The Impact of Local Labor Market Conditions On the Demand for Education: Evidence from Indian Casinos

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Abstract

Using restricted-use data from the 1990 and 2000 Census long-form, we analyze the impact of local labor market conditions on the demand for education using the economic shock produced by the opening of casinos on an Indian reservation as the identifying event. Federal legislation in 1988 allowed Indian tribes to open casinos in many states and since then, nearly 400 casinos have opened. We demonstrate that the opening of a casino increased the employment and wages of low-skilled workers. Young adults responded by dropping out of high school and reducing college enrollment rates, even though many tribes have generous college tuition subsidy programs.

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I. Introduction

Foregone earnings are, for most students, the largest expense associated with attending college. The College Board estimates that in the 2003/4 academic year, annual tuition and fees at four-year institutions averaged $4,650 at public schools and $18,950 at private schools.[1] In contrast, full-time/full-year workers with a high school degree aged 18-21 had labor earnings of $18,144 in 2003.[2] Simple models of human capital accumulation predict that rising opportunity costs for high school graduates should, all else equal, reduce college enrollment rates. This prediction has been tested by dozens of authors using a variety of techniques. Because new entrants to the labor market tend to work in the same geographic area where they went to high school, most of these tests have focused on the impact of local labor market condition on college enrollment decision. Given the size of foregone earnings associated with college attendance, it may be surprising to some that the results of these analyses are somewhat mixed, with few studies finding a large impact of local labor market conditions on educational attainment.

This paper analyzes the impact of local labor market conditions on the demand for education using the rise in American Indian casinos as an identifying shock to local economies. A series of Supreme Court cases and Federal legislation in the 1980s gave Indian tribes in certain states the ability to open Las Vegas–style casinos. Since that time, nearly 400 Indian casinos have opened generating net revenues of $25 billion (nominal dollars) in 2005.[3] By the early 2000s, about half of Indian tribe members in the lower 48 states belonged to tribes that operated a casino (Evans and Topoleski, 2002). As we demonstrate below, these casinos have had tremendous impact on the local economy, lowering unemployment rates and rising wages, especially for low-skilled workers.

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[1] http://www.collegeboard.com/press/article/0,,38993,00.html.
[2] Authors' calculations based on data from the March 2003, Current Population Survey.
[3] http://www.nigc.gov/ReadingRoom/PressReleases//PR63062007/PR63072007/tabid/784/Default.aspx.

The rise in casino gaming may exert both positive and negative forces on educational attainment of young adults. Evans and Topoleski (2002) showed that casinos reduced unemployment and increased family incomes, especially among Indians on reservations. Family income is a strong predictor of education attainment (Manski and Wise, 1983; Carneiro and Heckman, 2002) so the better financial standing of Indian families after a casino opened may increase schooling due to wealth and income effects. A large number of tribes use profits from casinos to enhance education opportunities for tribal members such as improving the quality of K-12 education or providing tuition subsidies for post-secondary education.[4] In contrast, improvements in the labor market opportunities for low-skilled workers may increase the opportunity costs of education and therefore, discourage young adults from furthering their education (Black, McKinnish, and Sanders, 2005).

There are at least four reasons the rise of Indian gaming provides an excellent opportunity to examine the link between the local economy and educational attainment. First, casinos are permanent shocks to the local community, so unlike many previous studies, we are measuring permanent rather than transitory effects.[5] Second, although there are a few large-scale, high-profile Indian casinos in metropolitan areas, the vast majority of Indian reservations and their casinos are in rural settings, making the definition of local labor markets easier to construct.[6]

[4] The Indian Gaming Regulatory Act requires that tribes file a Resource Allocation Plan (RAP). According to the law, tribes can use the profits from casinos for one of five purposes: 1) to fund tribal government operations, 2) provide for the general welfare of tribal members, 3) promote tribal economic development, 4) donate to charitable organizations, or 5) help fund operations of local government agencies. RAPs are not publicly available and by law, not subject to Freedom of Information Act requests. A check of tribal government web pages indicates that many tribes use casino profits to heavily subsidize various education programs such as efforts to improve K-12 education or college tuition subsidies. Tribes that run large casinos such as those run by the Pequots, the Seminoles, the Ho Chunk, the Oneidas of Wisconsin, and the Milles Lacs all provide generous tuition subsidies for college and vocational training. However, even tribes with smaller casino operations such as those run by the Gila River Community, the Sault Ste. Marie Chippewa, the Oneidas of New York, the Eastern Cherokee and Coquille Indian Tribe, all provide some college tuition assistance funded out of casino profits.

[5] From what we can determine, only a handful of the almost 400 Indian casinos that have opened have been closed.

[6] Evans and Topeleski (2002) show that of the casinos opened by the year 2000, the median tribe with a casino had about 800 members and only 1 million people living within a 100 mile radius of the casino.

Third, a number of tribes are prohibited by state law from opening a casino and some tribes choose NOT to open a casino, providing plausible comparison groups. Fourth, as we illustrate below, the benefits of casinos appear to be concentrated in lower-skilled jobs and Indians appear to be the primary beneficiaries, providing necessary variation by which we can identify models.

There is also substantive interest in the basic question about the social and economic benefits of the rise in American Indian casinos. Historically, people living on Indians reservations are among the poorest and least educated groups in the U.S. According to data from the 1990 Census, reservation residents had over twice the poverty rate, 38 percent lower median household income, and unemployment rate that was 2.75 times national averages. Adults aged 25 and older living on reservations had a 34 percent higher high school dropout rate and a 58 percent lower college graduation rate than national averages. Subsequently, the impact of local labor market conditions on their educational attainment levels might be instructive for other interventions aimed at populations with a large fraction of low-skilled workers.

The data for this paper comes from restricted-use versions of the 1990 and 2000 Census long-form data sets. The long-form survey was sent to one in six households and it contains detailed data on demographic characteristics, educational attainment, and economic outcomes for household members. The restricted-use data we utilize contains detailed geo-codes that identify whether households are located on particular reservations. We supplement this data with information about when and where tribes opened casinos on reservations.

In the first part of the results section, we demonstrate that the rise of casino gaming lead to larger gains in employment and wages among high school dropouts and high school graduates than for college-educated workers. The gains were primarily concentrated among Indians. The increase in employment was primarily in service sector jobs and mostly in the entertainment industry sub-sector. We find that the rise of casino gaming lead to a large reduction in both the fraction of young adults staying in high school and entering college. These results are even more startling when we consider that many tribes with casinos also instituted tuition programs to help pay for some college education.

II. Related Literature

A number of authors from a variety of fields have examined the social and economic forces that alter the demand for education. A frequent group of covariates in these papers are measures of the local labor markets. The predictions of human capital theory are not clear as to how local markets should alter school enrollment decisions. If high school students perceive better job prospects as rising returns to skill, young adults might increase enrollment rates. But, a robust local labor market for low-skilled workers may increase the opportunity cost of attending schools, thereby enticing young adults out of school and into the labor market. The net effect of local labor market conditions will therefore depend on the strength of these two countervailing forces.

A number of authors have examined the correlation between local unemployment and wages and educational attainment. For example, using data from the National Longitudinal Study of the High School Class of 1972, Manski and Wise (1983) conclude their results "weakly support the presumption that there is some interaction between local labor market opportunities and the continuation of schooling…" (p. 69). Likewise, Card and Lemieux (2000) used data on high school and college enrollment from the October Current Population Survey and data from the 1960-1990 Decennial Censuses to examine the determinants of rising educational attainment throughout the last half of the 20^{th} century. The authors found weak evidence at best, that the state-level unemployment rate impacts educational attainment. The coefficient on the local unemployment rate variable was typically small and routinely statistically insignificant. The unemployment rate had the strongest impact on high school graduation and college entrance and there was never an impact on college completion.

Using data from the October Current Population surveys from 1973 to 1988, Kane (1994) found that the state unemployment rate had no statistically significant effect on black or white college entrance rates, but the average weekly wage in manufacturing had a statistically significant negative impact on college entrance rates for both groups. In contrast, Black and Sufi (2002) used data from the 1968-1998 March CPS and found that college enrollment rates of whites was sensitive to the race-specific state-level unemployment rate, state tuition levels, and the return to education, but enrollment rates of black students are unaffected by these factors.

A related literature has examined the impact of higher wages generated by state minimum wage hikes on educational attainment. This line of work has also produce conflicting results. Papers by Ehrenberg and Markus (1980, 1982) and Neumark and Wascher (1995 and 2003) found that higher minimum wages discouraging school enrollment of teens but work by Chaplin, Turner and Paper (2003) and Campolieti, Fang, and Gunderson (2005) found no effect of higher minimum wages on enrollment.

The variance in results in the studies mentioned above could be due to many factors, but, one common thread through these papers is that all measure local labor market conditions at the state level. State-level aggregates may be poor measures of the labor market conditions that are important to youths. As a result, a number of authors have examined the link between education attainment and labor market conditions using county-level labor data. These studies tend to show a more consistent relationship between local labor market conditions and educational attainment. For example, using data from the High School and Beyond class of 1982 Rivkin (1995) found that higher county-level unemployment rate raised the probability of attending school for both high school students and high school graduates. Using a panel of data of school districts from New York state over the 1978-87 period, Rees and Mocan (1997) found that a one percentage point increase in the county-level unemployment rate reduced the probability of dropping out of high school by 0.077 percentage points, which is about 2 percent of the sample mean high school dropout rate of 3.7 percent.

Our work is similar in scope and design to that of Black, McKinnish and Sanders (2005) who used the coal boom and bust in Kentucky and Pennsylvania during the 1970s and 1980s as an identifying shock to local labor market. The demand for coal was increased considerably by the oil price shocks of the mid 1970s but fell sharply in the early 1980s as pollution rules encouraged the use of low sulfur coal from western states. Because coal seams follow specific geographic patterns, the coal boom and bust altered the local demand for labor. The authors demonstrate that the coal boom (bust) increase (decreased) the wages of low-skilled workers relative to high-skill workers in mining towns. Similarly, the authors found that high school enrollment fell (increased) during the coal boom (bust). In this analysis, the measure of the local labor market is essentially at the county level.

The disparity in results between studies that measure labor markets at the state and sub-state level is similar to a related literature that has examined the impact of local labor markets on the take up and exit from welfare. Hoynes (2000) notes when labor market conditions were measured at the state level, studies showed a weak relationship between the local labor market and welfare entry and exit. However, Hoynes found a much larger role for local labor markets in the welfare exit and take up decision when labor markets were measured at the county level.

Another result that runs through nearly all studies discussed above is that the impact of labor markets on educational attainment appears to be greatest for students from lower socioeconomic groups. The Kane's and Rivkin's studies find that black enrollment rates were more sensitive to labor market fluctuations than for whites. In contrast, Black and Sufi found that enrollment rates of whites were more sensitive. However, Black and Sufi did find that within white subsample, students with lower-educated parents were the most sensitive to labor market conditions.

III. The Rise of American Indian Casinos

In this section, we briefly summarize the legal and legislative actions that allowed the introduction and the growth of casinos on Indian reservations. A longer narrative is available in Evans and Topoleski (2002) and excellent book-length treatments are available in Eisler (2001) and Mason (2000).

Federally-recognized American Indian tribes are sovereign nations and a series of Federal laws define how state and local laws apply on reservation land. In general, state and local criminal laws are enforceable on reservation land but not civil statutes. This distinction was created because many tribes had no formal police presence and the Federal government wanted the ability for state and local police to enter reservations in order to pursue criminal suspects.

In the late 1970s, a small number of Indian reservations opened large-scale bingo parlors as a way to support tribal government operations. A bingo operation run by the Seminoles of Florida offered larger prizes and operated at hours that conflicted with state law. The State of Florida sought to restrict this operation but the district court determined that since bingo was legal within the state, the state restrictions on bingo were civil in nature and therefore, the state could not restrict the size of the Seminole operation.[7] The Fifth Circuit Court of Appeals upheld the district court's decision in 1981.[8]

Soon after this decision, a similar set of suits were brought against the Cabazon Indians of California for running a card room, which were legal in California, but subject to local ordinances. Because the card room was operated in a county that prohibited them, the county and state argued the tribe was in violation of local ordinances. The case was eventually decided in the U.S. Supreme Court (*California v. Cabazon and Morongo Bands of Mission Indians*)[9] and citing reasoning similar to that in the *Seminole* case, the court decided that while federal law gives city, county, and state authorities power to enforce criminal law on Indian trust land, these laws were not intended to make tribes subject to a state's civil code. Therefore, if states allow a particular form of gaming within the state, it has no ability to regulate similar gaming operations on tribal land. In the case of California, bingo and card games were legal, so the court decided the laws concerning these activities were civil rather than criminal in nature.

Because the federal government at the time of the *Cabazon* decision did not prohibit gaming on Indian reservations and many states allowed (but heavily regulated) various forms of gambling, some tribes interpreted the *Cabazon* decision as allowing gambling and opened casinos shortly after the decision. State officials and gaming interests from Nevada and New Jersey began to lobby Congress to limit tribally-owned gaming operations. Not surprisingly, Indian tribes did not want any federal intervention, believing that the lack of any federal laws restricting gaming on reservations and the *Cabazon* decision gave them greatest possible ability to run casinos.

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[7] *Seminole Tribe of Florida v. Butterworth* 491 F.Supp. 1015 (1980).
[8] *Seminole Tribe of Florida v. Butterfield*, 658 F.2d 310 (1981)
[9] *480 U.S. 202 (1987).*

In response to the Cabazon decision, the Indian Gaming Regulatory Act (IGRA)[10] was quickly passed in 1988. The act established three classes of gaming and allowed gaming operations only on federally-recognized reservation land and under certain conditions. Class I gaming is ceremonial games or games with small payouts. Class II gaming is bingo and is essentially unregulated by the states. Class III gaming is Las Vegas-style and is allowed on reservations in any state that allows these types of games, whether for charity or for-profit purposes. However, in order to obtain a Class III license, tribes must enter into a 'compact' with state governments that specifies such factors as the size of the operation, the types of games, etc. States cannot tax the profits of Indian casinos but in some states, tribes have agreed to pay a fixed percent of profits in return for special considerations from the state.[11] For example, in Connecticut, the Pequot and Mohegan tribes return profits on slot machines to the state and in exchange, the state has agreed to not grant any more gaming licenses.[12]

Since passage of the IGRA, casino operations have exploded. Today, there are roughly 400 Class III casinos in operation throughout the US and roughly half of all Indians who belong to tribes are enrolled in tribes that operate a casino (Evans and Topoleski, 2002). Net revenues in Indian casinos (gaming handle minus game payouts) have grown from under $100 million in the mid 1980s, to $5 billion dollars in 1995, to $16 billion dollars in 2003 and $25 billion in 2005 (all nominal dollar values).[13] According to Evans and Topoleski (2002) four or more years after casinos opened, employment increased by 26 percent and the fraction of working adults who were poor was reduced by 14 percent. The authors also demonstrate that four or more years

[10] 25 U.S.C. 2702(1).
[11] Arizona, California, Connecticut, Michigan, New Mexico, New York, and Wisconsin collect payment from gaming tribes. Source: National Conference of state Legislatures.
[12] For an excellent account of politics surrounding the deal struck between the state and the Pequots, see Eisler (2001).
[13] http://www.nigc.gov/ReadingRoom/PressReleases//PR63062007/PR63072007/tabid/784/Default.aspx..

after a casino has opened in a county, total jobs per adult increased by 2 percent, but personal bankruptcies and property crimes (especially larceny and auto thefts) increase by about 10 percent.

Tribes in some states such as Maine, Rhode Island and South Carolina are unable to open casinos because their reservations are in states that have prohibitions on casino-style gaming. Other tribes have decided to not pursue gaming as an economic strategy even though other tribes in the state have opened operations. The most notable example is the Navajo Nation, which has twice rejected gaming in nationwide referendums. The Navajo Nation is the largest reservation (by square miles), one of the largest in enrollment, and the single largest in enrollment among tribes with reservation land.[14] Oklahoma has the most Indians that belong to tribal nations but the state only allows Class II gaming, so in the state, there are lots of bingo parlors but no Las Vegas-style casinos.[15]

IV. Data

This study uses the restricted-use versions of the decennial census long-form samples of 1990 and 2000. The census long-form is sent to one-sixth of households in the U.S. and the survey instrument asks detailed questions about the housing unit, plus demographic, social and economic characteristics of each household member. Household data include the type of housing unit, number of rooms, rent or value of property, outstanding mortgage value, typical utility payments, plus whether the house has complete plumbing, a complete kitchen, and a

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[14] The treatment and control tribes in our sample are dispersed throughout the country. There are six states with tribes but no gaming operations: AL, ME, RI, SC, UT and WY. There are 11 states where all the tribes (or single tribe) in the state will eventually get casinos by the end of the 1990s: CT, CO, ID, IA, KS, LA, MS, NC, ND, OR, and WI. There are 13 states that have tribes with and without gaming: AZ, CA, FL, MN, MI, MT, NE, NV, NM, NY, TX, and WY.

[15] In recent years, however, electronic machines similar to slots have been installed in Oklahoma parlors offering bingo-type games.

telephone. Data at the person-level include the relationship to the head of housing unit, sex, race, age, marital status, Hispanic origin, citizenship, education, military service, work experience, and income.

Public-use versions of the long-form responses are available in aggregate form at various levels of geography as part of the Summary File (SF) data system. Although the SF system does report aggregate data for people living on federally-recognized Indian reservations, not all variable averages are reported. More importantly, aggregate data is not reported for population subgroups, preventing us from using this data to examine heterogeneity in the impacts of casinos across groups. For example, half of all people living on reservations are non-Indians. Since we suspect the benefits of a new casino might differ for Indians compared to non-Indians, SF data may miss this heterogeneity in treatment.

Likewise, individual-level data from the long-form is available in samples that represent one and five percent of the population as part of the Public Use Micro Sample (PUMS). The lowest level of aggregation identified on PUMS data is at the Public Use Microdata Area (PUMA) level, that are county-based aggregates of 100,000 people. Larger counties are broken up into multiple PUMAs and smaller counties are aggregated together into PUMAs. Given the small size of most Indian reservations, data at the PUMA level is unable to successfully identify reservation residents.

In contrast, our restricted-use versions of the census long-form data contain all respondents to the survey, roughly 16 percent of the US population. More importantly, our restricted-use data contains detailed geographic information that includes census block (or block part), state, county, congressional district, and MSA/CMSA definitions, plus the data indicates whether a household is located on a particular Indian reservation.

Our analysis sample includes all people from the 1990 and 2000 Census who live on federally-recognized reservations in the lower 48 states.[16] There are a small number of tribes that are recognized by state governments but do not have federally-recognized reservations. Because the IGRA only applies to federally-recognized tribes, these tribes are not allowed to open a casino so we delete these tribes from our sample. Although the state of Oklahoma has the most Indians who belong to tribes, there is only one reservation in the state. Most data for Oklahoma is reported instead for statistical areas which are broad geographic areas that contain mostly non-Indians, so we delete data for Oklahoma as well. A small number of tribes such as the Mohegans from Connecticut did not exist in 1990 but have been recognized since. We delete any tribe that only has one year of census data. Finally, we deleted a few tribes that report small numbers of people who live within the reservation area but have no Indians on tribal land. In the 2000 Census, there are roughly 300 Indian tribes in the lower 48 states with federally-recognized reservation land. Our final sample consists of 265 of these tribes, of which, 142 had opened at least one Las Vegas-style casino by the end of 1998 (many of these tribes have opened more than one casino). We should also note one caveat about the long-form data. Not all tribal members must live on the reservation. Subsequently, members may be living off reservation and receiving benefits from a casino operation. Subsequently, our model identifies the impact of casinos that remain on the reservation. As we demonstrate below, this is the vast majority of people who lived on reservations before casinos arrived.

Starting with the 2000 Census, respondents were allowed to identify multiple races in both the long- and short-form surveys. Nationwide, this increased considerably the fraction of people who identified at least some American Indian heritage. In 1990, 1,959,234 people (or

[16] There are over 250 tribes in Alaska. Because none of them has a gaming operation, we delete data from Alaska in our analysis.

0.79 percent of total population) reported American Indian/Alaskan Native (AI/AN) as their race. In the 2000 Census, 2,475,956 people (or 0.88 percent of total population) reported AI/AN solely while another 1,643,345 people (or 0.58 percent of total population) reported this race in combination with one or more other races.[17] The use of multiple race codes was not as prevalent on Indian reservations, even though in the 1990 Census, roughly half of reservation residents were non-Indians. In our sample, only 3 percent of people on reservations reported a multiple race code. In the 2000 Census, we code as Indian any person who reported an Indian race, either singly or in combination with other race codes.[18]

In the pooled 1990 and 2000 census data sets, there are 470,050 individuals from all age ranges living on the reservations used in this analysis. Given the focus of this research, we will not use all observations, but instead, focus on two distinct subsamples. First, we want to document the rise in economic opportunities likely to be faced by young adults. Therefore, we initially examine the impact of casinos on the economic opportunities for reservation members who were 25 to 40 years of age at the time of the census. These adults provide some indication to younger workers about the likely impact of casinos on their potential labor market experiences. In our sample, there are 103,964 individuals in this age group. Next, we examine whether the introduction of a casino altered educational attainment. For these models, we will focus our attention on samples of young adults who are high school (15-18) and college aged (20-24).

Table 1 describes the composition of the reservation population aged 25 to 40 by race, year, reservation type, and education level. Education is classified in three categories: less than a high school degree, a high school degree, and any college education. The Indian population on

[17] Source: 1990 Summary Tape File1- 100 percent data, Census 2000 Summary File1- 100 percent data.
[18] Our results are not sensitive to this specification. We obtain very similar results if we define those with multiple race codes and at least one race as Indian as non-Indian.

reservations increased at similar rates (about 23 or 24 percent) in both reservations with and without gaming. The non-Indian population increased on casino reservations by 5.7 percent but decreased in reservations without a casino by 6.2 percent. Looking at the composition of the population by education level, we find that the average educational attainment of an adult on an Indian reservation is substantially lower than the U.S. population as a whole. About 22 percent of the reservation population did not have a high school degree and only 43 percent of the population has any college education. The fraction of females with any college education is 47 percent, which is 7 percentage points higher than the corresponding number for males. Three-quarters of the population aged 25 to 40 were participating in the labor force, but only 87 percent of labor force participants had a job. About two-thirds of labor force participants and 72 percent of workers had a full-time and full-year job which is defined as working 40 weeks in the previous year for an average of 30 hours per week or more. More educated workers had higher employment rates and higher hourly wages. Among labor market participants, females had higher employment rate than males, but the full-time full-year employment rate was higher for males by 8 to 13 percentage points, depending on the education group. Female workers earned less than male workers and earnings differential was increasing with education level.[19]

In Table 2, we report sample statistics of economic variables for the population aged 25 to 40, by year and reservation type. The final two columns of the table indicate that for this age group, there is little change in employment variables among tribes without casinos between 1990 and 2000. There was a slight decline in the employment to population ratio, no change in the fraction employed, a four percentage point change increase in the fraction employed full time and a less than one percent increase in the real hourly wage among full-time/full-year workers.

[19] Earnings are hourly wage of full-time and full-year workers in constant 2000 dollars. The earnings differential is $1.39, $3.55, and $3.73 for less than high school, high school graduates, and college level education, respectively.

There was also little change in the employment to population ratio among the 25-40 year olds on reservations with casinos, but there is a 2.3 percentage point increase in the fraction employed, a 6 percentage point increase in the fraction working full-time and full-year and a 3.3 percent increase in real wages. In the final three rows of table 2, we report some descriptive statistics for our samples of younger workers whose educational attainment may be impacted by changing local labor markets. For all three outcomes, the growth in educational attainment is greater among tribes without casinos than those with casinos. For example, among those 20-24 years of age, those in a reservation without a casino had a five percentage point increase in the fraction attending any college, but the increase among those on reservations with a casino operation only increased by four percentage points.

These simple analyses are instructive but they may mask important heterogeneity across different demographic groups. In the next section, we outline an econometric model that will allow us to examine the impact of casinos on those aged 25-40 and we allow the impact to vary by race, gender and educational attainment. Likewise, when we examine the impact of casinos on educational attainment, we will consider how the impacts vary by race, gender and age.

V. Econometric Model

The *Cabazon* decision was issued in 1987 and the IGRA was passed in 1988. According to the law, tribes must first establish a compact with the state before it can open a casino. In most states, compact negotiations took some time so the majority of casinos opened during the 1990s. A total of 17 casinos in our sample opened prior to the passage of the IGRA. Some tribes opened casinos without a signed compact, but most had signed agreements with the state. After a compact is signed, the size of casino operations typically expands greatly. In their analysis of the social and economic impacts of Indian casinos, Evans and Topoleski (2002) show that the casinos' impact on most outcomes such as employment opportunities, crime, and bankruptcies, continued to grow through the first six years of operation. Subsequently, the 'treatment' effect of a casino does not end once a casino is opened. The effect of the casino builds over time. Given these results, our econometric analysis will compare the growth in outcomes for tribes that obtained a casino before 1999 and those that did not. We hold constant tribe specific characteristics and secular changes in outcomes common to all tribes, and therefore, our econometric framework is a basic difference-in-difference model, which can be described by the following equation:

$$(1) \qquad Y_{ijt} = X_{ijt}\beta + YEAR2000_t{*}CASINO_j\alpha + v_j + u_t + \varepsilon_{ijt}$$

where y represents the outcome of interest for person i from tribe j in year t. The vector X includes demographic information about the individual, and v and u are tribe and year effects, respectively. The key covariate is the interaction term $YEAR2000_t$*CASINOj, where YEAR2000 equals 1 for observation from the 2000 census and $CASINO_j$ equals 1 if the person belongs to a tribe that opened a casino by 1998.[20] The parameter 'α' measures the growth in outcomes between the two census years attributable to a casino operation. Because individuals on a reservation in a particular year can be affected by common events, we allow the errors ε_{ijt} within a tribe/year group to be correlated and estimate the variance/covariance using a procedure suggested by Liang and Zeger (1986). Individual sample weights are used in all econometric models. Although many of the outcomes are dichotomous, we estimate all equations as linear

[20] Class III casinos are much more profitable than Class II bingos so we only define the casino indicator to equal 1 if the tribe has either slot machines or table games. We should also note that although there are currently about 240 Vegas-style casinos on reservations, by 1998 there were a lot fewer.

probability models. We get very similar results when we utilize logistic regression models for the dichotomous outcomes (Kim, 2005).

The difference-in-difference model uses the time path in outcomes for tribes that never open casinos as an estimate of the secular trend in outcomes that would have occurred in the absence of treatment. The model will not provide a consistent estimate if the treatment is more likely to occur in tribes with different trends in outcomes. For example, the model will overstate the employment gains of a casino if reservations with faster-than average job growth were more likely to open casinos. Likewise, the model will understate the treatment effect if tribes that anticipated slower than average growth were more likely to move towards casino-style gaming. The available evidence indicates that neither the levels nor trends in economic outcomes predict which tribes opened casino style gaming. Evans and Topoleski (2002) estimate probit models where the outcomes of interest are whether a tribe will open a casino by 1995 or 2000 and the covariates are levels and trends of economic variables measured prior to passage of the IGRA. In their analysis, economic variables such as tribe-specific measures of the employment to population ratio, the fraction of tribal members working but poor, changes in the variables over the 1983 through 1989 period, and log county-level real wage and per capita income, were not statistically significant determinants for whether the tribe opened a casino by either 1995 or 2000. The only statistically significant covariates in the probit models are measures of the population in the area near the reservation, which means that tribes in more populated areas were more likely to open a casino.

We examine this in more detail using data available as part of the Census Summary File 3a series that provides aggregate data down to the reservation level for each census year. Using data from the 1980 and 1990 census data, we examine whether reservations that will eventually open a casino had different time trends in key economic outcome variables. For this analysis, we constructed a panel of reservation-level data for 1980 and 1990 only. We deleted any tribe that opened a casino before 1990. We then regressed some key tribe-level economic variables on a tribe fixed-effect, a year effect and a dummy that equals 1 if a tribe will opened a casino sometime in the 1990s. The models are designed to examine whether those tribes that eventually open a casino in the 1990s are somehow different from those that did not. The dependent variable and the coefficient (standard error) on the placebo treatment dummy variable in three regressions are as follows: fraction of the population in poverty, 0.0129 (0.0114); fraction age 16 or older in the labor force, -0.009 (0.023); the fraction of those in the labor force unemployed 0.023 (0.024).[21] Like the results in Evans and Topoleski, these results indicate those who eventually open a casino did not have different growth rates in economic outcomes prior to the opening of a casino.

VI Results

A. Changes in Labor Market Outcomes

In this section, we demonstrate how gaming operations have altered the labor market outcomes of reservation residents. Since the focus of this paper is how local conditions alter the demand for education among young adults, we construct on a sample of workers that young adults might reasonably expect to use as a gauge for future local labor market conditions. As a result, we estimate models similar to those in equation (1) for residents aged 25-40. We estimate models for four labor market outcomes: labor force participation, employment and full-time/full-year employment (for those in the labor market) and labor earnings (among those

[21] We weight the first regression by population and the other regressions by the population aged 16 and over,

employed full-time and full-year). To examine the heterogeneity in the treatment effect across different types of residents, we allow the impact of casinos to vary across race, gender, and education.

Linear probability estimates of the impact of casinos on the labor market outcomes for adults 25-40 are presented in Table 3. Other covariates in the model include tribe fixed effect, a year effect, a complete set of age dummy variables, a complete set of education dummies, an indicator for residents who are Indians, an indicator for females, plus separate year effects for each education group. In Table 3, we only report the coefficients on the treatment effects that vary by education and race status.

The rise of casino gaming has had little impact on labor force participation for Indian and non-Indian men at all education levels. The coefficients are small and statistically insignificant.[22] In contrast, the labor force participation rate increased by 6 percentage points for Indian women with and without a high school degree and by 3.4 percentage points for those with greater than a high school degree. These final set of results are all statistically significant.

The introduction of casino gaming is estimated to increase the employment rate among Indians in the labor force, especially those with low education levels. For Indian men, casinos increased the employment rate by 5.7 percentage points among those with less than a high school degree and by 6.7 percentage points for high school graduates, and both of these results are statistically significant. There is a small positive and statistically insignificant increase in employment for Indian men with more than a high school degree. For Indian women, employment increases for all education levels and the impact declines monotonically as education rises. The introduction of casinos is estimated to increase employment by 6.9, 4.0, and

[22] Throughout the rest of the paper, when we refer to statistically significant or insignificant results, we are referring to the results of two-tailed tests using a 95 percent critical value.

2.1 percentage points for high school dropouts, high school graduates, and college educated, respectively. The first two estimates are statistically significant at the 95 percent confidence level, while the final result has a p-value of about 0.09. Among non-Indians, the only statistically precise coefficient in the employment equation is for males with less than a high school degree where the opening a casino is estimated to increase employment by 8.2 percentage points. All other coefficients for non-Indians in the employment equations are statistically insignificant and modest or small in magnitude.

Even though the employment rate increases for low-educated Indians (high school dropouts), there is no corresponding increase in full-time/full-year employment for this group. In contrast, casinos are estimated to increase full-time/full-year employment by 4.4 percentage points among Indian men with a high school degree. There is however a much larger increase in full-time/full-year employment among Indian women but the size of the coefficient is positively correlated with education. Casinos are estimated to increase full-time/full-year employment rates among Indian females with a high school degree or more by a statistically significant 7 to 8 percentage points. Among non-Indian men and women, although casinos increased full-time/full-year employment rates by modest amounts for the lowest-skill groups, none of these results are statistically significant.

In the final three columns of Table 3, we report estimates for models where the outcome is the average hourly wage for full time/full year workers. Among Indian males, the opening of a casino generates hourly wages that are $1.78 higher for the least educated, $1.68 higher for those with a high school degree, and $1.38 higher for those with the most education, and all three of these results are statistically significant. The estimated impact of casinos on the hourly wages for Indian women is very different. The estimated treatment effect for Indian women with a high school degree is $1.22 and almost $1.00 for the highest educated group and both of these results are statistically significant. In contrast, we estimate that casinos only increased wages by a statistically insignificant $0.51/hour for Indian women with less than a high school degree. We estimate statistically insignificant wage changes induced by the opening a casino for non-Indians from all gender/education subsamples.

We note that in the labor force participation, employment, and hourly wage regressions, the estimated impacts of opening a casino are uniformly larger for Indians than for non-Indians. Given the large standard errors on the results for non-Indians, in most cases, we cannot reject the null hypothesis that the coefficients are the same across these two groups.

Finally, it is no surprise the industries where these new jobs appear. We estimated linear probability models similar to those in the previous tables where the dependent variable is an indicator that equals 1 if a respondent is employed in a particular industry group. The samples for these regressions are respondents, aged 25 to 40, who were in the labor force. Among Indians, employment in the arts, recreation, etc., industry (which includes casinos) increased by 7.4 percentage points (standard error of 0.8 percentage points). Among Indians on reservations, the only other industry sectors that saw statistically significant changes in employment were other services (except public administration) which saw a 1 percentage point increase in employment and manufacturing which witnessed a 3.5 percentage point decline in enrollment. Among non-Indians on reservations, the only industry sector that experienced a statistically significant change in employment shares was construction which saw an increase of 1.2 percentage points.

B. Changes in Educational Attainment

The results in Table 3 indicate that the movement to casino gaming by tribes increased the labor market opportunities for Indian men and women, especially those with low levels of education. Because employment and wages of low-skilled workers have increased relative to higher-skill workers, the expected returns to education have fallen. Likewise, the opportunity costs of education have increased with the increasing returns to low-skill work. Subsequently, we suspect that the movement towards casino gaming may have also dampened the demand for formal education among young adults. In this section, we test this explicitly by using a variety of samples and measures of education.

First, we look at the high school enrollment rate of 15 to 18 year-olds. In this sample, we define students as enrolled if they are formally going to class or if they are a high school graduate. We estimate a model similar to those in Table 3 but in this case, we allow the treatment effect to vary by age and race. We estimate this as a linear probability model and the results are presented in Table 5. In these models, we allow for separate year effects for each age/race group.

Indians aged 17 to 18 show a statistically significant decline in high school enrollment on reservations with casino gaming. The high school enrollment rate is lower by 3.6 percentage points for 17 year-old Indians and by 6.6 percentage points for 18 year-old Indians on casino reservations. The drop in enrollment is larger for Indian girls compared to Indian boys. Our results show that among reservations with casinos, school enrollment rates for 17 and 18 year-old Indian girls are 5.1 and 8.8 percentage points lower, respectively, than similarly defined Indians on reservations without gaming. Both of these results are statistically significant. Among 17 year-old Indian boys, gaming is estimated to have reduced enrollment by a statistically insignificant two percentage points, but among 18 year-olds, the coefficient is a statistically significant and negative 4.8 percentage points. The larger effects of casinos on the enrollment rates for girls could be due to higher fertility or marriage rates induced by the casino. We investigated this issue using a sample of 17 and 18 year-old female Indians. We can easily construct whether a respondent is married but we had to merge observations within households and families to identify whether a teen is a mother. In these models, we found that the casino treatment effects had small and statistically insignificant effects on both outcomes.

The results in Table 5 indicate that the impact of casinos on high school enrollment is very different for non-Indians. Among 15 and 16 year-old non-Indian boys and girls, we estimate that casinos generated statistically insignificant drops in enrollment of 1.4 to 2.2 percentage points. We estimate positive but statistically insignificant treatment effect for 17-year-old non-Indians. Among 18 year old non-Indian boys, we find that their high school enrollment rate is higher than the enrollment rate of similarly defined non-Indians without a casino by 6.6 percentage points and it is statistically significant.

Next, we look at the change in educational attainment of the population aged 20 to 40 on the reservations. Although casinos should mostly impact the educational decisions of younger adults, we begin by looking at a broader range of ages and the older half of this age group can be though of as a specification check in that casinos should have little impact on these people. We use two outcomes, whether the individual graduated high school or had some college education. In each model, we include a tribe fixed effects, an indicator for race, plus dummy variables for four age groups (aged 20 to 24, 25 to 29, 30 to 34, and 35 to 40). We allow the year effects to vary by age group and race and we estimate separate models for males and females. The results from these models are reported in Table 6.

The results in Table 6 show that between 1990 and 2000, young adult Indians on reservations had large declines in high school graduation rates. For male Indians, high school graduation rate drops by 9.6 percentage points for 20-24 age group and by 4.0 percentage points for 25-29 age group. The impact on young female Indians was even larger. High school graduation declined by 11.5 percentage points for 20-24 group and by 9.3 percentage points for 25-29 group. This is clear evidence that favorable labor market conditions lead Indians to drop out of high school. For non-Indians, females in 25-29 group show a statistically significant drop in high school graduation rate by 5.7 percentage points. This might be related to the increase of employment of arts, entertainment, recreation, accommodation, and food services sector which includes casino industry. The employment of non-Indian females in this sector increased by 2.0 percentage points and it is generally low-skilled work. No other non-Indian group shows a statistically significant change in high school graduation rate.

In the results for any the any college education outcome by age groups, results show that the economic changes generated by gaming operation have discouraged Indians from starting college. Among Indians aged 20-24, casinos are associated with statistically significant drops in college entrance of 5.3 and 7.8 percentage points, for males and females respectively. Among Indian females aged 25-29, this number falls to a statistically significant 6.4 percentage points. We do find a statistically significant drop in college entrance for Indian males aged 30-34, but small and statistically insignificant impacts for females aged 30-40 and males aged 35-50. There are no statistically significant impacts of casinos on the college entrance rates for non-Indians in any age group for either males or females. As we noted above in the introduction, these results are made more interesting by the fact that casino gaming tribes generously support college education for tribal members. Despite this financial support, labor market incentives appear to be a much stronger draw than tuition cost subsidies from the tribe.

C. Controlling for Migration

The majority of reservation residents stay on their reservation after high school, but some may leave the reservation to find another job or to attend college. Since the census is a household-based survey, family members who are away at school would not be included in the sample. Our results may therefore understate the demand for higher education on casino reservations if high school graduates from these tribes are disproportionately likely to attend college off the reservation. In this section, we exploit the migration data in the census long-form to identify individuals who have either recently joined or left the reservation and to examine whether these migration patterns impact our basic results.

The census long-form questionnaire asks all respondents greater than five years of age where they lived 5 years ago and respondents provide the zip code of their previous residence. In the restricted-use versions of the data we are using, the residence five years ago has been recoded into a ‘place code' which are typically areas larger than reservations and hence, include non-reservation land. Therefore, we can only identify whether a respondent living off a reservation at census time was living on or near a reservation five years ago. This is especially problematic if we want to include non-Indians in our data set. Half of all reservation residents are Indians but among those who live within 10 mile of a reservation, we calculate that only 1 to 2 percent of people are Indians. Subsequently, if we add back to our sample all people who lived on or near a reservation five years ago, we have a large number of Non-Indians (mostly white respondents) who probably did not live on but rather near a reservation. In contrast, Indians living on a reservation outnumber Indians living near a reservation so adding back Indians who lived on or near a reservation five years ago will most likely not add back too many who lived off a reservation five years ago.

There is one final concern about the migration codes. Some place codes include areas with multiple reservations. In these situations, we randomly assign a person to a reservation using the census-year Indian populations to determine the probability of placement into a reservation.

With the census migration data, we generate three separate samples of Indians aged 20 to 29.[23] First, we identify people who lived on the reservation both at census time and five years prior to the census. Second, we identify people who did not live on the reservation five years prior to the census but lived on the reservation at census time. Third, we can identify people that lived on a reservation five years prior to a census but lived off the reservation at census time. The first two groups when combined are the Indians who lived on the reservation at the time of the census, which is the population we used in the models reported in Table 6.

Counts of Indians by sample type, year, casino status, and education level are reported in Table 7. First, notice that of those people living on the reservations five years ago (Groups 1 and 3), the fraction that moved off the reservation by the time of the census increased between 1990 and 2000, and the increase was larger among tribes with a casino. This fraction increased from 24 to 26 percent between the two census years on reservations without a casino and from 25 to 34 percent on reservations with a casino. Second, of those living on a reservation at the time of the census (Groups 1 and 2), the fraction that moved to the reservation within the past five years grew between 1990 and 2000 and the growth was larger among reservations with a casino. In 1990 on reservations without a casino, 8 percent of the population moved there in the past five

[23] We focus on the 20-29 year age groups since these were the subsamples identified in Table 6 that were most impacted by the presence of casinos on reservations.

years and this number increased to 12 percent in 2000. The numbers for reservations with casinos were 11 percent in 1990 and 15 percent in 2000. So it appears that among Indians aged 20-29, both out- and in-migration increased on Indian reservations with casinos relative to non-casino reservations over the 1990 to 2000 period. Notice also that the education level of incoming and out-migrants is higher than those who were on the reservation in both time periods. In 2000, 78.6 percent of out-migration and 72.9 percent of incoming migrants were high school graduates on the gaming reservations, while only 67 percent of group 1 Indians had high school degree. Therefore, the exclusion of out-migrants (e.g., the samples in Table 6) should lead us to overstate the negative impact of casinos on educational attainment because those who have left the reservation with a casino tended to have higher levels of education.

Using data for Indians aged 20-29, we estimate linear probability models for the high school completion and college entrance outcomes for three different subsamples. First, we examine the impacts for Indians living on reservations at the time of the census. This sample is constructed by using data from Groups 1 and 2 from Table 7 and the sample is similar to the one used in Table 6 except that now we delete data for non-Indians. The second group includes all people who lived on the reservation five years before the census, regardless of where they live now (Groups 1 and 3). This sample does not include the new migrants to the reservation but does include people have migrated to other parts of the country. Finally, we look at those who lived on the reservation five years prior to the census and at the time of the census (Group 1 only). We estimate separate models for males and females, and within each model, we estimate separate treatment effects for those age 20-24 and 25-29.

The results from these models are reported in Table 8. The first two columns report results for those on reservations at the time of the census. These results are similar in magnitude to those in Table 6. In the next column, we consider results for those who were on the reservation five years prior to the census but live elsewhere at the time of the census. In this new sample, casinos generate statistically significant reductions in high school completion rates for males aged 20-25 and females in both age groups. Notice that in these samples, the impact of casinos on high school gradation rates is about the same for males but the estimate for female Indians aged 20-25 is about 3.5 percentage points lower than the comparable estimate for Groups 1 and 2 combined, and the estimate for women aged 25-29 is now half the previous estimate. We find that casinos are associated with statistically significant reduction college entrance rates for males and females aged 20-25 but there are small and statistically insignificant impacts for those aged 25-29. These results indicate that those who left the reservation have higher educational levels than those who stayed and NOT considering this group will tend to overstate the impact of casinos on education. These results suggest that some of the younger people not on the reservation at the time of the census may be attending college, and that possibly some of the older people used the benefits of a higher education to exit reservation life.

The results do however indicate that there is a large and pronounced negative impact of casinos on the educational attainment of those who stayed on reservations. In the final two columns of Table 8, we look at the impact of casinos on those who were on reservations five years before the census and those at census time (Group 1). Note here that the numbers are very similar to the estimates for Groups 1 and 2 which is no surprise given the small fraction of people in group 2. Among those in Group 1, casinos are estimated to reduce high school graduation rates by over 7 percentage points for Indian males 20-25 and about 10 percentage points for female Indians in both age groups. These results are statistically significant. Likewise, casinos are estimated to reduce college entrance by 6 and 3 percentage points for

Indian males aged 20-25 and 25-29 respectively, and by about 10 percentage points for Indian women in both age groups. Again, these results are statistically significant.

There is a concern that the estimated treatment effects in the proceeding analysis may be capturing other local economic conditions rather than the impact of a new casino. To examine this hypothesis, we re-estimated our basic models on samples that included only people who lived near but off the reservation. If our models are capturing local labor market conditions not due to the casino, we would expect to find large estimates for the treatment variable in these models. For reservations with a casino, we included all people that lived within 25 miles of the zip code where a casino is located but not on reservations. For tribes without a casino, we included people that lived within 25 miles of the on-reservation census block with the largest population but not on a reservation. We identified roughly 1.67 million people aged 25-40 who are in the labor force who meet the residency criteria defined above. We then estimated a linear probability model where the dependent variable is an indicator that equals 1 the respondent is employed. The estimated casino treatment for Indians with less than a high school degree, a high school degree, and more than a high school degree are -0.0155 (0.0218), 0.0177 (0.0116) and 0.0029 (0.0051), respectively. The estimates from the same model for non-Indians are -0.0084 (0.0084), 0.0015 (0.0022), and 0.0057 (0.0024). These results are substantially smaller than the estimates for the same outcome in Table 3.

In the off-reservation samples, there were roughly 1.254 million males and 1.292 million females aged 20-40. For these two groups, we also estimated linear probability models for the high school graduate and any college outcomes. These models are exactly identical to those in Table 4 except they include the off-reservation sample. The estimated casino treatment effects for Indian males aged 20-24 living off but near the reservation is -0.0061 (0.0237) in the high school graduation model and 0.0056 (0.0275) in the any college model. Similar estimates for Indian females in the same age group are -0.0064 (0.0231) and -0.0213 (0.0307) respectively. The estimated coefficients the casino treatment for non-Indian males and females aged 20-24 in the high school graduate and college entrance equations are all less that 0.01 in absolute value and all statistically insignificant. These results signal two key results. First, any impact of the casino on local employment outside the reservation is small. Second, it does not appear that the results in this paper are simply capturing local labor market conditions outside the reservation.

In the basic models, we estimated a single treatment effect model where all casinos are assumed to have the same impact. Evidence in Evans and Topoleski suggest that the impact of a casino grows over time as the casino naturally grows. We examine whether there is heterogeneity in the results based on the age of the casino. In the basic models from Table 6, we allowed the treatment effect to vary based on whether the casino opened in 1992 or earlier, 1993 to 1995 and 1996 or later. The estimates showed some evidence of a larger impact on enrollment for casinos that have been opened longer. In the college enrollment equation for Indian males aged 20-24, we that the treatment effect (standard error) for the three time periods for males are -0.079 (0.0275), -0.045 (0.0193) and -0.0388 (0.0361), respectively. The corresponding numbers for females are -0.0929 (0.032), -0.1086 (0.0256), and -0.0481 (0.0345). In these models, the three treatment effects for non-Indians males and females in the 20-24 age group was statistically insignificant in all cases. We get less of a consistent pattern when we examine high school completion for this age group. Among Indians males aged 20-24, we estimate the casino treatment effect on high school completion to be -0.0685 (0.0396), -0.1280 (0.0339) and -0.0628 (0.0442) for the oldest to youngest casinos. The corresponding numbers for females are -0.0974 (0.0301), -0.1460 (0.0244) and -0.0807 (0.0433). Again, none of the estimated treatment effect coefficients for non-Indian males and females aged 20-24 were statistically significant in the high school enrollment equation.

VII. Conclusion

In 1998, the Indian Gaming Regulatory Act was passed with the stated goal of enhancing tribal self sufficiency. Our estimates and those of others suggest that to some degree, the IGRA has been successful. The opening of a casino is estimated to increase the fraction of Indians on reservations with a job and to increase their hourly wage rate. These benefits are largest for those with the lowest levels of education. The results in this paper suggest that the greater availability of higher-paying, low skill jobs may have had some unintended negative consequences. We estimate that increased availability of jobs for low skilled workers is associated with sharply lower levels of high school enrollment, high school completion, and college entrance.

In contrast to the conflicting results found in the literature when one measures labor markets at the state level, our results are in line with recent papers that demonstrate pronounced behavioral responses to labor market conditions when the local market is defined at a much lower level of aggregation. Our methodology and findings are closest to the work of Black, McKinnish, and Sanders (2005) that used the coal boom and bust in Kentucky and Pennsylvania to demonstrate that educational attainment of young adults is counter cyclic. In their paper as well as the results here, the primary beneficiaries of new job opportunities were those with low levels of education, which not only reduced the expected returns to future education but increased the opportunity cost of obtaining more education.

Our results and the work of Black, McKinnish, and Sanders may also suggest caution when considering particular economic renewal policies. For example, some have advocated for aggressive federal jobs programs to generate employment opportunities in inner cities to deal with chronic unemployment, especially for young black males. If the new jobs generated by these programs are for low skill males, then these programs may also encourage students to exit education to take the jobs.

Finally, our results indicate that other factors may be much more important in the college enrollment decision than tuition levels. Many tribes have used casino profits to improve education opportunities for members, yet even with these benefits, high school attendance, high school graduation and college enrollment rates fell relative to the performance in non-casino reservations.

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Table 1: Sample Composition, Individuals Aged 25-40 Living on Federally Recognized Reservations, 1990 and 2000 Census Long-Form Data

	Tribes with Casino		Tribes without Casino	
	1990	2000	1990	2000
Indian	12,073	14,867	10,230	12,699
<HS degree	3,594	3,812	3,263	3,347
HS degree	4,444	5,660	3,724	4,701
>HS degree	4,035	5,395	3,243	4,651
Non-Indian	19,775	20,896	6,925	6,499
<HS degree	2,689	3,037	1,208	1,349
HS degree	7,039	6,406	2,481	2,062
>HS degree	10,047	11,453	3,236	3,088
Total	31,848	35,763	17,155	19,198

Table 2: Sample Characteristics, Individuals Living on Federally Recognized Reservations, 1990 and 2000 Census Long-Form Data

		Tribes with a Casino		Tribes without a Casino	
Variable	Sample	1990	2000	1990	2000
In labor force	25-40 year olds	.7763	.7719	.7228	.7044
Employed	25-40 year olds	.8685	.8918	.8355	.8399
Full time/full year worker	25-40 year olds	.6210	.6869	.5545	.5977
Hourly wage (in real 2000 $)	25-40 year olds Full time/ full year workers	13.69	14.14	12.69	12.76
Currently in school	15-18 year olds	.8674	.8738	.8609	.8756
High school graduate	20-24 year olds	.7234	.7218	.6627	.7064
Any college	20-24 year olds	.3588	.3990	.2925	.3426

Table 3: Linear Probability Estimates, Impact of Indian Casinos On Labor Market Outcomes, Reservation Residents Aged 25-40, 1990 and 2000 Census Long-Form Data

	In labor force			Employed			Full-time/full-year worker			Hourly wage among full-time/full year workers		
Race/Education	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female
Indian												
< HS degree	.0202	-.0227	.0664	.0597	.0568	.0689	.0317	.0319	.0194	1.19	1.78	.51
	(.0174)	(.0167)	(.0275)	(.0178)	(.0230)	(.0258)	(.0174)	(.0220)	(.0258)	(.78)	(.88)	(.87)
	[.55]	[.63]	[.46]	[.64]	[.63]	[.67]	[.36]	[.36]	[.36]	[10.16]	[11.52]	[8.77]
HS degree	.0321	-.0014	.0629	.0551	.0674	.0401	.0601	.0436	.0736	1.48	1.68	1.22
	(.0126)	(.0139)	(.0189)	(.0129)	(.0175)	(.0141)	(.0163)	(.0212)	(.0205)	(.36)	(.39)	(.52)
	[.66]	[.70]	[.63]	[.77]	[.73]	[.81]	[.52]	[.51]	[.53]	[10.86]	[12.06]	[9.70]
> HS degree	.0273	.0204	.0344	.0221	.0209	.0211	.0487	.0015	.0860	1.33	1.38	.98
	(.0124)	(.0151)	(.0158)	(.0106)	(.0157)	(.0125)	(.0125)	(.0173)	(.0152)	(.43)	(.49)	(.40)
	[.80]	[.83]	[.77]	[.86]	[.83]	[.89]	[.61]	[.61]	[.61]	[12.76]	[13.89]	[11.64]
Non-Indian												
< HS degree	-.0160	-.0189	-.0073	.0544	.0820	-.0091	.0333	.0272	.0456	.45	.78	.02
	(.0261)	(.0301)	(.0419)	(.0154)	(.0191)	(.0370)	(.0259)	(.0227)	(.0533)	(.59)	(.67)	(.87)
	[.67]	[.80]	[.52]	[.86]	[.86]	[.86]	[.56]	[.63]	[.47]	[10.27]	[11.32]	[8.80]
HS degree	.0091	.0219	-.0034	.0196	.0229	.0111	.0241	.0338	.0075	.47	.55	.36
	(.0117)	(.0145)	(.0171)	(.0132)	(.0142)	(.0170)	(.0203)	(.0224)	(.0362)	(.37)	(.49)	(.37)
	[.81]	[.91]	[.70]	[.92]	[.91]	[.93]	[.66]	[.71]	[.60]	[12.33]	[14.28]	[10.04]
> HS degree	.0041	.0044	.0028	.0046	.0000	.0097	-.0097	-.0004	-.0166	.19	.93	-.83
	(.0118)	(.0137)	(.0183)	(.0125)	(.0165)	(.0117)	(.0132)	(.0200)	(.0215)	(.73)	(.63)	(1.07)
	[.86]	[.93]	[.79]	[.96]	[.96]	[.96]	[.75]	[.85]	[.66]	[16.04]	[17.74]	[13.87]
# of Individuals	103,923	50,771	53,152	78,117	41,888	36,229	78,117	41,888	36,229	45,382	25,473	19,909
R^2	0.1064	0.0980	0.0931	0.1064	0.1198	0.0971	0.1052	0.1598	0.0672	0.1922	0.1783	0.1702

Numbers in parentheses are standard errors that allow for arbitrary correlation across observations in a tribe/year cell. The numbers in brackets are sample means. Other covariates include tribe fixed effects, age, race and education fixed-effects, year effects that vary by education/race status, and where appropriate, a male dummy variable.

Table 4: Linear Probability Estimates, Impact of Indian Casinos On Employment by Industry, Reservation Residents Aged 25-40, 1990 and 2000 Census Long-Form Data

Industry	All	Indians	Non-Indians	Indian Males	Indian Females
Agriculture, forestry, fishing, hunting, mining	-.0001	.0080	.0048	.0183	-.0025
	(.0038)	(.0056)	(.0085)	(.0098)	(.0032)
Construction	-.0069	-.0142	.0120	-.0256	-.0052
	(.0087)	(.0086)	(.0055)	(.0143)	(.0034)
Manufacturing	-.0177	-.0349	-.0019	-.0367	-.0297
	(.0072)	(.0089)	(.0092)	(.0097)	(.0104)
Wholesale and retail trade	-.0098	-.0029	-.0123	-.0080	.0030
	(.0054)	(.0066)	(.0089)	(.0069)	(.0086)
Transportation, warehousing, utilities, information, communication	.0043	.0037	.0028	-.0057	.0129
	(.0027)	(.0039)	(.0050)	(.0052)	(.0048)
Finance,insurance, real estate, rental, leasing	-.0005	-.0040	.0026	-.0036	-.0029
	(.0027)	(.0029)	(.0040)	(.0029)	(.0043)
Professional, scientific, management, administrative, waste management.	.0063	.0053	-.0032	.0059	.0044
	(.0042)	(.0027)	(.0057)	(.0052)	(.0031)
Educational, health & social services	-.0031	.0007	-.0135	.0011	.0030
	(.0061)	(.0087)	(.0082)	(.0069)	(.0133)
Arts, entertainment, recreation, accommodation, food services	.0393	.0741	.0118	.0778	.0682
	(.0070)	(.0077)	(.0082)	(.0095)	(.0082)
Other services except public administration	.0089	.0108	.0121	.0093	.0129
	(.0045)	(.0037)	(.0089)	(.0033)	(.0053)
Public administration	-.0043	-.0107	-.0001	.0135	-.0381
	(.0053)	(.0079)	(.0060)	(.0112)	(.0097)
# of Individuals	78,079	34,366	43,713	17,806	16,560

Each cell is the coefficient on the casino*Year2000 variable from a different regression. Numbers in parentheses are standard errors that allow for arbitrary correlation across observations in a tribe/year cell. Other covariates include tribe fixed effects, year effects, age effects, and where appropriate, sex and race effects.

Table 5: Linear Probability Estimates, Impact of Indian Casinos On High School Enrollment, Reservation Residents Aged 15-18, 1990 and 2000 Census Long-Form Data

Race/Age	All	Male	Female
Indians			
15	-.0002	.0208	-.0206
	(.0110)	(.0138)	(.0161)
16	-.0051	-.0032	-.0032
	(.0137)	(.0171)	(.0208)
17	-.0361	-.0243	-.0509
	(.0209)	(.0210)	(.0299)
18	-.0661	-.0476	-.0872
	(.0204)	(.0260)	(.0259)
Non-Indians			
15	-.0190	-.0157	-.0222
	(.0244)	(.0264)	(.0258)
16	-.0147	-.0159	-.0136
	(.0126)	(.0184)	(.0176)
17	.0195	.0100	.0289
	(.0281)	(.0284)	(.0362)
18	.0478	.0664	.0368
	(.0358)	(.0355)	(.0481)
# of Individuals	33,315	17,078	16,237
R^2	0.1101	0.1186	0.1173

Numbers in parentheses are standard errors that allow for arbitrary correlation across observations in a tribe/year cell. Other covariates include tribe fixed effects, age and race, and year effects that vary by age/race status.

Table 6: Linear Probability Estimates, Impact of Indian Casinos On High School Graduation, Any College, Reservation Residents Aged 20-40, 1990 and 2000 Census Long-Form Data

	High School Graduate		Any College	
Race/Age	Male	Female	Male	Female
Indian				
20-24	-.0955 (.0310)	-.1147 (.0202)	-.0530 (.0175)	-.0876 (.0196)
25-29	-.0396 (.0196)	-.0931 (.0194)	-.0277 (.0175)	-.0636 (.0185)
30-34	-.0252 (.0166)	.0085 (.0177)	-.0447 (.0156)	.0201 (.0189)
35-40	.0251 (.0189)	-.0177 (.0187)	.0144 (.0188)	.0028 (.0184)
Non-Indian				
20-24	-.0308 (.0264)	-.0338 (.0256)	.0339 (.0433)	.0207 (.0444)
25-29	-.0239 (.0371)	-.0572 (.0302)	-.0169 (.0533)	-.0653 (.0456)
30-34	-.0313 (.0326)	.0079 (.0332)	-.0736 (.0531)	.0401 (.0483)
35-40	-.0204 (.0261)	-.0404 (.0263)	-.0318 (.0350)	-.0475 (.0378)
# of Obs	64,656	67,391	64,656	67,391
R^2	0.0943	0.0836	0.0861	0.0711

Numbers in parentheses are standard errors that allow for arbitrary correlation across observations in a tribe/year cell. Other covariates include tribe fixed effects, age group and race fixed-effects and year effects that vary by age group/race status.

Table 7: Population Counts by Migration Status, Indians Aged 20-29, 1990 and 2000 Census Long-Form Data,

Group	Reservation Status: 5 years before the Census	Reservation Status: At the Census	Education	Tribes with a Casino: 1990	Tribes with a Casino: 2000	Tribes without a Casino: 1990	Tribes without a Casino: 2000
1	ON	ON	# of Obs.	7,144	7,776	6,247	6,813
			<HS Degree	35.2 %	33.0 %	36.2 %	27.7 %
			HS Degree	40.6 %	40.1 %	39.8 %	41.2 %
			>HS Degree	24.2 %	26.9 %	23.9 %	31.1 %
2	OFF	ON	# of Obs.	883	1,411	556	945
			<HS Degree	34.1 %	27.1 %	27.0 %	20.1 %
			HS Degree	33.5 %	35.2 %	36.3 %	35.1 %
			>HS Degree	32.4 %	37.7 %	36.7 %	44.8 %
3	ON	OFF	# of Obs.	2,403	4,064	1,967	2,399
			<HS Degree	23.2 %	21.4 %	24.8 %	19.8 %
			HS Degree	38.1 %	34.0 %	35.9 %	32.8 %
			>HS Degree	38.7 %	44.6 %	39.3 %	47.3 %
Total				10,430	13,251	8,770	10,157

Table 8: Linear Probability Estimates, Impact of Casinos On High School Graduation, Any College, Indians Aged 20-29, 1990 and 2000 Census Long-Form Data

	People on reservations at the time of the Census		People on reservations five years before the Census		People on reservations five years before the Census AND at the time of the Census	
	Groups 1,2		Groups 1, 3		Group 1	
	High School Graduate					
	Male	Female	Male	Female	Male	Female
20-24	-.0697	-.1052	-.0715	-.0647	-.0739	-.1074
	(.0321)	(.0166)	(.0201)	(.0168)	(.0336)	(.0178)
25-29	-.0156	-.0892	-.0085	-.0407	-.0132	-.0953
	(.0205)	(.0143)	(.0176)	(.0174)	(.0214)	(.0148)
# of Obs.	15,382	16,361	18,760	20,019	13,606	14,345
R^2	.0558	.0619	.0452	.0414	.0552	.0592
	Any College					
	Male	Female	Male	Female	Male	Female
20-24	-.0603	-.0969	-.0450	-.0504	-.0559	-.1002
	(.0153)	(.0189)	(.0149)	(.0228)	(.0162)	(.0185)
25-29	-.0358	-.0759	-.0091	-.0178	-.0324	-.0804
	(.0145)	(.0182)	(.0166)	(.0199)	(.0156)	(.0181)
# of Obs.	15,382	16,361	18,760	20,019	13,606	14,345
R^2	.0456	.0573	.0462	.0485	.0425	.0570

Numbers in parentheses are standard errors that allow for arbitrary correlation across observations in a tribe/year cell. Other covariates include tribe fixed effects, age group and race fixed-effects and year effects that vary by age group/race status.