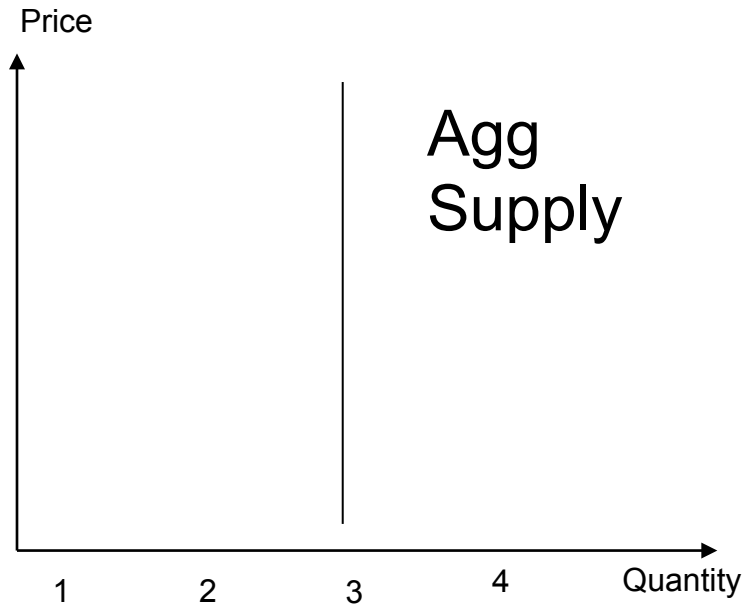- ## Short-Run

Price

Agg
Supply

| | | | | |
Quantity
1   2   3   4

- ## Long-Run

Price

Agg
Supply

| | | | | |
Quantity
1   2   3   4

What determines SRAS?

- Prices!
  - Wages
  - Materials
  - Loans / Financing
  - Sale price
  - Etc.

What determines LRAS?

- Who produces more, India or Moldova?

- Who produces more, Japan or Bangladesh?

- Whose workers are more productive (i.e. # of labour hours to produce a product, say a car), Korea or Zimbabwe?

- Who produces larger variety of goods, United States or Saudi Arabia?

What determines LRAS?

- Labour Supply
- Who produces more, Japan or Bangladesh?
- Whose workers are more productive (i.e. # of labour hours to produce a product, say a car), Korea or Zimbabwe?
- Who produces larger variety of goods, United States or Saudi Arabia?

What determines LRAS?

- Labour Supply
- Capital Investment
- Whose workers are more productive (i.e. # of labour hours to produce a product, say a car), Korea or Zimbabwe?
- Who produces larger variety of goods, United States or Saudi Arabia?

What determines LRAS?

- Labour Supply
- Capital Investment
- Technology
- Who produces larger variety of goods, United States or Saudi Arabia?

What determines LRAS?

- Labour Supply
- Capital Investment
- Technology
- Natural Resources
- Shifts in LRAS result from changes in one of these four
- Shifts in SRAS only result from changes in cost

So why do prices matter (in short run)?

- Suppose prices unexpectedly rise
  1. Sticky Wages – Wages don't change immediately (due to contracts), so more opportunity for profit, so increase production
  2. Sticky Prices – Input prices don't change immediately (due to contracts), so same as above
  3. Misperceptions – Firms misinterpret changes in the aggregate price level as an industry change
     - So even if wages and prices aren't sticky, firms don't expect renegotiations, so same thing

What happens in long run?

- Continuing from previous example
  1. Sticky Wages
  2. Sticky Prices
  3. Misperceptions

What happens in long run?

- Continuing from previous example
    1. Firms and workers renegotiate wage contracts
    2. Sticky Prices
    3. Misperceptions

What happens in long run?

- Continuing from previous example
  1. Firms and workers renegotiate wage contracts
  2. Firms and suppliers renegotiate input price contracts
  3. Misperceptions

What happens in long run?

- Continuing from previous example
  1. Firms and workers renegotiate wage contracts
  2. Firms and suppliers renegotiate input price contracts
  3. Firms correct their misperceptions

- So economy supplies the natural rate of output

Defining the LR Equilibrium

i.e. Identifying if the economy is doing well or poorly.

Defining a Long-Run AS-AD equilibrium

- We said: "(An economy is doing well) if the total amount of goods being produced in the short run is the same as that which would ideally be produced in the long run"

  - LR AS-AD Equilibrium: When the short-run equilibrium is the same as the long-run equilibrium

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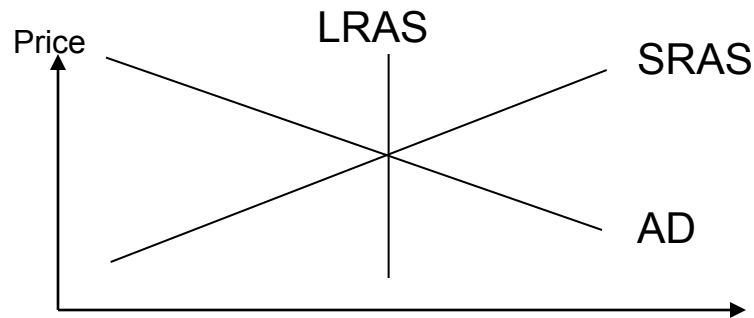
Recall: The U.S. "economy"

- We measure AD-AS equilibrium using GDP
- We measure LRAS using the trend line
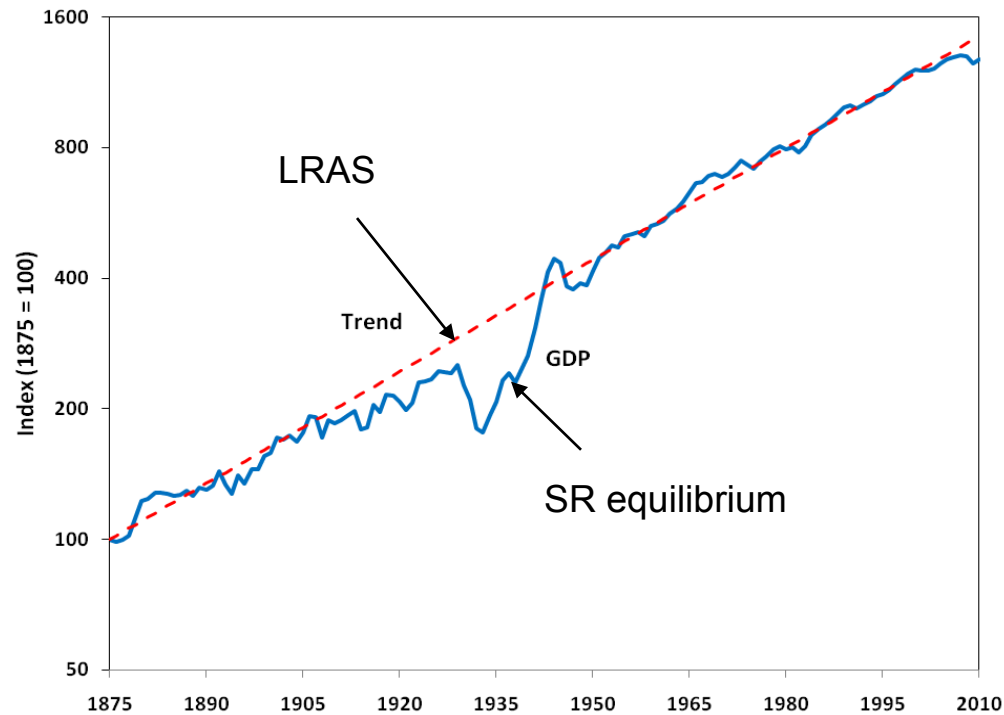
What if we aren't at equilibrium? (ie. Business cycles)

- Ex. AD increases above NRO (note: We always assume sticky wages)
  - AD shift causes prices to increase. In the LR, this implies wages will increase so production costs more. Therefore, firms produce less, shifting SRAS curve left.

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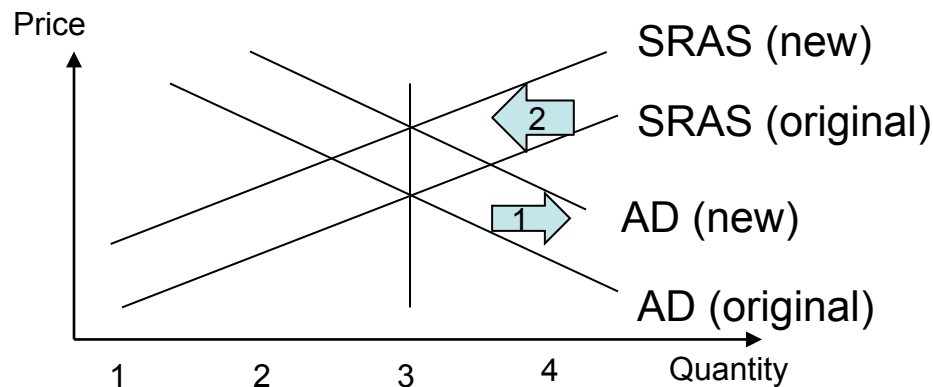
This is an example of Demand Pull inflation

- A price increase in equilibrium due to a shift in aggregate demand.

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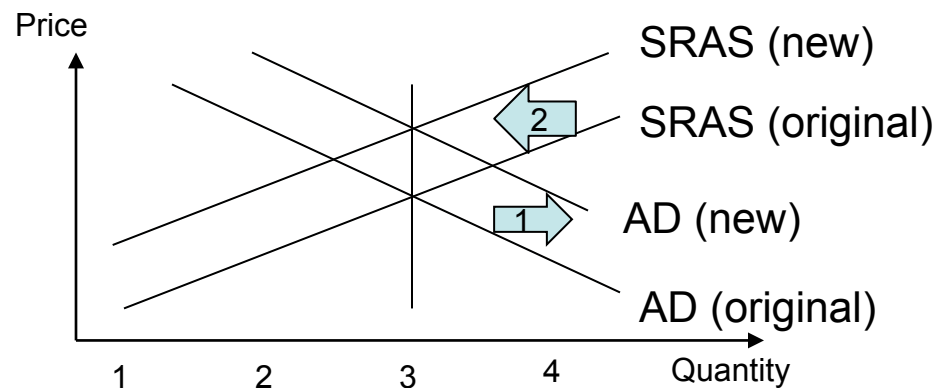
What if we aren't at equilibrium (contd.)?

- Ex. AS decreases below NRO (say we have a jump in input prices)
  - Prices decrease. In the LR, either 1) SR-AS increases (and result is recession "never happened" or 2) (diagrammed) AD increases (firms lower wages because of lower prices, so can increase production).
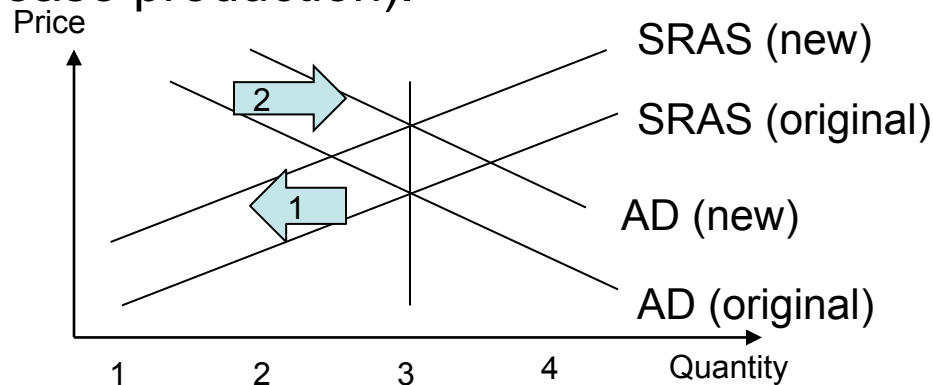
This is an example of Cost Push inflation

- A price in equilibrium due to shift in SR aggregate supply

Price

SRAS (new)

2

SRAS (original)

1

AD (new)

AD (original)

1   2   3   4   Quantity
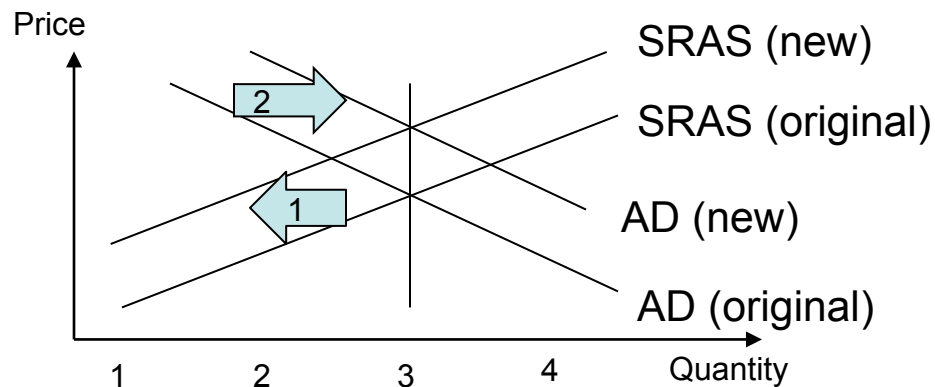
What if we aren't at equilibrium (contd.)?

- Ex. Technology shifts LRAS(online shopping)
    - In the LR: 1) AD increases (price levels increase); or 2) SRAS increases (costs decrease); or 3) Both

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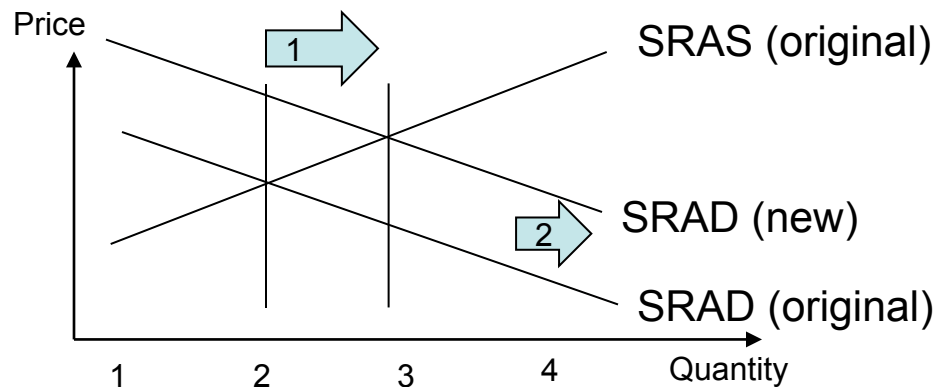
How are equilibrium and the unemployment related?

- What does lower wages really mean?
  - Sure, all wages could go down, but usually it means that firms let people go.
- This yields the following general results:

	Below Equilibrium	At Equilibrium	Above Equilibrium
Economic output	Below NRO (recession)	At NRO ("normal")	Above NRO (expansion)
Unemployment	Above natural rate of unemployment	At natural rate of unemployment	Below natural rate of unemployment

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Key Ideas and Things To Think About

Note: This is NOT a study guide – i.e. do not limit yourself to these items when studying

Key Ideas

- Agents and markets in an economy
- Assumptions about individuals
- What is Aggregate Demand (AD)?
- Why is AD downward sloping?
- Multipliers on spending
- Assumptions about firms

Key Ideas (contd.)

- How short-run and long-run AS curves differ and why

- What determines LRAS

- What happens when we move away from equilibrium (to employment, prices, output)

- How economies return to equilibrium

Things To Think About

- What are examples of government transfers?
- What are examples of government spending?
- Is government spending always bad?
  - Alternatively, is it always better to have consumers spend instead of the government?

Things To Think About (contd.)

- Why might governments choose one policy over the other (i.e. choose to spend versus choose to tax less / transfer more)?
  - What assumptions on I, NX, C and G are you making?
- Both parties are saying they will cut G. What effect might this have on GDP? Why are they suggesting this?
- What are some examples that might cause shifts in each of the determinants of AD?
- How much effect can government policy have on its economy? Which AD determinants can it affect?
- What might cause LRAS to shift?

Things To Think About (contd.)

- Is the economy better or worse off if it is producing below the LRAS? (Hint: Consider several cases: 1) Shift in AD curve to the left; 2) If we just had a technology shift and firms haven't yet reacted)

- In the context of our model, how can the government prevent layoffs; i.e. prevent firms from shifting AS by reducing wages.

- A real world example of the impacts of government spending: fiscal cliff