1 Elasticities

In the p-comp price-taking world, market-level supply and demand elasticities drive comparative statics.

Suppose there is one type of labor; demand for it is \( D(w) \), with derivative \( D'(w) \) and that homogeneous labor is supplied by natives according to \( S_1(w) \).

- The elasticity of demand is
  \[
  \eta = \frac{dL(w)}{dw} \frac{D'(w)w}{L} < 0
  \]

- We similarly define the elasticity of (native) labor supply
  \[
  \varepsilon = \frac{S'_1(L)w}{L} > 0
  \]

Recall that these describe movements along supply and demand curves.

2 Market structure

Johnson (1980) assumes that wages and employment of low-skill natives are determined by equilibrium in a perfectly competitive factor market.

- \( n_1 \) identical (low-skilled) natives supply this much labor:
  \[
  L_1 = S_1(w) = n_1 h(w),
  \]
  where \( h(w) \) is per-capita hours worked (normalized to vary from 0 to 1)

- Firms demand \( D(w) \) low-skill workers

- Without immigration, equilibrium wages \( (w^*) \) and employment \( (L_1^*) \) in the low-skill labor market satisfy:
  \[
  L_1^* = n_1 h(w^*) = D(w^*)
  \]
3 Shocking Immigration

Look out! 40,000 Canadian economists with H1Bs are a comin’ down I-93 . . .

- These $n_2$ immigrant economists supply labor inelastically (just happy to be here, *mon ami*! will run regressions for food)

- New equilibrium

$$n_1 h(w^*) + n_2 = D(w^*)$$  \hspace{1cm} (2)

- what’s the key economic assumption here (besides p-comp)?

- We now ask:

  1. What’s the diff between the with-immigrants equilibrium and the no-immigrant equilibrium?
  2. What parameters does the effect of immigration on equilibrium outcomes depend on?

- *Comparative Statics* is how we find answers: Totally differentiate the equilibrium conditions, and solve for the change in equilibrium outcomes with respect to a change in the exogenous variable of interest. In this case, we want to know

$$\frac{dw^*}{dn_2} = ?$$  \hspace{1cm} (3)

$$\frac{dL_1^*}{dn_2} = ?$$  \hspace{1cm} (4)

- Write the solution as a function of things that look good in Greek

**Details**

Totally differentiate (2) to find

$$D'(w)dw = n_1 h'(w)dw + h(w)dn_1 + dn_2$$

Assume $dn_1 = 0$, so

$$D'(w)dw = n_1 h'(w)dw + dn_2$$

Divide by $D(w)$, multiply by $\frac{n_1}{w}, \frac{n_2}{n_2}$, as needed to get:

$$
\left[ \frac{D'(w)w}{D(w)} \right] \left[ \frac{dw}{w} \right] = \left[ \frac{n_1 h'(w)w}{S_1(w)} \right] \left[ \frac{1}{w} \right] + \left[ \frac{dn_2}{n_2} \right] \left[ \frac{n_2}{D(w)} \right]
$$

where

$$\frac{n_2}{D(w)}, \text{ the immigrant share}$$
This produces the first comparative statics result:

$$\frac{d \ln w}{d \ln n_2} = \frac{\varepsilon(1 - \varepsilon)}{\eta \varepsilon} < 0$$ (5)

To get the employment effect, we differentiate (1):

$$dL_1 = S'_1(w)dw$$

or, in elasticity terms

$$\frac{dL_1}{L_1} = \frac{S'_1(w)w}{S_1(w)} \left( \frac{dw}{w} \right)$$

Using (5), we get the second comparative statics result

$$\frac{d \ln L_1}{d \ln n_2} = \frac{\varepsilon \phi}{\eta \varepsilon(1 - \varepsilon)} < 0$$

Here, however, it’s useful to work in levels instead of logs:

$$\frac{dL_1}{dn_2} = \left[ \frac{d \ln L_1}{d \ln n_2} \right] \left( \frac{L_1}{n_2} \right) = \frac{\varepsilon(1 - \varepsilon)}{\eta \varepsilon(1 - \varepsilon)}$$ (6)

This bodies-to-bodies equation answers the question: *When 100 immigrants arrive, how many natives lose their jobs?*

- Jobs are lost indeed, but less than 1:1 (see Johnson 1980, Table 1)

**Discussion questions**

1. What do wage declines depend on?
2. What do job losses depend on?
3. When are job losses at the extremes?

**4 Key Assumptions**

- Immigrants and natives are perfect substitutes
- Immigrant labor supply is inelastic
- Immigrants have no capital
- Immigrants don’t buy or make anything that matters for native labor demand

What can we say about a more realistic world, where immigration raises employment for some natives? DRAW THIS!
TABLE 1. Employment Reduction of Domestic Low-Skilled Workers Caused by Additional 100 Employed Immigrants for Selected Values of $\varepsilon$, $\eta$, and $\mu$.\textsuperscript{a}

<table>
<thead>
<tr>
<th>$\mu$ = 0</th>
<th>$\mu$ = 0.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\varepsilon = 0.2$</td>
<td>$\varepsilon = 0.5$</td>
</tr>
<tr>
<td>$\eta = 0.5$</td>
<td>29</td>
</tr>
<tr>
<td>$\eta = 1$</td>
<td>17</td>
</tr>
<tr>
<td>$\eta = 1.5$</td>
<td>12</td>
</tr>
</tbody>
</table>

\textsuperscript{a} $\varepsilon$ = supply elasticity, $\eta$ = demand elasticity, and $\mu$ = proportion of low-skilled labor force composed of immigrants.

Fluenced by changes in their relative wages and relative population shares. This, as I have argued elsewhere,\textsuperscript{a} leads to the conclusion that the frictional unemployment model is the most accurate analytical description of most labor markets in the United States. There are two groups, however, for which the data are not consistent with this interpretation: minority youth and persons eligible for income-transfer programs. There may well be significant amounts of structural unemployment among minority youth and induced unemployment among certain components of the adult low-skilled population.

To see how quantitatively important the labor market displacement effect might be, I calculated values of $\beta$ for a range of alternative values of $\varepsilon$, $\eta$, and $\mu$. These are reported in Table 1. Estimates of particular demand elasticities range from about 1 up to very high values, with a midpoint of about 1.5.\textsuperscript{9} Most recent estimates of the uncompensated labor supply elasticity of the poor adult population range from zero to 0.2,\textsuperscript{10} but I include larger values in the range to reflect more pessimistic assumptions. The calculated values of $\beta$ around the range that I believe is most plausible ($\varepsilon = 0.2$ and $\eta = 1.5$) imply a labor market displacement effect that is only around 10 percent. One has to make very extreme assumptions about the demand and supply elasticities (that the former is very small and the latter very large) in order to obtain displacement rates as large as 50 percent.

**Distributional Implications of Immigration**

The immigration of additional low-skilled labor into any country has several effects on the distribution of income, knowledge of which is necessary to understand the politics of immigration. I will analyze these for the longer-run situation, the period in which wages and aggregate demand policy have adjusted so that the aggregate and potential output are equal. Subsequently I will discuss the very long run in which immigration causes adjustments in the capital stock and the skill distribution of the domestic population.

**Impact on Gross Earnings.** The prior analysis of the employment effects of increased immigration was based on the implicit assumption that the other factors of production—high-skilled labor ($E_2$) and capital ($K$)—are both fully employed and inelastically supplied. Here I will assume further

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\textsuperscript{10}For an excellent survey of recent approaches to this problem, see Daniel S. Hamermesh and James Grant, "Econometric Studies of Labor-Labor Substitution and Their Implications for Policy," *Journal of Human Resources*, forthcoming.
