Tribal Casino Impacts on American Indian Household Well-being*

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ABSTRACT

The Indian Gaming Regulation Act was passed in 1988 and afterwards tribal gaming industry grew dramatically. However, it is unclear how tribal casinos impact different types of American Indian households' well-being. To address this question, I apply a difference-in-difference methodology to 1990 and 2000 IPUMS-USA Census micro-data. Casinos reduce per capita assistance income of all female householders and increase household per capita income of less-educated female householders by $891 or $1,859, depending on model selection. Casinos increase household per capita income of male householders inside MSAs and per capita earned income of female householders not identified as inside MSAs.

This study adds to the literature examining how tribal casinos impact American Indian well-being. During the 1990s, gaming changed the economic landscape for American Indian tribes dramatically, but it has been unclear how much the average gaming tribe gained and how these gains have been distributed among individuals and families. Previous research has found that tribal casinos are associated with the following gains in well-being: growth in American Indian employment outcomes on or near a reservation (Evans and Topoleski, 2002, Gitter and Reagan, 2007, Evans and Kim, 2005), increased earnings in surrounding non-Indian communities (Taylor, Krepps, and Wang, 2000), and increased American Indian per capita income on or near the reservation (Gitter and Reagan, 2007). On the other hand, casinos are associated with declines in young American Indian worker educational attainment (Evans and Kim, 2005).[1]

This paper uses a difference-in-differences methodology with 1990 and 2000 IPUMS (Integrated Public Use Micro Data Set) microdata to examine how tribal casinos impact income components and family and child poverty rates of different types of American Indian households. In all models, being near a casino is associated with reductions in assistance income of female-headed households. However, impacts on household total- and earned-income vary by householder sex, education, and household location. When householders are split by education, I find that casinos are associated with increased total and earned income of less-educated female householders. Additionally, casinos increase earned and total income for male householders inside MSAs and female householders not identified as inside MSAs. On the other hand, casino effects on child poverty are weak.

[1] This is a working paper.

BACKGROUND ON TRIBAL GAMING AND CONTRIBUTION TO THE LITERATURE

In the 1970s and 1980s, tribes began operating bingo parlors and other forms of gaming as economic development mechanisms.[2] States and tribes argued over the legality of these operations and this argument led to the Supreme court case *California v. Cabazon and Morongo Bands of Mission Indians* in 1987 and the Indian Gaming Regulation Act in 1988.[3] In the *Cabazon* case, the Supreme Court ruled that states did not have authority over tribal gaming and the Indian Gaming Regulation Act created the regulatory framework for tribal gaming (Light and Rand 2005: 41-42). The Indian Gaming Regulation Act (25 U.S.C. 2701-2721) divided tribal gaming into three classes: Class I was defined as social games for minimal value; Class II was defined as bingo, games similar to bingo (such as pull-tabs) and non-banking card games; Class III was defined as all other forms of gaming not in Class I or II, such as slots and banking card games. The Indian Gaming Regulation Act also stated that tribal gaming revenues must be reinvested back into the tribe.

After the Indian Gaming Regulation Act was passed, tribal gaming industry grew. The number of tribes with Class III gaming increased from 25 in 1988 to 160 in 2000.[4] In 1987, according to Cordeiro's (1989) collection of Bureau of Indian Affairs (BIA) tribal data, tribal bingo generated approximately $225 million in gross revenue. National Indian Gaming Commission statistics show that tribes generated $9.8 billion in gaming revenues in 1999 and generated $26 billion in gaming revenues in 2007. However, casino revenues were unequally

[2] According to Light and Rand (2005, 40), the Cabazon and Morongo Bands of Mission Indians used bingo hall and card clubs as their sole sources of tribal government revenue.
[3] For a rigorous analysis of the politics of American Indian Gaming see Mason, Dale W. Indian Gaming: Tribal Sovereignty and American Politics. University of Oklahoma: Norman 2000. Light and Rand (2005).
[4] Casino opening dates provided to me by Bill Evans.

distributed across tribes. The United States General Accounting Office (GAO) (1997), shows that in 1995 eight tribal casinos earned about 40 percent of tribal gaming revenues. In 2003, the Connecticut tribes near New York City operating two casinos, Foxwoods and the Mohegan Sun that earned $2 billion in revenue and Montana tribes operated twenty-five gaming facilities that earned $15 million in revenue.[5] Popular press, such as D. Barlett and J. Steele (2002) and Rezendes (2000), also started to pay close attention to inequalities between tribes near metropolitan areas running large, profitable casinos and rural tribes running smaller ones. Policy makers also examined casino whether benefited tribes. The National Gambling Impact Commission Final Report (1999) examined sub-national impact studies and testimony from the tribes and found that tribal casino gambling revenues on the whole had a positive effect on some tribes but also concluded more research was needed.

After the National Gambling Impact Commission report, a growing literature examined tribal casino impacts on American Indian and non-Native well-being. Previous work has found tribal casinos have positive impacts on household per capita income, employment, and wages but negative impacts on the educational attainment of American Indian young adults and mixed impacts on poverty. Taylor, Krepps, and Wang (2000) find gaming increases the net-earnings of non-Indian communities near reservations. Evans and Topoleski (2002), using Bureau of Indian Affairs labor force data, find employment levels for American Indians on or near reservations increased most in rural areas but employment rates increase most in urban areas. Evans and Kim (2005) use restricted use long form 1990 and 2000 Census microdata and find that casinos increase employment and wages of less-educated young on-reservation American Indians

[5] Revenue data taken from Light and Rand (2005 91-92).

workers.[6] Evans and Kim (2005) also find casinos reduce education attainment of the same cohort. Gitter and Reagan (2007), using 1990 and 2000 Public Use Census microdata, find that casinos increase householder employment and household per capita income and find larger impacts on income in MSAs. Only two papers use multivariate analysis to examine casino impacts on poverty measures.[7] Evans and Topoleski (2002) find casinos reduce the percentage of working poor. Kim (2006) finds casinos have little effect on child poverty.

I extend this literature by examining impacts on different poverty measures, components of household income, and different types of American Indian households near reservations.[8] Potential casino impacts on poverty are particularly relevant because American Indians have traditionally been one of the most vulnerable populations in the United States and changes in poverty tell us how many people move above a certain minimum standard of living.[9] Impacts on different components of income are also important because casinos could increase earned income and non-wage income but reduce any assistance income households receive if earned income increases bring households above eligibility requirements for means-tested assistance programs.

Impacts on different types of households are also important because households may be differentially affected by casinos and effects may vary by where on the income distribution casino impacts occur and the market size of the casino. To examine these potentially differential impacts, I allow casino impacts to vary in two ways. Following Evans and Kim (2005), I allow

[6] They also find casinos lead to increased high school dropout rates of young workers.
[7] Taylor and Kalt (2005) examine changes in mean poverty and child poverty rates on gaming and non-gaming reservations.
[8] Sandefur and Sakamoto (1988) are the first to examine American Indian household structure, household income, and economic well-being and find that American Indians are more likely to have couple headed households relative to Black and White families while household structure has a similar impact on the household income of American Indians as with Whites and Blacks.
[9] People living on American Indian reservation are twice as likely to be in deep poverty relative to the rest of the nation and 1990 poverty rates for American Indians living on reservations were almost 50% (Taylor and Kalt, 2005). Data from US Census data analyzed by Taylor, Jonathan B. and Kalt, Joseph P.

casino impacts to vary by education level. Impacts may vary by education, if education is a good proxy for worker skill, and if the distribution of casino impacts varies by the skill of workers obtaining casino employment. Then, following Gitter and Reagan (2007), I allow impacts to vary by whether a household is in a Metropolitan Statistical Area (MSA). Impacts may vary by household location if tribes in larger markets have casinos that generate larger revenues that are transferred to members in terms of larger increased income and reductions in poverty relative to tribes in smaller markets.

DATA

I examine how gaming affects American Indian poverty and income using 1990 5% State Sample and 2000 5% Sample of IPUMS (Integrated Public Use Micro Data Set) USA (Ruggles et al, 2008). Micro-data has a richer set of co-variates than aggregate level Census data, but casino effects are hard to identify. The finest geographic area consistent across 1990 and 2000 is the IPUMS-constructed PUMA (Public Use Micro Area) groups[10] and there are 542 PUMA groups in the United States. Hence, I examine casino impacts within a reservation area instead of reservations directly.

More than one reservation can be in a PUMA group or a reservation can be in overlapping PUMA groups. I first identify which PUMA groups contain reservations. However, an American Indian can live in a PUMA group but not be affiliated with the tribes that have reservation land within the PUMA group. Next, I use a method similar to Gitter and Reagan (2007) to identify households potentially affiliated with a tribe that has a reservation and impacted by any tribal casino on a reservation. I assume a household is affiliated with the tribe

[10] PUMA groups are referred to as consistent PUMAS by IPUMS.

that has a reservation in a PUMA group, if the householder has the same tribal ethnicity, or what I will refer to as tribal group, as that reservation.[11] I assume gaming impacts a household if the head of household affiliates themselves with the tribal group that has a reservation within a PUMA group with a casino. In some cases, there are reservations within the same PUMA group that are of the same tribal group, with some having casinos and some not having them. I assume that a tribal group is gaming if at least 50% of the 1990 population living in the PUMA group is affiliated with a reservation that has a gaming operation.[12]

I assume a household is impacted by gaming if the householder affiliates themselves with the tribal group on a reservation within a PUMA group with a Class III gaming operation that opened no earlier than 1989 and continued at least through 1998. To make meaningful comparisons across the 1990 and 2000 Censuses, I restrict my analysis to Class III gaming operations. A large number of tribes had some sort of high stakes bingo, or Class II gaming, prior to the Indian Gaming Regulation Act (Cordeiro, 1989). Nevertheless, there are a few tribes that had Class III gaming prior to 1989 and I exclude them from my analysis. By doing so, I drop 1,392 households and 1,213 children. Additionally, Evans and Topoleski (2002) show that tribal gaming impacts grow over time but have little initial impact during the first year of operation. Therefore, casinos that open in 1999 are also placed in the control group.

By using tribal group by PUMA group cells to identify whether tribal casinos impact an American Indian household, I must eliminate a number of tribal ethnicity groups that are not reported by the U.S. Census Bureau in both 1990 and 2000. The tribal ethnicity groups

[11] Reagan and Gitter (2007) assume if the head or the head of household's spouse is affiliated with a tribe, then the household is a part of the tribe. I use head of household only.

[12] PUMA group 214 has several Chippewa affiliated tribes but only 3% of the 1990 reservation population was gaming, so I assumed that Chippewa was non-gaming. In PUMA group 312, there are 19 Pueblo reservations and 19% of the 1990 reservation population was gaming. Hence, I assume Pueblo in that PUMA group are not impacted by gaming.

consistent across the 1990 and 2000 Census are the Apache, Blackfeet, Cherokee, Cheyenne, Chickasaw, Chippewa, Choctaw, Creek, Iroquois, Lumbee, Navajo, Potawatomi, Pueblo, Seminole, Sioux, and Tohono O'odham. In 2000, tribal affiliations are also not reported for multi-racial American Indians and I must further restrict my analysis to single race American Indians. The resulting un-weighted sample consists of 13,361 households and 20,522 children.[13]

TESTABLE IMPLICATIONS

I examine whether casinos increase or decrease different components American Indian income and reduce American Indian poverty. I expect tribal casinos to increase household total income and earned income, reduce assistance income, and reduce family and child poverty rates. Tribal casinos increase total household earned income if job creation at the casino or its auxiliary services increase labor demand and, in turn, increase individual wages. Non-wage household income could increase if tribes allocate revenue to members in the form of per capita payments.[14] Casinos may reduce household assistance income if household earned income and per capita payments increase total income above public assistance eligibility thresholds. Casinos will reduce poverty rates if income increases enough to raise a family above the poverty threshold.

Following Evans and Kim (2005), I allow casino impacts to vary by householder education and I expect households with lower skill householder to be impacted by casinos. Impacts may vary by education, if education is good proxy for worker skill and if the distribution of casino impacts varies by the skills of workers obtaining casino employment. Evans and Kim (2005) find that casinos increase employment outcomes and the wages of less-educated young

[13] Table A1 in the appendix shows the un-weighted sample split by householder education and whether the household is in a metropolitan statistical area.
[14] Tribes can allocate gaming revenues to members if they have a revenue allocation plan approved (25 U.S.C. 2701-2721).

adults and casinos significantly increase young adult employment in the art, entertainment, recreation, accommodation, and food services sector.

Following Gitter and Reagan (2007), I allow casino impacts to vary by whether households are identified as being inside MSAs and expect significant impacts inside MSAs.[15] Casinos may impact households differentially by location. Casino revenues are unequally distributed across tribes (GAO, 1997) and revenue is likely correlated with market size. Gitter and Reagan (2007) find casinos increase income of all American Indians near reservations but the impacts are greatest for households inside MSAs (Metropolitan Statistical Areas). Evans and Topoleski (2002) allow casino impacts to vary by market size and find that employment levels increase most in smaller markets and employment rates increase most in larger markets.

EMPIRICAL MODEL

To identify gaming, I use the difference-in-differences model. This method allows me to identify the impact of the treatment, a casino, on an economic outcome by comparing changes between the 1990 and 2000 Census in that outcome for a the control group that did not open a casino relative to a treatment group that did. The models are shown in equation (1) for household outcomes and in (1') for child outcomes.

[15] Within the IPUMS-USA samples, a portion of MSAs are partially identified in the 1990 and 2000 Samples. According to documentation, the portion MSAs not identified maybe not be random (http://usa.ipums.org/usa/volii/incompmetareas.shtml). I cannot say conclusively that not identified as inside MSAs live outside an MSA.

Y_{ijt} = income,poverty outcomes for household i in PUMA group by tribal group j in year t

Y_{kijt} = child poverty outcomes for child k household i in PUMA group by tribal group j in year t

X_{ijt} = controls for household i in PUMA group by tribal group j in year t

Year_2000_t = indicator equals 1 if household i is in 2000 Census

Casino_j = indicator equals 1 if household i is in PUMA group with reservation with a tribal casino and has the same tribal ethnicity as that tribe with casino

v_j = PUMA group by TRIBE fixed effects

ε_{ijt} = household level error term

ε_{kijt} = child level error term

$$Y_{ijt} = X_{ijt}'\beta +_t \alpha Year\_2000_t + d(Year\_2000_t * \text{Casino}_j) + v_j + \varepsilon_{ijt} \qquad (1)$$

$$Y_{kijt} = X_{ijt}'\beta +_t \alpha Year\_2000_t + d(Year\_2000_t * \text{Casino}_j) + v_j + \varepsilon_{kijt} \qquad (1')$$

My outcomes of interests are measured for households and the children of the householders. My observation is household i or child k in PUMA group by tribe group cell j in year t. The interaction between Casino_j and $Year\_2000_t$ is the difference-in-differences estimator. It measures differences in the changes over time between 1990 and 2000 Census income or poverty measures in puma group by tribe cells with casinos relative to those without casinos. Casino_j is an indicator variable for whether head of household i affiliates themselves with tribal group that has a reservation with casino that opens between 1989 and 1998 in a PUMA group. $Year\_2000_t$ is an indicator for whether the observation in the 2000 Census and controls for any common trends that affect reservation areas with and without casinos, such as nationwide economic growth.

A tribe's decision to open a casino may be correlated with unobserved and observed household characteristics and not controlling these characteristics may bias my results. I include

PUMA group by tribal group level fixed effects, v_j, in the form of an indicator variable, to control for any time-invariant reservation area level characteristics correlated with household income and poverty.[16] To control for any observed household characteristics that may change over time within a PUMA group by tribal group cell and potentially correlated with a tribal's decision to open a casino, I include head of household sex, age, age squared, marital status, educational attainment, disability status, and an indicator for being identified as being in an MSA.[17] In some models, I also include an indicator for whether the head of household is Navajo and the observation is in year 2000. The Navajo Reservation, which did not have a casino as of 2000, is a large reservation in terms of population and the Navajo may drive all changes over time in the non-gaming comparison group. The Navajo by year 2000 indicator picks up any changes over time for Navajo tribal members and is equivalent to excluding them from the control, no casino group.

To examine the effects of gaming by householder education, I interact the difference-in-differences estimator and its components Casino_j and $Year\_2000_t$ with an indicator for whether that householder has a high school degree and an indicator for whether they have less than a high school degree. In a second set of models, I allow casino impacts to vary by whether the household is in a MSA by interacting the difference-in-differences estimator and its components Casino_j and $Year\_2000_t$ with the indicator for being in an MSA and an indicator for whether the household is not identified as being in an MSA.

[16] In equations where I do not allow casino affects to vary by household characteristics, Casino_j is perfectly correlated PUMA group by tribal level fixed effects and therefore can be eliminated from the regression equation.
[17] I use the same controls as Reagan and Gitter (2007).

RESULTS

Descriptive Statistics

My outcomes of interest include household per capita total income, earned income, assistance income, the likelihood that a household has earned income, and the likelihood it receives assistance income. I also examine the probability that families and children are below the poverty line, are in deep poverty (< 75% of the poverty threshold), and are in near poverty (< 125% of the poverty threshold).

Household assistance income includes all household members SSI (Supplemental Security Income), AFDC (Aid to Families with Dependent Children), and General Assistance (GA) Income.[18] Earned income is the sum of personal income for all household members from wages, businesses, or farms. Household income is the sum of all household members' personal income. Poverty measures are calculated using the poverty matrix for families and children of the householder using family income, family size, and the householder age.

Table 1 shows the means of the left hand side variables used across Census years 1990 and 2000 and changes in means between 1990 and 2000 in gaming, non-gaming, and the Navajo groups. Average household per capita income and earned income increased between 1990 and 2000 for all groups. On the other hand, average household per capita assistance income declined in the casino group by $159 while it increased in the non-gaming group. The proportion of households with assistance income also declined in the casino group by 9 percentage points. Family and child poverty declined for all households in between 1990 and 2000.

[18] By 2000, AFDC no longer existed and was replaced by TANF and other state assistance programs.

Pooled Casino Impacts

Table 2 shows estimated effects for the casino measures and control variables on American Indian income and poverty outcomes. In all income regressions, I eliminate the top and bottom 1% of household per capita income distribution to control for possible influential outliers.[19] The coefficient on the indicator for whether the householder is married is insignificant in the household per capita total income and earned income estimating equations. Married householders likely have larger households and smaller per capita income measures than unmarried head of households. Being married significantly explains the left hand side variable and is the expected sign, negative, in the household per capita assistance income and poverty equations.

Casinos have the expected, positive, effects on all income measures except the probability of having earned income but insignificant effects on all of the poverty measures. Being near a reservation with a casino significantly increases per capita household income and earned income by about $550 and $629, respectively. It also reduces the probability that a household receives assistance income by 7 percentage points and the amount of assistance income households receive by $197.

My results also suggest there were gains in well-being for all American Indians in this sample. The coefficient on the year 2000 indicator is large in magnitude and significant in all but the per capita assistance income level regressions. During the 1990s, household per capita income grew on average $1,292, household per capita earned income grew on average by $997, and the probability of being below the poverty line declined by 10 percentage points for families

[19] Plots of the residuals from regressions ran on the controls only show without excluding the top and bottom 1% there are several income outliers are available upon request. Previous results with the top and bottom 1% included have larger casino effects on income and are available upon request.

and children. This finding is similar to Taylor and Kalt (2005) who find increases in aggregate per capita income for American Indians living on reservations between 1990 and 2000. Furthermore, increases in American Indian income during the 1990s come after a decade of declining income (Taylor and Kalt, 2005 and Gregory, Abello, and Johnson, 1997).

The Navajo Reservation is the largest federally recognized reservation in terms of American Indian population and any increases in Navajo well-being may outweigh increases in well-being for American Indians in all other non-gaming areas and, in turn, impact the difference-in-differences estimator.[20] Table 3 presents results on year_2000, Navajo*year_2000, and casino*year_2000 coefficients both controlling and not controlling for changes over time in Navajo households' well-being. Once I control for being Navajo, the casino impact on household per capita income and earned income respectively are $674 and $776 relative to $555 and $629 in the previous model, but effects on household per capita income lose significance. The casino impacts on household per capita assistance income and probability a household receives assistant income remain significant and negative, at -$195 relative to -$197 and -10 percentage points relative to - 7 percentage points. Casino now significantly increase the probability a household receives earned income by 4 percentage points. Casinos also reduce the probability a family is below the poverty line by 3 percentage points, below the deep poverty line by 5 percentage points, and below the near poverty line by 4 percentage points. Impacts on child poverty remain insignificant.

[20] The Navajo Reservation had an American Indian population estimated to be 174,847 while 511,000 American Indians lived on reservation land in 2000 (Taylor and Kalt ,2005). In my sample, Table A1 shows households with a Navajo head on or near the Navajo reservation total 5,157 observations compared to 13,631 total households. Taylor and Kalt (2005) also present income and poverty statistics by reservation gaming status both with and without the Navajo.

Casino Impacts Vary by Householder Education Level

Tables 4 and 5 present estimated casino effects split by householder education. I use two models; Panel A of each Table does not include the Navajo*year 2000 indicator and Panel B includes it. I expected casino to have impacts on less-educated householders. In both models, casinos are associated with increased household income and an increased likelihood of earned income for less-educated female householders and reductions in assistance income for both less- and more-educated female householders. Casinos are also associated with increased income for less-educated male householders in Panel A and an increased likelihood of earned household income for female householder in Panel B. Poverty results are not as strong as income results.

Table 4 shows casino impacts on income measures. When the Navajo are included in the no casino group, casinos increase household per capita total income for male and female householders with less than a high school education by $896 and $891, respectively and household per capita earned income by $1,028 and $1,333, respectively. Casinos also increase the probability of having earned income by 10 percentage points for households with less-educated female householders. These results are similar to Evans and Kim (2005) who find casinos increased the employment and wages of less-educated young workers. Once the Navajo are excluded from the no casino group, income effects on less-educated male householders lose significance but income effects on less-educated female householders remain significant and positive. Casinos also increase the likelihoods that more- and less-educated female householders have earned income by 8 percentage points and 13 percentage points, respectively.

Additionally, I find reductions in the assistance income of all female householders. Depending on the model used, female householders with less than a high school degree likelihoods of receiving public assistance income declines on average 16 and 25 percentage

points and their household per capita public assistance income declines on average by $520 andc$598. Female householders with at least a high school degree likelihoods of receiving public assistance fall on average 13 and 14 percentage points and household per capita public assistance income decline on average $265 and $280. Of male householders, casino only significantly impact public assistance recipiency of those having least a high school and only if changes on the Navajo Reservation are not controlled.

Table 5 shows casino impacts on family and child poverty. Casinos significantly decrease family deep poverty rates of more-educated female householders by 7 to 8 percentage points , depending of the model used, and family near poverty rates of less-educated female householders by 11 and14 percentage points, depending of the model used,. Child near poverty rates decline by10 and 20 percentage points, depending of the model used, for less-educated female households.

Casino Impacts Vary by Whether the Household is in an MSA

Tables 6 and 7 present estimated casino effects split by household location. Like Tables 3 and 4, Panel A of each Table does not include the Navajo*year 2000 indicator and Panel B includes it. There are large impacts on both total and earned household per capita income of male householders inside MSAs. But impacts on female householders are a different story, casinos impact the earned income of households not identified as inside MSAs. Casinos also reduce assistance income for male householders who cannot be identified as living inside MSAs. As in Tables 3 and 4, for all female householders, impacts on assistance income remain strong and negative in both models and effects on the likelihood of having earned income are significant if the Navajo are excluded from the control group. Casinos reduce family poverty of

male householders inside MSAs but there some significant impacts on both types of female householders. For child poverty measures, only one model yields significant results.

Table 6 shows casino impacts on income measures. For male householders located inside MSAs, casinos significantly increase total household per capita income and earned income on average $3,292 and $3,255 and $3,638 and $3,483, respectively, depending on the model used. For female householder not identified as inside MSAs, casinos increase per capita earned income by $1,074 and $1,215, depending on the model used, but increase the probability of having earned income only if the Navajo are excluded from the control group. However, in both models, for female householders inside MSAs casinos significantly increase the likelihood of having earned income. Casinos also reduce the probability female householders inside MSAs receive assistance income by 15 and 20 percentage points, depending on the model used, and not identified as inside MSAs on average by 12 and 18 percentage points, , depending on the model used. For male householders not identified as inside MSAs, casinos reduce the likelihood of receiving assistance income 3 and 6 percentage points, depending on the model used. Inside MSAs, casinos reduce female householders' per capita assistance income by $210 and $315, depending on the model used, and outside MSAs by $409 and $467, depending on the model used. For male householders not identified as being inside MSAs, casinos are associated in declines in the likelihood of receiving earned income if changes over time on the Navajo Reservation are not controlled.

Table 7 shows impacts on family and child poverty rates by MSA status. Depending on model selection, casinos reduce family poverty rates by 11 and 15 percentage points of male householders inside MSAs and family deep poverty rates by 11 and 15 percentage points of female householders in MSAs. Casinos reduce near poverty rates 6 and 9 percentage points of

female householders outside MSAs. They also reduce deep poverty rates for female householders not identified as in MSAs by 8 percentage points but only if changes over time on the Navajo reservation are controlled. For male householders, casinos significantly reduce child poverty rates by 21 percentage points but again, only if the Navajo are excluded from the control group.

CONCLUSIONS

In this paper, I examine casino impacts on different household income and poverty measures and how those impacts varied by householder sex and education and household location. For all households, casinos are associated with increases in household per capita income, increases in earned income, and reductions in assistance income. However, impacts on family poverty depend on the exclusion of the Navajo from the control group and there are no significant impacts on child poverty. Once I split households by householder education, results are similar to Evans and Kim's (2005) findings that casinos impact wages of less-educated workers. I find casinos increase less-educated male and female householders' income by around $890 and earned income by approximately $1,000 and $1,300, respectively. When the Navajo are excluded from the control group, income effects remain large and significant for less-educated female householders but impacts on less educated male-headed householders lose significance. When households are split by location, effects on income are mixed. I find that casinos increase earned and total income for male householders who live in MSAs and for female householders that could not be identified as living inside MSAs.

I also find that casinos are associated with reductions in public assistance income and recipiency for all female householders in all models. Depending on the model used, point

estimated impacts on assistance income recipiency were 12 or 25 percentage points and effects on household per capita income were $210 or $598. These declines may come from true casino impacts on means tested program eligibility. On the other hand, declines in assistance income may come from changes in federal welfare laws during the 1990s. For example, if there are systematic unobserved differences in how gaming and non-gaming tribes develop and implement TANF programs, then my results are picking up those effects instead of casino impacts. Further work should explore changes in assistance income recipiency for American Indian households that occurred after the passage of PRWORA (Personal Responsibility and Work Opportunity Act of 1996).[21]

Casinos impacts on child poverty rates are weak; few models have significant casino impacts on that outcome. However, child and family poverty rates declined for all American Indian households between the 1990 and 2000 Census. Hence, not finding many significant casino effects may imply that casinos brought most people affiliated with gaming tribes out of poverty at similar rates as non-gaming tribes.

My study has several limitations. I cannot identify reservations and nor can I identify tribes not reported by the Census. I also use 1990 and 2000 cross-sectional data not panel data and therefore could do not follow households over time. Hence, any unobserved changes in household composition correlated with income and poverty but not correlated with a tribe's

[21] After the passage of PRWORA, tribes who had previously enrolled in state welfare programs under AFDC (Aid to Families with Dependent Children) could set up their own TANF (Temporary Assistance for Needy Families) or group TANF programs (GAO, 2002). According to GAO (2002), as 2002, 36 tribal TANF programs were established that served over 170 tribes and half of were established in the 3 years prior to 2002, no later than 1999, which is the reference year of Census 2000 income questions. Additionally, GAO (2002) cites there were overall declines in welfare caseloads for American Indians in the 34 states with federally recognized tribes between 1994 and 2001 but increases in 6 of those states: Minnesota, Nebraska, Montana, North Dakota, South Dakota, and Wyoming.

decision to open a casino will bias my results. Nevertheless, Census micro data is likely the best source of income and poverty data for American Indian households and this is the first paper to my knowledge to examine casino impacts on household income and poverty measures in detail.

Additionally, while I do find that casinos are associated with increases in household income, American Indians continue to remain worse off relative to the rest of country. Most recent American Community Survey estimates (U.S. Census Bureau, 2008), 2005 to 2007 3-year estimates, show that the mean per capita income for all Americans was $26,178 while it was $16,499 for single race American Indians.[22] Furthermore, while gaming revenues continued to grow as of 2007(National Indian Gaming Commission), it is unclear how that growth impacted the average American Indian household and how the current economic crisis will impact tribal gaming. Future work could use the American Community Survey to address these questions. Currently, data for geographic areas with 20,000 people or more are available and data for census tracts are planned for release in late 2010.

[22] This data uses 2007 inflation adjusted dollars. It was obtained from table S1902 from 2005-2007 American Community Survey 3-year estimates located on American Factfinder. More information on the American Community Survey may be found on the 2005-2007 American Community Survey 3-Year Accuracy of Data document located at http://www.census.gov/acs/www/UseData/Accuracy/Accuracy1.htm.

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Table 1: Mean Left Hand Side Variables by Casino Status[*+#]

	Casino Group			No Casino, Non-Navajo Group			Navajo Group		
	1990	2000	2000-1990	1990	2000	2000-1990	1990	2000	2000-1990
Household Income									
PCI	7,640	9,769	2,129	9,501	11,558	2,057	6,327	8,327	2,001
	[349]	[569]		[405]	[782]		[227]	[345]	
PC Earned Income	5,845	7,654	1,809	7,582	9,312	1,729	4,904	6,565	1,661
	[316]	[438]		[361]	[526]		[302]	[389]	
PC Assist. Income	622	463	-159	292	505	213	291	493	202
	[66]	[35]		[43]	[61]		[44]	[68]	
Prob(Assit. Income)	0.35	0.26	-0.09	0.18	0.31	0.13	0.17	0.26	0.09
	[0.02]	[0.02]		[0.03]	[0.03]		[0.02]	[0.03]	
Prob(Earned Income)	0.76	0.78	0.02	0.83	0.83	0.00	0.70	0.74	0.05
	[0.02]	[0.01]		[0.03]	[0.01]		[0.04]	[0.02]	
Family Poverty									
Prob. Below Poverty	0.47	0.38	-0.09	0.37	0.27	-0.09	0.55	0.41	-0.14
	[0.02]	[0.03]		[0.03]	[0.02]		[0.01]	[0.02]	
Prob in Deep Pov.	0.37	0.28	-0.09	0.26	0.20	-0.07	0.44	0.30	-0.13
	[0.02]	[0.03]		[0.03]	[0.02]		[0.02]	[0.02]	
Prob in Near Pov.	0.57	0.45	-0.12	0.46	0.34	-0.11	0.64	0.50	-0.14
	[0.02]	[0.03]		[0.02]	[0.02]		[0.01]	[0.02]	
Child Poverty									
Prob. Below Poverty	0.58	0.47	-0.10	0.43	0.33	-0.10	0.58	0.43	-0.15
	[0.03]	[0.03]		[0.03]	[0.03]		[0.01]	[0.01]	
Prob in Deep Pov.	0.46	0.35	-0.11	0.34	0.24	-0.10	0.49	0.32	-0.17
	[0.03]	[0.03]		[0.04]	[0.02]		[0.02]	[0.01]	
Prob in Near Pov.	0.68	0.55	-0.13	0.54	0.42	-0.12	0.67	0.53	-0.14
	[0.02]	[0.03]		[0.03]	[0.03]		[0.01]	[0.01]	

[*] PCI stands for per capita income, PC stands for per capita, Assist. Income is an abbreviation for assistance income. Income regressions trim out outliers. Prob. Stands for probability.

[+] Standard errors are in brackets below each mean. All means weighted either household sample weight or child sample weight. Income is in 1999 dollars. All household standard errors clustered PUMA group by tribe by year and all child standard errors also clustered within household.

[#] Microdata from Ruggles, Steven, Sobek, Matthew, Alexander, Trent, Fitch, Catherine A., Goeken, Ronald, Kelly Hall, Patricia, King, Miriam and Ronnander, Chad. Integrated Public Use Microdata Series: Version 4.0 [Machine-readable database]. Minneapolis, MN: Minnesota Population Center [producer and distributor], 2008. Retrieved from: http://usa.ipums.org/usa/. Gaming identified using reservation Census data linked with whether the reservation had casino from Taylor and Kalt (2005) and casino opening dates from William N. Evans.

Table 2: Full Estimating Equations for American Indian Income and Poverty Characteristics[*+#]

	Household Income Characteristics					Family Poverty Outcomes			Child Poverty Outcomes		
Regression Coefficients	HH PCI	Prob(Earned Income)	PC Earnings	Prob(Assit. Income)	PC Assist. Income	Prob in Pov.	Prob in Deep Pov.	Prob . In Near Pov.	Prob in Pov.	Prob in Deep Pov.	Prob . In Near Pov.
year_2000	1,292.18***	0.02*	996.87***	-0.02***	21.72	-0.09***	-0.08***	-0.09***	-0.10***	-0.13***	-0.11***
	[157.40]	[0.01]	[120.68]	[0.01]	[17.41]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]
year_2000*casino	554.51**	0.01	629.03***	-0.07***	-197.11***	0.01	0	-0.02	0	0.01	-0.03
	[264.45]	[0.01]	[200.63]	[0.02]	[38.31]	[0.01]	[0.01]	[0.02]	[0.02]	[0.01]	[0.02]
married	-188.29	0.13***	233.16	-0.08***	-324.13***	-0.17***	-0.15***	-0.16***	-0.19***	-0.17***	-0.18***
	[247.35]	[0.01]	[223.99]	[0.01]	[37.50]	[0.01]	[0.01]	[0.01]	[0.02]	[0.01]	[0.02]
male	2,074.68***	0	2,022.92***	-0.10***	-61.78**	-0.07***	-0.05***	-0.08***	-0.06***	-0.07***	-0.07***
	[245.88]	[0.02]	[241.36]	[0.01]	[29.14]	[0.02]	[0.02]	[0.01]	[0.02]	[0.01]	[0.02]
age	344.74***	0.01***	430.40***	0	-1.29	-0.02***	-0.01***	-0.02***	-0.02***	-0.01***	-0.02***
	[20.49]	[0.00]	[19.67]	[0.00]	[7.50]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
age^2	-2.57***	-0.00***	-4.39***	0	0.12	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***
	[0.21]	[0.00]	[0.20]	[0.00]	[0.09]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
>= HS degree	3,926.10***	0.16***	4,057.28***	-0.19***	-354.65***	-0.25***	-0.21***	-0.24***	-0.26***	-0.24***	-0.22***
	[183.08]	[0.02]	[206.39]	[0.01]	[41.23]	[0.01]	[0.02]	[0.01]	[0.02]	[0.02]	[0.02]
disabled	-820.66***	-0.06***	-1,303.70***	0.11***	386.19***	0.06***	0.04***	0.06***	0.06**	0.06	0.06***
	[268.13]	[0.02]	[288.04]	[0.02]	[62.66]	[0.01]	[0.01]	[0.02]	[0.02]	[0.03]	[0.02]
ln MSA	2,782.09***	0.03	2,587.68***	-0.02	6.14	-0.12***	-0.09***	-0.13***	-0.13***	-0.10***	-0.12***
	[433.98]	[0.02]	[415.08]	[0.03]	[45.77]	[0.02]	[0.03]	[0.02]	[0.03]	[0.03]	[0.03]
Constant	-3,926.61***	0.23***	-7,894.04***	0.65***	2,807.66***	0.81***	0.64***	0.84***	0.90***	0.81***	0.88***
	[555.32]	[0.04]	[521.46]	[0.05]	[159.63]	[0.06]	[0.05]	[0.06]	[0.05]	[0.09]	[0.04]
N	13,383	13,383	13,383	13,383	13,383	13,629	13,629	13,629	20,513	20,513	20,513
Adj R-sq.	0.16	0.23	0.18	0.14	0.12	0.16	0.14	0.17	0.18	0.17	0.17

[*] PCI stands for per capita income, PC stands for per capita, Assist. Income is an abbreviation for assistance income. Income regressions trim out outliers. Prob. stands for probability.

[+] HS stands for high school. Standard errors are in brackets below each estimate, *<10%, **<5%, *** <1% significance. Income is in 1999 dollars. All household standard errors clustered PUMA group by tribe by year and all child standard errors also clustered within household. PUMA group by tribe fixed effects included. Controls for age, education, metropolitan statistical area, disability, and sex included when needed. Poverty rates calculated for children and families related to the head of household.

[#] Microdata from Ruggles, Steven, Sobek, Matthew, Alexander, Trent, Fitch, Catherine A., Goeken, Ronald, Kelly Hall, Patricia, King, Miriam and Ronnander, Chad. Integrated Public Use Microdata Series: Version 4.0 [Machine-readable database]. Minneapolis, MN: Minnesota Population Center [producer and distributor], 2008. Retrieved from: http://usa.ipums.org/usa/. Gaming identified using reservation Census data linked with whether the reservation had casino from Taylor and Kalt (2005) and casino opening dates from William N. Evans.

Table 3: Estimated Casino Effects and Year 2000 Effects With and Without Navajo Tribal Members [*+#]

Panel A: Income Equations

	HH PCI		Prob(Earned Income)		PC Earned Income		Prob(Assit. Income)		PC Assist. Income	
Regression Coefficients	(1) Navajo In, No Dummy	(2) Navajo In, Dummy	(1) Navajo In, No Dummy	(2) Navajo In, Dummy	(1) Navajo In, No Dummy	(2) Navajo In, Dummy	(1) Navajo In, No Dummy	(2) Navajo In, Dummy	(1) Navajo In, No Dummy	(2) Navajo In, Dummy
year_2000	1,292.18***	1,172.23***	0.02*	-0.01	996.87***	849.72***	-0.02***	0.01	21.72	19.6
	[157.40]	[438.63]	[0.01]	[0.01]	[120.68]	[309.52]	[0.01]	[0.01]	[17.41]	[26.54]
Navajo*year_2000		165.16		0.04***		202.63		-0.04***		2.92
		[438.69]		[0.01]		[315.32]		[0.01]		[34.20]
casino*year_2000	554.51**	674.32	0.01	0.04**	629.03***	776.01**	-0.07***	-0.10***	-197.11***	-195.00***
	[264.45]	[482.16]	[0.01]	[0.02]	[200.63]	[343.76]	[0.02]	[0.02]	[38.31]	[42.71]
N	13,383	13,383	13,383	13,383	13,383	13,383	13,383	13,383	13,383	13,383
Adj. Rsq.	0.16	0.16	0.23	0.23	0.18	0.18	0.14	0.14	0.12	0.12

Panel B: Poverty Equations

	Family Poverty Outcomes						Child Poverty Outcomes					
	Prob in Pov.		Prob in Deep Pov.		Prob . In Near Pov.		Prob in Pov.		Prob in Deep Pov.		Prob . In Near Pov.	
Regression Coefficients	(1) Navajo In, No Dummy	(2) Navajo In, Dummy	(1) Navajo In, No Dummy	(2) Navajo In, Dummy	(1) Navajo In, No Dummy	(2) Navajo In, Dummy	(1) Navajo In, No Dummy	(2) Navajo In, Dummy	(1) Navajo In, No Dummy	(2) Navajo In, Dummy	(1) Navajo In, No Dummy	(2) Navajo In, Dummy
year_2000	-0.09***	-0.05***	-0.08***	-0.03***	-0.09***	-0.07***	-0.13***	-0.08***	-0.13***	-0.08***	-0.12***	-0.11***
	[0.01]	[0.02]	[0.01]	[0.01]	[0.01]	[0.01]	[0.02]	[0.03]	[0.02]	[0.03]	[0.02]	[0.03]
Navajo*year_2000		-0.06***		-0.07***		-0.03*		-0.04		-0.04		-0.01
		[0.02]		[0.01]		[0.02]		[0.04]		[0.04]		[0.04]
casino*year_2000	0.01	-0.03*	0	-0.05***	-0.02	-0.04***	0.03	-0.02	0.03	-0.02	-0.02	-0.03
	[0.01]	[0.02]	[0.01]	[0.01]	[0.02]	[0.02]	[0.04]	[0.04]	[0.04]	[0.04]	[0.03]	[0.04]
N	13,629	13,629	13,629	13,629	13,629	13,629	20,522	20,522	20,522	20,522	20,522	20,522
Adj. Rsq.	0.16	0.16	0.14	0.14	0.17	0.17	0.15	0.18	0.15	0.18	0.17	0.17

[*] PCI stands for per capita income, PC stands for per capita, Assist. Income is an abbreviation for assistance income. Income regressions trim out outliers. Prob. stands for probability.

[+] Standard errors are in brackets below each estimate, *<10%, **<5%, *** <1% significance. Income is in 1999 dollars. All household standard errors clustered PUMA group by tribe by year and all child standard errors also clustered within household. PUMA group by tribe fixed effects included. Controls for age, education, metropolitan statistical area, disability, and sex included when needed. Poverty rates calculated for children and families related to the head of household.

[#] Microdata from Ruggles, Steven, Sobek, Matthew, Alexander, Trent, Fitch, Catherine A., Goeken, Ronald, Kelly Hall, Patricia, King, Miriam and Ronnander, Chad. Integrated Public Use Microdata Series: Version 4.0 [Machine-readable database]. Minneapolis, MN: Minnesota Population Center [producer and distributor], 2008. Retrieved from: http://usa.ipums.org/usa/. Gaming identified using reservation Census data linked with whether the reservation had casino from Taylor and Kalt (2005) and casino opening dates from William N. Evans.

Table 4: Estimated Casino Effects on Income by Sex and Education of Head of Household[*+#]

Panel A: No Navajo Dummy	HH PCI		Prob(Earned Income)		PC Earned Income		Prob(Assit. Income)		PC Assit. Income	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
< HS Degree	896.70*	890.53*	-0.03	0.10*	1,028.22**	1,332.55***	-0.03	-0.16***	-107.46	-598.11***
	[495.57]	[505.94]	[0.04]	[0.06]	[439.08]	[395.38]	[0.05]	[0.06]	[130.77]	[212.26]
>=HS Degree	607.15	642.44	-0.04	0.04	359.7	619.55	-0.06*	-0.13***	-16.56	-265.05**
	[443.17]	[626.46]	[0.02]	[0.03]	[425.51]	[595.89]	[0.03]	[0.03]	[59.14]	[122.33]
Observations	7,340	6,043	7,340	6,043	7,340	6,043	7,340	6,043	7,340	6,043
Adj. Rsquared	0.15	0.17	0.26	0.21	0.17	0.18	0.11	0.13	0.11	0.12

Panel B: Navajo*year_2000 Dummy Included	HH PCI		Prob(Earned Income)		PC Earned Income		Prob(Assit. Income)		PC Assit. Income	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
< HS Degree	590.12	1,859.36**	-0.02	0.13*	914.81	2,250.05***	-0.03	-0.25***	50.63	-520.80**
	[1197.73]	[872.54]	[0.06]	[0.07]	[768.17]	[826.38]	[0.05]	[0.06]	[131.78]	[228.97]
>=HS Degree	1,146.75	-149.03	-0.02	0.08**	1017.62	-8.23	-0.04	-0.14***	-37.34	-279.58**
	[857.93]	[835.80]	[0.02]	[0.04]	[655.09]	[790.05]	[0.03]	[0.03]	[62.60]	[114.65]
Observations	7,340	6,043	7,340	6,043	7,340	6,043	7,340	6,043	7,340	6,043
Adj. Rsquared	0.15	0.17	0.26	0.21	0.17	0.18	0.11	0.13	0.11	0.12

[*] Income is in 1999 dollars. PCI stands for per capita income, PC stands for per capita, Assist. Income is an abbreviation for assistance income. Prob stands for probability and Pov. stands for poverty. Income regressions trim out outliers. HS stands for high school.

[+] Standard errors are in brackets below each estimate, *<10%, **<5%, *** <1% significance. All household standard errors clustered PUMA group by tribe by year and all child standard errors also clustered within household. PUMA group by tribe indicators included in regressions. Controls for age, education, metropolitan statistical area, disability, and sex included when needed. Poverty rates calculated for children and families related to the head of household.

[#] Microdata from Ruggles, Steven, Sobek, Matthew, Alexander, Trent, Fitch, Catherine A., Goeken, Ronald, Kelly Hall, Patricia, King, Miriam and Ronnander, Chad. Integrated Public Use Microdata Series: Version 4.0 [Machine-readable database]. Minneapolis, MN: Minnesota Population Center [producer and distributor], 2008. Retrieved from: http://usa.ipums.org/usa/. Gaming identified using reservation Census data linked with whether the reservation had casino from Taylor and Kalt (2005) and casino opening dates from William N. Evans.

Table 5: Estimated Casino Effects on Poverty by Sex and Education of Head of Household[**+#]

Panel A: No Navajo Dummy	Family Poverty Outcomes						Child Poverty Outcomes					
	Prob Below Pov.		Prob in Deep Pov.		Prob Near Pov.		Prob Below Pov.		Prob in Deep Pov.		Prob Near Pov.	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
< HS Degree	0	-0.05	0.02	0.01	-0.05	-0.11***	0.01	0	0.07	0.08	-0.06	-0.10*
	[0.04]	[0.04]	[0.03]	[0.05]	[0.04]	[0.03]	[0.07]	[0.06]	[0.07]	[0.07]	[0.07]	[0.05]
>=HS Degree	0.02	-0.03	0.02	-0.08**	0.02	-0.05	-0.03	0.01	-0.02	-0.05	-0.06	0.02
	[0.03]	[0.04]	[0.02]	[0.04]	[0.03]	[0.03]	[0.05]	[0.05]	[0.05]	[0.06]	[0.05]	[0.05]
Observations	7,504	6,125	7,504	6,125	7,504	6,125	11,139	9,383	11,139	9,383	11,139	9,383
Adj. Rsquared	0.15	0.16	0.13	0.14	0.15	0.16	0.16	0.17	0.14	0.17	0.15	0.16
Panel B: Navajo*year_2000 Dummy Included	Family Poverty Outcomes						Child Poverty Outcomes					
	Prob Below Pov.		Prob in Deep Pov.		Prob Near Pov.		Prob Below Pov.		Prob in Deep Pov.		Prob Near Pov.	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
< HS Degree	-0.08	-0.05	-0.05	-0.09	-0.04	-0.14**	-0.05	-0.11	-0.05	-0.07	-0.06	-0.20**
	[0.05]	[0.06]	[0.04]	[0.08]	[0.06]	[0.05]	[0.10]	[0.09]	[0.10]	[0.10]	[0.09]	[0.09]
>=HS Degree	-0.03	-0.01	-0.02	-0.07*	-0.02	-0.03	-0.05	0.03	-0.01	-0.01	-0.04	0.04
	[0.05]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]	[0.06]	[0.07]	[0.06]	[0.07]	[0.06]	[0.06]
Observations	7,504	6,125	7,504	6,125	7,504	6,125	11,139	9,383	11,139	9,383	11,139	9,383
Adj. Rsquared	0.15	0.16	0.13	0.14	0.15	0.16	0.16	0.17	0.14	0.17	0.15	0.16

[**] Prob stands for probability and Pov. stands for poverty.

[+] HS stands for high school. Standard errors are in brackets below each estimate, *<10%, **<5%, *** <1% significance. Income is in 1999 dollars. All household standard errors clustered PUMA group by tribe by year and all child standard errors also clustered within household. PUMA group by tribe fixed effects included. Controls for age, education, metropolitan statistical area, disability, and sex included when needed. Poverty rates calculated for children and families related to the head of household.

[#] Microdata from Ruggles, Steven, Sobek, Matthew, Alexander, Trent, Fitch, Catherine A., Goeken, Ronald, Kelly Hall, Patricia, King, Miriam and Ronnander, Chad. Integrated Public Use Microdata Series: Version 4.0 [Machine-readable database]. Minneapolis, MN: Minnesota Population Center [producer and distributor], 2008. Retrieved from: http://usa.ipums.org/usa/. Gaming identified using reservation Census data linked with whether the reservation had casino from Taylor and Kalt (2005) and casino opening dates from William N. Evans.

Table 6: Estimated Casino Effects on Income by Sex of Head of Household and whether household is in Metropolitan Statistical Area (MSA)[*+ #]

Panel A: No Navajo Dummy	HH PCI		Prob(Earned Income)		PC Earned Income		Prob(Assist. Income)		PC Assit. Income	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
IN MSA	3,291.62***	-170.22	-0.01	0.10**	3,637.54***	-10.71	-0.02	-0.15*	267.63	-209.62*
	[1252.20]	[946.62]	[0.06]	[0.04]	[1124.58]	[982.03]	[0.04]	[0.08]	[169.77]	[118.05]
NOT IDENTIFIED AS IN MSA	277.27	786.7	-0.04***	0.06	232.09	1,073.52**	-0.06*	-0.18***	-131.53**	-466.91***
	[304.96]	[499.16]	[0.01]	[0.04]	[321.14]	[412.72]	[0.03]	[0.02]	[62.64]	[72.72]
Observations	7,340	6,043	7,340	6,043	7,340	6,043	7,340	6,043	7,340	6,043
Adj. Rsquared	0.15	0.17	0.26	0.21	0.17	0.18	0.11	0.13	0.11	0.12
Panel B: Navajo*year_2000 Dummy	HH PCI		Prob(Earned Income)		PC Earned Income		Prob(Assist. Income)		PC Assit. Income	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
IN MSA	3,255.25**	-1067.32	-0.03	0.06*	3,483.15***	-827.25	-0.06	-0.20**	205.11	-315.73**
	[1443.53]	[933.50]	[0.06]	[0.03]	[1325.64]	[942.98]	[0.05]	[0.08]	[175.37]	[120.89]
NOT IDENTIFIED AS IN MSA	95.22	926.1	0.01	0.12***	217.61	1,214.93**	-0.03*	-0.12***	-74.41	-409.20***
	[424.65]	[747.26]	[0.02]	[0.03]	[414.13]	[576.13]	[0.01]	[0.02]	[48.47]	[64.63]
Observations	7,340	6,043	7,340	6,043	7,340	6,043	7,340	6,043	7,340	6,043
Adj. Rsquared	0.15	0.17	0.26	0.21	0.17	0.18	0.11	0.13	0.11	0.12

[*] PCI stands for per capita income, PC stands for per capita, Assist. Income is an abbreviation for assistance income. Income is in 1999 dollars Income regressions trim out outliers.

[+] HS stands for high school. Standard errors are in brackets below each estimate, *<10%, **<5%, *** <1% significance. All household standard errors clustered PUMA group by tribe by year and all child standard errors also clustered within household. PUMA group by tribe fixed effects included. Controls for age, education, metropolitan statistical area, disability, and sex included when needed. Poverty rates calculated for children and families related to the head of household.

[#] Microdata from Ruggles, Steven, Sobek, Matthew, Alexander, Trent, Fitch, Catherine A., Goeken, Ronald, Kelly Hall, Patricia, King, Miriam and Ronnander, Chad. Integrated Public Use Microdata Series: Version 4.0 [Machine-readable database]. Minneapolis, MN: Minnesota Population Center [producer and distributor], 2008. Retrieved from: http://usa.ipums.org/usa/. Gaming identified using reservation Census data linked with whether the reservation had casino from Taylor and Kalt (2005) and casino opening dates from William N. Evans.

Table 7: Estimated Casino Effects on Poverty by Sex of Head of Household and whether household is in Metropolitan Statistical Area (MSA)[**] [+#]

Panel A: No Navajo	Family Poverty Outcomes						Child Poverty Outcomes					
	Prob Below Pov.		Prob in Deep Pov.		Prob Near Pov.		Prob Below Pov.		Prob in Deep Pov.		Prob Near Pov.	
Dummy	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
IN MSA	-0.11*	-0.08	-0.07	-0.15***	-0.07	-0.07	-0.17	0	-0.08	-0.11	-0.18	0.03
	[0.06]	[0.07]	[0.07]	[0.06]	[0.05]	[0.07]	[0.11]	[0.13]	[0.10]	[0.13]	[0.12]	[0.13]
NOT IDENTIFIED AS IN MSA	0.04*	-0.02	0.04**	-0.03	0.01	-0.06***	0	0.01	0.03	0.02	-0.04	-0.02
	[0.02]	[0.02]	[0.02]	[0.02]	[0.03]	[0.02]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]
Observations	7,504	6,125	7,504	6,125	7,504	6,125	11,139	9,383	11,139	9,383	11,139	9,383
Adj. R2	0.15	0.16	0.13	0.14	0.15	0.16	0.16	0.17	0.14	0.17	0.15	0.16
Panel B: Navajo*year_2000	Family Poverty Outcomes						Child Poverty Outcomes					
	Prob Below Pov.		Prob in Deep Pov.		Prob Near Pov.		Prob Below Pov.		Prob in Deep Pov.		Prob Near Pov.	
Dummy	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
IN MSA	-0.15**	-0.04	-0.08	-0.11*	-0.08	-0.03	-0.21**	-0.07	-0.09	-0.11	-0.16	-0.02
	[0.06]	[0.06]	[0.07]	[0.05]	[0.05]	[0.06]	[0.10]	[0.13]	[0.09]	[0.12]	[0.12]	[0.13]
NOT IDENTIFIED AS IN MSA	-0.02	-0.04	-0.02	-0.08***	-0.02	-0.09***	-0.02	-0.02	0	-0.02	-0.05	-0.04
	[0.03]	[0.03]	[0.03]	[0.02]	[0.03]	[0.02]	[0.06]	[0.06]	[0.06]	[0.06]	[0.06]	[0.06]
Observations	7,504	6,125	7,504	6,125	7,504	6,125	11,139	9,383	11,139	9,383	11,139	9,383
Adj. R2	0.15	0.16	0.13	0.14	0.15	0.16	0.16	0.18	0.14	0.17	0.15	0.16

[**] Prob stands for probability and Pov. stands for poverty.

[+] HS stands for high school. Standard errors are in brackets below each estimate, *<10%, **<5%, *** <1% significance. . All household standard errors clustered PUMA group by tribe by year and all child standard errors also clustered within household. PUMA group by tribe fixed effects included. Controls for age, education, metropolitan statistical area, disability, and sex included when needed. Poverty rates calculated for children and families related to the head of household.

[#] Microdata from Ruggles, Steven, Sobek, Matthew, Alexander, Trent, Fitch, Catherine A., Goeken, Ronald, Kelly Hall, Patricia, King, Miriam and Ronnander, Chad. Integrated Public Use Microdata Series: Version 4.0 [Machine-readable database]. Minneapolis, MN: Minnesota Population Center [producer and distributor], 2008. Retrieved from: http://usa.ipums.org/usa/. Gaming identified using reservation Census data linked with whether the reservation had casino from Taylor and Kalt (2005) and casino opening dates from William N. Evans.

Appendix

Table A1. Number of Household and Child Observations by Tribal Grouping and Casino Status and Household Education and MSA Status[#]

	Casino Group		No Casino Group		Navajo		
Householders	1990	2000	1990	2000	1990	2000	Total
< HS Male	473	437	309	207	767	686	2,879
< HS Female	397	531	218	221	442	604	2,413
>=HS Male	786	1,089	548	670	610	923	4,626
>=HS Female	612	1,076	376	624	260	765	3,713
Total	2,268	3,133	1,451	1,722	2,079	2,978	13,631
In MSA, Male	1,174	1,299	628	499	1,310	1,463	6,373
Not identified as in MSA, Male	916	1,376	444	525	653	1,261	5,175
In MSA, Male	85	227	229	378	67	146	1,132
Not identified as in MSA, Female	93	231	150	320	49	108	951
Total	2,268	3,133	1,451	1,722	2,079	2,978	13,631

	Casino		No Casino		Navajo		
Children < 18 by HH Characteristics	1990	2000	1990	2000	1990	2000	Total
< HS Male	630	620	292	277	991	853	3,663
< HS Female	613	621	277	249	953	873	3,586
>=HS Male	1,224	1,628	644	764	883	1,538	6,681
>=HS Female	1,148	1,561	685	756	911	1,531	6,592
Total	3,615	4,430	1,898	2,046	3,738	4,795	20,522
In MSA, Male	1,704	1,954	746	610	1,797	2,229	9,040
Not identified as in MSA, Male	1,652	1,868	764	609	1,765	2,221	8,879
In MSA, Male	150	294	190	431	77	162	1,304
Not identified as in MSA, Female	109	314	198	396	99	183	1,299
Total	3,615	4,430	1,898	2,046	3,738	4,795	20,522

[#] Microdata from Ruggles, Steven, Sobek, Matthew, Alexander, Trent, Fitch, Catherine A., Goeken, Ronald, Kelly Hall, Patricia, King, Miriam and Ronnander, Chad. Integrated Public Use Microdata Series: Version 4.0 [Machine-readable database]. Minneapolis, MN: Minnesota Population Center [producer and distributor], 2008. Retrieved from: http://usa.ipums.org/usa/. Gaming identified using reservation Census data linked with whether the reservation had casino from Taylor and Kalt (2005) and casino opening dates from William N. Evans.

Table A2: Descriptive Statistics of Variables Used in Examining Household Income and Poverty[*#]

Variable	Description	Observations	Raw Mean	Raw Std. Error	Weighted Mean	Robust Std. Error	Min	Max
HH PCI	Household Per Capita Income	13,631	9,219	97	9,116	402	4	436,300
Prob(Earned Income)	Household has Earned Income)	13,631	1	0	1	0	0	1
PC Earned Income	Per Capita HH Earned Income	13,631	7,297	91	7,218	355	-4,300	327,000
Prob(Assist. Income)	Household receives Assistance Income	13,631	0	0	0	0	0	1
PC Assist. Income	Per Capita Household Assistance Income	13,631	438	10	467	30	0	21,093
Prob. Below Poverty	Prob(Head of HH Family Below Poverty Threshold)	13,631	0.41	0.00	0.43	0.02	0	1
Prob in Deep Poverty	Prob(Head of HH Family Below 75% of Poverty Threshold)	13,631	0.31	0.00	0.32	0.02	0	1
Prob Near Poverty	Prob(Head of HH Family Below 125% of Poverty Threshold)	13,631	0.49	0.00	0.51	0.02	0	1
Casino	In Casino Group	13,631	0.40	0.00	0.39	0.10	0	1
year_2000	In Year 2000	13,631	0.57	0.00	0.57	0.11	0	1
navajo_2000	Navajo	13,631	0.22	0.00	0.26	0.12	0	1
year_2000*casino	In Year 2000* In Casino Group	13,631	0.23	0.00	0.22	0.07	0	1
married	Householder Married	13,631	0.46	0.00	0.46	0.02	0	1
male	Male Householder	13,631	0.55	0.00	0.55	0.02	0	1
age	Age of Householder	13,631	46.04	0.14	45.76	0.45	15	93
aths	Householder has at least a High School Degree	13,631	0.61	0.00	0.60	0.03	0	1
lesshs	Householder does not have at least a High School Degree	13,631	0.39	0.00	0.40	0.03	0	1
disable	Householder disabled	13,631	0.18	0.00	0.18	0.01	0	1
msa	Household in MSA	13,631	0.15	0.00	0.14	0.03	0	1

[*] Weighted means use IPUMS household sample weights. The robust standard errors for household characteristics allow for arbitrary correlated within each PUMA group by tribal group by year cell and for children allow for arbitrary correlation within each household. There are 115 PUMA group by tribal group by year cells.

[#] Microdata from Ruggles, Steven, Sobek, Matthew, Alexander, Trent, Fitch, Catherine A., Goeken, Ronald, Kelly Hall, Patricia, King, Miriam and Ronnander, Chad. Integrated Public Use Microdata Series: Version 4.0 [Machine-readable database]. Minneapolis, MN: Minnesota Population Center [producer and distributor], 2008. Retrieved from: http://usa.ipums.org/usa/. Gaming identified using reservation Census data linked with whether the reservation had casino from Taylor and Kalt (2005) and casino opening dates from William N. Evans.

Table A3: Descriptive Statistics of Variables Used In Regressions Examining Child Poverty*#

Variable	Description	Observations	Raw Mean	Raw Std. Error	Weighted Mean	Robust Std. Error	Min	Max
Prob. Below Poverty	Prob(Child Below Poverty Threshold)	21,744	0.47	0.00	0.48	0.01	0.00	1.00
Prob in Deep Poverty	Prob(Child Below 75% of Poverty Threshold)	21,744	0.36	0.00	0.38	0.01	0.00	1.00
Prob Near Poverty	Prob(Child Below 125% of Poverty Threshold)	21,744	0.56	0.00	0.58	0.01	0.00	1.00
Casino	In Casino Group	21,744	0.48	0.00	0.45	0.01	0.00	2.00
year_2000	In Year 2000	21,744	0.55	0.00	0.55	0.01	0.00	1.00
navajo_2000	Navajo	21,744	0.22	0.00	0.26	0.01	0.00	1.00
year_2000*casino	In Year 2000* In Casino Group	21,744	0.26	0.00	0.25	0.01	0.00	2.00
married	Householder Married	21,744	0.58	0.00	0.58	0.01	0.00	1.00
male	Male Householder	21,744	0.55	0.00	0.54	0.01	0.00	1.00
age	Age of Householder	21,744	40.30	0.08	40.13	0.16	15.00	93.00
aths	Degree	21,744	0.65	0.00	0.64	0.01	0.00	1.00
lesshs	School Degree	21,744	0.35	0.00	0.36	0.01	0.00	1.00
disable	Householder disabled	21,744	0.15	0.00	0.15	0.01	0.00	1.00
msa	Household in MSA	21,744	0.12	0.00	0.11	0.00	0.00	1.00

* Weighted means use IPUMS person sample weights. The robust standard errors allow for arbitrary correlated within each each household. There are 9028 household cells. Only children related to head of household included.

Microdata from Ruggles, Steven, Sobek, Matthew, Alexander, Trent, Fitch, Catherine A., Goeken, Ronald, Kelly Hall, Patricia, King, Miriam and Ronnander, Chad. Integrated Public Use Microdata Series: Version 4.0 [Machine-readable database]. Minneapolis, MN: Minnesota Population Center [producer and distributor], 2008. Retrieved from: http://usa.ipums.org/usa/. Gaming identified using reservation Census data linked with whether the reservation had casino from Taylor and Kalt (2005) and casino opening dates from William N. Evans.

Notes on Matching Reservations and IPUMS Census Microdata

The smallest geographic identifier in the Public Use Micro Data (PUMS) is a PUMA (Public Use Micro Area). PUMAs were used by the Census for tabulation purposes and in 1990 generally followed county group, county or census "place" boundaries. PUMAs contain at least 100,000 people and changed coding and boundaries in 2000 (http://usa.ipums.org/usa-action/variableDescription.do?mnemonic=PUMA). For this reason, I use the Minnesota Population Center IPUMS created consistent PUMAs which are the finest geographic area consistent between 1990 and 2000 Censuses. There are 542 consistent PUMAs in the microfile (http://usa.ipums.org/usa-action/variableDescription.do?mnemonic=CONSPUMA). To make a cross walk between reservations and Consistent PUMAs, I use GIS with (cite) reservation shape files and IPUMS publically available consistent PUMA shape files[23].

[23] http://usa.ipums.org/usa/volii/conspuma.shtml has boundary files