Labor Demand 2

The Labor Demand Elasticity

- Why do we care about labor demand elasticity?
- Can be important for several policy applications and other important questions.
  - the effect of a minimum wage law.
  - what is the effect of immigration on wages of (substitute) native workers?
  - should a firm unionize? More inelastic demand curve, more likely to get gains from higher wages without sacrificing employment too much.

Empirical estimates of labor demand elasticity

- First generation estimates: estimating equation derived directly from specification of production function. Examples:

$$\ln L = \beta_0 + \beta_1 \ln w + \beta_2 \ln r + \beta_3 \ln K + \beta_4 \ln Q + u$$

  β_1 is the elasticity of labor demand.

- Data and measurement issues:
  - Which data to use: aggregate time-series data; across industries; across states; within an industry?
  - How to measure K? How to measure r?
  - How to deal with endogeneity?

More recent approaches

- Instead of estimating equations based on production functions, study specific episodes (possibly natural experiments) that make it possible to learn about the labor demand elasticity (e.g., exploiting shifts in the labor supply).
- Example 1: Overtime regulations in California. Imposes that workers must be paid 1.5 times the wage if they work more than 8 hours per day, even if they work less than 40 hours per week.
- Before 1980: applied only to women. After 1980: also men.
- Prediction: male employment in California will decline following passage of the law, relative to male employment in other states and relative to female employment.

TABLE 3-2 Employment Effects of Overtime Regulation in California

Source: Daniel S. Hamermesh and Stephen J. Trejo, "The Demand for Hours of Labor: Direct Estimates from California," *Review of Economics and Statistics* 82 (February 2000): 38–47.

	Treatment Group	Control Group	
	Men in California (%)	Men in Other States (%)	Women in California (%)
Workers working more than 8 hours per day in			
1973	17.1	20.1	4.0
1985	16.9	22.8	7.2
Difference	−0.2	2.7	3.2
Difference-in-differences	—	**−2.9**	**−3.4**

- Basic problem with many of first-generation studies: essentially regress quantities on prices, but the resulting estimates could be due to shifts in either labor demand or labor supply.

- We would like to make sure that labor demand curve is not shifting, changes coming only from labor supply.
- Acemoglu-Autor (JPE 2004): estimate demand for female labor by *instrumenting* the increase in female employment between 1939-1949 with the mobilization rate during WWII.
- Estimating equation:

$$\ln w_j = \beta_0 + \beta_1 \ln E_j + u_j$$

- IV estimate can be obtained as

$$\begin{aligned}\beta_{IV} &= \frac{Cov(Y,Z)}{Cov(X,Z)} = \frac{Cov(Y,Z)/V(Z)}{Cov(X,Z)/V(Z)} \\ &= \frac{\text{reduced form coefficient}}{\text{first stage coefficient}}.\end{aligned}$$

- First stage equation: regress endogenous variable on instrument:

$$\ln E_j = \gamma_0 + \gamma_1 Mobilization\ Rate_j + v_j$$

- Reduced form equation: regress dependent variable directly on the instrument:

$$\ln w_j = \delta_0 + \delta_1 Mobilization\ Rate_j + z_j$$

- Two stage least squares: replace actual change in employment with the predicted value from the first stage, and regress

$$\ln w_j = \beta_0 + \beta_1 \widehat{\ln E_j} + u_j$$

  where $\widehat{\ln E_j}$ is the predicted value from a regression of $\ln E_j$ on *Mobilization Rate* (and any other exogenous explanatory variables).

- The logic of 2SLS: use as explanatory variable the change in employment that is predicted exclusively by mobilization rate during WWII (presumably exogenous to labor market conditions).

- 2SLS more appropriate when there are many instruments.

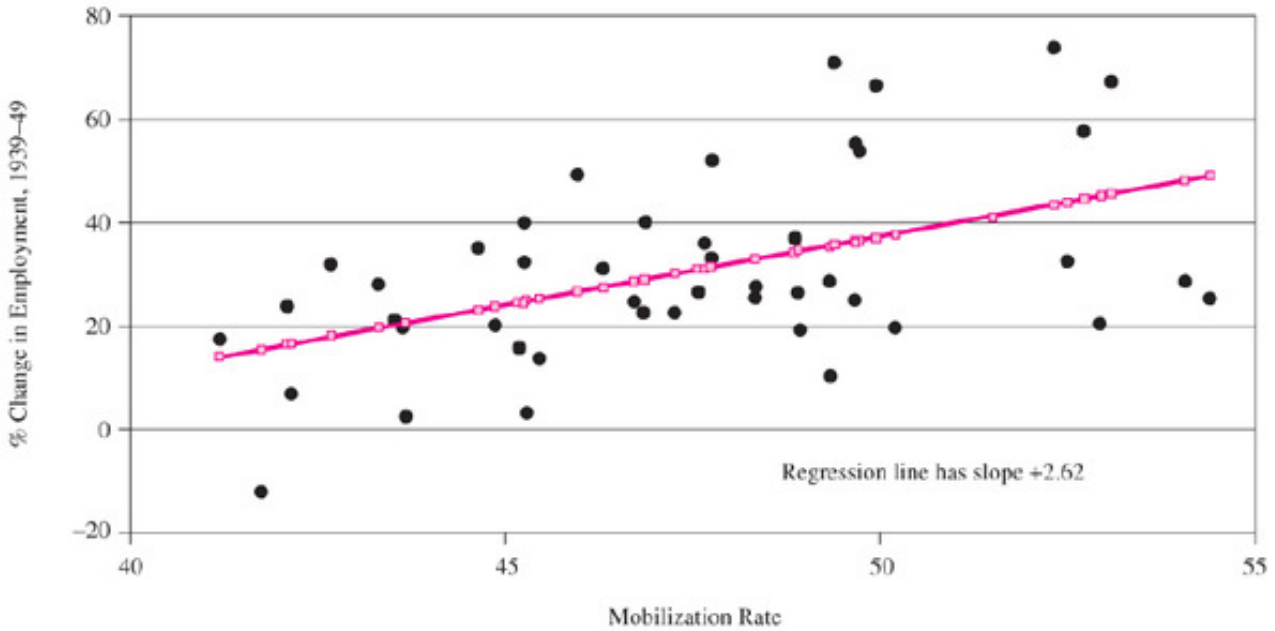
TABLE 3-4 **Mobilization Rate of Men and Changes in Female Wages and Employment, 1939–1949**

Source: Daron Acemoglu, David H. Autor, and David Lyle, "Women, War and Wages: The Effect of Female Labor Supply on the Wage Structure at Midcentury," *Journal of Political Economy* 112 (June 2004): 497–551. The mobilization rate gives the proportion of men aged 18–44 who served in the military between 1940 and 1945; the percent change in female employment gives the log change in the total number of nonfarm weeks worked by women aged 14–64; the percent change in the female wage gives the (deflated) change in the log weekly wage of women employed full time multiplied by 100.

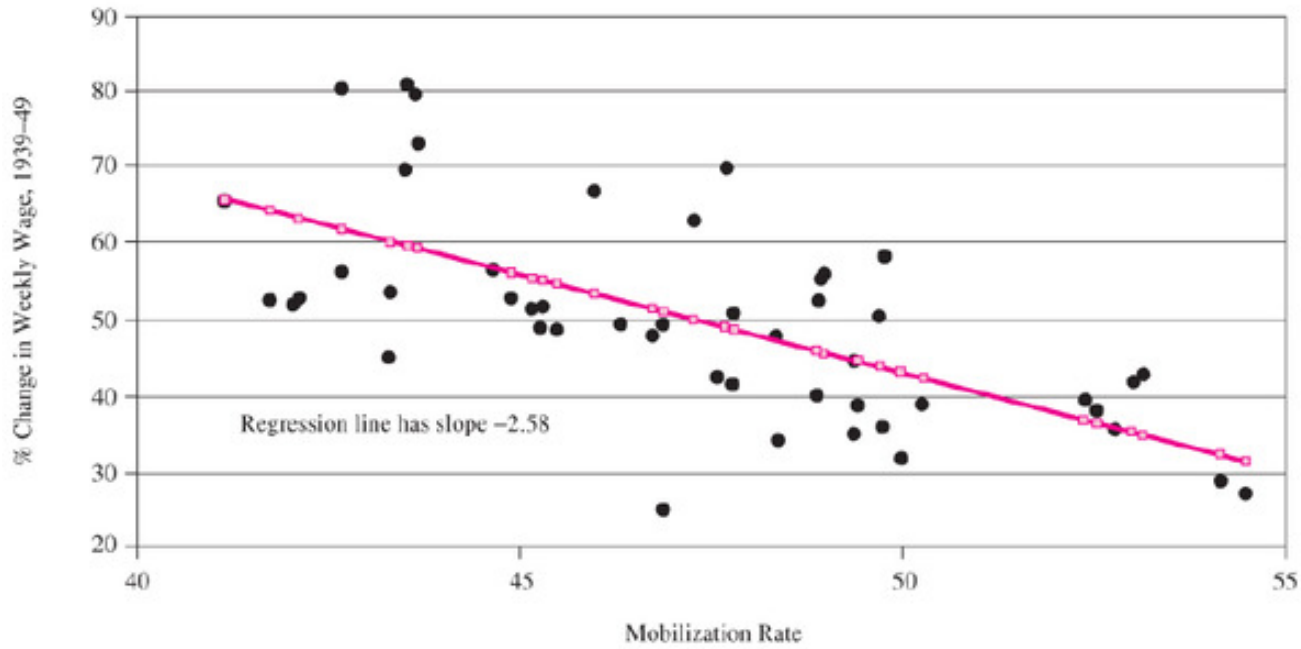
State	Mobilization Rate (%)	Change in Female Employment (%)	Change in Female Wage (%)	State	Mobilization Rate (%)	Change in Female Employment (%)	Change in Female Wage (%)
Alabama	43.6	20.3	81.0	New Jersey	49.7	24.3	35.7
Arkansas	43.6	19.2	79.5	New Mexico	47.8	51.1	50.6
Arizona	49.4	70.2	38.4	New York	48.4	24.9	33.7
California	50.0	65.7	31.3	North Carolina	42.1	23.3	51.6
Colorado	49.7	54.5	50.2	North Dakota	41.8	–12.5	51.8
Connecticut	49.4	27.9	34.5	Ohio	47.8	32.4	41.1
Delaware	46.9	39.4	24.6	Oklahoma	49.0	25.9	55.1
Florida	47.7	35.2	69.9	Oregon	53.1	66.5	42.3
Georgia	41.2	16.7	65.2	Pennsylvania	52.6	31.9	37.9
Idaho	49.8	53.3	58.1	Rhode Island	54.1	27.8	28.6
Illinois	47.6	26.2	42.0	South Carolina	42.7	31.1	80.0
Indiana	45.3	31.6	48.3	South Dakota	42.2	6.5	52.5
Iowa	45.3	2.9	51.2	Tennessee	44.9	19.5	52.4
Kansas	49.0	18.8	55.6	Texas	46.0	48.5	66.8
Kentucky	45.2	15.1	51.1	Utah	52.8	56.9	35.3
Louisiana	43.5	19.5	69.4	Vermont	47.3	21.9	62.6
Maine	50.3	19.1	38.4	Virginia	44.7	34.5	56.1
Maryland	46.9	22.1	48.9	Washington	52.4	72.8	39.2
Massachusetts	54.5	24.8	26.9	West Virginia	48.4	27.3	47.5
Michigan	45.3	39.1	48.6	Wisconsin	43.3	27.3	44.4
Minnesota	46.8	23.9	47.5	Wyoming	48.9	36.2	39.6
Mississippi	43.7	2.2	73.0				
Missouri	45.5	13.2	48.2				
Montana	49.4	10.1	44.2				
Nebraska	46.3	30.4	49.0				
New Hampshire	53.0	20.1	41.8				

FIGURE 3-24 **The Impact of Wartime Mobilization of Men on Female Labor Supply and Wages**

(*a*) Mobilization Rate and Changes in Female Employment, by State



(b) Mobilization Rate and Changes in Female Wages, by State



- First stage:

$$\ln E_j = -94.56 + 2.62 \ \textit{Mobilization Rate}_j$$

- Reduced form:

$$\ln w_j = 171.69 - 2.58 \ \textit{Mobilization Rate}_j$$

- Implied labor demand elasticity ≈ -1.

The Marshall-Hicks Laws of Demand

1. Labor demand function is more elastic the greater the elasticity of substitution.
2. Labor demand is more elastic the greater the elasticity of demand for output.
3. Labor demand is more elastic the greater labor's share in total costs.
4. Labor demand is more elastic the greater the supply elasticity of other factors of production.

1. Elasticity of substitution

- The labor demand function is more elastic the greater the elasticity of substitution.
- High σ implies that it is easier to substitute between L and K when the wage changes.
- For a given wage change, there will be a larger **substitution effect** the higher σ.

2. Elasticity of product demand

- Labor demand is more elastic the greater the elasticity of demand for output.
- Higher elasticity of product demand means that a given change in production costs (and then in product price) will lead to larger changes in demand for output.
- The larger the elasticity of product demand, the larger the **scale effect**.

3. Labor share in total costs

- Labor demand is more elastic the greater labor's share in total costs.
- The larger the share of labor in total costs (think of an industry where production is very labor intensive), the more likely it is that a given change in the wage will lead to a large increase in production cost, lowering demand for the product.
- Therefore, the share of labor in total costs, the larger the **scale effect.**

4. The elasticity of supply of other factors

- Labor demand is more elastic the greater the supply elasticity of other factors of production.
- The higher the elasticity of supply of capital (the flatter the supply curve), the easier it is to substitute between labor and capital without the price of capital increasing.
- The higher the elasticity of supply of other factors, the larger the **substitution effect.**