

# **Put on ICE? Effects of Immigration Raids in the Animal Slaughtering and Processing Industry**

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## **Online Appendix**

Our descriptions and counts of raids and arrests in the animal slaughtering and processing industry are based on coverage of immigration enforcement actions in major U.S. newspapers. Specifically, we searched Factiva.com, a comprehensive news resource from Dow Jones, for all articles in the top 15 circulating U.S. newspapers that included any of the following terms during the period 2004 to 2016: Immigration and Customs Enforcement or ICE; audit, inspect, raid, sweep, crackdown, enforcement surge, workplace enforcement, worksite enforcement; workplace, worksite, employer, company, companies, work place, worksite; undocumented or illegal and worker, immigrant, immigration, alien, hire, or employee. Bruno (2015) reports a count of administrative arrests in worksite enforcement operations by fiscal year that serves as our denominator for calculating the share of administrative arrests that occurred in the animal slaughtering and processing industry during fiscal year 2007.

### **Data and Methods**

*Current Population Survey:* Our CPS sample is all people currently employed in the private sector who have at most completed high school. We exclude workers who do not report an industry or who work for the government/military.

We categorize non-naturalized immigrants as likely refugees (or asylees) based on their year of entry and country of birth as reported in the CPS. Following Bollinger and Hagstrom (2008, 2011), we categorize non-naturalized immigrants as refugees if at least half of people receiving legal permanent residence in their country-of-birth-by-period-of-entry cohort were refugees or asylees, according to INS/DHS data.

We categorize non-naturalized immigrants as likely Temporary Protected Status (TPS) holders based on their reported year of entry and country of birth and whether TPS was in place in a given year for immigrants from that country-by-period-of-entry cohort. See Wilson (2021) for details about the TPS program and Orrenius and Zavodny (2015) for discussion of the effects of the program on labor supply.

We categorize non-naturalized immigrants as likely beneficiaries of the 1986 Immigration Reform and Control Act (IRCA) or 1997 Nicaraguan Adjustment and Central American Relief Act (NACARA) legalization programs if they report entering the U.S. before 1982 for IRCA or 1990 (and from an eligible country: El Salvador, Guatemala, Nicaragua, and the USSR/Soviet Bloc) for NACARA.

All other non-naturalized immigrants are categorized as likely unauthorized immigrants. Again, our sample is limited to private-sector workers who have at most a high school diploma.

The CPS data are from IPUMS (Flood et al. 2021). We use person weights throughout the analysis.

*Quarterly Workforce Indicators:* We collapse state-level data on employment, hires, and separations for all states with data available for the animal slaughtering and processing industry and the private sector as a whole for each quarter from the fourth quarter of 2003 through the second quarter of 2016; this results in AK, AZ, DC, and MA being excluded from the sample. We seasonally adjust the data. We create hiring and separations rates as the sum across states of all hires or separations divided by the sum across states of the average of beginning-of-quarter and end-of-quarter employment. The data are from <https://lehd.ces.census.gov/data/#qwi>.

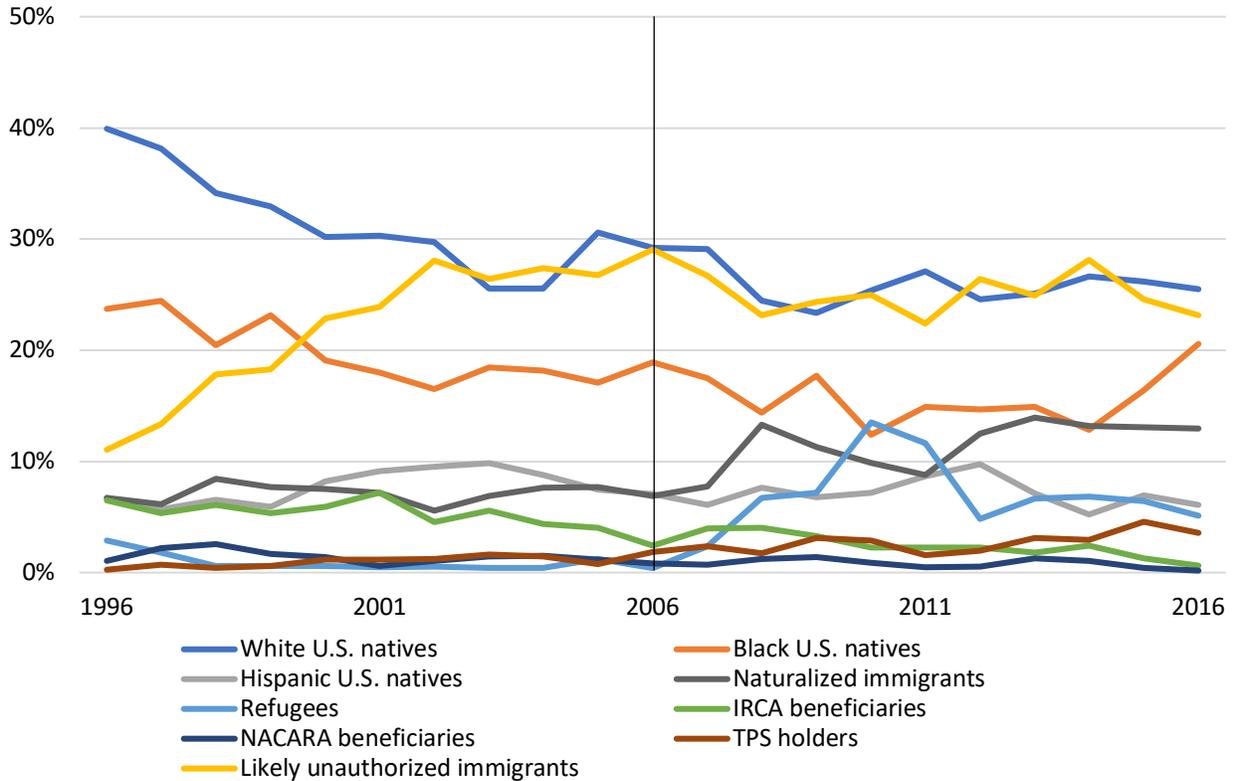
*BLS data on hourly compensation and labor productivity:* We use annual data on hourly compensation and labor productivity for the animal slaughtering and processing sector and the private sector as a whole for 1996 to 2016. Each data series is reported as an index (with 2007 = 100), so we examine growth rates rather than levels. The data are from <https://www.bls.gov/lpc/>.

When estimating the dynamic treatment effects models, we combine (or “bin”) the endpoints and do not show them in the figures. The period before the event is the omitted (baseline) period in the event study models.

## Results

Appendix Figure 1 shows the distribution of less-educated workers in the meat- and poultry-processing sector across the demographic groups we examine, by year. We focus on post-2006 trends. There is a noticeable increase in the share of workers in the industry who are refugees after 2006 (shown in light blue). There is also an increase in the share of workers who are naturalized immigrants (darker gray). Those increases are offset by decreases in the share of workers who are likely unauthorized immigrants (yellow), white non-Hispanic U.S. natives (the highest initial share, in medium blue), and Black non-Hispanic U.S. natives (orange). The decreases for white and Black U.S. natives are continuations of ongoing negative trends; the decrease for likely unauthorized immigrants is a reversal in the trend. We also observe a decline in the share who are IRCA beneficiaries (green), which may be due in part to those workers reaching retirement age or becoming naturalized U.S. citizens. Such concerns about changes in labor force composition motivate our focus in the paper on the share of workers in a demographic group who are employed in the sector rather than on the share of workers in the sector who are in a demographic group.

**Appendix Figure 1: Distribution of Less-Educated Meat and Poultry Plant Workers across Groups, 1996-2016**



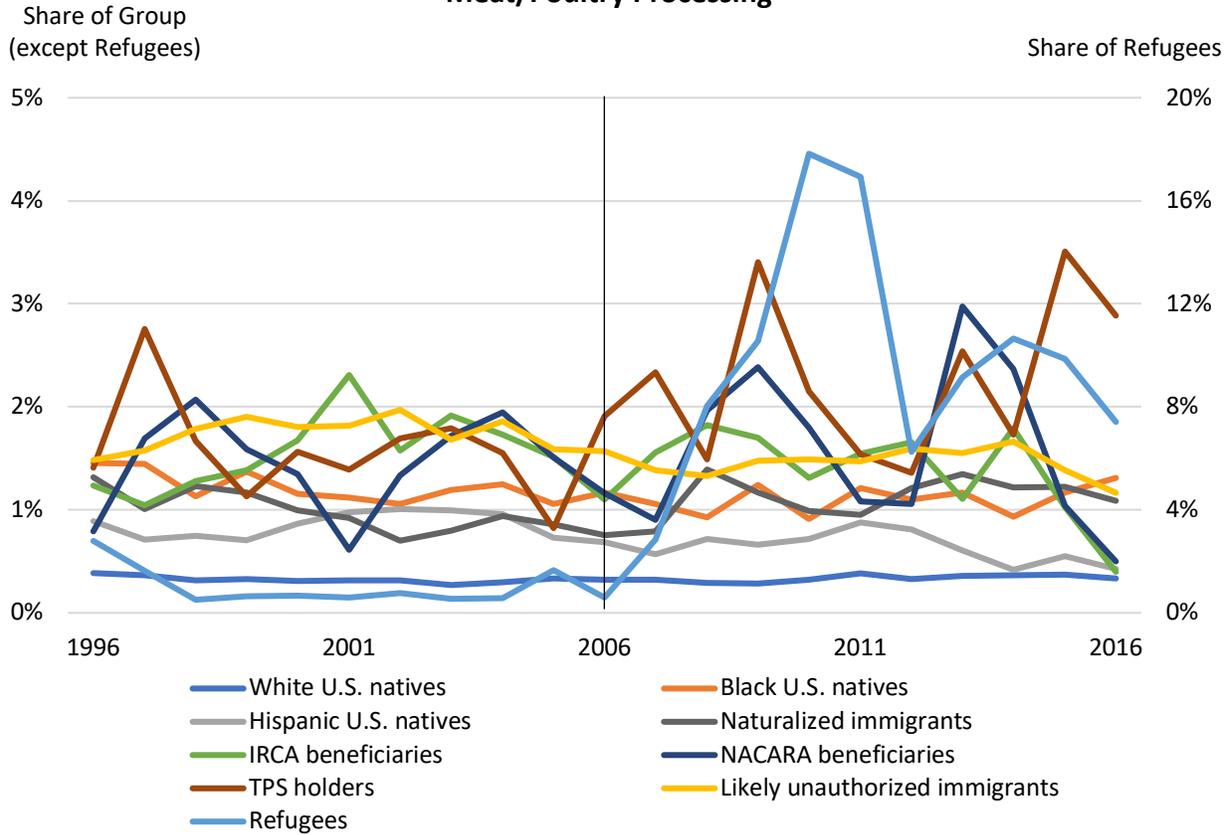
Note: Calculations based on CPS data.

Appendix Figure 2 shows the share of less-educated workers in each demographic group who are employed in the meat- and poultry-processing sector. These shares underlie the dynamic treatment effects analysis we report in the paper.

The most dramatic change is among refugees, so much so that their share in the sector is measured on the right-hand vertical axis. The share of refugees (lighter blue line) working in the industry increases dramatically between 2006 and 2010. The shares of TPS holders (brown line) and NACARA beneficiaries (dark blue) working in the industry are more volatile, which is not surprising given the smaller sizes of these groups, but appear to generally increase after 2006. The share of naturalized immigrants (darker gray) also tends to be higher after 2006. The share of likely unauthorized immigrants (yellow) working in the sector appears to fall, but the decline starts as early as 2005, before the raids began in earnest. The share of white non-Hispanic U.S. natives (medium blue) employed in the industry – the control group in the event

studies – is virtually unchanged.

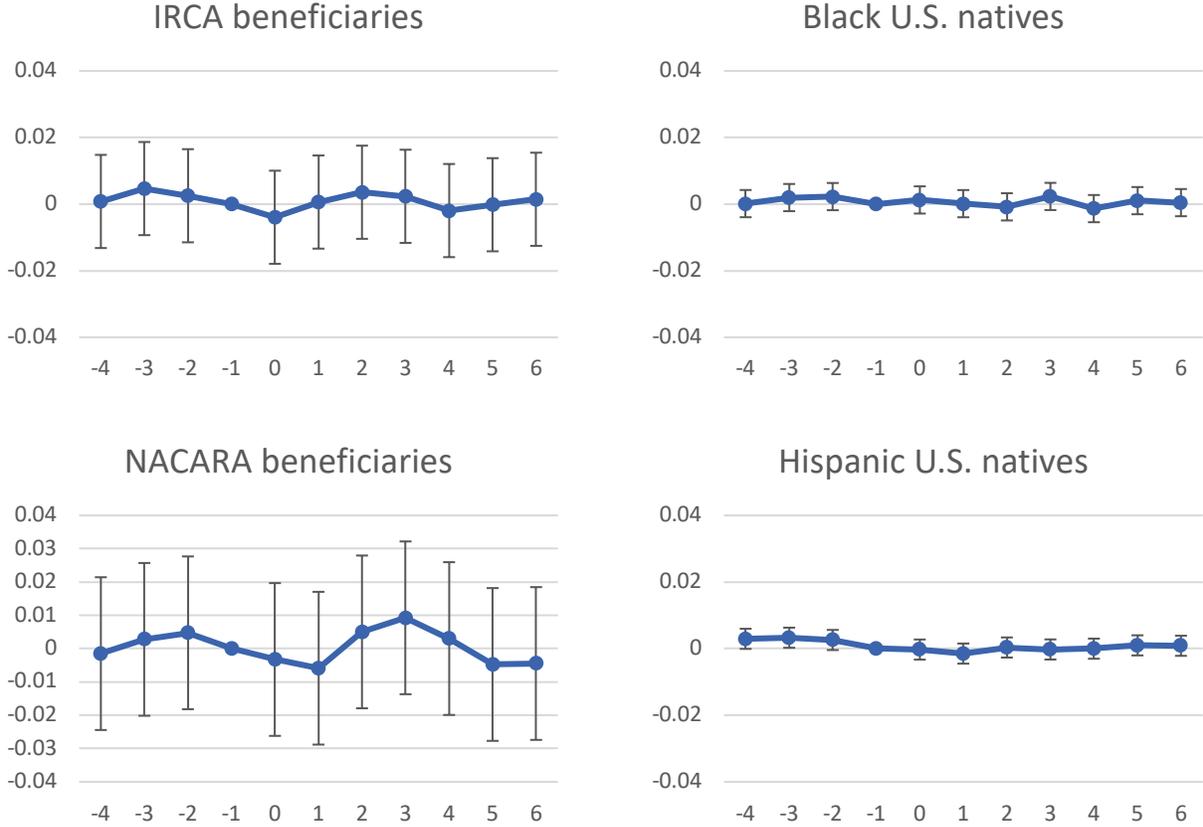
**Appendix Figure 2: Share of Less-Educated Workers in Group Working in Meat/Poultry Processing**



Note: Calculations based on CPS data.

The article shows the event study results for demographic groups with a meaningful change in their share in the industry relative to white non-Hispanic U.S. natives and for likely unauthorized immigrants since they are the focus of the raids. Appendix Figure 3 shows the event study results for the other demographic groups for completeness.

**Appendix Figure 3: Event Study Estimates for Share of Other Demographic Groups Employed in the Meat- and Poultry-Processing Industry**



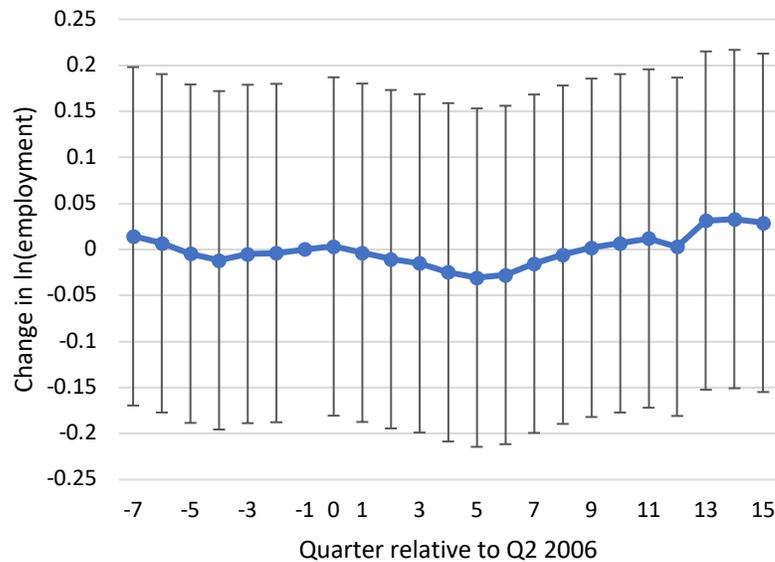
Note: Calculations based on CPS data.

There is little change in the share of IRCA beneficiaries working in the industry, relative to the change among white non-Hispanic U.S. natives. There may be an increase in the share of NACARA beneficiaries working in the industry, given the pattern in their figure above, but it is not statistically significant. The sample – and the population – of NACARA beneficiaries is small, making it difficult to detect any change among that group. We obtain precisely estimated null results for Black and Hispanic U.S natives.

As noted in the article, we do not find a significant change in average employment after the raids. Appendix Figure 4 shows the event study results for average employment in the

animal slaughtering and processing industry relative to the private sector as a whole. We obtain similar null results when using beginning-of-quarter employment or end-of-quarter employment (not shown). We also obtain results similar to Figure 2 in the article when examining the  $\ln(\text{hiring rate})$  and  $\ln(\text{separations rate})$  or the  $\ln(\text{count of hires})$  and  $\ln(\text{count of separations})$  instead of the levels of the hiring and separations rates (not shown).

**Appendix Figure 4: Event Study Estimates for Employment in the Meat- and Poultry-Processing Industry**

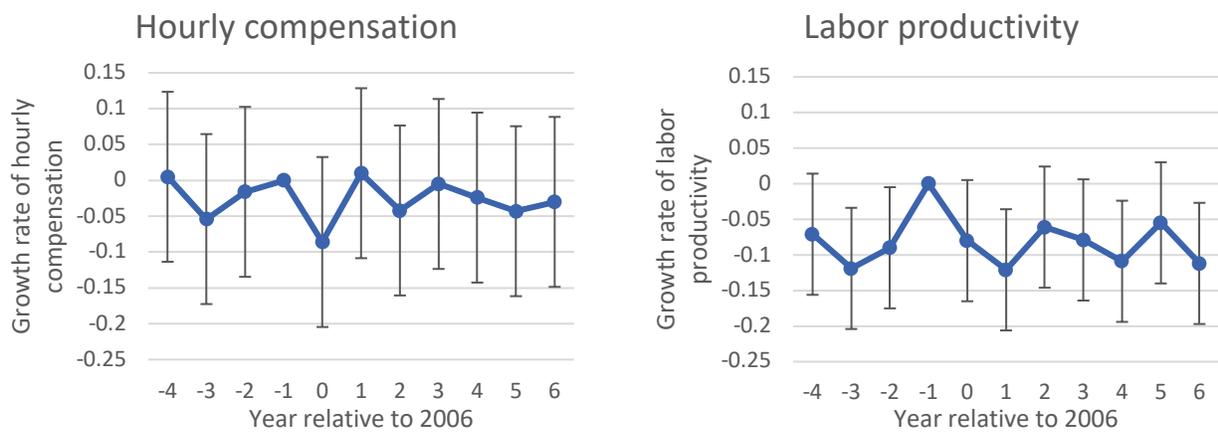


Note: Calculations based on QWI data.

Lastly, we examine the growth rates of hourly compensation and labor productivity in the animal slaughtering and processing industry compared with the private sector as a whole. As Appendix Figure 5 shows, the growth rate of hourly compensation does not change significantly in the industry, relative to the private sector as a whole, after the raids began. (In results not shown here, we obtain similar null results in the CPS when looking at real hourly wage levels, both in the raw data and when looking at wage residuals after controlling for age,

sex, education, and nativity/race/ethnicity.) The growth rate of labor productivity is significantly lower in the industry than in the private sector as a whole, but this may be a continuation of pre-2005 trends. We also find no significant change in employment in these annual data (not shown), similar to the null result in the quarterly data from the QWI.

**Appendix Figure 5: Event Study Estimates for Hourly Compensation and Labor Productivity Growth in the Meat- and Poultry-Processing Industry**



Note: Calculations based on BLS LPC data.

## References Cited in Appendix

Bollinger, Christopher R., and Paul Hagstrom. 2008. "Food Stamp Program Participation of Refugees and Immigrants." *Southern Economic Journal* 74: 665–692. Doi: 10.1002/j.2325-8012.2008.tb00858.x

Bollinger, Christopher R., and Paul Hagstrom. 2011. "The Poverty Reduction Success of Public Transfers for Working Age Immigrants and Refugees in the United States." *Contemporary Economic Policy* 29: 191–206. Doi: 10.1111/j.1465-7287.2010.00217.x

Bruno, Andorra. 2015. "Immigration-Related Worksite Enforcement: Performance Measures." Congressional Research Service report R40002.

Sarah Flood, Miriam King, Renae Rodgers, Steven Ruggles, J. Robert Warren, and Michael Westberry. 2021. Integrated Public Use Microdata Series, Current Population Survey: Version 9.0 [dataset]. Minneapolis, MN: IPUMS. Doi: 10.18128/D030.V9.0

Orrenius, Pia M., and Madeline Zavodny. 2015. "The Impact of Temporary Protected Status on Immigrants' Labor Market Outcomes." *American Economic Review: Papers & Proceedings* 105: 576–580. Doi: 10.1257/aer.p20151109

Wilson, Jill H. 2021. "Temporary Protected Status and Deferred Enforced Departure." Congressional Research Service report RS20844.