

1. Introduction

The historical legacy of Euro-American expansion and the resulting displacement of American Indians created a patchwork of American Indian reservations that occupy a distinct demographic, socioeconomic, political, legal, and institutional space in the United States (Wilkins 2002). For instance, most American Indian reservations tend to have, by national standards, lower levels of human capital, poorer housing stocks, and lower incomes (Native Nations Institute, or NNI, 2016). Reservations may also differ in key socio-economic dimensions from nearby non-reservation counties (Ockert 2010).

Social scientists have investigated various explanations for these disparate outcomes for American Indians on reservations. One strand of research examines demographic/socioeconomic differences, including human capital levels (Akee et al. 2010; Feir 2014; Gitter and Reagan 2002). A second has examined political institutions (Cornell and Kalt 2000; Jorgensen and Taylor 2000). A third strand of the literature has examined legal and civil jurisdictions (Goldberg and Champagne 2006; Dimitrova-Grajzl et al. 2014; Anderson and Parker 2008; Cookson 2014; Brown et al. 2016a, 2016b). A fourth has examined property institutions and land tenure as a potential determinant of economic development on American Indian reservations (Anderson and Lueck 1992; Akee 2009; Carlson 1981, 1983; Trospen 1978).

Collectively, these studies suggest that reservations' nonstandard land and property rights, as well as real or perceived jurisdictional and political issues, may discourage business development on American Indian reservations relative to nearby non-reservation areas. These obstacles go above and beyond the frequently encountered impediments of remoteness and low education and income levels that exist for many American Indian reservations. However, it has not been possible to assess the extent to which these obstacles have hindered businesses on American Indian reservations due to the lack of data on reservation businesses (Native Nations Institute 2016, p. 53).

To address this data gap, and as a preliminary step toward resolving the deeper issues, we have created and analyzed the first comprehensive data set on reservation businesses and other reservation employers.¹ After linking the U.S. Census Bureau's Standard Statistical Establishment List (SSEL) and Longitudinal Business Database of establishments with employees (employer establishments), we geocode (i.e., assign longitude and latitude coordinates to) the address of each establishment and use the

¹ The data contain all workplace establishments that file Social Security taxes or withhold federal payroll taxes for their employees. This includes most private business employers and most nonprofit and government-held establishments with employees.

location coordinates to create new variables that identify whether an establishment is located in an American Indian reservation (and if so, which one). One purpose of this paper is to summarize the data issues confronted in this process and the methods employed to create new information on reservation employers.

A second purpose is to provide an initial description of the employer segment of the reservation economy, in terms of sectoral distribution, per-capita employer counts, and number of jobs provided by reservation employers. We find that, on average across 18 industries, reservations have a similar sectoral distribution of employer establishments but a significantly smaller overall number of employer establishments per capita than that in adjacent county areas. This difference is especially clear for reservations with fewer than 15,000 residents, which account for the vast majority of reservations and over half of reservation residents. By contrast, the total number of jobs per capita on reservations is, on average, at par with, or somewhat higher than in nearby county areas but skews toward casino-related and government employers. An implication is that the average number of jobs per establishment is higher in these sectors on reservations, including those with populations below 15,000.² The remaining sectors of the economy, thus, appear sparser in terms of per-capita establishments and jobs provided.

A third goal is to begin to explore the extent to which the differences between reservation and nearby non-reservation areas are related to common, observable correlates of development. We find that two economic geography variables—population density and rural location—account for very little of the differences, perhaps because the majority of the establishments in our sample lie outside of metropolitan areas (see Table 1). Indicators of income and education can statistically account for many but not all of the reservation-county differences, but further work, beyond our reduced-form equations, would be needed to clarify the causal relationships underlying these multivariate correlation results.

The next section details the data set creation and variable definitions. In Section 3 we discuss a conceptual framework for the analysis. Section 4 provides empirical results. Section 5 briefly summarizes our findings.

2. Data Set Creation and Description

We primarily use the U.S. Census Bureau’s Center for Economic Studies’ Longitudinal Business Database (LBD), which is available to researchers as a restricted-use data set. From 1975 on, the LBD contains annual employment, payroll, and industry classification data for all workplace establishments that file Social Security taxes or withhold federal payroll taxes for their employees (Jarmin and Miranda

² We use the term “jobs” to refer to paid positions at an employer establishment. It excludes self-employment or work as a sole proprietor.

2002; Fairman et al. 2008; 2016 personal communication from Kristin McCue of the U.S. Census Bureau).³ In this initial analysis, we use only the data for 2010. We link these LBD records to establishment data in the 2010 SSEL maintained by the U.S. Census Bureau in order to obtain the establishment location information contained in the SSEL—the mailing and/or physical address of almost all 2010 employer establishments, as well as the Census-provided longitude, latitude, and Census block codes corresponding to many but not all of these addresses.

Notwithstanding the availability of SSEL data on longitude-latitude and block code for many establishments, we use SAS procedures and geographic data files to conduct our own geocoding of the 2010 establishment addresses.⁴ Multiple considerations led us to this decision. First, the Census geolocation data in the SSEL begin in 2002 but the business data available for analysis go back much further. Second, many SSEL records have missing latitude-longitude or Census block data, so we attempt to expand the set of records with usable geocodes. In addition, we have only limited documentation explaining how the geographic coordinates and Census block codes in the SSEL were determined. We use SAS procedures to geocode the physical addresses, where available, and the mailing address otherwise (on the assumption that the mailing address is also the physical address for those records).

Having geocoded almost all relevant 2010 addresses, we then assign establishments to reservations based on their geographic coordinates and TIGER/Line Shapefiles® for reservation boundaries.⁵ Finally, we override a small percentage of these reservation codes in cases where the establishment’s five-digit ZIP Code is inconsistent with our SAS-based results.⁶

These methods do not precisely geocode the location of all establishments. In some cases, the primary source of spatial measurement error is an uninformative or hard-to-process address, such as an address with a post office box number instead of a street number. For example, longitude and latitude were assigned based on a relatively precise street address for only about 71 percent of the establishments in the construction industry that our methods assigned to a reservation. For almost all of the remaining addresses assigned to reservations, longitudes and latitudes were based on the centroid of the

³ Sole proprietorships are not included in this data set; we intend to analyze this component of the reservation business sector in future work.

⁴ We use the SAS procedure GEOCODE, along with SAS’s 2010 street lookup file, to geocode nearly all establishment addresses merged from the 2010 SSEL into the 2010 LBD. For additional information on these SAS methods, see support.sas.com/rnd/datavisualization/maponline/html/geocode.html.

⁵ We use SAS’s PROC GINSIDE and U.S. Census Bureau 2010 TIGER/Line Shapefiles for reservations and their off-reservation trust land to determine if the establishment’s coordinates are located inside a reservation. If so, we assign the Census reservation ID code to the record, and if not we leave this field blank.

⁶ We imported into the Census Research Data Center a data set showing the degree of spatial overlap of all reservations and ZIP Code tabulation areas (ZCTAs). If our SAS-based method assigned an establishment to a reservation with less than a 0.0001 land area overlap with the establishment’s ZCTA, we changed the reservation ID code value for that establishment to a blank. Similarly, if our SAS-based method showed the establishment to be off-reservation but the establishment’s ZCTA had more than a 0.9999 land area overlap with a certain reservation, we assigned that reservation’s Census ID code to the establishment’s record.

establishment's ZIP Code area.⁷ As noted above, we overrode some of the centroid-based coordinates based on further analysis of ZIP Code area and reservation overlaps. Nonetheless, we cannot eliminate non-trivial spatial measurement error in our assignment of establishments to reservations.⁸ Although the empirical results presented below are based solely on our geocoding of SSEL addresses and are thus affected by this spatial measurement error, we obtain similar results if we instead use the longitude-latitude coordinates or Census block identifiers already present in the SSEL.⁹

In this analysis we restrict our sample to only federally recognized reservations in the contiguous 48 states and their nearby non-reservation areas. To operationalize our “comparison group” of non-reservation areas, we first use geographic information systems (GIS) software to partition counties that intersect with reservations into their reservation and non-reservation components. We generate a new set of polygons that are identical to the county itself for all counties that do not intersect with any reservations and the non-reservation component of counties that intersect with at least one reservation. We label these polygons “county complements.” We then restrict the set of county complements to those of counties included in at least one reservation's list of ten nearest county neighbors, based on centroid-to-centroid distance.

We also limit our sample to reservations and county complements with a 2010 population of less than 50,000. Among reservations, this excludes only Navajo, whose exceptionally large area and population make it an extreme outlier for our purposes. Our final data set with these restrictions contains spatially aggregated data on 277 American Indian reservations and 514 county complements.¹⁰ As shown in Table 1, the aggregates summarize information on about 281,000 establishments across 18 industries, including about 14,600 establishments on reservations.

⁷ For a very small fraction of records, SAS assigned longitude and latitude based on other address fields, such as Place (e.g., city).

⁸ In their discussion of the relationship between Business Register data (which are a superset of the 2010 SSEL data) and published statistics such as the County Business Patterns, DeSalvo, et al., (2016) note that “...the Census Blocks are not used for presentation of economic statistics, but serve as building blocks for larger geographic areas. Therefore, these fields may suffer from missing data. Starting in 2007, there are also some populated fields for latitude and longitude. The coverage by year ranges from 45–80 percent for the physical address field of individual establishments.” See also Davis and Holly (2006), p. 288.

⁹ That is, if we replace our geocoding and reservation assignment results with results based on Census geospatial information for all establishment records that have sufficient Census geospatial data, while retaining our results for the remaining establishment records in order to preserve the same sample of records overall.

¹⁰ We directly construct establishment and employee counts for the county complements using our location-augmented LBD data set. We construct the remaining variables for county complements using Census ZIP Code area estimates for 2010 and weights (from ArcGIS) showing the extent to which the land area of each ZIP Code area overlaps the land area of any reservation that intersect the county.

3. Conceptual Framework

A goal of this paper is to compare the employer segment of the economy on reservations and nearby county complement areas with respect to the number of employer establishments and number of jobs per capita, across 18 industries. Multiple factors might cause the per-capita number of employer establishments or jobs to differ between reservations and county complements.

As discussed above, social scientists have identified political, legal, and historical or institutional factors on American Indian reservations that may impede business development. For example, the underlying titles to American Indian lands on reservations are held in trust by the U.S. federal government both for the tribal governments and for the individual American Indians who hold the usufructuary rights. Trust land differs from fee simple land in that it cannot be used as easily as collateral for a commercial mortgage. This is due to the fact that commercial banks must make nonstandard arrangements and use often unfamiliar procedures to secure their interest in or foreclose upon lands held in trust by the U.S. federal government for tribes or tribal members. Possibly as a result, Dimitrova-Grajzl et al. (2015) find a low usage of consumer mortgage credit on reservations as compared to adjacent areas. Despite some mitigating factors,¹¹ it is quite plausible that reservation businesses' access to mortgages is also affected. In addition, only some tribes have adopted business laws for non-real-estate collateral that closely parallel the relevant title (IX) of the Uniform Commercial Code (UCC) that state collateralized-lending laws are based on (Woodrow 2011). There is a positive association between adoption of uniform commercial codes and the prevalence of self-employment reported on American Indian reservations included in the small sample of reservations studied by Akee (2012), suggesting that the failure of some tribal business codes to parallel the UCC may be a barrier to reservation business development.¹² Further such examples include underfunded, underdeveloped infrastructure; a lack of financial institutions on or near reservations; many Native Americans' relatively limited experience with the financial world; lenders' and investors' general failure to understand tribal government or legal systems; the historical absence of trust between tribes and banks; and discrimination against and stereotyping of tribal community members (NNI 2016).

¹¹ Akee (2009) and Akee and Jorgensen (2014) have shown that extension of leasing options can facilitate housing and business infrastructure investment that mirrors that of off-reservation land parcels in Southern California. Additionally, Native-owned community development finance institutions (CDFIs) have proliferated through Indian Country and, for a variety of purposes, provide increased access to credit and financial services to Native communities. And for American Indian home buyers, the U.S. Department of Housing and Urban Development (HUD) offers the Indian Home Loan Guarantee program that guarantees mortgages on American Indian lands and helps to encourage home mortgage lending by commercial lenders. In recent years, however, the vast majority of loans made under this HUD program have been on fee simple land, not trust land (Jorgensen 2016).

¹² However, Akee's findings are based on a small sample of American Indian reservations, and additional data and analysis would be required to identify true causal effects.

Demographic and socioeconomic differences between reservations and nearby areas may also lead to different business patterns. To the extent, for example, that reservations have relatively low incomes or population densities, the effective demand for goods and services may not be sufficient to support the number of consumer-oriented establishments found in more affluent or densely populated off-reservation locations (Berry and Garrison 1958). Alternatively, workforce issues, such as low population or limited educational attainment, may inhibit placement of production facilities on reservations. This can feed back into other sectors as well, given the finding of Shonkwiler and Harris (1996) that retail firms in rural areas are dependent upon the presence of retail demand from other industries and the finding of Blair et al. (2004) that the presence of a large manufacturing sector in rural areas has a positive association with a strong retail sector.

Competition from suppliers in adjacent areas can also shape the mix of industries in rural and reservation economies. There is some evidence that rural areas are demanding more nonlocal services over time (Kilkenny and Partridge 2009) and using more nonlocal sources of finance (Tolbert et al. 2014). Mushinski and Weiler (2002) have also found that significant geographical interdependence exists for most retail industries, and that spatial competition on the supply side is particularly important. This could have important implications for how retailers and their suppliers are distributed in reservations and adjacent areas. Similarly, Hammond and Thompson (2001) find that in the period 1969–1997 rural communities as a whole increasingly lost retail services and businesses, although there was substantial upward and downward movement in concentration within rural areas. The business environment differences across reservations and their neighbors could underlie substantial mobility in industrial distribution.

These economic development factors can potentially affect employer and job numbers in the many small, low-income, or rural American Indian reservations (Akee and Taylor 2015). However, there is some significant variation in average annual income for American Indians, especially after the advent of casino operations, so it is possible to gain a better understanding of the role of demand-side factors, relative to supply-side and institutional barriers to development.

One area that has been little studied is whether tribal governments fill the void when the number of commercial business enterprises on American Indian reservations is low. Legislation and court decisions since the 1970s have clarified the authority of tribal governments to establish and operate business enterprises on reservation trust land. The National Indian Gaming Regulatory Act (NIGRA) gives many tribes the option of owning casinos, and Title 17 of the Code of Federal Regulations provides additional authority for the establishment of tribal corporations that may own and operate commercial enterprises for the purpose of raising revenue for tribal governments (whose ability to raise revenue from

property taxation is limited by the prevalence of trust lands on reservations).¹³ Tribally owned and operated businesses may have certain tax and jurisdictional advantages (as well as disadvantages) over that of businesses located in complementary counties. Existing research provides little information about whether tribally owned enterprises offset some of the disadvantages that reservations face in attracting employers and jobs. We show that, with tribal employer entities under Title 17 included, reservations have, on average, fewer employer establishments per capita than nearby off-reservation county areas but, on average, achieve or surpass parity in jobs per capita due to the presence of many casino-related and public sector jobs.

Although we do not attempt here to resolve most of the issues raised above, our empirical analysis is the first to comprehensively compare reservation-based employer establishments to nearby county-based employer establishments. We first estimate purely descriptive regressions that summarize the differences in establishment and job numbers between reservations and nearby county areas, as functions of population size. We then add geographic and economic controls that statistically account for many but not all of the differences summarized by our descriptive regressions.

4. Results

For the 18 industries shown in Table 1, which reflect the North American Industry Classification System (NAICS) two-digit sector codes, we examine the differences in the per capita number of employer establishments and jobs across reservation and nearby non-reservation geographies, as of 2010. We begin by presenting summary statistics on reservations and nonparametric comparisons of reservations and nearby county complement areas. We then present, for the 18 industries in Table 1, a regression-based description of how the number of employer establishments and their number of employees increase with population on reservations versus county complements.

A. Background Statistics on Population and Establishments

Our analysis focuses on whether there are reservation-versus-county differences in the number of employer establishments or jobs per capita. In light of the population threshold effects documented in Berry and Garrison (1958) and subsequent papers, we first show, in Figure 1, the population distributions for the reservation and county complement areas in our sample. Threshold effects may be especially relevant to American Indian reservations, which cluster at the low end of the population distribution in

¹³ Most tribally owned enterprises will be included in our LBD data set, since most will have employees and be required to withhold federal payroll taxes for them.

Figure 1, below 15,000. The nearby county complement areas are much more evenly distributed across the population bins, up to our sample cutoff point of 50,000. These basic results help to explain our focus on population size as an important characteristic in the comparison of establishment and job counts on and off reservations. Specifically, over half of the on-reservation population lives in communities of less than 15,000 people, and this alone may be an important predictive characteristic for the presence of employer establishments and the number of jobs.

Establishments Per Capita. Figure 2 shows that the composition of employer establishments by industry is similar in reservations and county complements. The blue bars in Figure 2 indicate the percent of all reservation employer establishments in each industry. The red bars provide the same measure for the county complements. Overall, it appears that there is little difference in the distribution of employer establishments across industries for these two geography types. The largest differences, proportionally, are in Mining, Quarrying, and Oil and Gas Extraction (hereafter “Mining”) and Educational Services, but these two sectors account for just a small share of the total number of all establishments.

Although the distribution of establishments across sectors is similar in reservations and nearby county areas, the number of establishments per person is typically lower on reservations than in county complements, overall and in most sectors. Figure 3 shows this by plotting Table 1’s reservation establishment parity ratios by industry. The numerator of this ratio (by industry and for all industries overall) is the percentage of all establishments in the sample that are located on reservations. The denominator is the same in each case and equals the percentage of the total population (of reservations plus county complements) that lives on reservations, or 8.2 percent. A ratio of 1 then indicates parity—the same number of employer establishments per person on reservations as in county complements. Ratios below 1 indicate fewer employer establishments per person on reservations, and the opposite for ratios above 1. The “Total” row of Table 1 shows an overall parity ratio of 0.63 (or $5.2/8.2$), indicating about 37 percent fewer employer establishments per person on reservations than in nearby county complement areas overall. The industry-specific parity ratios in Figure 3 show that reservations have a similar deficit of employer establishments per person in most industries. The biggest exceptions are again the Mining sector (parity ratio of 1.35) and the Education sector (parity ratio of 1.08).

Jobs Per Capita. Figure 4 shows that, unlike the composition of establishments, the composition of jobs per capita by industry differs considerably between reservations and county complements. In most sectors, notably large sectors such as Manufacturing, Retail Trade, and Health Care and Social Assistance, jobs per capita appears much higher in nearby county areas than on reservations. The reverse is true for Arts, Entertainment, and Recreation; Accommodation and Food Services; Public Administration; and a few smaller sectors.

Although job provision per capita is lower on reservations in most sectors, reservations' large advantage in a few sectors causes overall jobs per capita on reservations to be somewhat higher than in nearby county complements. The bottom row of Table 2 shows that the jobs parity index for total reservation jobs is 1.12, which means that the share of jobs on reservations is 12 percent higher than the reservation share of total population (reservation plus county complement) in our sample. Figure 5 shows the jobs parity index by industry, with results that parallel Figure 4. Reservations have a very distinct advantage (relative to county complements) in jobs per capita in the Arts, Entertainment, and Recreation sector, which includes the gaming industry; another large advantage in Public Administration; and moderate advantages in the Accommodation and Food Services; Management of Companies and Enterprises, Administrative and Support, and Waste Management and Remediation Services (hereafter "Management"); and Other Services (except Public Administration) sectors. However, in several economically important sectors, such as Manufacturing; Retail Trade; and Health Care and Social Assistance; reservations display large deficits (relative to county complements) in jobs per capita, just as they showed for establishment per capita in Figure 3. Overall, the position of reservations relative to county complements is more varied by sector for jobs per capita than for the number of establishments per capita, and reservations hold a moderate advantage in total jobs per capita in part due to their very high job numbers in the casino-driven Arts, Entertainment, and Recreation sector and in Public Administration.

It is important to note, however, that these results are averages across all the reservations and county complements in our sample and do not hold uniformly for each reservation. The job situation on a remote reservation with at most a small casino could be very different from the overall average shown in Figure 5 or the situation on a near-urban reservation with a large casino.

B. Descriptive Regression Analysis of Establishments and Jobs Per Capita

The non-parametric results above show a sizable deficit of establishments on reservations and mixed results for jobs per capita but leave many questions unanswered, such as whether the raw differences are statistically significant and how they vary across reservations. To answer some of these questions, we fit descriptive regressions that relate both employer establishments per capita and jobs per capita to population size and reservation location, to capture how the relative position of reservations and county areas may vary with population size. Specifically, we use weighted least squares, with population as the weight to fit a descriptive regression equation with the following form:

Equation 1:

$$\left(\frac{E}{P}\right)_i = \alpha + \beta_1 Population_i + \beta_2 Population_i^2 + \beta_3 Reservation_i + \beta_4 (Reservation_i \times Population_i) + \beta_5 (Reservation_i \times Population_i^2) + \varepsilon_i$$

The outcome variable $(E/P)_i$ is either establishments or jobs per capita for the i^{th} area (a reservation or a county complement) in 2010. We conduct this analysis separately for each of our 18 two-digit NAICS categories. There is a common intercept term included in the model. The variable *Reservation* equals 1 if the observation is an American Indian reservation and is 0 if it is a county complement. To allow for a nonlinear relationship between *P* and *E*, we include a simple count of population for the geographic unit as well as its squared term in the regression, and we interact the reservation indicator variable with these two population measures.¹⁴ This full set of interaction terms allows counties and reservations to have fully independent E-P relationships. The random variable ε_i represents the error term. Our baseline descriptive regression includes only this parsimonious selection of variables. However, we also estimate augmented specifications that include additional variables to control for factors such as rural location, population density, income, poverty, and educational attainment for the geographic unit.

It is important to note that our analysis is not intended to identify causal relationships in any sense. Our descriptive and augmented regression results will be interpreted as conditional partial correlations between the right-hand side variables and the outcome variables above. In this framework, a reservation deficit can be interpreted as a residual deficit after holding constant typical correlates of development, and it is likely to represent a conservative estimate of the impact of factors that are uniquely present in reservations (since many of the additional control variables are likely endogenous). Nevertheless, this is the first time that it has been possible to identify the industry, count, and size of employer establishments by reservation status.

The full set of estimated regression coefficients and related analyses, sector-by-sector, of how establishment or job numbers vary with population on reservations as compared to nearby county complement areas appears in a separate technical appendix (Akee et al. 2017). In this paper, we show selected results that illustrate the key patterns found. One important pattern—a tendency in many industries for the number of both establishments and jobs per capita to be lower on reservations than in county complements for population levels below about 15,000—is illustrated in Figures 6 and 7, for the sector Agriculture, Forestry, Fishing, and Hunting. These figures are based on the corresponding fitted

¹⁴ Berry and Garrison (1958) provide an early discussion of the nonlinearity of this relationship at the local level in the U.S.

regression coefficients and variance-covariance matrices shown in Tables 3 and 4. In both Figure 6 and Figure 7, the solid lines at the center of the shaded areas are lines of best fit for Equation 1, computed as shown in Equation 2, where E = the number of either establishments or jobs; a = the fitted value of α , B_i = the fitted value of β_i , for $i = 1, 2, 3, 4$, and 5 ; P = population, and R = the dummy variable for location on a reservation. Setting $R = 0$ yields the line of best fit for county complements (thinner line), and $R = 1$ yields the corresponding best-fit line for reservations (thicker line).

Equation 2:

$$(E) = aP + B_1P^2 + B_2P^3 + B_3(RP) + B_4(RP^2) + B_5(RP^3)$$

Each line is surrounded by a shaded area, red for county complements and blue for reservations. These shaded areas represent a 90 percent confidence region around the line of best fit. To calculate these regions, we randomly drew 1,000 sets of coefficients from a multivariate normal distribution with the fitted coefficients as the mean and their estimated variance-covariance matrix as the variance matrix. Then we used Equation 2 to calculate E as a function of P and R for each draw. The shaded region shows, for each level of P , the middle 90 percent of the resulting distribution of the fitted values for both county complements ($R = 0$) and reservations ($R = 1$). That is, for each value of population P , 5 percent of the fitted values of E were above the shaded region and 5 percent were below, for both county complements and reservations (separately).

In Figure 6, the 90 percent confidence interval for reservations noticeably widens as population increases, in part because the number of areas (i) becomes very small at the high end of the population range. Specifically, in our sample only the 11 reservations shown in Table 5 have populations over 15,000. Because the county complements in our sample are more numerous and their population sizes are more evenly distributed, the 95 percent confidence interval for those estimates are more precisely estimated and widen less as population increases, for most industries.

Figures 6 and 7 show that the fitted numbers of Agriculture, Forestry, Fishing, and Hunting employer establishments and jobs tend to be significantly lower on reservations relative to county complements for population levels up to about 15,000. Beyond 15,000, the confidence intervals are wide (especially for reservations) and often overlap.

This pattern—significantly lower numbers of both establishments and jobs on reservations over a range of lower population values—prevails in a slight majority of industries, as we show in graphs similar to Figures 6 and 7 but for all 18 sectors in Akee et al. (2017). A reservation deficit at lower population levels is especially common for employer establishments; this gap appears in all industries for

populations of 7,500 or less and in all but 3 industries in areas of up to 15,000 people. Beyond 15,000, there is often an overlap of the confidence intervals of the number of establishments for the two geography types. In a few cases (Mining, Wholesale Trade, and Transportation and Warehousing), there's evidence that at higher population sizes, reservations have a higher establishment count than the county complements.

An alternative summary of these findings for employer establishments appears in Table 6, which covers all 18 sectors. Industry categories are presented along the Y-axis and range from Agriculture, Forestry, Fishing, and Hunting (NAICS 11) to Public Administration (NAICS 92). (See Table 1 for a full set of sector names and NAICS codes.) Population size is given along the X-axis (in thousands). Each sector-population cell in the table reports its respective establishment gap—the fitted number of county complement establishments minus the fitted number of reservation establishments. For each industry, orange-colored cells show population cells where the number of employer establishments on reservations is significantly lower, based on 90 percent confidence regions computed with our randomly drawn coefficients. The light yellow color indicates a reservation deficit that is not significant. The gray color marks cells where reservations have an advantage that is not significant, and the blue-color shows cells where reservations have significantly higher amounts of employer establishments as compared to county complements. Table 6 clearly shows that statistically significant employer establishment deficits on reservations are common across the sectors for population levels below 15,000.

At higher population sizes, Table 6 reflects the more mixed results discussed above. The prevalence of light yellow and gray cells at high population levels, signifying insignificant differences, may be due to the fact that there are relatively few American Indian reservations with large populations and, thus, standard errors are quite large, making it difficult to estimate differences efficiently. In addition, at higher population levels in a few industries (Mining, Education, Wholesale Trade, and Transportation and Warehousing) we find significantly more predicted employer establishments on reservations. Again, however, these limited results pertain primarily and only on average to the 11 large but quite diverse reservations listed in Table 5 (and, in particular, should not be assumed to hold for all of the 11 individually or for the much larger Navajo reservation, which we did not analyze).

Table 7 provides a summary of the county-reservation gaps for job numbers. It shows significant job number deficits for reservations in many but not all industries when population is low. However, it also shows the reverse over some low population ranges in four industries: Management; Arts, Entertainment, and Recreation; Other Services (except Public Administration); and Public Administration. Table 7 also shows a greater number of reverse deficits (county complements significantly less than reservations) at higher population levels than we saw for employer establishment numbers. Overall, the pattern for jobs is more mixed across sectors than the pattern for establishments,

although for reservations with populations below 12,500, a significant deficit remains the most common pattern, especially outside of the sectors arguably related to tribal casinos, tribal government, and tribal enterprises.

The fact that significant reservation establishment gaps are more common across sectors than significant reservation job gaps, especially for reservations with fewer than 15,000 people, suggests that the average number of employees per establishment may be higher on small reservations in some sectors. In Akee et al. 2017, we present figures that verify that this is indeed the case in many sectors, at least over some low population range. Higher reservation jobs per establishment for populations below 15,000 is very distinct in sectors such as Arts, Entertainment, and Recreation; Accommodation and Food Services; Other Services; and Public Administration, but prevails to a lesser degree and often over a more limited population range in some other sectors as well. In addition, for the 11 reservations with populations above 15,000, Tables 6 and 7 imply that, on average, reservations have higher jobs per establishment than county complements in the following industries: Construction; Wholesale Trade; Transportation and Warehousing; Finance and Insurance; Information; Management; and Educational Services.

C. Regression Analysis with Additional Control Variables

Although we do not attempt a causal analysis of the reservation-county gaps, we did examine the extent to which additional control variables commonly used in the spatial density literature affect the basic descriptive patterns discussed above. We first added two economic geography variables—rural location and population density¹⁵—that tend to change gradually with distance and are thus likely to affect reservations and their neighboring county areas somewhat evenly. In a second step, we added three measures of personal outcomes¹⁶—per capita personal income, the poverty rate, and the percentage of adults (25 years old and older) with a bachelor’s degree—whose values can vary significantly over short distances, depending on the nature of the local economy. Thus, the causality links between this second group of variables and either establishment numbers or jobs can easily flow in either or both directions.

¹⁵ For county complements, rural location is an indicator variable equal to 1 if the U.S. Department of Agriculture’s 2013 Rural-Urban Continuum Code is greater than 3 and 0 otherwise. Reservations are assigned the same value as their nearest county (based on centroid-to-centroid distance). Population density is measured as square miles per person, based on 2010 *Census Gazetteer* data on population and the land area of county complements and reservations.

¹⁶ The data are from the 2008–2012 American Community Survey (ACS). For counties that overlap one or more reservations in our sample, we compute the value of these variables using land area weights and ACS data on ZCTAs. That is, we adjust the raw ACS value for a ZCTA by multiplying it by the fraction of the ZCTA’s land area that lies inside the county but outside of all reservation boundaries. County complement values are constructed by aggregating over their ZCTAs. (We separately aggregate the numerator and denominator of our ratio variables and then divide.)

By contrast, we might expect that establishment and job numbers are less likely to strongly affect the two economic geography variables (rural location and population density), although such effects are clearly possible, especially for locally dominant industries.

Tables 8 and 9, in the same format as Tables 6 and 7, show the results for adding rural location and population density.¹⁷ Although not identical to Tables 6 and 7, Tables 8 and 9 show only minor alterations. That is, accounting for two important economic geography variables does not materially change the general pattern of establishment and job gaps between reservations and nearby county complements discussed above. This is in part due to the fact that we chose a geographically adjacent comparison group of non-reservation areas, limiting the sample variation in “rurality.”

Much larger changes appear when we add the three measures of local area personal outcomes, as shown in Tables 10 and 11. A majority of industries still show a significant shortfall in the number of establishments on reservations when the local population is at or below 10,000, but now several industries (Mining; Construction; Manufacturing; Management; Educational Services; Arts, Entertainment, and Recreation) fail to show a significant shortfall of establishments even at low population levels. For jobs, only a few industries in Table 11 consistently show a significant reservation deficit for populations at or below 10,000 (Agriculture, Forestry, Fishing, and Hunting; Utilities; Wholesale Trade; and Educational Services). Instances of the reverse, where reservations exhibit a significant job advantage even for relatively low values of population, also diminish somewhat. Overall for establishment numbers and jobs, an increase in the share of insignificant differences prevails in the lower population ranges of Tables 10 and 11, as compared to Tables 6 and 7. In this sense, the additional personal outcome variables statistically account for many, but not all, of the reservation-county differences that were significant in Tables 6 and 7 at population levels of 15,000 or less.

Our multivariate regressions do not reveal the causal relationships between the additional control variables and the reservation-county differences in establishment or job numbers. For example, for relatively low levels of population, Tables 6 and 7 show that the construction sector has significantly fewer establishments and jobs on reservations than in county complements, but Tables 10 and 11 show that these reservation-county differences become insignificant when we control for personal income, poverty, and college graduation. This change could arise because certain reservations and counties have resource endowments that promote the presence of a strong construction sector, which in turn provides jobs, raises local incomes, and lowers local poverty. Alternatively, high (low) personal income could

¹⁷ We produce these tables by setting the additional control variables at their mean values and then following the same procedures as for Tables 6 and 7 but with two additional coefficients. In Akee et al. 2017 we use these procedures to also produce figures similar to Figures 6 and 7 for this model and all 18 sectors. The same procedures but with 11 coefficients are also used to produce Tables 10 and 11 as well as the corresponding figures for all sectors in Akee et al. 2017, which also displays the estimated coefficients and variance-covariance matrices for these models.

serve as a marker for underlying business environmental factors that promote (inhibit) the success of the construction sector, and there are other possible linkages. We can only say that the fact that the additional variables diminish the number of sectors with significant differences suggests that further work on the causal linkages would be useful.

Summary

Using a newly linked confidential-use data set (U.S. Census Longitudinal Business Database), we are the first to identify employer establishments located on American Indian reservations and make useful comparisons to comparable establishments in nearby county areas. Our analysis focuses on the number of employer establishments and jobs per capita across 18 industry categories. We find that there tend to be large deficits in the per capita number of employer establishments located on reservations relative to county complements overall and for all industries when area populations are below 15,000. The pattern of reservation-county differences in jobs per person is more mixed, reflecting the fact that reservation-based establishments in several sectors, and especially those associated with gaming and government (i.e., Arts, Entertainment, and Recreation; Accommodation and Food Services; Public Administration), employ a higher number of workers per establishment than their county complement counterparts. Adding basic economic geography variables has little effect on these results. Adding measures of residents' economic and educational success reduces the number of significant differences generally and the incidence of significant reservation deficits relative to counties, but further work is needed to understand the causal relationships underlying the reservation-county difference we document.

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Table 1: Establishment Overview by Industry

Industry	NAICS codes	Total Establishments	Percent on Reservations	Percent Rural	Implied # of Reservation Establishments	Reservation Establishment Parity Index*
Agriculture, Forestry, Fishing and Hunting	11	29000	4.7%	87%	1363	0.57
Mining, Quarrying, and Oil and Gas Extraction	21	2400	11.0%	92%	264	1.35
Utilities	22	2200	4.6%	87%	101	0.56
Construction	23	31000	5.1%	84%	1581	0.62
Manufacturing	31, 32, 33	12000	4.6%	83%	552	0.56
Wholesale Trade	42	10000	5.9%	84%	590	0.72
Retail Trade	44, 45	40000	5.1%	88%	2040	0.62
Transportation and Warehousing	48, 49	11000	5.8%	84%	638	0.71
Information	51	4300	5.2%	88%	224	0.64
Finance and Insurance AND Real Estate and Rental and Leasing	52, 53	23000	4.8%	87%	1104	0.59
Professional, Scientific, and Technical Services	54	17000	5.1%	86%	867	0.62
Management of Companies and Enterprises; Administrative and Support; and Waste Management and Remediation Services	55, 56	10000	5.6%	84%	560	0.68
Educational Services	61	3400	8.8%	86%	299	1.08
Health Care and Social Assistance	62	24000	5.4%	86%	1296	0.66
Arts, Entertainment, and Recreation	71	5400	5.4%	86%	292	0.66
Accommodation and Food Services	72	25000	5.0%	88%	1250	0.61
Other Services (except Public Administration)	81	26000	4.7%	85%	1222	0.57
Public Administration	92	5600	6.4%	88%	358	0.78
Total		281300	5.2%	86%	14601	0.63

Note: Figures are approximate, in keeping with Census Bureau disclosure rules.

* Index = Percent on Reservations/8.2, where 8.2 is the percentage of the population (reservations plus county complements) on reservations.

Table 2: Job Number Overview by Industry

Industry	NAICS codes	Total Jobs	Percent on Reservations	Implied Reservation Jobs	Reservation Jobs Parity Index*
Agriculture, Forestry, Fishing and Hunting	11	138000	4.88%	6734	0.60
Mining, Quarrying, and Oil and Gas Extraction	21	54000	5.26%	2840	0.64
Utilities	22	31000	4.18%	1296	0.51
Construction	23	144000	7.15%	10296	0.87
Manufacturing	31, 32, 33	392000	3.68%	14426	0.45
Wholesale Trade	42	100000	6.94%	6940	0.85
Retail Trade	44, 45	416000	6.51%	27082	0.79
Transportation and Warehousing	48, 49	92000	6.49%	5971	0.79
Information	51	42000	8.72%	3662	1.06
Finance and Insurance AND Real Estate and Rental and Leasing	52, 53	128000	7.38%	9446	0.90
Professional, Scientific, and Technical Services	54	90000	6.28%	5652	0.77
Management of Companies and Enterprises; Administrative and Support; and Waste Management and Remediation Services	55, 56	109000	11.13%	12132	1.36
Educational Services	61	341000	8.07%	27519	0.98
Health Care and Social Assistance	62	462000	6.33%	29245	0.77
Arts, Entertainment, and Recreation	71	84000	40.45%	33978	4.93
Accommodation and Food Services	72	337000	13.47%	45394	1.64
Other Services (except Public Administration)	81	133000	12.50%	16625	1.52
Public Administration	92	196000	21.63%	42395	2.64
Total		3289000	9.17%	301632	1.12

Note: Figures are approximate, in keeping with Census Bureau disclosure rules.

* Index = Percent on Reservations/8.2, where 8.2 is the percentage of the sample population (reservations plus county complements) living on reservations.

Table 3: WLS Regression Results for Number of Establishments*

Agriculture, Forestry, Fishing, and Hunting

Variable:	Intercept	P (1000s)	P*P	R	R*P	R*P*P
Fitted Coefficients:	1074.688	-51.3163	0.6925	-997.579	65.4025	-1.001
Std. Error:	51.9444	4.2141	0.0756	99.3396	10.7923	0.2181
T Statistic:	20.6892	-12.1772	9.1635	-10.0421	6.0601	-4.5906
VCV	Intercept	P (1000s)	P*P	R	R*P	R*P*P
Intercept	2698.222	-201.848	3.2617	-2698.22	201.8482	-3.2617
P (1000s)	-201.848	17.7588	-0.3106	201.8482	-17.7588	0.3106
P*P	3.2617	-0.3106	0.0057	-3.2617	0.3106	-0.0057
R	-2698.22	201.8482	-3.2617	9868.356	-890.668	15.2936
R*P	201.8482	-17.7588	0.3106	-890.668	116.4742	-2.2602
R*P*P	-3.2617	0.3106	-0.0057	15.2936	-2.2602	0.0475
R-Squared:	0.284	*Establishments were expressed as number per 100,000 local area residents				

Table 4: WLS Regression Results for Number of Jobs*

Agriculture, Forestry, Fishing, and Hunting

Variable:	Intercept	P (1000s)	P*P	R	R*P	R*P*P
Fitted Coefficients:	275.5501	-7.1535	0.0694	-266.195	16.5714	-0.2434
Std. Error:	32.1735	2.6102	0.0468	61.5294	6.6846	0.1351
T Statistic:	8.5645	-2.7406	1.4837	-4.3263	2.479	-1.8022
VCV	Intercept	P (1000s)	P*P	R	R*P	R*P*P
Intercept	1035.137	-77.4364	1.2513	-1035.14	77.4364	-1.2513
P (1000s)	-77.4364	6.8129	-0.1192	77.4364	-6.8129	0.1192
P*P	1.2513	-0.1192	0.0022	-1.2513	0.1192	-0.0022
R	-1035.14	77.4364	-1.2513	3785.864	-341.693	5.8672
R*P	77.4364	-6.8129	0.1192	-341.693	44.6838	-0.8671
R*P*P	-1.2513	0.1192	-0.0022	5.8672	-0.8671	0.0182
R-Squared:	0.0533	*Jobs were expressed as number per 10,000 local area residents				

Note: P = population; R = 1 for reservations and 0 for county complements.

Table 5: Reservations with 2010 Population between 15,000 and 50,000

Reservation	Population 2010
Nez Perce Reservation	18,437
Pine Ridge Reservation	18,834
Oneida (WI) Reservation	22,775
Uintah and Ouray Reservation	24,369
Agua Caliente Indian Reservation	24,545
Isabella Reservation	26,274
Wind River Reservation	26,481
Flathead Reservation	28,359
Yakama Nation Reservation	31,219
Puyallup Reservation	46,813
Osage Reservation	47,472

Note: P=population; R=1 for reservations and 0 for county complements.

Table 6: Establishment Count Gap—County Minus Reservation (Based on Fitted Coefficients of a Six-Variable WLS)

SECTOR	0.5	1.0	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5	25.0	27.5	30.0	32.5	35.0	37.5	40.0	42.5	45.0	47.5	50.0
11	5	9	21	35	42	44	42	36	28	18	7	-3	-12	-19	-23	-23	-18	-7	11	37	71	115
21	0	1	2	2	2	1	0	-2	-4	-7	-9	-12	-15	-17	-19	-21	-22	-22	-22	-21	-19	-16
22	0	0	1	2	2	2	2	2	2	1	1	1	0	0	0	0	1	2	3	5	7	
23	2	3	7	11	14	16	16	15	13	11	8	6	4	2	1	1	3	6	11	18	27	39
31_32_33	0	1	2	4	5	6	7	8	8	8	8	8	8	7	7	6	5	5	4	3	2	1
42	1	1	3	6	7	8	8	7	5	3	1	-2	-5	-9	-12	-16	-20	-23	-27	-30	-33	-36
44_45	2	4	9	15	19	21	22	22	20	19	17	16	15	15	16	19	24	31	41	54	70	90
48_49	1	2	4	7	8	9	8	7	5	3	0	-2	-5	-8	-11	-13	-14	-15	-16	-15	-13	-11
51	0	1	1	2	3	3	3	2	2	1	1	0	0	-1	-1	-1	-1	0	1	2	4	6
52_53	1	3	6	10	13	14	14	12	11	9	6	4	2	1	0	0	2	5	10	16	26	37
54	1	2	4	6	8	8	7	6	4	2	0	-2	-4	-5	-6	-6	-5	-3	1	6	13	22
55_56	0	1	1	3	3	4	4	5	4	4	3	3	2	0	-1	-3	-5	-7	-9	-11	-14	-16
61	0	0	1	1	1	1	1	0	0	-1	-1	-2	-2	-3	-3	-3	-3	-2	-1	0	1	3
62	1	2	4	7	8	8	7	5	2	0	-2	-4	-6	-6	-5	-2	3	9	18	30	45	63
71	0	0	1	2	3	4	4	5	5	6	6	6	6	6	6	7	7	7	7	7	8	8
72	1	3	7	11	14	15	15	13	12	10	8	6	5	5	6	9	13	20	29	40	55	73
81	1	3	6	11	15	17	18	18	18	17	15	14	12	11	10	9	9	10	12	16	20	27
92	1	1	3	4	5	6	6	6	5	5	4	3	3	3	3	3	4	6	8	11	16	21
Pop. (1000s)	0.5	1.0	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5	25.0	27.5	30.0	32.5	35.0	37.5	40.0	42.5	45.0	47.5	50.0

Table 7: Job Count Gap—County Minus Reservation (Based on Fitted Coefficients of a Six-Variable WLS)

SECTOR	0.5	1.0	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5	25.0	27.5	30.0	32.5	35.0	37.5	40.0	42.5	45.0	47.5	50.0
11	13	25	57	95	117	125	121	109	89	64	37	10	-15	-36	-50	-55	-49	-29	7	60	134	231
21	9	16	36	55	59	51	34	10	-19	-50	-81	-109	-132	-147	-152	-144	-121	-81	-20	62	170	306
22	3	5	12	20	25	28	28	26	24	21	18	15	13	13	14	19	26	36	51	71	95	125
23	3	7	16	31	42	50	53	52	44	31	10	-19	-57	-104	-161	-229	-309	-401	-506	-624	-758	-906
31_32_33	3	6	21	61	114	179	250	324	399	469	532	584	621	640	637	609	551	460	333	166	-44	-302
42	7	13	31	56	75	87	91	88	75	52	20	-23	-77	-143	-222	-314	-419	-539	-674	-824	-991	-1174
44_45	9	17	38	60	69	68	57	41	20	-1	-21	-38	-49	-52	-44	-22	14	69	144	242	365	515
48_49	3	7	16	32	44	54	59	60	54	42	22	-7	-46	-95	-155	-228	-314	-414	-530	-661	-809	-975
51	2	4	8	12	12	9	3	-5	-16	-29	-44	-60	-77	-95	-114	-133	-152	-170	-188	-204	-219	-233
52_53	6	12	24	33	29	15	-9	-39	-73	-109	-145	-178	-206	-228	-240	-241	-228	-199	-151	-84	7	122
54	5	9	21	35	42	43	37	27	11	-10	-34	-63	-94	-128	-165	-203	-243	-284	-325	-366	-407	-447
55_56	-4	-7	-11	-2	21	51	82	108	124	122	96	41	-50	-183	-365	-601	-897	-1261	-1697	-2213	-2814	-3507
61	10	19	37	41	18	-27	-87	-157	-230	-301	-364	-412	-441	-444	-416	-349	-239	-80	134	410	753	1169
62	18	34	72	109	117	101	66	19	-35	-91	-143	-184	-210	-215	-193	-139	-47	89	274	515	815	1182
71	-45	-86	-191	-309	-363	-365	-325	-254	-161	-59	44	136	206	245	241	185	64	-130	-409	-783	-1262	-1858
72	-44	-85	-185	-285	-311	-276	-190	-65	87	255	427	593	739	856	931	952	909	790	583	277	-140	-679
81	-6	-12	-29	-56	-82	-104	-124	-140	-152	-159	-162	-159	-150	-134	-112	-82	-44	3	58	122	197	281
92	-17	-34	-85	-172	-259	-344	-424	-498	-562	-616	-656	-681	-689	-676	-642	-583	-499	-385	-241	-65	147	396
Pop. (1000s)	0.5	1.0	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5	25.0	27.5	30.0	32.5	35.0	37.5	40.0	42.5	45.0	47.5	50.0

Legend for both tables:

- Reservation significantly lower
- Reservation lower, not significant
- County lower, not significant
- County significantly lower

Table 8: Establishment Count Gap—County Minus Reservation (Based on Fitted coefficients of an Eight-variable WLS)

SECTOR	0.5	1.0	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5	25.0	27.5	30.0	32.5	35.0	37.5	40.0	42.5	45.0	47.5	50.0
11	4	8	17	29	36	39	39	36	31	24	16	9	2	-3	-7	-8	-6	0	11	27	49	78
21	0	1	1	1	1	1	-1	-2	-4	-6	-9	-11	-13	-16	-18	-21	-23	-24	-26	-27	-27	-27
22	0	0	1	2	2	2	2	2	2	2	1	1	1	1	0	0	0	0	1	1	2	3
23	1	3	7	11	14	15	16	15	13	11	8	6	3	1	0	-1	0	2	5	11	18	28
31_32_33	1	1	2	4	6	7	7	8	8	7	7	6	5	4	3	2	1	0	0	-1	-2	-2
42	1	2	4	6	7	8	8	7	5	3	0	-3	-6	-10	-14	-18	-22	-26	-30	-34	-37	-40
44_45	2	3	8	14	17	20	21	20	19	17	15	12	10	7	5	3	3	3	5	8	13	20
48_49	1	2	4	6	8	8	8	7	5	3	0	-2	-5	-8	-11	-13	-15	-17	-18	-18	-17	-16
51	0	1	1	2	2	3	3	2	2	1	1	0	-1	-2	-2	-3	-3	-4	-4	-4	-3	-2
52_53	1	2	6	9	12	13	13	12	10	8	5	3	0	-3	-6	-7	-9	-9	-8	-6	-3	2
54	1	2	3	6	7	7	7	6	4	2	0	-3	-5	-7	-9	-10	-11	-11	-10	-8	-5	0
55_56	0	1	1	3	3	4	4	4	4	4	3	2	1	-1	-3	-5	-7	-10	-13	-16	-19	-23
61	0	0	0	0	1	0	0	0	0	0	-1	-1	-1	-2	-2	-2	-2	-3	-3	-3	-3	-2
62	1	2	4	7	8	7	6	4	2	-1	-4	-6	-8	-9	-10	-9	-7	-3	3	11	21	34
71	0	0	1	2	3	3	4	5	5	6	6	6	7	7	6	6	6	5	4	3	2	1
72	1	2	5	9	12	13	13	13	12	10	8	6	5	3	2	2	3	5	8	12	19	27
81	1	3	7	12	15	17	18	18	17	15	13	11	8	5	3	1	-1	-2	-2	-1	1	5
92	1	1	3	4	5	6	6	6	5	4	4	3	2	1	1	1	2	3	5	7	11	15

Table 9: Job Count Gap—County Minus Reservation (Based on Fitted Coefficients of an Eight-Variable WLS)

SECTOR	0.5	1.0	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5	25.0	27.5	30.0	32.5	35.0	37.5	40.0	42.5	45.0	47.5	50.0
11	11	22	50	85	106	116	116	108	94	75	54	32	12	-6	-19	-26	-24	-12	12	50	104	174
21	5	9	20	31	34	29	19	5	-13	-33	-53	-74	-93	-110	-123	-131	-132	-127	-112	-88	-54	-7
22	3	5	11	19	24	27	28	27	26	24	23	22	23	25	30	37	48	62	81	104	133	168
23	4	7	17	32	43	51	54	53	45	32	11	-16	-52	-97	-151	-215	-289	-375	-473	-582	-705	-842
31_32_33	10	21	53	109	165	222	277	329	377	419	455	482	500	507	501	482	449	399	331	245	138	10
42	8	16	36	64	84	94	96	88	71	45	8	-39	-96	-163	-242	-331	-432	-544	-667	-803	-950	-1110
44_45	8	15	33	52	60	59	49	32	9	-17	-45	-75	-103	-129	-152	-169	-179	-182	-174	-155	-123	-76
48_49	4	7	18	33	46	56	60	60	53	40	19	-11	-50	-99	-159	-231	-316	-414	-527	-654	-798	-958
51	2	3	7	11	11	8	2	-6	-17	-31	-46	-64	-83	-104	-126	-150	-174	-200	-226	-252	-279	-306
52_53	6	12	26	35	31	16	-9	-40	-77	-116	-155	-192	-225	-252	-270	-277	-271	-250	-212	-154	-74	31
54	5	11	24	39	46	46	39	25	5	-20	-50	-84	-122	-163	-208	-254	-302	-351	-401	-451	-501	-549
55_56	-4	-7	-10	-1	22	52	82	108	122	118	90	33	-61	-197	-381	-620	-920	-1286	-1726	-2245	-2850	-3546
61	6	12	21	17	-8	-50	-104	-166	-232	-297	-358	-409	-446	-466	-463	-434	-374	-279	-145	34	260	539
62	18	34	74	111	119	101	63	10	-53	-120	-187	-247	-297	-331	-343	-328	-282	-199	-74	99	324	606
71	-42	-81	-180	-292	-345	-350	-314	-249	-164	-68	30	119	190	233	240	199	102	-60	-298	-622	-1039	-1561
72	-44	-85	-184	-284	-310	-276	-191	-69	79	241	406	562	698	800	859	861	796	652	417	78	-374	-953
81	-6	-11	-27	-54	-79	-102	-123	-140	-154	-164	-169	-169	-162	-150	-130	-103	-67	-23	30	93	166	251
92	-15	-30	-78	-162	-248	-335	-419	-497	-568	-629	-676	-708	-721	-713	-681	-623	-536	-418	-265	-75	154	426

Legend for both tables:

- Reservation significantly lower
- Reservation lower, not significant
- County lower, not significant
- County significantly lower

Table 10: Establishment Count Gap—County Minus Reservation (Based on Fitted Coefficients of an Eleven-Variable WLS)

SECTOR	0.5	1.0	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5	25.0	27.5	30.0	32.5	35.0	37.5	40.0	42.5	45.0	47.5	50.0
11	3	5	12	18	20	19	14	7	-2	-12	-23	-33	-41	-48	-53	-54	-51	-44	-32	-13	12	45
21	0	0	0	0	0	-2	-3	-5	-7	-9	-11	-13	-16	-18	-20	-22	-24	-26	-27	-28	-29	-29
22	0	0	1	1	2	2	2	2	2	2	1	1	1	0	0	0	0	0	0	1	2	3
23	0	0	0	0	-1	-1	-2	-3	-4	-5	-6	-7	-7	-8	-7	-7	-6	-5	-2	0	4	8
31_32_33	0	0	0	0	-1	-1	-2	-3	-4	-5	-6	-7	-9	-10	-11	-12	-12	-13	-14	-14	-14	-14
42	0	1	2	4	4	4	3	2	0	-2	-5	-8	-11	-14	-18	-22	-26	-30	-34	-38	-42	-45
44_45	1	2	4	7	9	10	11	11	11	10	9	8	7	5	4	3	3	3	4	5	7	10
48_49	0	1	2	3	3	2	0	-2	-4	-7	-10	-13	-16	-19	-22	-25	-26	-28	-28	-28	-27	-25
51	0	0	1	1	1	1	1	1	1	0	0	-1	-1	-2	-2	-3	-3	-3	-4	-4	-4	-3
52_53	1	1	3	5	7	9	9	10	10	10	9	8	7	6	5	4	3	2	1	0	0	-1
54	0	0	1	2	4	5	6	7	7	8	9	9	9	10	9	9	8	8	6	5	3	1
55_56	0	0	0	0	0	1	2	3	3	4	5	5	5	4	3	2	-1	-4	-8	-12	-18	-25
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-2	-2
62	0	1	2	2	2	0	-1	-3	-6	-8	-10	-12	-13	-14	-14	-12	-10	-6	-1	6	15	26
71	0	0	0	0	0	1	1	2	3	4	5	6	6	7	7	7	7	6	5	3	1	-2
72	1	1	3	5	6	7	8	8	9	8	8	8	8	8	8	9	10	11	13	15	18	22
81	1	1	3	5	6	6	5	4	3	1	-1	-3	-5	-7	-9	-11	-12	-13	-13	-13	-12	-9
92	0	1	1	2	2	2	2	1	0	-2	-3	-4	-5	-5	-6	-6	-5	-4	-1	1	5	10

Table 11: Job Count Gap—County Minus Reservation (Based on Fitted Coefficients of an Eleven-Variable WLS)

SECTOR	0.5	1.0	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5	25.0	27.5	30.0	32.5	35.0	37.5	40.0	42.5	45.0	47.5	50.0
11	12	24	54	87	102	102	89	66	36	0	-38	-75	-110	-140	-162	-173	-172	-154	-119	-62	18	123
21	1	3	5	6	2	-5	-15	-26	-39	-53	-67	-80	-91	-101	-108	-111	-110	-104	-93	-75	-51	-19
22	2	5	11	18	23	26	27	27	26	25	25	25	26	29	34	42	53	67	86	109	137	170
23	1	1	4	13	24	36	47	56	63	64	59	46	24	-9	-54	-113	-187	-278	-386	-514	-663	-835
31_32_33	-5	-10	-24	-43	-59	-71	-81	-90	-97	-104	-112	-121	-132	-146	-163	-184	-210	-241	-278	-323	-375	-436
42	5	10	24	41	51	55	51	38	18	-11	-49	-96	-153	-220	-297	-386	-485	-596	-720	-855	-1003	-1164
44_45	-2	-4	-11	-25	-41	-59	-78	-98	-119	-140	-160	-179	-197	-213	-226	-237	-245	-248	-248	-243	-232	-216
48_49	2	3	8	16	22	25	20	10	-6	-29	-60	-99	-149	-209	-280	-364	-460	-571	-697	-839	-997	
51	0	0	-1	-3	-7	-12	-19	-28	-38	-50	-64	-79	-96	-114	-135	-157	-181	-207	-235	-264	-296	-329
52_53	2	4	7	4	-7	-26	-50	-78	-108	-139	-169	-197	-221	-240	-251	-255	-248	-229	-198	-151	-89	-8
54	4	8	23	51	84	119	154	189	221	249	271	286	291	286	268	235	187	121	37	-69	-197	-350
55_56	-6	-12	-21	-18	2	33	67	99	121	126	108	60	-24	-152	-330	-565	-864	-1233	-1679	-2210	-2830	-3549
61	16	31	68	108	124	121	102	72	34	-7	-47	-82	-107	-119	-114	-87	-34	49	166	321	518	762
62	8	14	27	24	-4	-51	-114	-186	-264	-343	-418	-484	-537	-571	-582	-565	-515	-428	-298	-122	106	391
71	-47	-90	-198	-313	-357	-341	-276	-175	-49	90	231	362	471	546	577	551	456	282	16	-354	-838	-1449
72	-61	-116	-253	-389	-425	-376	-258	-86	123	354	591	818	1020	1181	1285	1315	1258	1096	814	396	-173	-909
81	-7	-14	-34	-64	-88	-108	-123	-134	-139	-139	-134	-125	-110	-90	-65	-34	2	42	89	140	197	260
92	-19	-37	-91	-174	-248	-313	-368	-413	-445	-465	-472	-465	-443	-405	-352	-281	-192	-85	42	189	356	546

Legend for both tables:

- Reservation significantly lower
- Reservation lower, not significant
- County lower, not significant
- County significantly lower

Figure 1: The Population Distribution of Reservations and County Complements

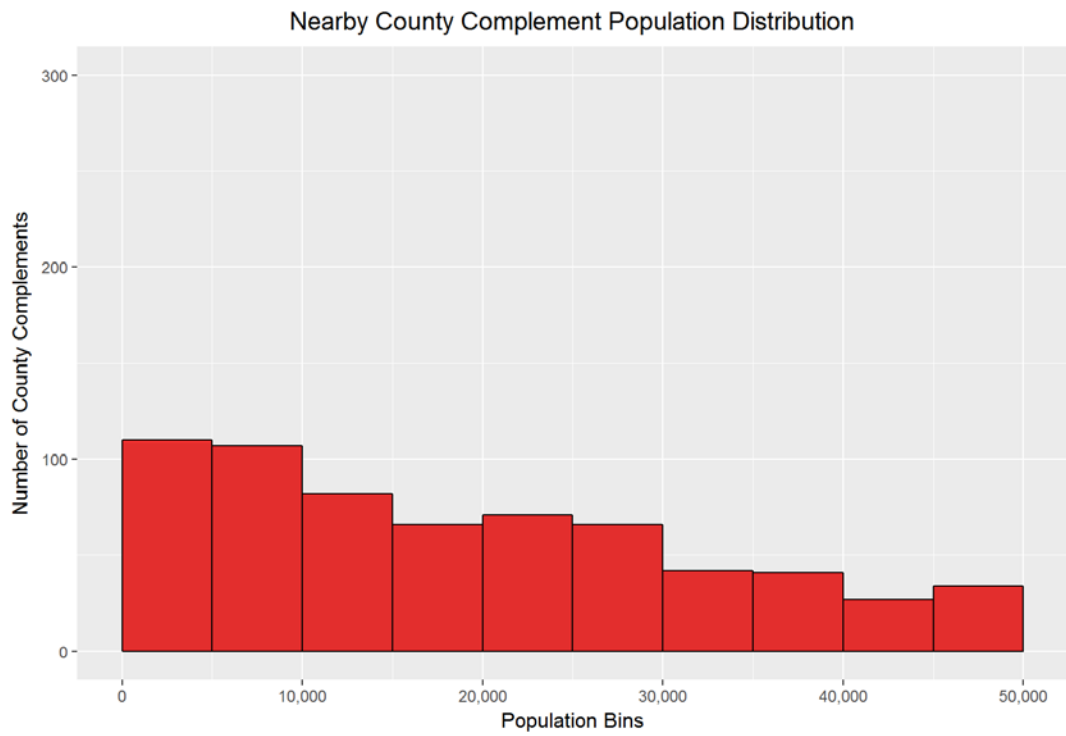
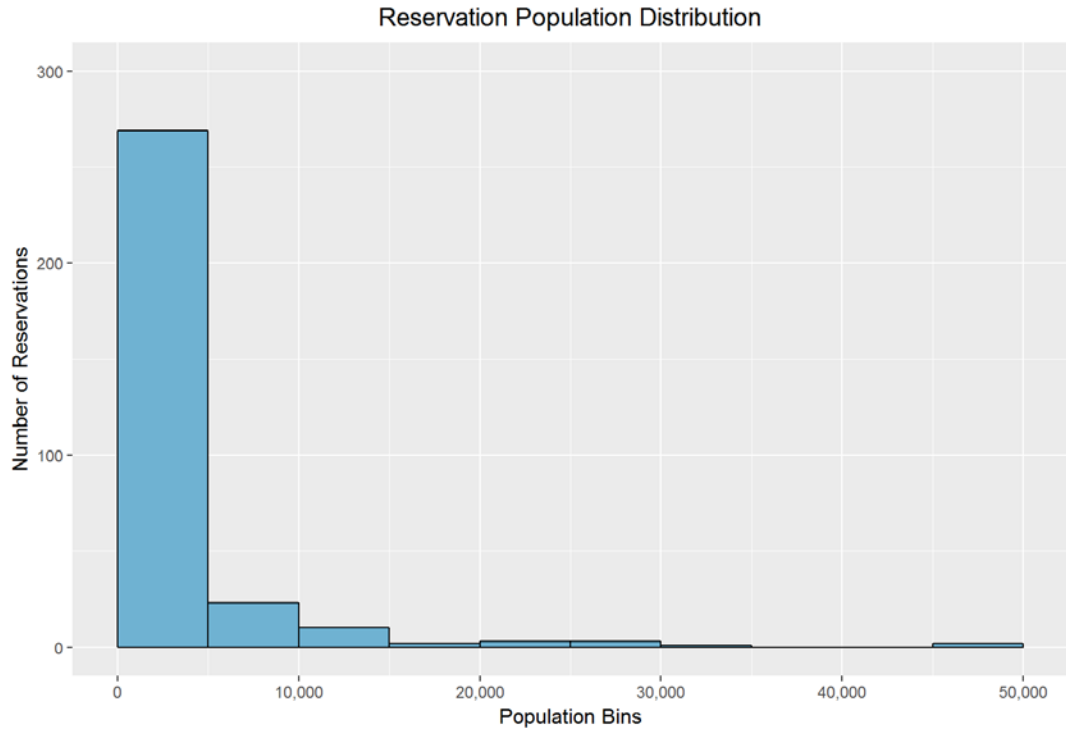


Figure 2: Establishment Shares by Sector and Place

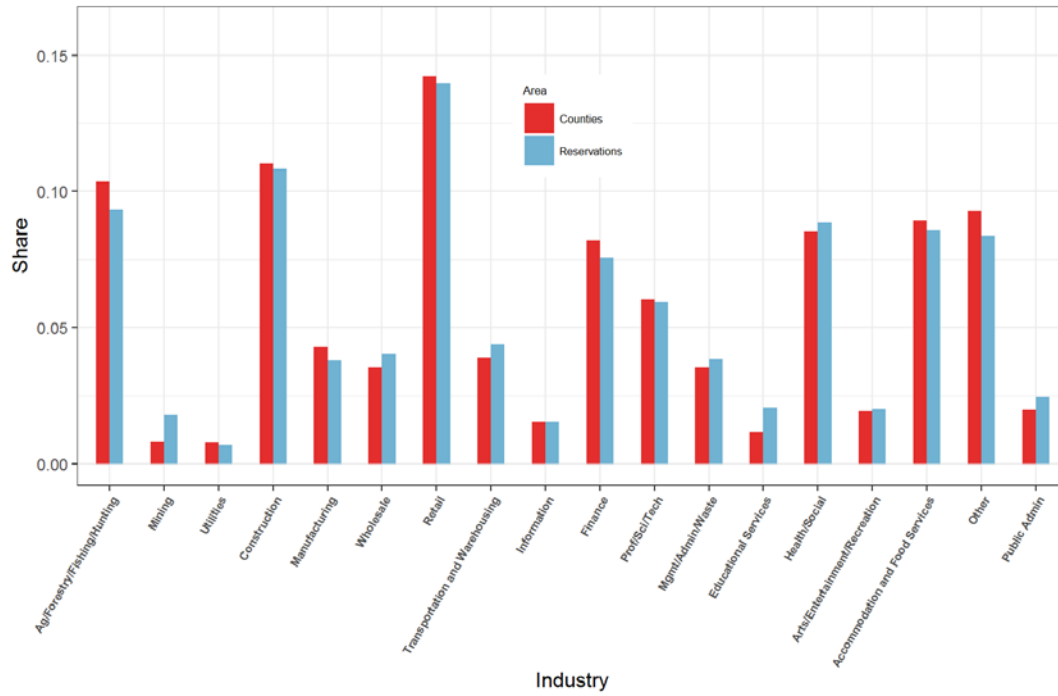


Figure 3: Index of Reservation Parity: Establishments (Share of Establishments on Reservations Divided by Share of Population on Reservations)

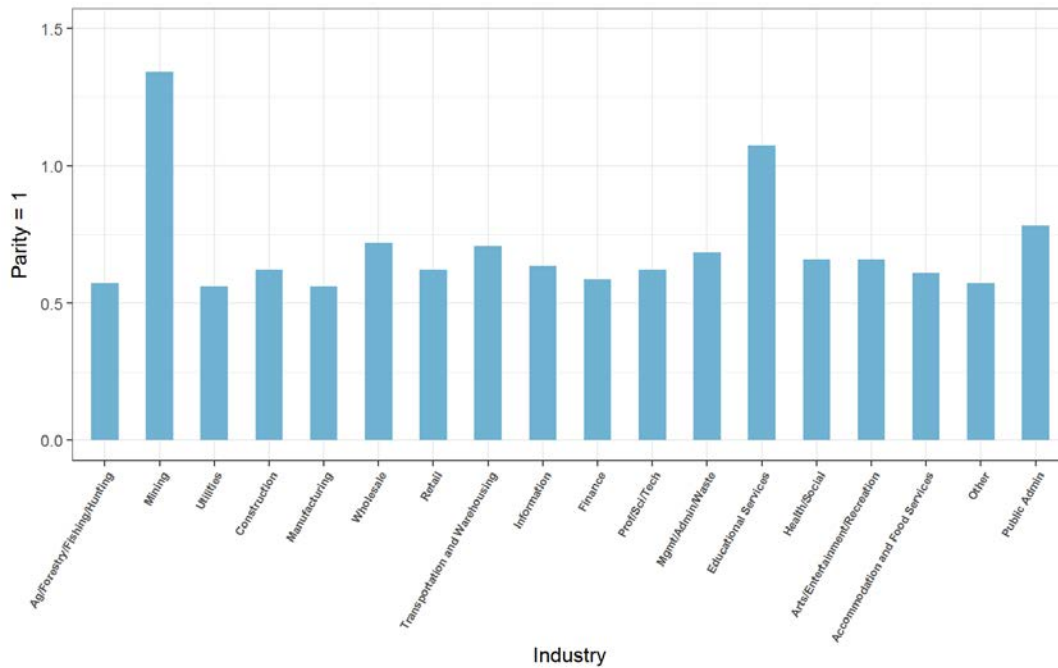


Figure 4: Employment Shares by Sector and Place

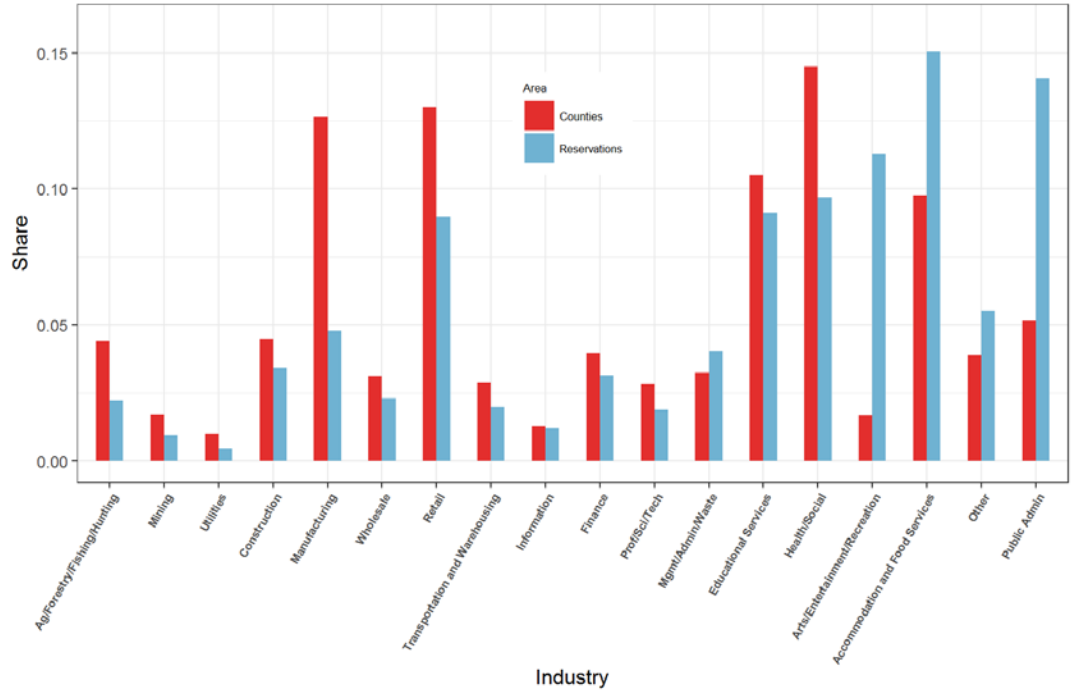


Figure 5: Index of Reservation Parity: Employment (Share of Employment on Reservations Divided by Share of Population on Reservations)

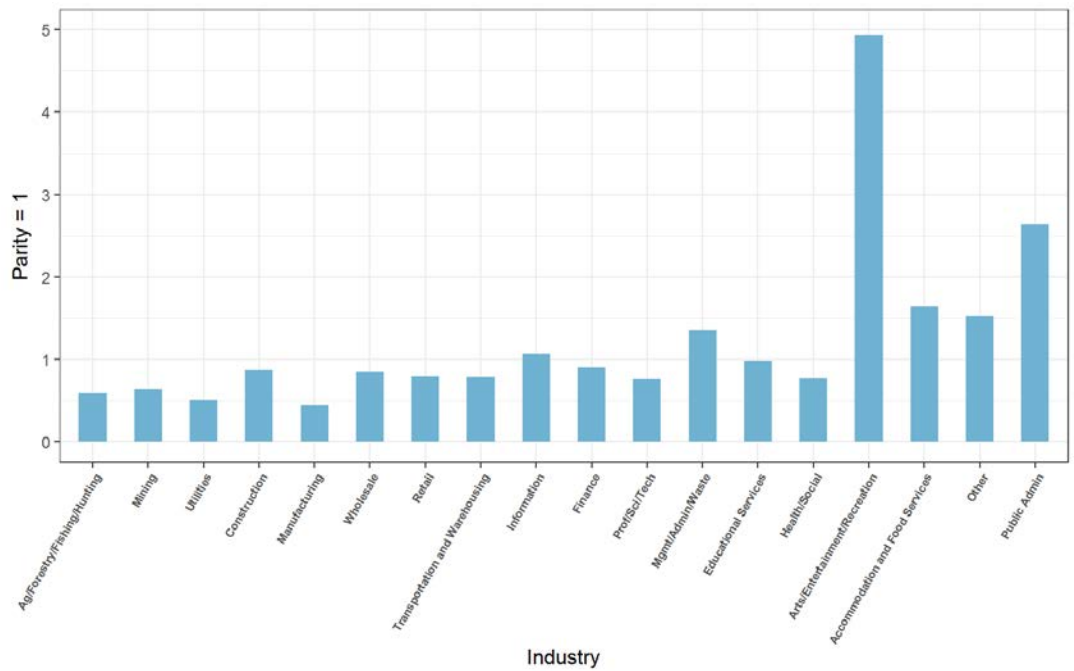


Figure 6: Establishments in the Agriculture, Forestry, Fisheries, and Hunting Industry

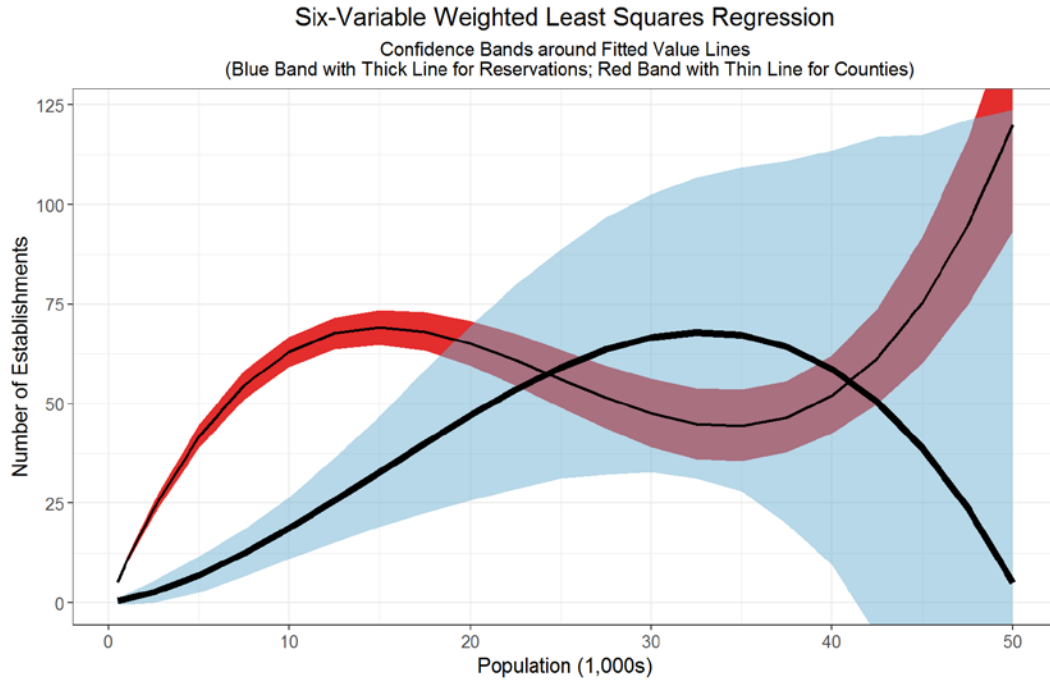


Figure 7: Job Numbers in the Agriculture, Forestry, Fisheries, and Hunting Industry

