

Appendix A: Estimating migration due to labor market conditions

Following Gallin's *Net Migration and State Labor Market Dynamics* (2004), we estimate the role of labor market prospects on migration decisions.

Most standard models of an individual's migration decisions include differences across regions—which can be composed of things like wages, tax rates, and amenities—the one-time cost of migrating to that region (0 if they stay in the same region), heterogeneous preferences (which account for movements that do not adhere to the elements above), and expectations about the future.

Due to the endogeneity of migration and labor market outcomes, the study instruments for labor market outcomes with a measure of the effects of oil prices on state sectorial employment growth. This is a valid instrument because oil is a global commodity, and any individual state has very little control over the price of oil.

The model is as follows:

$$Mig_{it} = \beta_0 + \beta_1 \hat{v}_{it} + \beta_2 \widehat{Mig}_{t+1,i} + Year_t + state_i + \epsilon_{it}$$

Where \hat{v}_{it} is a vector of labor market variables, such as log wages and unemployment. The regression also includes year and state fixed effects.

The first stage of the regression is estimated as such:

$$\begin{aligned} Endogenous_{it} \\ = \beta_0 + \beta_1 Oil_{it} + \beta_2 Growth_{it} + \beta_3 Oil_{t-1,i} + \beta_4 Growth_{t-1,i} + Year_t + state_i \\ + \epsilon_{it} \end{aligned}$$

Where $Endogenous_{it}$ is the labor market variable of interest (*wages or unemployment*). We replicate the results found in the original paper. A one standard deviation increase in log wages is associated with a one standard deviation increase in net migration. Conversely, a one standard deviation increase in unemployment is associated with a one standard deviation decrease in net migration.

Neighbor-States Specification:

Gallin's study doesn't include any elements of migration cost in the model. All else equal, when costs of migration are lower between two regions, individuals will respond more sharply to changes in labor market conditions. Assuming geographic distance is associated with increased cost, we would expect state migration rates to be heavily influenced by their neighbors' labor market outcomes.

In order to best understand Illinois' migration problem, we formulate an alternative regression format where each observation is paired with its neighbor states.¹

The preferred regression form for the neighbor states specification is:

$$Mig_{ijt} = \beta_0 + \beta_1 \widehat{\Delta v}_{ijt} + \beta_2 \widehat{\Delta Mig}_{t+1,ij} + Year_t + state_i + state_j + \epsilon_{it}$$

Where i is the state of interest, and j is the neighboring state of i . Δ -values are the differences in neighbor state outcomes. The sample consists of two observations per border pair per year.

The first stage is run as:

$$\begin{aligned} \Delta Endogenous_{ijt} \\ = \beta_0 + \beta_1 Oil_{it} + \beta_2 Growth_{it} + \beta_3 Oil_{t-1,i} + \beta_4 Growth_{t-1,i} + \beta_1 Oil_{jt} \\ + \beta_2 Growth_{jt} + \beta_3 Oil_{t-1,j} + \beta_4 Growth_{t-1,j} + Year_t + state_i + state_j + \epsilon_{it} \end{aligned}$$

We find some evidence that labor outcomes of neighbor states are more important than those in other parts of the country. We also find that the tax burden, as measured by the amount of direct government expenditures per person and how efficiently a state spends money given their tax revenue, are significant in this format. It seems that smaller and more efficient governments attract more people.

Imputations

We then use the results of our model to estimate the extent with which Illinois's migration problem was caused by its labor market performance. We take the year of 2006 and use it as our counterfactual, meaning our projections of employment loss due to worsening labor market conditions is as compared to Illinois's labor market condition relative to that of the United States as a whole in 2006.

Our model varies year by year only due to changes in labor market conditions, so any differences in the predictions of the model by year can be attributed solely to changing labor market conditions. The estimated role of Illinois's labor market on migration is sizable. Out of the 438,000 residents that left the state from 2007-2015, we estimate that approximately 251,000 of those were due to declining labor market conditions.

¹ Regressions are clustered by state and year so that the number of clusters in this specification is the same as the number of observations in the previous regression.