

## Announcements

- Midterm Exam 1 next Thursday!!
- Extra office hours next week (Mon 10/3: 9:00-10:30am & Wed 10/5: 9:30-10:30am)
- No Discussion section next week.

## From last week

- Clarification on unemployment definitions:
  - Natural Rate of Unemployment: No cyclical unemployment. Consists of BOTH structural and frictional unemployment. (around 5%)
  - Full Employment: Level of employment when the unemployment rate is at the natural rate.

## A few words on models...

- “All models are wrong, but some are useful” - George Box (started the UW-Madison stats dept.)
- Occam’s Razor - *When you have two competing theories that make exactly the same predictions, the simpler one is better.* (i.e. don’t overcomplicate your models)

## Goals for this session

- Understand Labor Demand, Supply, Marginal Product (MPL)
- Build simple  $F(K,L, \text{tech})$  output model.
  - SHOCK SHOCK SHOCK - understand how this model changes with shocks
- Real Business Cycle (RBC) model
- ‘Crowding out’ caused by government spending

## Important Concepts

- $MPL = \frac{W}{P} = \text{REAL WAGE}$  - this arises from two assumptions:
  1. Diminishing returns to labor: MPL decreases as L increases.
  2. Perfect competition:  $MB = MC$ .

Putting 1 and 2 together this implies  $w = \text{mpl} * p$  (the wage you are willing to pay is equal to your revenues from hiring your last worker). Therefore  $\text{mpl} = w/p$ .

## Problems

1. You're in charge of running a pizza shop, and want to understand how many people you need to hire to produce enough pizzas to satisfy demand.

(a) Complete the MPL column in the following table:

Pizzas produced (Y)	Employees (L)	Marginal Product (MPL)
50	1	50
80	2	30
100	3	20
110	4	10

- (b) Graph this curve. Does it follow the principle of diminishing returns? **See attached graph. It does have diminishing returns.**
2. Shocks! For each of the following below, draw an output and labor market graph and illustrate the shocks. Be sure to always label each axis, curve, and equilibrium points. Explain what happens to the following equilibria after the shock:

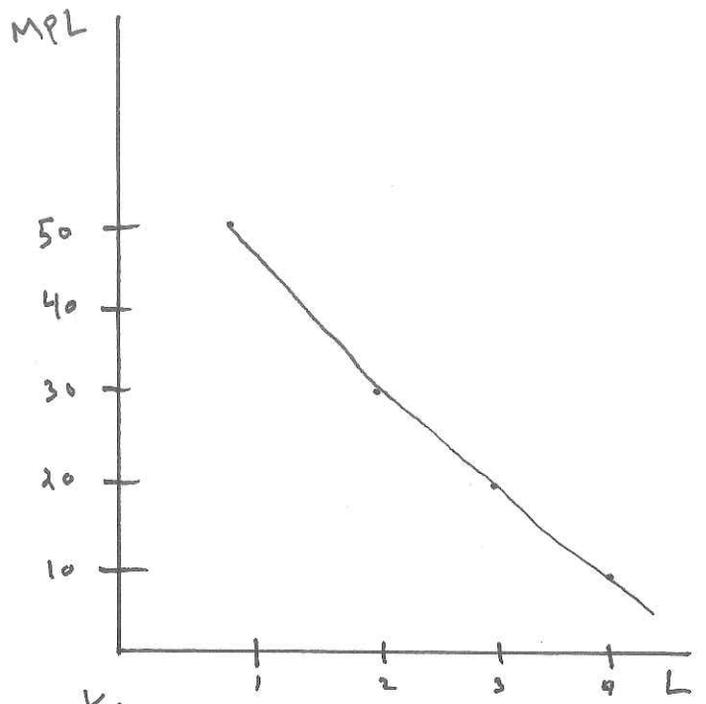
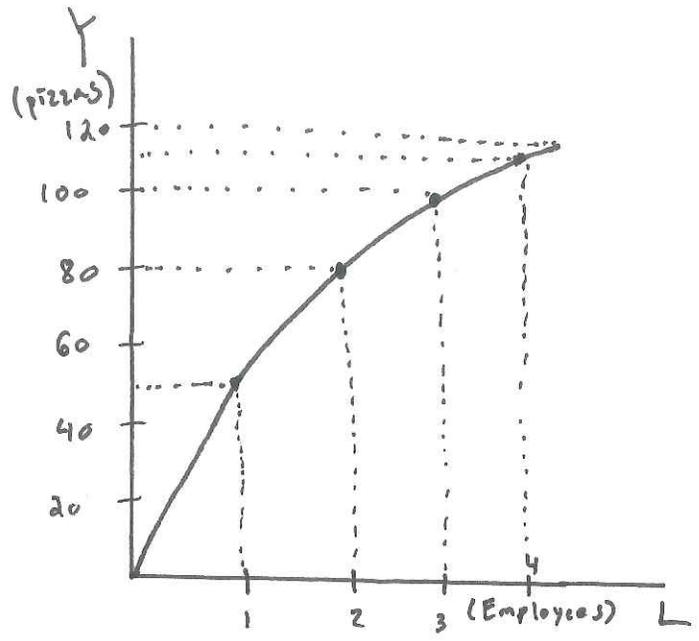
- Level of Full Employment
- Real Wage
- Output Level

- (a) The US relaxes immigration laws, so there is a huge influx of new immigrant laborers. **See attached graph. Full employment rises, output rises, wages decrease.**
  - i. Explain to your neighbor the wage 'story', how do real wages adjust to the new equilibrium level? **At the original equilibrium real wage, now all of a sudden there are many more people willing to work at that wage. There are also more people willing to work at lower wages, so the group of new immigrants bid down the wage (offer to work for less), until we reach the new equilibrium wage.**
- (b) A tornado rips through the midwest, destroying many factories/machines. **See attached graph. Full employment falls, wage falls, output falls. Three bads!!! Note that the output function has shifted.**
- (c) Bill gates invents the Windows computer. **See attached graph. Full employment rises, real wage falls, output rises. Note the output curve shifts up (workers are more productive with the new tech)**
- (d) Obama pushes through an increase to employment taxes before leaving office. (explain two possible outcomes) **The two cases are when labor supply is vertical (i.e. people work 40 hour weeks no matter what), or labor supply has a positive slope like we usually have assumed (i.e. people work more if you pay them more). In the usual case we have studied (left set of graphs) employment falls, real wage falls, and output falls :(. In the vertical labor supply case, employment and output are constant, but wages fall - a much better scenario. You may lament that wages fall in this example as well, however, those wages go to the government who can redistribute it to the people or it helps pay for services which also benefit people.**
- (e) Obama declares that every Friday is now a national holiday! **See attached graph. Employment falls, wage rises, output falls. You may ask, why does employment fall if the same # of people are working???** The answer is that employment is measured in 'hours' worked not number of people who have jobs.

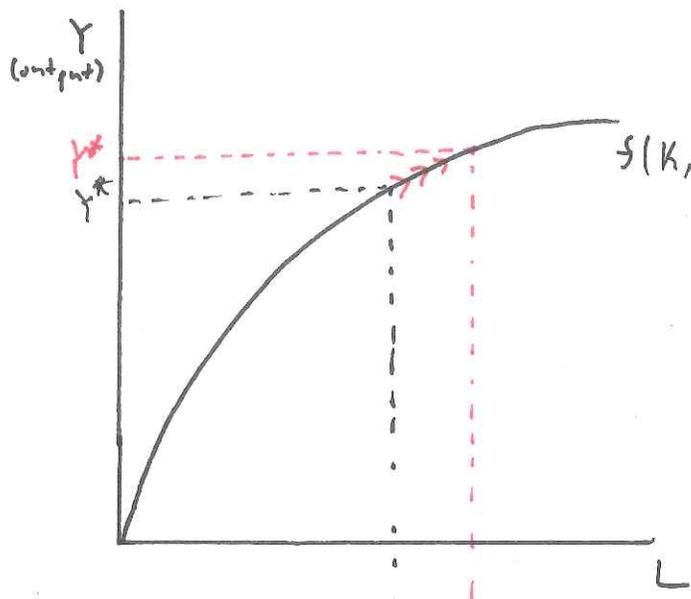
3. The RBC model argues that Technology shocks are the major cause of economic fluctuations.
4. Crowding out: The US has a(n) open (open/closed) economy. When the government increases its spending, what happens to C, I, NX, and Y if the economy is at full employment? C, I, and NX decrease as they are 'crowded out' by the government spending. Why is full employment a necessary assumption here? full employment is a necessary assumption in order to ensure that Y is constant. If we are under full employment, the government could theoretically spend money to employ these workers and bring us back to full employment. This means Y and G would increase so there is no crowding out. In practice this is a contentious issue and people disagree on how much crowding out occurs in certain employment situations.

**Good Luck on the Exam!!! On Wisconsin!!!**

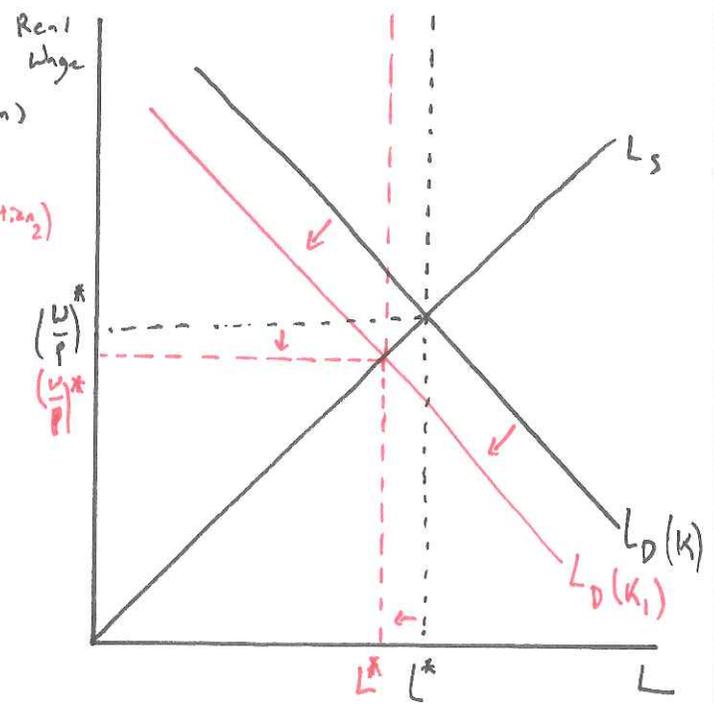
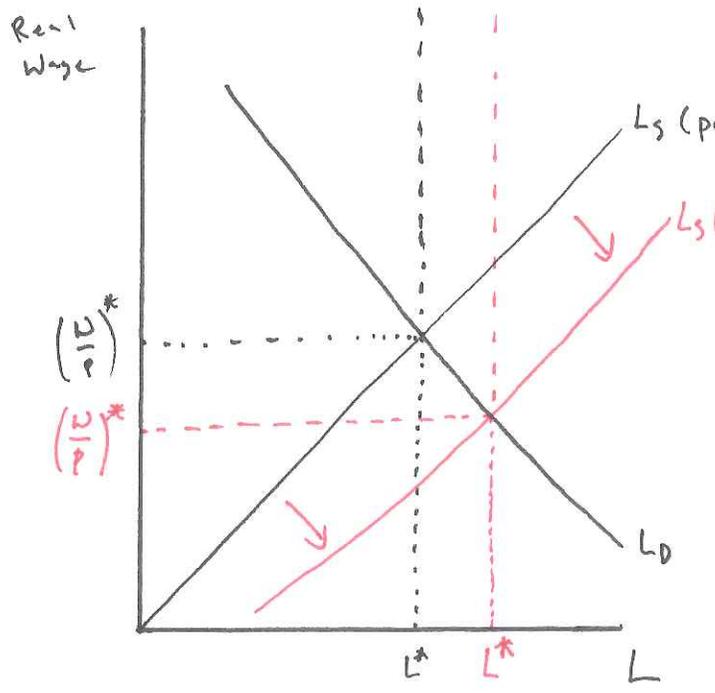
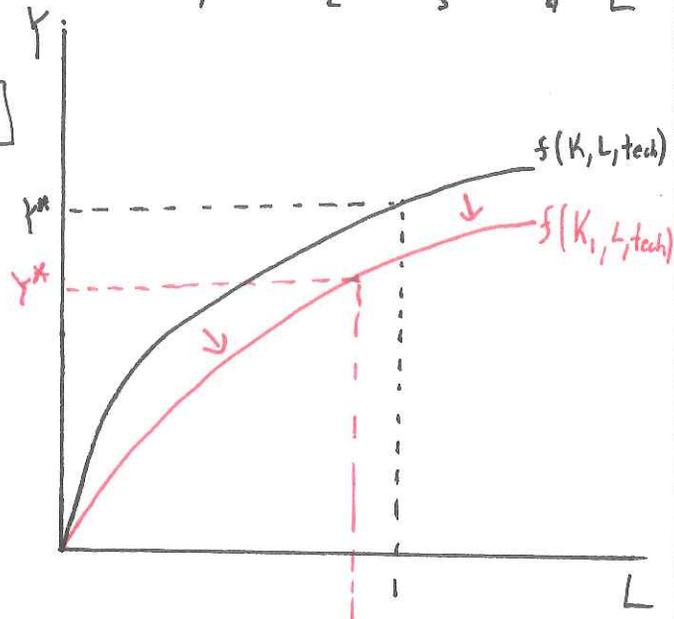
11

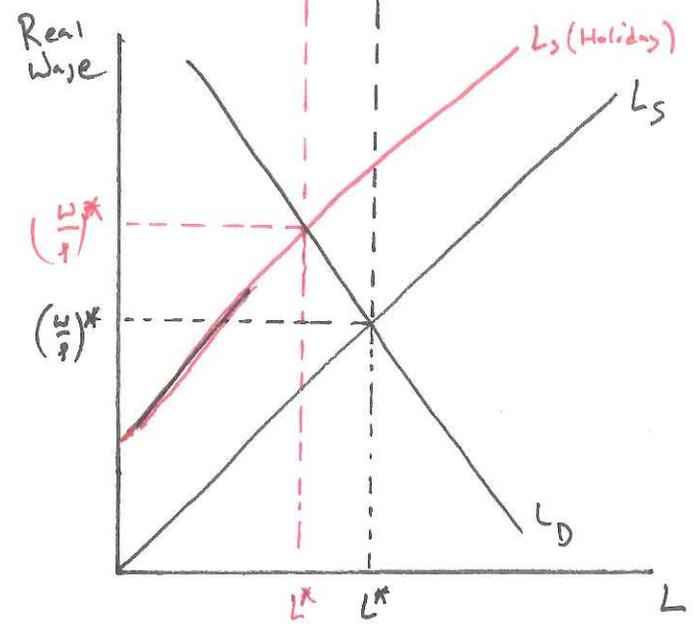
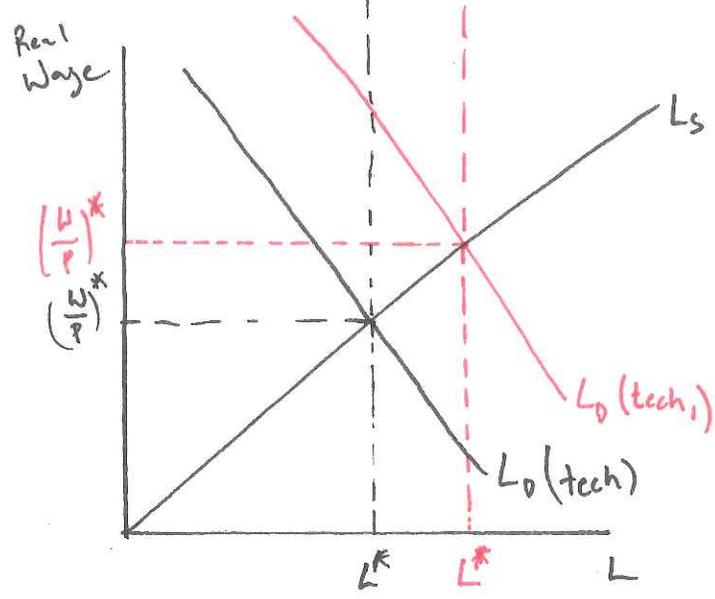
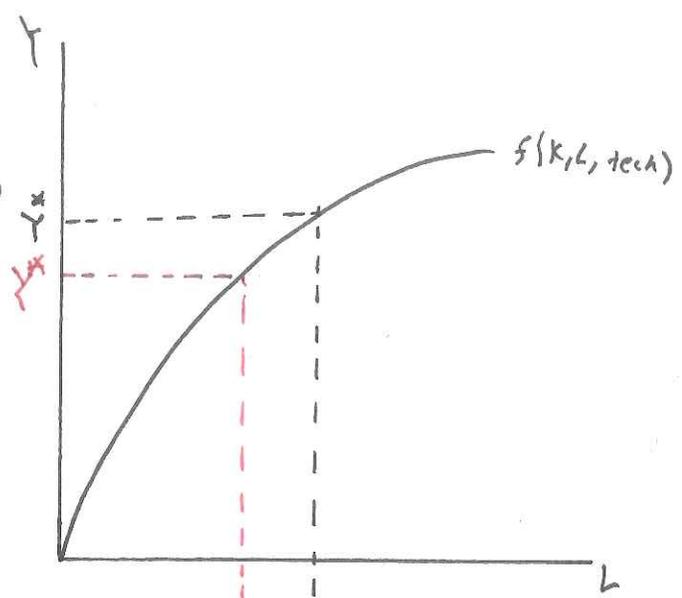
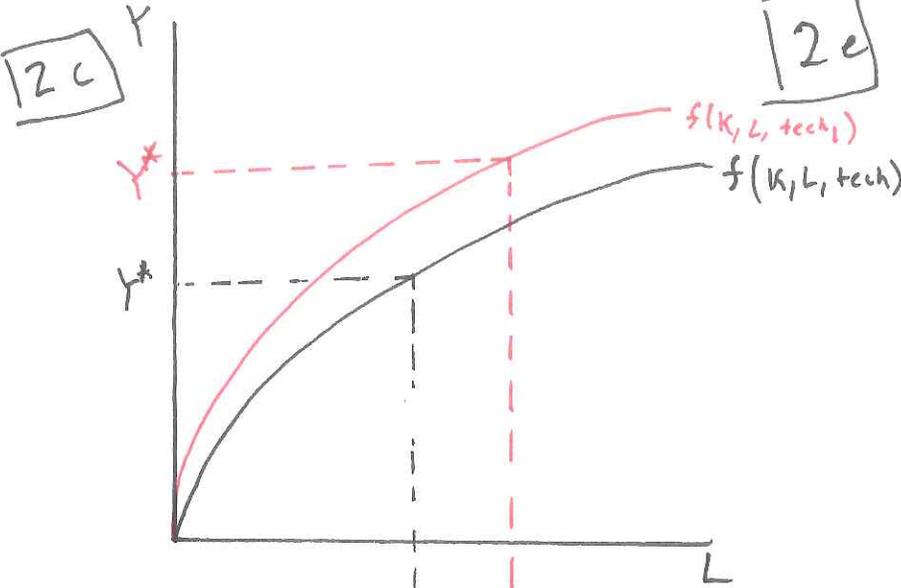


2a



2b





**2d** See next page

12d

