Lecture VII Economics 202A Fall 2007

Distribute section assignments.

Announce date of midterm. Tuesday, October 23.

There is no class on Thursday and I will unfortunately miss office hours since I have to be in Ottawa.

Either next Tuesday or next Thursday I will spend some time in class on the current macroeconomic situation.

This class covers Yellen on Efficiency Wages, and Shapiro and Stiglitz on the same topic.

The next class will cover Akerlof and Yellen on Near Rationality.

Then next Tuesday I will claw back some time to talk about the current macroeconomic situation. I think that I will take time from Mankiw's article on small menu costs. I will leave some comments on it in the notes, and I will also expect you to read it.

☮☮☮☮

Today we are going to begin talking about New Keynesian economics and theories of unemployment.

I will begin with an overview and an introduction.

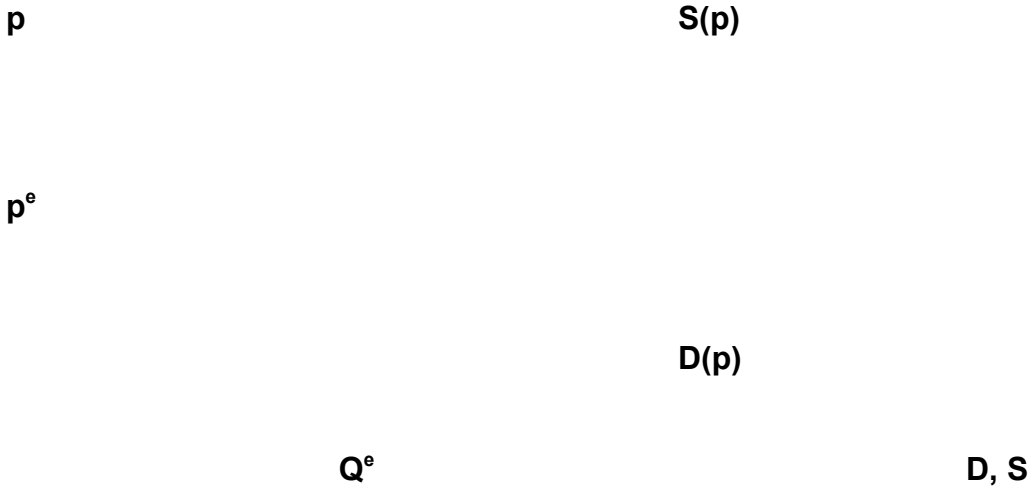
This introduction begins with an explanation for why it is hard to find an adequate theory of unemployment.

The basic problem of unemployment is the following:

Involuntary unemployment occurs only when the *supply* of labor is not equal to the *demand.*

Economics, at least until fairly recently, was only about *supply* and *demand.*

In Economics 1 the standard picture of market equilibrium comes from the standard supply-demand graph:



Equilibrium *price* and *quantity* occur where supply equals demand.

What happens if price and quantity are not at equilibrium?

***Then,* there is some agent who could *profitably* engage in trade with some other agent.**
This is the fundamental truth about competitive markets:

if S ≠ D two agents could mutually exchange with one another and *both* could benefit from the exchange.

The fundamental truth is very far reaching.
It is *genuinely difficult* to construct models in which S ≠ D , yet in some meaningful sense, all agents are in equilibrium — so that there are no *mutually beneficial* trades that have not been made.

That is the result of *standard* economic theory.

At the same time there seems to be a *lot* of *unemployment*, some of it of long duration.
***Also,* the total amount of this *unemployment* varies over time.**

If supply equals demand, why should there be large *macroeconomic* fluctuations in unemployment?

It is *possible* to construct models with fluctuating unemployment, in which *Supply* equals *Demand*.

The simplest examples are *Search Theory Models of unemployment.*
But such models almost of necessity make a very wrong prediction about the cyclical nature of labor turnover.
In search theory labor does not always accept jobs in the downturn because the terms of existing jobs have deteriorated.
***But* if workers are shunning jobs because of bad terms of *employment,* that does not explain why *voluntary* quits fall dramatically as unemployment rises.**

FN: This fact has been emphasized by James Tobin: *AER,* 1972, "Inflation and Unemployment." END FN

This is the tell-tale of problems all theories of unemployment, where unemployment is voluntary.

Alternatively, some people have proposed that high unemployment reflects times of high *sectoral shift.* This is a variant of the real business cycles model.

This theory, however, hits the rocks on the fact that when unemployment goes up, *intersectoral mobility falls.*
It does not rise, as the theory predicts.

These results should be established more thoroughly, especially now with panel data.

Surprisingly, I am unaware of anyone trying to do that although this is a central topic in macroeconomics.

If you are thinking of doing research in this area you should look at the papers by Bob Hall and Robert Shimer. Both of them have recently decided that the low rate of quits when unemployment is high means that unemployment must be Keynesian.

I will mention their research program again at the end of the class.

All the facts about cyclical unemployment are consistent with the notion that *money wages* and possibly also *prices* are sticky. They do not change enough to clear the labor market when demand declines.

***Wages* are too high to equilibrate the demand and supply for labor in the labor market in labor market downturns.**

Jobs are rationed and unemployment results.

It is always a good thing, where there is unemployment to ask the following question:

Is there some reason why *wages* are too high to clear the labor market?

This of course is also a very classical view of unemployment.
Early credits for this would be to Pigou and Keynes in the 1930s.
The view that unemployment is the result of wages that are too high corresponds to economists' view of the world.

In that view the reason some good or service does not sell is almost always that the price is too high.

I have an economist friend who complained that he *could not* sell his house, which had been on the market for a long time.
When I repeated this to a mutual friend, he politely let me know that I had flunked Econ 1.

This is even a view of the *supply side* in the Great Depression.

From 1929 to 1933 prices fell by ½ but wages fell by only ⅓.

The net result was a large increase in real wages for those who remained *employed.*
Firms could not profitably employ their existing employees, and therefore made large losses.

Let me mention 6 theories of unemployment.
(1) Search theories: Phelps\Lucas\Sargent\Mortensen\Pissarides.
(2) Implicit Contract Theory: Azariadis and Baily
(3) Efficiency Wage Theories: Solow, Shapiro and Stiglitz
(4) Insider-Outsider Theories: Shaked and Sutton, Lindbeck and Snower and Blanchard and Summers
(5) Real Business Cycle Theories, Kydland and Prescott
(6) Coordination Failure: Diamond, Russell Cooper, Peter Howitt.

The notes have covered the search theories of Phelps, Lucas and Sargent.
And David Romer has also covered them in the textbook.
I will go over at least one version of efficiency wage theory.
I think that Maury has eliminated Implicit Contract Theory, insider-outsider theory, and also co-ordination failures.

With these preliminary remarks let me begin to review efficiency wage theory.

The easiest view of unemployment theory is that employers, either because they are *forced* to do so by unions, or because they do so *voluntarily*, pay higher wages than necessary to obtain employees.
There is a large difference between U. S. theories of unemployment and European theories. European theories put much greater emphasis on high union wage demands because the rate of unionization in Europe is so high.

Here is data for union membership in 2000 relative to the number of all paid employees is:

Italy	**35 %**
Canada	**30 %**
UK	**29 %**
Germany	**26 %**
Japan	**22 %**
France	**9 %**
United States	**13 %.**

Source: www.nationmaster.com/graph/lab_tra_uni_mem-labor-trade-union-membership

For the United States it is even lower as a fraction in the *private* sector, since the public sector tends to be relatively more unionized.

In consequence, to explain U.S. unemployment we need a theory that explains why wages might be so high that less than the full labor force is employed.
A union-related theory will be insufficient since the fraction of the private labor market with union employees is so very small.
And, this must entail a theory why *employers willingly*, for some reason or other, pay workers more than necessary.

Before we embark on finding such a theory it is useful to see that *in fact* this is the case. In fact, some employers pay workers more than necessary to attract them to their work force.

The U.S. Labor Department publishes — area-by-area — wage surveys by detailed occupation.
In all these surveys, the variability of the wages for seemingly similar jobs is truly remarkable.

This variability has an implication.
If there are *two identical* non-unionized workers in the same area receiving very different wages, it means that for some reason or other, the higher paying employer is paying more than necessary *just to attract the employee.*

Two papers, one by Bill Dickens and Larry Katz, and another by Alan Krueger and Larry Summers, have shown fairly conclusively that identical nonunion workers receive quite different wages, dependent on industry of employment.

With some exaggeration, Dickens and Katz show that *all* workers in all *occupations* receive high wages in high wage industries, and, similarly, *all* workers receive *low* wages in *low* wage industries when classified by occupation.

Thus, for example the industries that pay high wages to managers also pay high wages to their office clerks.
And, similarly, industries that pay low wages to their managers pay low wages to their office clerks.

Reference: in K. Lang and J. Leonard, editors, *Unemployment and the Structure of the Labor Market.*

Krueger and Summers show that when workers move from a low-wage industry to a high-wage industry they tend to have wage changes commensurate with the *general* industry wage differentials.

Also those industries with *higher* wages have *lower quit* rates.

***Econometrica,* March 1988.**

These studies then seem to show that *identical* workers in the same regions receive quite different wages dependent upon the circumstance of who their employer might be.

FN: People who believe that these findings are consistent with market clearing say that the high paying jobs are *good* matches. The fact that they are *good* matches explains the low quit rates, not the fact that these jobs pay rents. END FN

The next to last word on this subject is a current series of papers by John Abowd and Francis Kramarz. They have looked at massive amounts of French data, which follows workers' pay by firm.
You could do that, for example, from social security data.

You then take a regression of

wage = worker (fixed coefficient, time, experience of worker, and a fixed coefficient on the firm).

The fixed coefficients on the firm should have explanatory power.
In fact it explains a significant part of interfirm wage differentials.
The surprise in this study is that the interfirm differentials, while present, were not very large.

I am told that there was a mistake in the programming in this study that occurred because the data set was so very large that it became very difficult to handle in the computer and that newer results have much higher coefficients.
The most recent estimates from this data had quite a significant fraction of the variance in wages explained by interfirm data. (See Postel-Vinay and Robin in *Econometrica* (2002)).
But that data also seems to have ridiculously low variation in French wages (as measured by the coefficient of variation.
I should tell you that I do not understand the reasons for the low variation in the French data.
It seems to be very different from what we seem to see in American data.

Juhn, Murphy, Pierce looked at wage dispersion in the United States.
Unfortunately they did not have the firm-specific effect.
They find a standard deviation of log wages of .49 for males in 1988 *after adjusting* for years in labor force and education.
***Unadjusted* that variation is .59.**
Those are very *big wage* differentials.
With the *education and experience adjustment* it means that if you are just *one* standard deviation above the mean, you have a roughly 49 percent higher wage.
Correspondingly if you are one standard deviation *below the mean,* you have roughly 49 percent lower wage.
This occurs even after adjustment for years in labor force and years of education.

That suggests that the variation in wages is very large.
Such a wide wage distribution *suggests* that wages for the same person would be very different depending on whether they are lucky to have a high-paying employer.
It may also depend upon whether they are lucky with the wage that their employer has assigned them within the firm.

The implication of different wages in terms of theory is the following.
If there is one laborer who is receiving $20.00 per hour and, nearby, a seemingly identical laborer receiving $10.00 per hour we should conclude that for some reason or other the $20.00-per-hour employer could have obtained her labor for *less* than she is actually paying. *There is a question for economic theory why that should occur.*

Why should a firm *voluntarily* pay $20.00 per hour for its employees when it could hire these employees for $10.00 per hour?

Let me give you the simplest answer to the question why employers might want to pay more to their workers than necessary just to employ them.
That is the simplest efficiency wage model—due to Robert Solow.

ERASE BB

Suppose, for some reason, or other, how hard people work depends on their *real wage*. In other words, the effort that workers put in depends on their real wage:

$$e = e(\omega).$$

A firm owns one unit of capital and the output from that one unit of capital depends on the number of *labor efficiency units:*

$$q = f(e(\omega)l)$$ **NOTE: write l as script lower case L.**

where l is the number of workers hired.
The product e • l can be considered as labor adjusted for quality, or for effort.

In common terminology, labor *adjusted for quality* is called *effective labor.*
A unit of *effective labor* is called a labor efficiency unit.

The firm chooses the *real wage* ω and its labor l to maximize its profits.

SHIFT TO RHBB: only thing on RHBB

Profits are

$$\Pi = f(e(\omega)l) - \omega l$$

and the firm hires labor up to the point where

$$\partial\Pi/\partial l = 0$$ **RHBB same height as next line on LHBB**

So

(1) $$e(\omega)\, f'(e(\omega)l) = \omega.$$

And it will set the wage so that RHBB on next line down

$\partial \Pi / \partial \omega = 0$.

Now on LHBB.

$e'(\omega)\, l\, f'(e(\omega)l) - l = 0$.

We can re-write this as

(2) $e'(\omega)\, f'(e(\omega)l) = 1$.

Let's name this equation (2).

[ERASE equation between (1) and (2)].

BE SURE THAT (1) and (2) are labeled.

If we divide (2) by (1) we find

or

It says that the elasticity of effort with respect to the wage is *one.*
This condition determines the optimum wage ω*.

This condition—that the elasticity of effort with respect to the wage is *one*—is called the *Solow Condition.*

Let me give an intuitive explanation for this formula.

The wage ω* is the wage at which the firm pays the *lowest cost* for a unit of *effective* labor. In other words, the wage ω* is the wage at which the firm has the lowest cost for *quality adjusted labor.*

The firm could pay a *very low wage.* But *then* it would be losing money because its workers would not work hard at all.
Or, the firm could pay a very high wage.

In that case it would also lose money because it was paying too much in labor costs.

If the firm wants to maximize the units of effort per wage dollar it maximizes

or effort per wage dollar.

If this maximization has an internal (nonboundary) solution then that occurs where

And that occurs where the elasticity of effort with respect to the wage is *one.*

Now let's see if that yields involuntary unemployment.

The firm sets the wage ω at ω* determined by the Solow condition.

And then we determine the labor demand l* by the condition:

$$e(\omega^*)\, f'(e(\omega^*)l^*) = \omega^*.$$

This condition says that firms setting the real wage at ω* will then subsequently hire labor up to the point where the MRP is equal to the real wage.

The total demand is then

$$Kl^*,$$

where K is the capital stock.

We earlier had assumed that each firm owned one unit of the capital stock.

Unemployment is then

$$L - K\, l^*,$$

where L is the *supply* of labor.

If at the wage ω* more labor is supplied than demanded there will be unemployment.

All efficiency wage models are embellishments on this simple model by Solow.

The different embellishments mainly differ in the reasons why effective labor depends on the wage ω.

ERASE BB

This model leaves some questions – especially why unemployment would be some number between 0 and 15 %, rather than zero or some very high number.

In fact, unemployment, except in the worst times and places seldom exceeds 15 %.

❁❁❁❁❁

Let me now review the most popular efficiency wage model, by Carl Shapiro and Joseph Stiglitz.

In this model there is *positive* unemployment in the equilibrium.
We do not obtain some unpleasant corner solution, as was all too likely in the Solow model.

In this model it pays firms to set wages *above* the level where the labor market is clearing.
If firms did not set such high wages all workers would shirk because the *cost* of losing a job would not offset the *benefits* from shirking.

Let me be more specific.
Let's go over the Shapiro-Stiglitz model.
I will give you the assumptions.

1. The utility of a worker is:

$$u = w - e.$$

2. Firms have a production function:

$$q = f(e \bullet l).$$

3. Effort may be 0, or it may be $\bar{e}$.

[Note it may be hard to see the bar in $\bar{e}$, here and elsewhere.]

4. Workers may *shirk* and let e = 0,
or they may *work* and let e = $\bar{e}$.

A worker decides to *work* or to *shirk* dependent on whether she has more to gain by *working or shirking.*

At a given *unemployment* rate a worker has more to lose from being dismissed for shirking, the higher is the wage rate.

At a higher wage rate, ω, for a given unemployment rate, the worker has more to lose by shirking, if with some probability q she is caught and loses her job.

Above some *critical* level ω, sufficiently high, at a given unemployment rate u, the worker decides not to shirk.

Let's graph this.

wages

0 **1 employment rate**

Let's measure the employment rate on this axis. PUT IN 0, 1.

Then the unemployment rate can be measured in the reverse direction.

PUT IN 1, 0, in reverse.

An employment rate of 0 corresponds to an unemployment rate of 1.

Suppose the unemployment rate is u. MARK IT

Above* a critical wage ω, workers *will not shirk.

Below* this critical wage ω, workers will *shirk.

SHOW THIS ON GRAPH: MARK WITH AN X

At *lower* unemployment rates the critical wage at the boundary between *working* and *shirking* is higher.

Why?
Because at lower unemployment rates workers have less to lose if caught shirking and they are unemployed.
They have less to lose because they can quickly get another job.

Therefore, when unemployment is lower it takes higher wages to induce workers *not to shirk.*

Thus the *boundary* between *shirking* and *not shirking* rises as the unemployment rate falls.

ω

NSB = NonShirking Boundary

u=0

Now I want to note the following.

If the unemployment rate is u_0 [POINT TO u_0] firms find it optimal to pay just on the NonShirking Boundary.

POINT

If they pay a *higher* wage they lose money from paying a higher wage bill, but they get no additional effort.
If they pay *less* they get *no effort at all.*

The NSB yields the wages the firm will pay as a function of the unemployment rate.
But firms, given ω will hire labor up to the point where the marginal revenue product of labor equals the wage:

$\bar{e}\ f'(\bar{e}\ l) = \omega$.

Thus there is a demand for labor which increases as ω falls.
This demand increases as ω falls because the MP of labor is declining as firms hire more labor.

SHOW PICTURE

ω

NSB

ē f′ (ē l)

u=1 **u=0**

Where the two curves cross gives the equilibrium non-market-clearing unemployment rate.

The preceding description gives the Shapiro-Stiglitz model in a nutshell.

There is only one more detail to derive *more precisely.*

How do we get a *formula* for the NonShirking Boundary?
The Non Shirking Boundary gives the wage at which workers will just switch from *shirking* to *nonshirking.*

ERASE BB

Let me go over the model in more detail.

I will begin again with the assumptions.

TOP PANEL

1. A worker has utility

w - e

2. In the absence of being dismissed the worker leaves the firm with probability b.

3. If she shirks she has probability q of being *discovered* and *fired.*

LHS

Let V_E^S be the *expected* lifetime utility of a worker who is *employed* in the first period, and who shirks.

Let V_E^N be the *expected* lifetime utility of a worker who is *employed* in the first period, and who *does not shirk.*

Let V_U be the *expected* lifetime utility of a worker who is unemployed.

The nonshirking boundary is the lowest value of ω for which $V_E^N \geq V_E^S$.

BOTTOM of the 4 lines.

Let's see if we can calculate that value of the real wage ω.

Let me explain why. The logic occurs in three steps corresponding to each of the three terms.

(1) In the current period the *shirking* employed worker receives wage ω.

(2) in the next period the worker is unemployed with probability b + q with expected discounted utility from then on of V_U / (1+r).

b is the probability of quitting.
q is the probability of being caught shirking and being fired.

(3) and in the next period the worker is *employed* with probability 1 - b - q, with future utility

V_E^S / (1+r).

FOOTNOTE: I made a slight error. I should have written max (V_E^S, V_E^N). Since at the boundary $V_E^S = V_E^N$, this "mistake" makes no difference. END FN

Similarly,

The worker's utility if not shirking in the first period is $\omega - \bar{e}$.
Then with probability b she is unemployed in the next period with discounted expected future utility

$$V_U / (1+r).$$

And she is *employed* with probability (1 - b) with discounted future utility

$$V_E^N / (1+r).$$

FOOTNOTE: I made a slight error. I should have written max (V_E^S, V_E^N). Since at the boundary $V_E^S = V_E^N$, this "mistake" makes no difference. END FN

Let $\bar{w}$ be the unemployment benefit.
Unemployed workers receive $\bar{w}$.

where $\bar{w}$ is the unemployment benefit, and a(u) is the probability of transition from unemployment into employment.
a(u) is the probability an unemployed worker will find a job.

NOTE. V_E should be max (V_E^S, V_E^N). END NOTE

Now let's see how we would calculate the *lowest wage* at which workers are *just* willing to *work* rather than *shirk.*

$$V_E^N \geq V_E^S .$$

And since there is no advantage to the firm for paying in excess of the NonShirking Boundary

$$V_E^N = V_E^S .$$

NOTE: since $V_E^N = V_E^S$,

$$\max (V_E^N , V_E^S) = V_E^N = V_E^S = V_E.$$

All previous equations are OK.

END NOTE

We now have 4 linear equations with 4 unknowns:

ω, V_E^N, V_E^S, and V_U.

So we can determine ω as a function of the parameters

$\bar{e}$, a(u), b, r, q and $\bar{w}$.

We solve

There is just one slight problem left.
a is not exogenous.
We can now solve for a, which is the transition from unemployment into employment.
Let's solve for a as a function of the unemployment rate.

In equilibrium there are no shirkers. The flow out of employment is then bN, where N is the number of *employed* workers.

The *flow* out of unemployment is:

a(L - N) where

L is the total labor force
N is the number of employed workers.

And in steady state the unemployment rate is constant.

So the flow *in* is equal to the flow *out* of unemployment:

$$a(L - N) = b\,N$$

As a result

This is our answer.

This is the NonShirking Boundary.

From the formula you can see that as the unemployment rate approaches 0 the wage rate on the NSB approaches +∞.

So it was appropriate to draw the NSB as I did, approaching ∞ as u approached 0.

This guarantees an equilibrium will *not* have a zero unemployment rate.

There will be some *positive* equilibrium unemployment rate.
I am going to skip my criticisms of the Shapiro-Stiglitz model.
It is the model that best fits what you learn in micro theory.

I think that a model of unemployment based on fair wages fits the facts better.
It is also more sound theoretically since if people only have economic motives, superior mechanism design, such as paying people a bonus for not shirking at retirement will dominate incentive schemes as blunt as firing people who are caught shirking.

In addition, it deals with the fact that many employees are under very close observation.
If the principal really wants to observe what she can usually find out by asking other employees.
There are typically constraints also of fair dealing that also prevent her from undertaking such interrogations.

Fair-wage models of unemployment will also be consistent with the idea that *shoulds* play an important role in macroeconomics.
In this case unemployment is caused by people thinking that they *should* be paid a fair wage and that causes wages to be above market-clearing.

Be sure that everyone has section assignments.

Directions for presentations.

1. Prepare to talk for only five minutes. Just give the basic essential idea.

2. There will be no blackboard or slide projector so you will have to bring whatever you want to show us on a hand-out.

3. The Bowker Room is through the Kerr Dining Room, which is the main dining room and in the back. They are hard to find.

4. Note that this is the *Men's* Faculty Club, not the *Women's* Faculty Club.