Labor Demand: Lecture 8

Empirical Evidence of Effects of Immigration, continued

Today we pick up where we left off on our discussion of the effects of immigration on labor supply and wages of natives. Recent immigration in the U.S. is concentrated in certain occupations, particularly low skilled occupations and agricultural work.

Please see Table 4.1: Percentage Distribution of Immigrants and Natives by Educational Attainment, United States and California.
In Smith, James P., and Barry Edmonston, eds. The New Americans: Economic, Demographic, and Fiscal Effects of Immigration. Panell on the Demographic and Economic Impacts of Immigration, National Research Council, 1997. Available online at: http://www.nap.edu/catalog/5779.html

Consider the model, where closed economy c produces one output:

$$Y_c = F(K_c, L_c)$$

$$L_c = \left[\sum_j (e_{jc} N_{jc})^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}$$

σ is the elasticity of substitution between occupation groups. e_{jc} is a city-occupation augmentation factor. Since wage is equal to marginal value product in equilibrium,

$$w_{jc} = q \frac{1}{\sigma-1} F_{L_c} L_c^{\frac{1}{\sigma}} \frac{\sigma-1}{\sigma} N^{\frac{-1}{\sigma}}_{jc} e^{\frac{\sigma-1}{\sigma}}_{jc}$$

rearranging:

$$\log N_{jc} = \theta_c + (\sigma-1)\log e_{jc} - \sigma \log w_{jc}$$

This is not a proper labor demand function, because we have not solved for F_{L_c}. Nevertheless, we've expressed employment as a function of city effects, city/occupation effects, and wages.

Define total number of workers in city c as N_c

Solve for $\log w_{jc}$ and add and subtract $\log N_c$:

$$\log w_{jc} = \frac{1}{\sigma}(\theta_c - \log N_c) + \frac{(\sigma-1)}{\sigma}\log e_{jc} - \frac{1}{\sigma}\log(\frac{N_{jc}}{N_c})$$

Define the city-skill augmentation factor as: $\log e_{jc} = e_j + e_c + e_{jc}$

$$\log w_{jc} = u_j + u_c + d_1 \log f_{jc} + u_{jc},$$

where f_{jc} is the fraction of workers in city c in occupation (or skill group) j.

For employment, define:

P_{jc} the number of people in city c, occupation j (labor force)

P_c the number of people in city c

Labor supply depends on wages: $\log(\dfrac{N_{jc}}{P_{jc}}) = \varepsilon \log w_{jc}$,

So ε is the elasticity of labor supply (in our static model). Subbing in:

$$\log(N_{jc}/P_{jc}) = \frac{\varepsilon}{\varepsilon+\sigma}\left[(\theta_c - \log P_c) + (\sigma-1)\log e_{jc} - \log(\frac{P_{jc}}{P_c})\right], \text{ or}$$

$$\log(\frac{N_{jc}}{P_{jc}}) = v_j + v_c - \left(\frac{\varepsilon}{\varepsilon+\sigma}\right)\log f'_{jc} + v_{jc}$$

$$\log w_{jc} = \frac{1}{\varepsilon+\sigma}\left[(\theta_c - \log P_c) + (\sigma-1)\log e_{jc} - \log(\frac{P_{jc}}{P_c})\right]$$

$$\log w_{jc} = u_j + u_c - \left(\frac{1}{\varepsilon+\sigma}\right)\log f'_{jc} + u_{jc}$$

Note, we have not mentioned immigration in the model yet. But consider two skill groups: skilled and unskilled. Suppose immigration leads to an increase in the population of unskilled labor. Implicitly, this assumes immigrants and unskilled natives are perfect substitutes. To the extent that this is not true, the implied increase in the population of unskilled labor is less, and the implied effect is less.

The model predicts a decrease in wages if the elasticity of labor supply or the elasticity of substitution are not infinite (similar to the Johnson model). Ignoring demand (as this model does), an increase in

the unskilled labor allows firms to lower the wage and still hire the same number to produce the same output. How much of a decrease depends on how sensitive the current native workers are to that change.

If unskilled labor is a substitute for other inputs in production, firms can take advantage of lower wages for unskilled workers also by substituting the use of other inputs and using more unskilled labor. The more unskilled labor is a substitute for other inputs, the more unskilled workers demanded, putting pressure to drop the wage by less.

Native unskilled labor employment only changes from immigration to the extent that immigration affects wages.

A number of papers define j simply in terms of 2 groups: skilled and unskilled. The main empirical approach therefore is to regress wages and unemployment levels of unskilled natives at the city level on the city immigration level:

$$\log y_{cn} = X_{cn}\beta + f_c\delta + e_{cn} \text{ (cross section)}$$

(note: most studies switch to using f instead of logf to ease interpretation).

We can't use city fixed effects because f is measured across only one or two skill groups. Even if f is the fraction of unskilled immigrants, we can't include the skilled worker observations becase $f_{c,unskilled} = 1 - f_{c,skilled}$

$$\Delta \log y_{cn} = \Delta X_{cn}\beta + \Delta f_c\delta + \Delta e_{cn} \text{ (first difference)}$$

e.g. Altonji and Card (1991), Butcher and Card (1991), LaLonde and Topel (1991), Schoeni (1997).

The main advantage with the first difference analysis is that it eliminates bias from not including time invariant city specific fixed effects. Transitory effects (associated with transitory fluctuation in the

demand for the output of specific cities remain). Altonji and Card suggest instrumenting with the initial period level of immigration.

Note, if short and long run differences exist, the first difference approach measures more short run effects.

<Altonji and Card, Table 7>

The general conclusion with this approach has been that immigration has had little or no significant negative effect on native wages and employment.

Main concerns with this approach: 1) the possibility that mobility offsets immigrant inflows
2) the possibility of remaining downward bias from local demand shocks

Card, defines skill groups as occupations. This allows him to include city fixed effects in the cross sectional regressions. Also, grouping by occupation allows for more specific labor supply increase, and may allow more precision in estimation, and more useful variation.

$$\log w_{jc} = u_j + u_c + d_1 (\frac{P_{jc}}{P_c}) + u_{jc}$$

$$\log (\frac{N_{jc}}{P_{jc}}) = v_j + v_c + d_2 (\frac{P_{jc}}{P_c}) + v_{jc}$$

Data:
1990 U.S. Census
16-68 year olds, no students
175 largest MSA's
6 occupation groups

(N = 175 x 6)

Question: how to measure P_{cj}? City-occupation specific labor force.

Approach: At the country level, for the sample working, estimate

$$\Pr(occ = j)_i = X_i\beta + e_i$$

(multi-nomial logit). X includes race, education, age, marital status, ethnicity, and city.

Use prediction equation to estimate probability of being in occupation j for entire sample (even those not working). P_{cj} is the sum of the probabilities:

$$P_{cj} = \sum_{i \in c} \hat{\pi}_{ji}$$

Cities with more immigrants, individuals with less education, will have higher P_{cj} for low skill occupations.

Finally, Card instruments the city occupation labor supply, $\dfrac{P_{cj}}{P_{jc}}$, using the predicted change due to predicted increase in immigrant labor supply:

$$SP_{jc} = \sum_g M_g \lambda_{cg} \tau_{jg}$$

M_g is the country-wide total immigrant inflow of ethnic group g, between 85 and 90.

λ_{cg} is the fraction of pre 85 immigrants of ethnic group c in city c

τ_{jg} is the country wide fraction of 85-90 immigrants in ethnic group g in occupation j

City specific variation in SP_{jc} arises only from a variable that is measured before 85. Thus, SP_{jc} is independent of any city specific demand shock between 85 and 90 that would have led to differences in immigration composition.

Table 6 and 7 show results with and without IV

Note, first stage not shown, but T-stat from regressing $\log \dfrac{P_{cj}}{P_{jc}}$ on SP_{jc} is about 5.

Even though the analysis is at the occupation/city level, the LATE is the effect of wages and employment from an increase in the city-occupation labor force due to immigration between 85 and 90.

Approach generates more precise results, but conclusion that immigration effects on labor market are small remains.

Concern about mobility remains. Card tries to address this by actually measuring population inflows and outflows of cities, in response to city specific immigration. The census provides information on location 5 years ago. Can use to calculate city-occupation population inflows and outflows.

$$\frac{N_{90,cj}}{N_{85,cj}} = Z_{jc}\beta + \gamma R_{jc} + d_j + \theta_c + e_{jc}$$

Figure 1 and Table 4.

y_{jc} is component of population growth for occupation group j in city c

Borjas: The demand curve is downward sloping

Borjas takes the mobility concern seriously. He argues strong forces exist to equalize economic conditions across cities. (Note, see Schoeni who takes Altonji and Card and adjusts for cost of living by city).

Borjas' approach is analogous to Card's, but uses variation by experience and education group rather than city, to measure impacts of immigration at the national level.

Output is time specific, rather than city specific:

$$Y_t = F(K_t, L_t)$$

$$L_t = \left[\sum_s (e_{st} N_{st})^{\frac{\sigma_E - 1}{\sigma_E}} \right]^{\frac{\sigma_E}{\sigma_E - 1}},$$

like before. N_{st} is now the number of workers with education s at time t, and σ_E is the eslaticity of substitution across these education groups. Borjas normalizes the skill augmentation factors to sum to one:

Now he goes one step further to allow for workers with same education but different experience not to be perfect substitutes:

$$N_{st} = \left[\sum_x (\alpha_{xs} N_{xst})^{\frac{\sigma_X - 1}{\sigma_X}} \right]^{\frac{\sigma_X}{\sigma_X - 1}},$$

N_{xst} are the number of workers in education group s and experience group x at time t, and σ_X is the elasticity of substitution across experience classes, within an education group.

Like before, set the MP = w to get the wage equation

$$w_{xst} = F_{L_t} L_t^{-1} e_{st} N_{st}^{\frac{\sigma_E - 1}{\sigma_E}} \alpha_{xs} N_{xst}^{\frac{-1}{\sigma_X}}$$

(*) $\log w_{xst} = u_t + u_{st} + u_{xt} - \dfrac{1}{\sigma_X} \log N_{xst} + u_{xst}$

Borjas' main analysis estimates a slightly different model:

$$\log w_{xst} = e_t + e_{st} + e_{xt} + \beta \log \frac{M_{ijt}}{M_{ijt} + N'_{xst}} + e_{xst}$$

Which is similar to what Card estimates. To get back to the elasticity, define

$$\log w_{xst} = v_t + v_{st} + v_{xt} + \beta \frac{M_{ijt}}{N'_{xst}} + v_{xst}, \text{ where}$$

$m_{tsx} = \dfrac{M_{ijt}}{N'_{xst}}$ is the percentage increase in the group's labor supply due to immigration.

Be careful to note whether elasticites are being measured (not here) or whether the studies are comparable.

Since $\dfrac{d \log w_{xst}}{d \log(\frac{M_{ijt}}{M_{ijt} + N'_{xst}})} = \dfrac{d \log w_{xst}}{d \log(\frac{m_{ijt}}{1 + m_{xst}})} = \dfrac{d \log w_{xst}}{dm} \dfrac{1}{(1 + m_{xst})^2}$,

So we can divide Borjas' coefficient by $(1 + m_{xst})^2$ to get $\dfrac{d \log w_{xst}}{dm_{xst}}$.

Borjas uses m = .168, the fraction of immigrants in the labor force in 2000, for the comparison.

Note, comparison between Card and Borjas is made difficult by Borjas using education-experience shares, and Card using occupation shares.

Table 3

Table 4

Table 5: Main point, estimates much different whether defining economies at the state level versus the national level. Implied effect from a 10 percent increase in the flow if immigration on wages is 1.3 percent fall when a state's geographic boundary is used, and a 4-6 percent fall when considering the national market.

For a really good overview of the economics of immigration in the United States, you are recommended to take a look at 'The New Americas,' National Research Council. The book can be read on consulted quickly online at:

http://www.nap.edu/books/0309063566/html/