Is it a Jungle Out There?: Meat Packing, Immigrants, and Rural Communities

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The shift of the U.S. meatpacking industry from urban to rural areas has generated controversy regarding potential social and economic costs of meatpacking plants on their host communities. This study uses media comments to identify the most prominent controversies regarding meatpacking, its largely immigrant workforce, and rural communities. We find that the industry has impacted the demographic composition of rural communities and their schools, but find no evidence that the industry increases per capita government expenditures. This suggests that rural communities trade off the economic benefits of hosting these large employers against the costs of accommodating needs of new residents.

Keywords: Immigration, meatpacking, rural communities

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On May 12, 2008, Immigration and Customs Enforcement arrested nearly one-third of the 968 employees of Agriprocessors, the largest employer in the rural community of Postville, Iowa. According to the affidavit, over three-quarters of the plant's employees were alleged to have been using fraudulent documents. This raid followed by 17 months a raid initiated on similar charges at Swift & Company meatpacking plants in six states. Almost 1,300 workers, approximately 10 percent of Swift's employees, were arrested in the largest immigration raid in U.S. history (Duara, Schulte, and Petroski, 2008). The controversies and vast media attention paid to these arrests reinforced a negative image of meatpacking and processing companies as users and exploiters of illegal labor and as poor corporate citizens in their communities.

Meatpacking has long been a source of employment for immigrants, as first vividly described by Upton Sinclair in his 1906 novel *The Jungle*. The industry continues to be an important provider of entry-level opportunities for low-skilled labor and recent immigrants (Huffman and Miranowski, 1996). Data from the Public Use Microdata Sample of the 2000 Census reports that 29.2 percent of those employed in the animal slaughtering and processing industry are foreign-born. This underreports the true immigrant share because the Census underreports undocumented workers. Jeffrey Passel (2006) estimates that 27 percent of the nation's butchers and other meat, poultry, and fish processing workers are undocumented.

Meatpacking has shifted from a primarily urban to a rural industry since the 1900's (McGranahan, 1998; Drabenstott, Henry and Mitchell, 1999). Before the 1930s, poor refrigeration meant that livestock needed to be shipped close to the consumer before butchering, and so almost all packing was done in or near cities. In 1880, Chicago alone accounted for 60

percent of all cattle slaughtered in the U.S. (Azzam and Anderson, 1996). The shift away from city production began in earnest with the 1960 establishment of Iowa Beef Packers (IBP). Metropolitan areas still claimed over half the jobs in the industry as late as 1980, but by 2000, 60 percent of meatpacking jobs had relocated to nonmetropolitan areas (Kandel and Parrado, 2005)[1]. Because the industry attracts immigrant labor, expansion to non-metropolitan areas has raised concerns about how an influx of new immigrant workers might affect rural communities. A common perception is that the construction of a meat packing facility will bring a large number of immigrant workers and a host of social problems to a community, including higher levels of crime, increased welfare loads, the inconvenience of bilingual commerce, and heavier burdens on public services such as schools, health care providers, and low-income housing. Past case study research has claimed that evidence supports these views (Broadway, 1990; Broadway, Stull, and Podraza, 1994; Broadway, 2000; Grey, 1997a; Grey, 1997b). However, these case studies have tended to focus on the most egregious cases or on very large plants; they often fail to provide comparisons to other communities lacking these plants, making it difficult to determine typical outcomes.

Case analysis may find that crime rates rise in a community after a packing plant opens the natural tendency is to implicate the packing plant for the rise in crime, but rising crime rates might be a broader societal trend. If crime rates are rising in otherwise similar counties that lack packing plants, the timing of the plant opening and increasing crime rates may be a coincidence rather than a causal relationship. Despite individual cases claiming that meatpacking causes criminal activity and local government expenditures to rise, a study that compares outcomes

[1] Poultry processing has historically been located in rural areas, but has undergone significant employment growth in recent decades, driven in large part by technological innovation and increasing consumer demands for poultry relative to beef and pork (Kandel and Parrado, 2005).

between counties with and without a meatpacking plant found no evidence of impact on local crime rates or local government spending (Artz, Orazem, and Otto, 2007).[2]

This study takes a comprehensive approach to examining the social consequences of having a meatpacking plant in a rural community. Rather than relying on individual cases, we use data on rural counties in 23 Midwestern and Southern states.[3] A host of claims have been made regarding the impacts of the meat packing and processing (MPP) industry on host communities. These claims are generally based on anecdotal evidence rather than scientific research. Our intent is to test the validity of these accusations using a more comprehensive, empirical approach to measure how counties that differ in the importance of meatpacking in their economies also differ in local outcomes alleged to be caused by meatpacking. .

We focus on rural areas for three important reasons. First, as already noted, meatpacking has been expanding in rural areas. Second, because rural areas have lower original levels of foreign-born residents than urban areas, meatpacking growth is more likely have an observable impact on the proportion of immigrants in rural areas (Martin, 1997). Third, growth in meatpacking can influence the overall economy of a rural area to a much greater extent than in urban areas because meatpacking plants are atypically large relative to other rural employers. For these reasons, if meatpacking does have adverse affects, they would likely be largest in rural areas.

The underlying causes of change in host communities are varied and complex. Structural changes in the industry (increasing plant size, increasing capital intensity, diminishing unionization rates) have altered the nature of the workforce employed in these firms (MacDonald and Ollinger, 2005; Ollinger, MacDonald, and Madison, 2005; Kandel and Parrado, 2005). Changing legal, political, and economic environments have affected the migration decisions of

[2] That study also found that the meatpacking and processing industry had a net positive impact on employment growth but not on wage growth (Artz, Orazem, and Otto, 2007).
[3] We use the terms rural and non-metropolitan interchangeably throughout the paper.

immigrants employed in the industry. It is not our intent to model these forces individually; instead, we capture their aggregate effects to the extent that they are correlated with the location and pace of meatpacking expansion in rural communities.

CONCEPTUAL FRAMEWORK

We can frame the community response to the presence of a meatpacking plant using the Gyourko-Tracy (1991) extension of the Roback (1982) formulation of local quality of life. In Roback's formulation, the hedonic value of exogenous local amenities is captured in local wages and land prices. Gyourko and Tracy added exogenous government expenditures and taxes as another vector of location specific amenities. These local fiscal policies have effects on wages and land prices comparable to naturally occurring amenities. Glaeser and Gottlieb (2009) provide a review of the empirical research estimating local quality of life.

In our context, the share of local meatpacking employment relative to the size of the local labor market, M_i, takes on the guise of an exogenous hedonic factor that affects local quality of life and local firm profitability. However, it is not plausible that local fiscal policies are set exogenously without input from the population. Instead, it is likely that those fiscal policies are changed in response to the presence or absence of a meatpacking plant.

To make this clear, let the indirect utility function for a representative resident of location *i* be given by

$$V_i = V\{(1-\tau_i^w)\cdot w_i(N_i), (1+\tau_i^R)\cdot r_i, G_i;\ \mathbf{A_i}, M_i\}\ \geq \bar{V}, \tag{1}$$

where τ_i^w is the local tax on incomes; w_i is the local wage that declines in the size of the local labor force, N_i, ; r_i is the imputed rental value of local property which faces a property tax, τ_i^R, ; G_i is the level of local government services; and $\mathbf{A_i}$ measures local amenities such as weather quality and topography. Government expenditures are paid by local taxes, so $G_i = (1-\tau_i^w)\cdot$

$w_i \cdot N_i + (1 + \tau_i^R) \cdot r_i \cdot R_i$, where R_i is the total amount of taxable property available in community *i.* Local amenity variables G_i, $\mathbf{A_i}$, and M_i are nonrival public amenities or disamenities which benefit or harm all equally. Populations are mobile; therefore, the utility offered by community *i* has to be at least as high as the utility offered elsewhere.

In the Gyourko-Tracy formulation, taxes and government expenditures are set and the aim is to estimate the hedonic prices attached to them.[4] Our aim is simpler. When meatpacking is introduced to community *i*, it either raises or lowers quality of life. If it lowers quality of life so that $V_i < \bar{V}$, then any number of endogenous variables will need to adjust to raise V_i. . If nothing else happens, some people will leave, the local wage w_i will be bid up, and the rent on land r_i will decrease as N_i falls. The government could also respond to decreasing quality of life by altering the mix of fiscal policies, raising or lowering tax rates, and shifting government spending across categories to replace lost utility. Meatpacking could also raise the quality of life, in which case the responses would shift in the other direction. However, meatpacking may alter quality of life differently for different sub-populations, so the mix of N_i may change as well as the magnitude. The key point is that meatpacking can alter the quality of life, which will potentially induce changes in population, wages, land prices, taxes, and government spending, holding other fixed and preexisting amenities constant.

We designed our difference-in-differences empirical exercise to document the magnitude and sign of those effects of meatpacking on the local community. The reduced form effects of meatpacking on the vector of endogenous variables, $dY_i = [dN_i, dw_i, dr_i, dG_i, d\tau_i^w, d\tau_i^R]'$, will be of the form:

$$dY_i = \theta_M dM_i + \theta_A \mathbf{A_i}, \tag{2}$$

[4] Gyourko and Tracy also add a firm sector, as they are interested in solving for equilibrium values of $w_i$and r_i, assuming taxes and government spending are fixed. In our context, adding the firm sector will yield the same reduced form responses to the presence of meatpacking, and so we dispense with the additional sector.

where changes in local endogenous responses are regressed on changes in the intensity of local meatpacking and the vector of exogenous amenities. The coefficient θ_M will yield inferences for average local community responses to the presence of meatpacking in their community.

EMPIRICAL STRATEGY

Equation (2) provides the basis for empirical specification. The vector of dependent variables is composed of changes in K elements, $Y_{i.}^{k}$,, that include population and its various subcomponents, measures of government services or costs that may be affected by the presence of the MPP industry, and measures of school expenditures and services that also may vary with MPP presence. The vector $\mathbf{A_i}$ includes the base period values of the dependent variables and other exogenous control variables.[5]

We expect that the impact of MPP varies according to its size relative to the size of the host community. A very large plant in a sparsely populated area might be expected to have greater effects, positive or negative, than would a plant that represents a much smaller share of the local labor market. To account for this, we measure M_{it}^{m} by a series of dummy variables representing various MPP shares of total county employment. The use of these dummy variables is by agreement with the Department of Labor, who maintain the Establishment Longitudinal Database (LDB). The data are not publicly available, but they allowed us to generate aggregated results using these broader measures of industry size. These dummy variable measures, which

[5] As an alternative specification, we performed a principal component analysis over all 1990 values of the endogenous variables. The first two principal components accounted for about 70 percent of the covariation in the starting values, and so we opted to use those two principal components plus the starting value of the kth endogenous variable. Results were not sensitive to the inclusion or exclusion of various subsets of these variables or to the use of the principal components.

span the period 1990 to 2000,[6] satisfied their confidentiality restrictions, whereas actual measures of firm size did not. These dummy variables are summarized in Table 1. The four dummy variables are M_{it}^1: employment share between 0 and 5 percent; M_{it}^2: share between 5 percent and 10 percent; M_{it}^3: share between 10 percent and 20 percent; and M_{it}^4: share over 20 percent. The base case is no industry employment in 1990.

[Table 1 about here.]

We also include a measure of the change in the MPP industry's importance during the decade. We approximate the change in industry size, denoted ΔM_i, , by the change in employment share rank. The value ranges from -4 to +4, with the largest negative case denoting the complete loss of the industry when it held greater than 20 percent employment share in 1990, and the largest positive denoting the entry of the MPP industry with employment share rising over 20 percent by 2000. Negative numbers indicate the industry's share of total county employment fell over the time period, whereas positive numbers reflect growth in employment share. If the MPP industry retains its employment share, then ΔM_i=0. To allow the impact of MPP growth to differ from MPP decline, we interact ΔM_i with a dummy variable, D_i, which equals one if the industry grew in importance over the decade and zero otherwise. Summarizing these specification choices, equation (2) becomes:

$$(3)\ ln\left(\frac{Y_{i,t+1}^k}{Y_{it}^k}\right) = \alpha + \delta_Y \ln\left(Y_{it}^k\right) + \mathbf{A}'_{\mathbf{i,t}}\boldsymbol{\delta}_{\mathbf{A}}^{\mathbf{j+k-1}} + \sum_{m=1}^{4} \delta_M^{mk} M_{it}^m + \theta_M^{1k}\Delta M_i + \theta_M^{2k}(D_i \cdot \Delta M_i) + \varepsilon_{it}^k$$

The key parameters are the δ_M^{mk}. Positive and increasing values as we progress from m=1, 2, 3, 4 suggest that increasing presence of meatpacking as a fraction of the local economy increases

[6] The research was carried out at the Bureau of Labor Statistics (BLS) in Washington, D.C. in between 2004 and 2006. (See http://www.bls.gov/bls/blsresda.htm for more details.)

the growth rate of the dependent variable, Y_{it}^{k}. Negative values suggest that meatpacking lowers the growth of the dependent variable. Failure to reject joint significance tests of these four parameters suggests that meatpacking presence does not affect the dependent variable.

The other critical parameters are θ_M^{1k} and θ_M^{2k}. In this expanded specification, the effect of gaining the industry (when a county had no industry jobs in 1990) is captured by $(\theta_M^{1k} + \theta_M^{2k})$. If the sum of the parameters is positive and significant, then a rising MPP employment share over the decade will be associated with growth in the dependent variable.

Equation (3) is applied to data from non-metropolitan counties in twenty-three Midwestern and Southern states to test four hypotheses regarding the impacts of local meatpacking and processing firms on local immigration and other social outcomes.[7] The dependent variables are compiled from the U.S. Decennial Census, the U.S. Census of Governments, and the National Center for Educational Statistics, and are available at the county level.[8] The specific starting and ending dates for the relative change in outcomes depends on data availability. For measures based on the U.S. Decennial Census, the start and end dates are 1990 and 2000, respectively. For data culled from the Census of Governments, the start and end years are 1992 and 2002. For the education measures, data on the number and demographics of students and students eligible to receive free lunches are available for 1990 and 2000, but measures on English language learners are only available between 2000 and 2005.[9]

[7] The states included in the study are Alabama, Arkansas, Colorado, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Minnesota, Mississippi, Missouri, Nebraska, Ohio, Oklahoma, South Carolina, South Dakota, Virginia, and Wisconsin.

[8] Our choice of counties as the unit of analysis is dictated by data availability. By estimating impacts on a larger geographic scale, we are, if anything, biasing our results toward zero.

[9] While the Decennial Census data appeared to be complete, the data from the Census of Governments and the National Center for Educational Statistics had fewer observations due to counties that did not report their information. The decreased number of observations has a greater potential to skew results and must be taken into consideration with the interpretation of this data.

Data from the Bureau of Labor Statistics' Longitudinal Database (LDB) spanning 1990 to 2000 are used to identify the location and size of meat packing and processing facilities in a county. We consider five related industries which hire a significant share of immigrant labor: Animal (except poultry) Slaughtering (NAICS 311611), Meat Processed from Carcasses (NAICS 311612), Rendering and Meat Byproduct Processing (NAICS 311613), Poultry Processing (NAICS 311615) and Frozen Specialty Food Manufacturing (NAICS 311412).

The choice of the time period was dictated by data availability; 1990 is the earliest year available in the LDB. While the shift of meat packing and processing into rural areas began earlier, a considerable amount of change occurred in the 1990s. Forty-three percent of the sample counties (598 counties) had MPP employment in 1990. By 2000, the industry had entered 91 new counties and exited 110 other counties in the sample. While the number of counties hosting the industry fell slightly, plant size increased; average county-industry employment rose nearly 50 percent over the decade. Furthermore, Kandel and Parrado (2005) find that the effect of meat processing employment on Hispanic population growth was roughly five times larger in the 1990s than in the 1980s.

We estimate equation (3) using ordinary least squares.[10] Our estimates are presented in table 2. For each outcome we present only the parameters of primary interest: δ_M^{mk}, θ_M^{1k} and θ_M^{2k}, along with δ_Y and the constant term. The constant term represents the average change in the dependent variable for counties without MPP employment, conditional on the starting value and the additional control variables. Those controls include base period values of the K dependent

[10] OLS is equivalent to generalized least squares estimation when the set of regressors is identical (Greene, 2000, p. 616). We assume that meatpacking grows independently of other measures. However, it might be the case that growth in meatpacking intensity is not exogenous. We estimated equation (3) with and without the terms reflecting industry growth. Our results are not sensitive to this change in specification. In addition, we estimated equation (3) allowing correlation in the errors across counties that are in the same labor market, to allow for spillover effects between counties. We assumed clustered errors across counties within the Bureau of Labor Statistics' defined economic areas as our defined market boundaries. Our results were unchanged.

variables, the USDA amenity index, the 1990 proportion of college educated residents in the county (a measure of human capital), and a dummy variable indicating the presence of an interstate highway. These measures, commonly used as regressors in the regional growth literature, control for plausible sources of cross-county variation in the dependent variables other than MPP to minimize the chance that our estimated effects of meatpacking are due to missing variables bias rather than a true MPP effect.[11] In addition, we report the Chi-square-statistic for tests of two restrictions. The first is a test of the joint significance of the δ_M^{mk}. Failure to reject this test implies that industry presence has no impact on growth in the dependent variable. The second is a test of the significance of rising MPP employment share during the decade on growth in the dependent variable: $(\theta_M^{1k} + \theta_M^{2k})$=0.

Given the number of estimates presented in table 2, we are not able to discuss all findings in detail. Instead we will focus our discussion on the key findings for each our four hypotheses. However, to insure that readers understand how we derive our interpretation of the results, we present a detailed discussion of all the estimates for one dependent variable: total population growth. Those results are reported in the first column of table 2: Hypothesis A.

Since the dependent variable is measured as a log change over the decade, the estimates of δ_M^{mk} can be interpreted as the added effect of industry presence on growth in the outcome relative to not having the industry. Counties with less than 10 percent MPP employment share have the same population growth as counties with no MPP presence. However, once MPP share rises above 10 percent of total county employment, population growth exceeds that in counties without MPP jobs. Counties with MMP employment share between 10 and 20 percent grew an added 4 percentage points relative to non-host counties. Counties with MPP employment share

[11] We reject the null hypothesis that these controls have no effect in nearly all regressions, indicating their effectiveness in accounting for variation across counties.

exceeding 20 percent grew an additional 8 percentage points over the decade. The joint test of significance for the δ_M^{mk} is rejected, confirming the effect of MPP employment share on total population growth. In contrast, the change in industry share over the decade did not significantly affect total population growth because the null hypothesis that ($\theta_M^{1k} + \theta_M^{2k}$)=0 is not rejected. Finally, a positive and significant estimate on δ_Y, the parameter on the log level of 1990 total population, implies divergence in population growth among the sample counties over the decade.

[Table 2 about here.]

HYPOTHESIS STATEMENTS AND TESTS

A. MEATPACKING PLANTS CHANGE THE POPULATION DEMOGRAPHICS

The first common belief is that the shift of meatpacking plants from urban to rural areas has changed the demographics of host communities. There is a perception that a new plant in a rural community will bring not only an influx of new immigrants to the town, but will also spur out-migration of native residents. Describing the changes in Lexington, Nebraska after the 1990 opening of an IBP plant in his best seller *Fast Food Nation*, Eric Schlosser (2002, p. 165) writes, "the majority of Lexington's white inhabitants moved elsewhere; and the proportion of Latino inhabitants increased more than tenfold, climbing to over 50 percent."

While some people seem to fear such a dramatic change in local demographics, others have a more positive view. Rural population losses in the 1990s were offset by growth in the Hispanic population (Johnson and Lichter, 2008). Immigrants can inject new life into rural communities, working in low-skill, low-wage industries that native workers shun, opening new businesses, and buying houses (Gouveia and Stull, 1997; Kernek, 2001; Davies, 2004).

Hypothesis A: *The presence of meatpacking plants attracts foreign-born workers and decreases the native-born population.*

To examine this hypothesis, we analyze the impact of MPP employment on the change in a county's total population, white population, Hispanic population, Asian population, native-born population, and foreign-born population. Table 2 reports the results.

The evidence in support of Hypothesis A is mixed. While the Hispanic population declined in rural counties that never had the industry, counties with meatpacking plants saw significant growth. The larger the industry's employment share, the faster the population growth. In counties with less than 5 percent MPP employment share, the Hispanic population grew an added 13 percentage points relative to counties that did not have meatpacking, while in counties with more than 20 percent MPP employment share, the Hispanic population rose almost 200 percentage points. Growth in industry employment over the decade spurred further increases. The sum of the growth coefficients ($\theta_M^{1k} + \theta_M^{2k}$)= 0.25 and is highly significant, implying that a 1 percent increase in MPP employment share would raise Hispanic population growth by 23 percent. New Hispanic populations in these counties were primarily foreign-born. Due to growth in the foreign-born Hispanic population, host counties experienced faster overall population growth as well.

Despite claims of an associated out-migration of whites and native-born workers, the estimates in Table 2 do not reflect a significant decrease in either population related to the presence of the industry. Conditional on 1990 population levels, counties in the sample did lose white and native populations over the decade, but industry presence did not exacerbate the population decline (the joint test of the significance for the δ_M^{mk} cannot be rejected). These data show that meatpacking plants do attract immigrants, especially Hispanics, but do not significantly alter the size of the native-born population. Overall, the total population increases in the presence of meatpacking.

B. IMMIGRANTS DO NOT SPEAK ENGLISH

Another common concern is that new immigrants do not speak English well. Language barriers impede communities' ability to assist new immigrants in obtaining services such as education, police protection, and adequate health care (Griffith, 2008). Communities may incur public costs to handle the language problem. For example, the No Child Left Behind Act requires school districts to provide services to limited English proficient students whether ELL learners number five or fifty.[12] The school system in Beardstown, Illinois hired an additional 16 teachers and aides to offer Spanish language instruction to immigrant children until they become proficient in English (Kernek, 2001). In Storm Lake, Iowa, the police department hired bilingual community service officers to provide language translation services and cultural education to the existing police force (Prosser, 2008).

This communication barrier often raises accusations that immigrants are not willing to assimilate into American culture. The Federation for American Immigration Reform (2002b) contends that, "business and social transaction costs rise as time, effort, and money are spent overcoming language and cultural barriers." Others acknowledge that first-generation immigrants have poor English skills, but they claim this does not affect assimilation because subsequent generations speak English well. Hakimzadeh and Cohn (2007) estimated that while less than one-quarter of Latino immigrants report being able to speak English very well, nearly all their children (88 percent) do.

***Hypothesis B**: Meatpacking plants attract people who do not speak English.*

Indicators relevant for this hypothesis include the population over age 5 that speaks English "less than very well" in total and by Hispanic and Asian ethnicity. Consistent with the

[12] U.S. Department of Education, Office of English Language Acquisition, <http://www.ed.gov/about/offices/list/oela/index.html>.

estimates of total population growth, the results in Table 2B show that the presence and growth of MPP employment in the county significantly raises the number of people, specifically Hispanics, with limited English proficiency. The size of the effect increases as the share of MPP employment in the county rises. The impact for counties with a largest presence of meat packing is very large. Relative to non-host counties, the population with limited English skills in these counties doubled over the decade and among Hispanics, those with poor English skills more than tripled. Growth in the industry over the decade accelerated these changes.

C. IMMIGRANTS BURDEN LOCAL SCHOOLS

A third common perception is that immigrants who are attracted by meatpacking jobs impose burdens on local schools. One concern relates simply to increases in the number of students. According to Steven Camarota (2001), "Immigration accounts for virtually all of the increase in the school-age population in the United States over the last few decades. More importantly, without a change in immigration policy, the number of children in our already overtaxed schools will continue to grow". While this highlights some schools' struggle with problems stemming from burgeoning enrollments, many rural schools face the opposite threat of closure or consolidation due to declining enrollments. For these schools immigrant populations may represent an investment rather than a burden: "Reopening shuttered schools, closed in waves of district consolidations, and recruiting new teachers can reinvigorate a slumping economy" (Jensen and Duncan, 2006).

More specifically, immigrants are thought to burden schools by increasing the number of students requiring special programs or assistance. Immigrant students often have language barriers that require additional assistance and expenditures. In Lexington, Nebraska, roughly one-third of the students are English language learners and almost half receive a free or reduced-

price lunch (Bauer, 2005). While some worry that immigrants exploit the Free/Reduced Lunch Program, others feel they do not use it enough. Immigrant families typically do not qualify for many low-income support services or are unwilling to accept help. Not only does this affect the families themselves, but it also results in funding shortages for support services programs in the schools since funding is based on the number of free and reduced price meals (ISU Extension, 2001). An additional problem associated with meat packing plants is instability in school enrollment. Columbus Junction, Iowa, has a reported 30 percent turnover in school enrollment each year (Lantor Fandel, 2007). Migrant students can cause large swings in the number of children requiring school services and are thought to pose additional problems because of large numbers of new students unfamiliar with local schools. And like problems with the free/reduced lunch program noted above, unstable enrollments may negatively impact school funding (Grey, 1997a).

***Hypothesis C**: Schools in communities with meatpacking plants face a large and costly influx of students, especially those requiring special programs.*

For Hypothesis C, we examine the impact of MPP jobs on the following outcomes: growth in a county's total number of students, students by white, Hispanic, and Asian ethnicity, number of migrant students, number of students eligible to receive free lunches, and number of English Language Learners (ELL) or Limited English Proficiency (LEP) students. This last indicator is measured from 2000 to 2005; correspondingly we measure the presence of MPP jobs in 2000 and do not estimate the impact of growth in the industry.

As seen in Table 2C, industry presence significantly increased growth in the number of Hispanic students relative to non-host counties. Counties with at least 5 percent MPP employment share added more than 100 percentage points to Hispanic student population growth

relative to non-host counties. Relatively large Asian and migrant student population increases are also related to a strong presence of meatpacking. Migrant student populations grew nearly twice as quickly in counties with more than 5 percent MPP employment share relative to counties without the industry. Growth in the industry induced further increases in the Hispanic student populations but has no added affect on Asian student population growth. The presence of the MPP industry does not affect the total number of students nor white students in rural counties.

Meatpacking and processing plants may lead to a significant increase in some special programs for students in rural communities. From 2000-2005, there was a significant increase in the number of English Language Learners (ELL) or Limited English Proficiency (LEP) students in counties with a meatpacking employment share between 5 and 10 percent . The industry's presence may also impose a burden on programs such as Free Lunches. In counties where industry presence is between 10 and 20 percent of total employment the data reflect a significant increase in the number of students using such programs between 1990 and 2000,

D. IMMIGRANTS INCREASE GOVERNMENT SPENDING AND USE PUBLIC ASSISTANCE PROGRAMS

Critics claim that immigrants in rural communities are a burden, requiring public assistance and increased local government spending. Reporting from a RAND Institute publication, the Federation for American Immigration Reform (2002a) states: "That immigration does not help the economy should come as no surprise, since, in a sense, we are importing poverty. One out of every five poor people is an immigrant." The same website concludes that, "the average immigrant imposes a net lifetime fiscal cost on state and local governments of $25,000." Lou Dobbs (2006), former CNN anchor and outspoken critic of US immigration

policy, asserts immigrants place "a tremendous burden on hospitals, schools and other social services." Certainly, there is anecdotal evidence of increased local public costs associated with rising immigrant populations. As noted above, meat packing towns have hired teachers and translators to assists new comers to their communities. Others argue that immigrants provide a substantial net economic benefit: "In the case of the social security system in particular, new legal immigrants will provide a net benefit of $611 billion over the next 75 years" (Hate Free Zone Washington, 2008). Bowman (2008) notes that "new immigrants are re-populating small towns, starting new businesses and generating more money for local school systems."

Hypothesis D: *Meatpacking plants attract poor immigrants who need public assistance and increased government spending on services.*

The measures examined for this hypothesis are the change in a county's total number of people below the poverty line, number of people receiving public assistance, and local government spending per capita on education, health, police, corrections and welfare.

The presence of meatpacking and processing jobs significantly increased poverty levels in the 1990s. Having industry employment share of 5 percent or more increased growth in the population below poverty between 5 and 18 percentage points. In contrast, industry growth over the decade had no additional effect. It is possible that counties where meatpacking and processing has an unusually large employment share are counties whose other sectors are relatively weak as opposed to having meatpacking sectors that are atypically strong. The weakness in the rest of the non-meatpacking areas of the local economy may be driving the higher incidence of poverty. In fact, County Business Patterns data show that the counties with high MPP concentrations are counties with very large meatpacking plants. Large meatpacking plants are correlated with higher incidence of poverty.

We can interpret this result in light of other studies. Artz, Orazem and Otto (2007) find the presence of meat processing lowers wage growth while boosting employment growth in host counties. As a result, the effect on total income growth is unclear. Card concludes that an influx of immigrants increases income inequality, but only because the foreign born are atypically at the bottom or at the top of the income distribution. Immigration does not increase inequality among native born workers. In combination, these results suggest that an influx of foreign-born workers does not make the native residents poorer. Instead, the rural poverty levels rise with meatpacking presence because the immigrant workers attracted to jobs at rural meat processing plants are atypically drawn from the lower tail of the income distribution. An important question that we cannot address with our Census data is whether the MPP jobs eventually allow these immigrant households to establish an economic foundation that eventually leads to full assimilation into the economy, if not for parents, then for their progeny.

This also begs the question of whether meatpacking presence imposes related fiscal costs on these counties. The second column of Table 2D shows that despite the higher poverty levels, neither meatpacking's presence nor growth raises the number of households on public assistance. In fact, growth in the industry between 1990 and 2000 *reduced* per capita government spending on welfare. Likewise, there is no evidence that local MPP presence or growth increases per capita government spending on corrections, health, education or police protection.

Given our findings of significant increases in populations requiring special services, it is striking that we find no impact of industry presence on local government expenditures. One plausible explanation is that the burden of these social services may be borne by private charitable organizations such as churches, rather than local governments. However, Osili and Xie (2009) found that compared with native-born Americans, immigrant populations are more likely

to contribute their own resources toward privately provided public goods (i.e. contributions of time and money to charities) and are less likely to receive benefits from those same non-government sources. As a result, foreign-born adults and their children are less likely to be a burden on their host communities than are native-born Americans. Consequently, the increased presence of foreign-born and nonnative speakers in rural communities hosting MPP plants does not create an undue burden on public services. The other plausible explanation is that MPP presence generates sufficient local public resources that it pays its own way for any associated need for public services.

CONCLUSIONS

Meat packing and processing plants, especially large ones, change the demographics of their communities. Industry plants are associated with increases in the foreign born population and Hispanic population, and especially those with limited English ability. The industry brings changes to the local school systems, increasing diversity in the student population, but also escalating numbers of students requiring special services. Host counties experienced faster growth in the number of migrant students, English language learners, and students receiving free lunch between 1990 and 2000. These counties also saw rising poverty levels.

In light of the rise in factors many people would view as disruptive if not outright negative, why do rural communities continue to recruit these firms? Our results imply that the presence of meat processing jobs provides benefits to communities, but there are trade-offs involved. Communities absorb some costs, specifically a rise in foreign-born populations with limited English skills and a rise in poverty, in exchange for the benefits, higher employment for example, associated with hosting a plant.

We close with a return to Postville, Iowa. If meatpacking and processing plants are truly a negative factor in the community, then the elimination of a plant would leave the community better off. Yet, a year after the May 2008 raid on Agriprocessors and its subsequent bankruptcy filing, Postville's population has shrunk by nearly half. Many businesses have closed. By February 2009, the unemployment rate in the county was 10.6 percent, more than twice the statewide average of 4.9 percent. Without a prospective buyer, the future of the plant remains uncertain, but the town still owes $4.5 million on a sewage treatment facility it built for the plant (Olivo). While there were clearly very serious labor violations involved in this case, the loss of Agriprocessors has devastated a town that had been viewed as a true success story for rural economic development. Less dramatic but similar stories are found in other communities that have lost large MPP plants. While case studies have focused on the costs of adding large processing facilities, the worst cases must surely be the towns that have lost those jobs.

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Table 1: Distribution of Rural Counties in the Midwest and South by Presence and Relative Size of Local Meatpacking and Processing Employment

Industry Employment Share	**1990**	**2000**
No industry	806	832
M_{it}^{1}: Industry share < 5%: M_{it}^{1}	510	466
M_{it}^{2}: Industry share > 5%, < 10%, M_{it}^{2}:	47	55
M_{it}^{3}: Industry share > 10%, < 20%M_{it}^{3}:	32	30
M_{it}^{4}: Industry share > 20%M_{it}^{4}:	9	21
Total number of counties	1404	1404

Source: Data spanning 1990 to 2000 were obtained from the Bureau of Labor Statistics' Longitudinal Database (LDB).

Table 2: Estimates of the Impact of MPP Industry on Demographic, Social, and Policy Outcomes

Hypothesis A: Population Demographics

	Total Population	White Population	Hispanic Population	Asian Population	Native Population	Foreign Born Population
$\ln (Y^k_{it})$	0.07**	0.01	-0.75***	-0.90***	0.03	-0.75***
	(1.98)	(0.55)	(30.60)	(32.02)	(0.08)	(22.14)
M^1	0.00	-0.01	0.13***	-0.04	-0.01	0.09**
	(0.74)	(1.39)	(2.96)	(0.69)	(1.23)	(2.40)
M^2	0.02	0.01	0.71***	0.06	0.01	0.62***
	(1.45)	(0.69)	(6.92)	(0.43)	(0.35)	(6.82)
M^3	0.04**	0.01	1.08***	0.22	0.01	0.92***
	(2.39)	(0.74)	(8.81)	(1.34)	(0.49)	(8.39)
M^4	0.08**	0.04	1.93***	0.29	0.01	1.81***
	(2.42)	(1.21)	(8.68)	(0.96)	(0.46)	(9.12)
ΔM	0.01	0.00	0.22***	-0.04	0.00	0.19***
	(1.06)	(0.48)	(3.45)	(0.46)	(0.44)	(3.33)
$D \bullet \Delta M$	0.00	0.00	0.03	-0.06	0.00	0.02
	(0.14)	(0.29)	(0.32)	(0.55)	(0.21)	(0.23)
constant	-0.07	-0.19**	-1.34***	-6.38***	-0.04	-3.70***
	(1.01)	(2.48)	(2.69)	(9.41)	(0.55)	(8.30)
$\delta_M{}^{1k}=\delta_M{}^{2k}=\delta_M{}^{3k}=\delta_M{}^{4k}=0$	15.38***	5.59	184.64***	3.92	2.73	185.09***
$\theta_M{}^{1k} + \theta_M{}^{2k}=0$	1.54	0.03	29.14***	2.61	0.07	25.72***
n	1399	1399	1399	1399	1399	1399
R-sqr	0.355	0.321	0.496	0.507	0.332	0.432

Notes: t-statistics are in parentheses. (*) represents significance at the 10 percent level; (**) represent significance at the 5 percent level; (***) represent significance at the 1 percent level. Additional control variables include 1990 values of all dependent variables, 1990 values of USDA/ERS amenity index, presence of an interstate, proportion of county residents with a college degree. See text for further details.

Hypothesis B: English

	Population >5	Population >5, No English	Hispanic Population >5	Hispanic Population >5, No English	Asian Population > 5	Asian Population > 5, No English
ln (Y^k_{it})	-0.86***	-0.43***	-0.68***	-0.90***	-0.93***	-0.82***
	(43.09)	(21.41)	(18.22)	(26.05)	(28.44)	(23.94)
M^1	-0.01	0.03	0.11***	0.14***	-0.04	-0.02
	(0.85)	(1.10)	(3.20)	(3.13)	(0.65)	(0.33)
M^2	0.02	0.32***	0.53***	0.79***	-0.04	-0. 20
	(1.39)	(5.62)	(6.64)	(7.38)	(0.28)	(1.18)
M^3	0.04**	0.54***	0.85***	1.21***	0.42**	0.41**
	(2.21)	(7.89)	(8.93)	(9.41)	(2.50)	(2.03)
M^4	0.07**	1.04***	1.52***	2.14***	0.54*	0.58
	(2.19)	(8.39)	(8.80)	(9.17)	(1.79)	(1.59)
ΔM	0.01	0.13***	0.20***	0.31***	-0.03	-0.06
	(0.97)	(3.80)	(4.09)	(4.72)	(0.33)	(0.61)
$D \bullet \Delta M$	-0.00	-0.02	-0.04	-0.05	-0.08	0.03
	(0.12)	(0.42)	(0.61)	(0.56)	(0.71)	(0.23)
constant	-0.11	-1.75***	-2.54***	-3.83***	-6.83***	-7.57***
	(1.55)	(6.29)	(6.54)	(7.33)	(10.05)	(9.29)
$\delta_M{}^{1k}=\delta_M{}^{2k}=\delta_M{}^{3k}=\delta_M{}^{4k}=0$	13.63***	155.50***	185.37***	208.72***	10.79**	8.72*
$\theta_M{}^{1k} + \theta_M{}^{2k}=0$	1.33	20.93***	21.55***	31.51***	2.89*	0.20
n	1399	1399	1399	1399	1399	1399
R-sqr	0.762	0.485	0.389	0.479	0.547	0.463

Notes: t-statistics are in parentheses. (*) represents significance at the 10 percent level; (**) represent significance at the 5 percent level; (***) represent significance at the 1 percent level. Additional control variables include 1990 values of all dependent variables, 1990 values of USDA/ERS amenity index, presence of an interstate, proportion of county residents with a college degree. See text for further details.

Hypothesis C: Schools

	Total Students	White Students	Hispanic Students	Asian Students	Migrant Students	Free Lunch	ELL†
$\ln (Y^k_{it})$	-0.12***	-1.01***	-0.61***	-0.65***	-0.30***	-0.98***	-0.47***
	(8.84)	(204.71)	(21.66)	(24.61)	(12.51)	(201.40)	(19.66)
M^1	-0.01	-0.05**	0.18***	0.08*	0.03	-0.04	-0.06
	(0.53)	(2.23)	(3.02)	(1.78)	(0.27)	(1.59)	(0.76)
M^2	0.01	-0.04	1.09***	0.15	0.83***	0.08	0.48***
	(0.57)	(0.67)	(7.91)	(1.40)	(3.80)	(1.36)	(3.01)
M^3	0.03	-0.06	1.22***	0.29**	0.70***	0.27***	0.06
	(1.29)	(0.97)	(7.39)	(2.30)	(2.85)	(3.92)	(0.29)
M^4	0.05	-0.01	1.44***	0.35	1.49***	0.16	0.29
	(1.10)	(0.08)	(4.79)	(1.50)	(3.66)	(1.13)	(1.04)
ΔM	0.01	-0.03	0.31***	0.01	0.13	0.02	
	(0.44)	(0.99)	(3.72)	(0.20)	(0.93)	(0.54)	
$D \bullet \Delta M$	0.00	0.00	-0.03	0.03	0.11	-0.18	
	(0.19)	(0.01)	(0.28)	(0.31)	(0.62)	(0.33)	
	-0.32***	-0.29	0.34	-3.44***	-1.58	-1.31***	-0.66
constant	(2.88)	(1.05)	(0.51)	(6.63)	(1.43)	(4.10)	(0.71)
$\delta_M^{1k}=\delta_M^{2k}=\delta_M^{3k}=\delta_M^{4k}=0$	3.91	5.33	127.07***	9.87**	8.20***	6.30***	3.01**
$\theta_M^{1k} + \theta_M^{2k}=0$	0.08	1.91	22.24***	0.67	5.74**	0.02	
n	1399	1399	1399	1399	799	850	1167
R-sqr	0.243	0.987	0.625	0.664	0.352	0.985	0.275

Notes: t-statistics are in parentheses. (*) represents significance at the 10 percent level; (**) represent significance at the 5 percent level; (***) represent significance at the 1 percent level. Additional control variables include 1990 values of all dependent variables, 1990 values of USDA/ERS amenity index, presence of an interstate, proportion of county residents with a college degree. † indicates the outcome is measured from 2000 to 2005. See text for further details.

Hypothesis D: Government Spending and Public Assistance

			Government Expenditures Per Capita				
	Below Poverty Line	Public Assistance	Corrections	Health	Education	Welfare	Police
ln (Y^k_{it})	-0.28***	-0.60***	-0.98***	-1.00***	-0.98***	-1.01***	-1.00***
	(12.43)	(15.15)	(85.83)	(87.04)	(85.67)	(95.66)	(98.52)
M^1	-0.01	-0.05**	-0.01*	0.01	0.02**	0.00	0.00
	(1.32)	(2.23)	(1.88)	(1.49)	(2.14)	(0.57)	(0.31)
M^2	0.05**	-0.04	-0.01	-0.01	0.01	-0.01	0.00
	(1.99)	(0.80)	(1.22)	(0.48)	(0.38)	(0.38)	(0.54)
M^3	0.11***	0.03	0.01	0.00	0.00	-0.01	-0.02*
	(3.59)	(0.52)	(1.06)	(0.28)	(0.15)	(0.63)	(1.83)
M^4	0.18**	-0.02	-0.02	-0.01	-0.07	-0.06*	-0.01
	(3.13)	(0.14)	(1.50)	(0.62)	(1.34)	(1.65)	(0.82)
ΔM	0.02	0.01	0.00	0.00	0.02	0.02**	0.00
	(1.14)	(0.22)	(0.15)	(0.59)	(1.40)	(2.11)	(0.95)
$D \bullet \Delta M$	-0.02	-0.01	0.00	-0.01	-0.03	-0.03***	0.00
	(0.86)	(0. 28)	(0.37)	(0.61)	(1.62)	(2.62)	(0.58)
constant	0.69***	2.06***	0.08**	0.07	1.47***	0.49***	0.12***
	(5.34)	(7.99)	(2.14)	(1.24)	(13.45)	(6.33)	(3.46)
$\delta_M^{1k}=\delta_M^{2k}=\delta_M^{3k}=\delta_M^{4k}=0$	31.61***	5.92	8.12*	3.75	6.77	3.91	4.71
$\theta_M^{1k} + \theta_M^{2k}=0$	0.01	0.03	0.19	0.07	0.81	2.79*	0.10
n	1399	1399	1399	1399	1399	1399	1399
R-sqr	0.535	0.327	0.973	0.950	0.977	0.934	0.992

Notes: t-statistics are in parentheses. (*) represents significance at the 10 percent level; (**) represent significance at the 5 percent level; (***) represent significance at the 1 percent level. Additional control variables include 1990 values of all dependent variables, 1990 values of USDA/ERS amenity index, presence of an interstate, proportion of county residents with a college degree. See text for further details.