ABSTRACT

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This dissertation analyzes the impact of American Indian casinos on social and economic outcomes of reservation residents using restrict-use data from 1990 and 2000 census long form. Federal legislature in 1988 allowed Indian tribes in certain states to open casinos and since then, over 400 casinos have opened, 240 of which have Las Vegas-style games. I demonstrate that casino operations increased employment rates and wages. The impact was primarily for Indians and larger for low-skilled workers among Indians. Employment rates of Indians increased by 6.0 percentage points for those with less than high school degree and by 5.5 percentage points for those with high school degree. Young Indian adults responded by dropping out of high school and not enrolling college even though many tribes had generous college tuition subsidy programs. High school enrollment rates fell by 4.8 percentage points for 18 year old Indian males, by 5.1 and 8.7 percentage points for Indian females aged 17 and 18. The high school graduation rate of those aged 20-24 fell by 9.6 percentage points and by 11.5 percentage points for Indian males and for Indian

females, respectively. College entrance rate fell by 5.3 percentage points and by 8.8 percentage points for young Indian males and Indian females, respectively.

Economic changes on gaming reservations also altered the incentives to marry and have children. Ever married rates of males increased by 2.6 to 5.0 percentage points for those aged 18 to 21. Ever married rates of females did not show any statistically significant changes except among 24 year old Indians. The fraction of females (aged 18 to 25) having children fell for both Indians and non-Indians by 3.4 to 3.7 percentage points.

THE ECONOMIC IMPACTS OF AMERICAN INDIAN CASINOS

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Dedication

To my lovely wife, Ryojin; my graduate study in the U.S. was a very tough life for her with two kids. She dedicated herself to me, Jiwon, and Jaewon. She did her best to help me to complete this dissertation. Whenever I need help, she provided wise and bright pieces of advice.

To my parents, Mr. SeungSu Kim and Ms. SeungAe Choi; they are the best parents. I always want to be such great parents to my kids as them.

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And to my daughter, Jiwon, and my son, Jaewon; they are my greatest happiness.

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The research in this dissertation was conducted while I was Special Sworn Status researcher of the U.S. Census Bureau at the Center for Economic Studies. Research results and conclusions expressed are all mine and do not necessarily reflect the views of the Census Bureau. This dissertation has been screened to insure that no confidential data are revealed.

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Chapter 1: Introduction

A series of Supreme Court cases and Federal legislation in the mid to late 1980s gave Indian tribes in certain states the ability to open Las Vegas–style casinos. Since that time, over 400 Indian casinos have opened, 240 of which offer Las Vegas-style games. Indian casinos generated gaming revenues of $16.7 billion in 2003.[1] Today, over half of tribal members in the lower 48 states now belong to tribes that operate a casino (Evans and Topoleski, 2002).[2] This dissertation uses restricted use data from the 1990 and 2000 Census long form samples to analyze the impact of casinos on residents who live on and near reservations that have opened casinos.

There is substantive interest in the basic question about whether gaming has improved the outcomes of Indians on reservations. Historically, people living on Indians reservations are among the poorest and least educated groups in the U.S. Table 1.1 presents sample statistics from the 1990 Census for various variables of interest in this dissertation. The results in the first two columns are produced from the Census long form data used in this dissertation and the results in the final column are from the Census Public Use Micro Sample 1 percent sample. According to data from the 1990 Census, Non-Indian residents of reservation and U.S. citizens in general look very similar. Compared to the U.S. as a whole, Non-Indian residents on

[1] Source: Annual Report 2004 by National Indian Gaming Commission accessed at http://www.nigc.gov/Portals/0/reading_room/biennial_reports/nigc_2004_annual_report.pdf.

[2] Most Indian reservations are located in the states of Arizona, California, Florida, Michigan, Minnesota, Nevada, New Mexico, Oregon, South Dakota, Washington, and Wisconsin. Some other states such as Alabama, Colorado, Connecticut, Georgia, Montana, Nebraska, Utah, Idaho, etc., have a few Indian reservations.

reservations have similar labor force participation rates, slightly higher unemployment rates, lower poverty rates, slightly higher incomes and 10 percent lower college graduation rates. In contrast, the differences between Indians on reservations and the U.S. as whole are stark. Compared to the rest of the U.S., Indians on reservations have 24 percent lower labor force participation rates, 25 percent lower personal income, four times the unemployment rate, twice the poverty rate and 41 percent lower college graduation rate.

In chapter 2 of this dissertation, I provide a brief summary of the legal and legislative events that lead to the rise of legal gaming on reservations and in Chapter 3, I describe in detail the census long form data used in this dissertation. In Chapter 4, I examine the impact of casinos on economic outcomes of adults. In that chapter, I use a basic difference-in-difference model where I compare the changes over time in economic outcomes for reservations that opened a casino to the same differences for reservations that did not adopt casino gaming. In Chapter 4, I show that Indian casinos have had a tremendous impact on the local economy, lowering unemployment rates and rising individual incomes and labor earnings. All of the impacts of casinos on unemployment rates are for Indians on reservations and the changes are especially large for low-skilled workers. Among reservation residents aged 18 to 64, labor force participation increased for Indians by 1.68 percentage points, unemployment fell by 3.06 percentage points, and real income of the employed increased by $2,004 for Indians. Non-Indians did not have any statistically significant changes in these outcomes. Although a 3 percentage point change in unemployment is a large effect, the results do indicate that casinos have not alleviated the economic problems on

reservations. By 2000, unemployment rates of Indians on reservations were still substantially higher than rates in the rest of the country.

The rapid change in economic opportunities generated for Indians as a result of casinos provides interesting variation that can be used to test various hypotheses about the impact of local labor market conditions on economic decisions. For example, in chapter 5, I examine the impact of local labor market conditions on the demand for education. A number of authors from the fields of economics, sociology, education, and demography, have examined the social and economic forces that alter the demand for education. The decision to continue with formal education is affected by a number of factors including the direct costs of education (e.g., tuition and fees, the generosity of financial aid), indirect costs such as foregone earnings, the expected returns from education, the psychic costs/benefits of education, plus a variety of other factors such as parents' socioeconomic background. In this study, I am interested in how local labor market conditions impact high school graduation and college entrance rates. The predictions of human capital theory in this case are not clear. If high school students perceive better job prospects as rising returns to skill, young adults might increase enrollment rates. But abundant work opportunity for low skilled workers in local labor market 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 conditions will therefore depend on the strength of these two countervailing effects.

The rise in casino gaming may exert both positive and negative forces on educational attainment of young adults. Family income is a strong predictor of

education attainment and the reduced unemployment and increased family incomes for Indians I estimate in Chapter 4 may generate an income effect that would increase the demand for education. Second, anecdotal evidence from a number of tribes indicates that profits from casinos were poured back into education efforts such as improving the quality of K-12 education or providing tuition subsidies for post-secondary education. In contrast, there are some forces generated by casinos that may discourage additional education. As I show in detail in Chapter 5, much of the improvements in labor market opportunities were for low skilled Indian worker and as a result, the returns to having a college degree fell relative having fewer years of education.

There are at least four reasons the rise of Indian gaming provides an excellent opportunity to examine the link between the local economy and individual responses. First, few Indian casinos have closed, so unlike many previous studies, this dissertation is measuring permanent rather than transitory effects.[3] 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 areas, making the definition of local labor markets easier to construct.[4] 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 I illustrate in the following chapters, the benefits of casinos appear to be concentrated in lower-skilled jobs and

[3] From what I can determine, only two of the more than 300 Indian casinos that have opened have been closed due to lack of business.

[4] Evans and Topeleski (2002) show that the median tribe with a casino has about 800 members and only 1 million people living within 100 miles of the casino.

Indians appear to be the primary beneficiaries, providing necessary variation by which I can identify models.

The results in Chapter 5 indicate that changing economic opportunities for low skilled Indians has discouraged human capital accumulation among younger Indians. I find that among 18 year old Indians, high school enrollment rates fell by 5 percentage points for males and 8 percentage points for females. Likewise, I find that among 20-24 year olds, high school graduate rates fell by almost 10 percentage for males and 11 percentage points for females. In addition, college entrance rates for 20-24 year olds fell by almost 6 percentage points for males and 8 percentage points for females. These results suggest that caution must be taken when instituting economic renewal programs for disadvantaged areas. If renewal programs raise economic opportunities by primarily enhancing the demand for low skilled jobs, then these policies may have the unintended consequence of discouraging human capital accumulation.

In Chapter 6, I take a closer look at why the human capital investments of young females were more responsive than for males. In that chapter, I examine whether the rise of casinos altered social outcomes such as teen childbearing, marriage rates and marital dissolution rates. Casino operations provided new employment opportunities, especially for low-skilled workers and females among Indians. Younger males are now more attractive marital partners because their wages have risen, but the option value of searching for a spouse may have changed as well, increasing the opportunity cost of marriage. Interestingly, I found that while more males aged 18 to 25 had higher marriage rate, females in the same age group had no

change in marriage. Closer inspection suggests that marriage rates among younger females (15-17) increased, suggesting that males 18-21 increased their marriage rates by marrying younger women.

Since younger Indian women responded to the opening of casinos by increasing work and dropping out of school, it is no surprise that I find these women had lower fertility. I estimate that among Indian women in this age group, the fraction of females who ever had a child fell by 4.4 percentage points with the corresponding number for non-Indians being a 6.7 percentage point drop. I find that marital dissolution rates (which include separation and divorce) increased for Indian males and decreased for non-Indian males among the married. Indian females had no statistically significant changes in marital dissolution rate while non-Indian females experienced statistically significant drop in marital dissolution rate.

Chapter 2: The Rise of Indian Gaming

In this chapter, I outline the legal and legislative institutions that lead to the rise of Indian gaming. Much of this chapter is based on fuller length treatments of the issue such as Eisler (2001), Evans and Topoleski (2002), and internet sources of the states allowing gaming on Indian reservations.

2.1. Legal and Institutional Background

Federally recognized Indian reservations are sovereign nations and as such, their relationships with local, state and the federal government are determined primarily by federal statutes. The current legal treatment of Indians was determined in 1953 by the passage of a number of important pieces of legislation including the House Concurrent Resolution 108 which made Indians subject to the same privileges and responsibilities as other citizens of the United States. So although Indians may belong to a particular tribe, they are citizens of the United States as well. Another key piece of legislation that has direct ties to the current debate concerning Indian casinos was also passed in 1953. That law, Public law 83-280 (P.L. 83-280 or P.L. 280), transferred criminal jurisdiction on Indian reservations to 6 states (Alaska, California, Nebraska, Minnesota, Oregon, Wisconsin). There was considerable disagreement between the tribes and state and local governments about what the enforcement of criminal law on reservations meant. After a series of lower court decision, the issue was settled in 1976 by the Supreme Court in the case of *Bryan v. Itasca County*. In the case, the Supreme Court determined that under P.L. 280, if an activity was treated as civil by state statutes, states could not enforce these activities

on Indian reservation within the state. Under the *Bryan* decision, reservations were subject to the same criminal laws as other state residents, but, civil statutes did not apply on Indian land. As an example, tribes were not required to collect state excise taxes on products sold on reservations nor are they required to enroll workers in state unemployment insurance programs because both of these are considered civil statutes. P.L. 280 was eventually expanded to include 10 other states.[5]

Prior to the 1970s, the economies of Indian tribes with reservations were based mostly on agriculture and natural resources. Indian tribes were at the time heavily dependent on federal funds for schools, public safety, health care, job training and other programs. As some natural resource industries declined and federal funds and employment were reduced in late 1970s, tribal governments were given more responsibility for their economic development. Some Indian tribes opened cigarette and tobacco shops using the tax exemption status on Indian lands to attract non-Indian smokers. But a 1980 Supreme Court decision[6] ruled that sales taxes should be imposed to non-Indian customers. This decision reduced revenue from cigarette and tobacco sales dramatically in some states that chose to enforce the decision.

Some tribes also opened gaming sites on the reservations as an economic development program. Most of the early gaming sites were large-scale bingo parlors. Tribal operation of gaming site on the Indian land caused conflicts between tribes and

[5] "The "mandatory" states, required by Public Law 280 to assume jurisdiction, are Alaska, California, Minnesota (except Red Lake), Nebraska, Oregon (except Warm Springs). and Wisconsin. The "optional" states, which elected to assume full or partial state jurisdiction, are Arizona (1967), Florida (I961), Idaho (1963, subject to tribal consent), Iowa (1967), Montana (1963), Nevada (1955), North Dakota (1963, subject to tribal consent), South Dakota (1957-61), Utah (1971), and Washington (1957-63)." Source: http://www.tribal-institute.org/articles/goldberg.htm.

[6] *Washington State v. Confederated Tribes of the Colville Indian Reservation,* 1980.

state governments. In some cases, the state governments argued the gaming operations were in violation of state or local ordinance. For example, the Seminole of Florida opened a high stakes bingo parlor in 1978. The Seminole bingo was a great success and its annual earnings were over $100 million within 10 years of opening (Eisler, 2001, p.101). This bingo operated six days a week and awarded large prizes. The hours of operation and the size of offered prize were both contrary to state laws concerning bingo and the state attempted to close the bingo operation. The federal District Court decided that because the gambling law of Florida was civil and not criminal, Florida could not enforce criminal jurisdiction over Indian reservation in Florida. The Fifth Circuit Court of Appeals upheld the district court's decision in 1981 (*Seminole v. Butterfield*).

A situation similar to the Seminole case arose in California where card rooms are legal but subject to local ordinances. Cards rooms are gaming operations that allow non-banked games where the house operates the games and takes a fraction of the handle. The California law did however only allow card rooms if local ordinances permitted. The Cabazon Band of Mission Indians is a tribe in the city of Indio, California, near Palm Springs and in the 1970s, the tribe opened a bingo parlor and in the early 1980s, a card room. The local police department ordered the card room closed and arrested over 100 people for violating local ordinance prohibiting poker games. The Federal district court decided in favor of the city of Indio in 1981. The Ninth Circuit Court of Appeals reversed district court's decision in 1982 noting that reservation was not considered as a part of Indio. Then Riverside County attempted to close the card room and the tribe sued the county in federal district court.

Since the reservation was in fact in Riverside County, the court decided that the county did have jurisdiction so the case went forward and eventually was heard by the U.S. Supreme Court. This case (*California v. Cabazon Band of Mission Indians*) was decided in 1987 in favor of the tribe noting that only federal government had the authority to prohibit gambling on Indian reservations. Citing the precedents set by the *Bryan* and *Seminole* cases, the court argued that if a state allows any form of gambling, the rules concerning gaming are then civil and not criminal in nature and therefore, the state cannot restrict gambling in the reservation. Because California state law allowed bingo and card games, the court argued local regulations concerning gaming were civil nature and therefore local jurisdictions could not restrict gaming on the reservations.

Right after the Supreme Court's *Cabazon* decision, state governors and the casino industries sought federal regulation over Indian gaming because, at the time, there was no federal law to prohibiting Indian gaming. In contrast, Indian tribes wanted no federal action since the *Cabazon* decision gave them the widest possible latitude to operate a casino in states that allow some forms of casino-style gaming.

In response, the federal government rapidly passed the Indian Gaming Regulatory Act (IGRA) in 1988.[7] The IGRA allows gaming only on federally recognized reservations and its purposes are i) to promote tribal economic development, self-sufficiency, and strong tribal governments and ii) to shield Indian tribes from organized crime and other corrupting influences to ensure that Indian

[7] Source: National Indian Gaming Commission, http://www.nigc.gov/nigc/laws/igra/overview.jsp.

tribes are primary beneficiary of gaming operation. The IGRA established 3 classes of games. Class I are traditional Indian game and social games for minimal prizes. The regulatory authority for these games is the tribal governments themselves. Class II games are games of chance (bingo), pull tabs (if played in the same location as bingo), punch board, tip jars, and other games similar to bingo. Regulatory authority is still on the tribal government with oversight of the National Indian Gaming Commission (NIGC). Finally, Class III gaming is a casino-style gaming such as slot machines, black jack, craps, and roulette.

The IGRA set conditions for legal operation of Class III gaming on reservations. These conditions reflected existing casino-industry interests, which were to keep new competitors from growing. First, to operate class III gaming in a certain state, the games must be legal in the state. Second, Indian tribes must negotiate a *compact* with the state where it could operate the Class III gaming. "The compact may contain any subjects directly related to the operation of gaming activities…In the absence of a compact regarding Class III gaming, no extension of state jurisdiction or application of state laws to Indian gaming is permitted…" (Indian Gaming Regulatory Act, 1988). If the state and the tribe do not reach the agreement on the compact within 180 days of the tribe's request, tribe can file suit in federal district court against the state for not bargaining in good faith.[8] The courts were given the ability to order the state and the tribe to conclude a compact within 60 days. If they fail to conclude a compact, each party would then submit its last best offer to a mediator, whom the court appoints. Then the mediator must choose one which

[8] This provision has since been challenged in federal court.

comports with IGRA and other federal laws (IGRA, 1988).[9] Third, tribal governments must adopt a gaming ordinance to operate class II and class III gaming. Tribal gaming ordinance sets the terms for gaming operation such as gaming authorization, ownership, use of gaming revenue, protection of the environment, public health and safety, and so forth. Tribal gaming ordinance must be approved by the chairperson of National Indian Gaming Commission.[10] The IGRA restricts the use of net revenue from any gaming to five categories: i) to fund tribal government operations and programs, ii) to provide of the general welfare of Indian tribe and its member, iii) to promote tribal economic development, iv) to donate to charitable organizations, or v) to help fund operations of local government agencies. Currently, 73 tribes (one-fourth of gaming tribes) share their gaming revenue by paying per capita payment for tribal members.[11]

The IGRA stipulates that states cannot tax the profits of Indian casinos. The law also did not institute a federal tax on profits. Some tribes did however reach agreements with state to pay a profits tax in exchange for more favorable agreements from the state.[12] In many cases, the states granted the tribes an exclusive right to operate gaming within the state. One such tribe is the Mashantucket Pequot tribe in Connecticut. The original tribal-state compact allowed only table games and bingo

[9] Later the court made a different decision on the right of a tribe in compact negotiation. The Court of Appeals decided that Seminole Tribe may not enforce the good faith of Florida in compact negotiation by filing a suit against state governor (*Seminole Tribe v. Florida*, 517 U.S. 44, 1996), source: http://www.oyez.org/oyez/resource/case/662/ accessed on 5/15/06.

[10] A Model tribal gaming ordinance is well described in Bulletin No. 93-1 of National Indian Gaming Commission (http://www.nigc.gov/Default.aspx?tabid=176 accessed on 5/15/06).

[11] National Indian Gaming Association, http://www.indiangaming.org.

[12] In Arizona, California, Connecticut, Michigan, New Mexico, New York, and Wisconsin, tribes agreed to pay some portion of casino revenue. Source: National Conference of state Legislatures at http://www.ncsl.org/programs/statetribe/trgaming.htm.

because slot machines were illegal in the state. In 1992, tribe and the state reached a new compact allowing slot machine in the Pequot gaming operation and in return, the tribe agreed to pay the state $100 million or 25 percent of gross revenue on the slot machines.[13] This payment is conditional on the exclusive right of the tribe on slot operations. Later, the Pequots altered compact to allow the Mohegan Indian tribe, which just won federal recognition, the rights to a slot machines license for a proposed casino. Under the new deal, the Pequots and the Mohegans agreed to pay the state 25 percent of gross slot machine revenue or $80 million per year. The size of the payments effectively prohibits the state from granting another casino license since no other casino could generate that kind of revenue.[14]

In California, Indian gaming (especially, slot machine operation) is still controversial. In early 1990s, tribes wanted video slot machines but the state did not allow games in which gamblers competed against the house rather than other players. After a subsequent breakdown in negotiations between tribes and the state, the case was taken to the federal court. By then about 40 tribes opened casinos with video slot machines without a compact required by the IGRA (Evans and Topoleski, 2002). In 1998 California voters passed proposition 5, which is a statutory initiative that required the governor to approve any tribal casino proposal.[15] It placed no limits on the number of casinos, on the number of gambling machines and tables in each casino, and on the usage of the video slot machines. It also proposed to lower gambling age

[13] If tribal payment falls below $100 million, the rate increases to 30 percent.
[14] OLS research report at http://www.cga.ct.gov/2001/rpt/olr/htm/2001-r-0599.htm accessed on Aug. 26,2005.
[15] Proposition 5 (the Tribal Government Gaming and Economic Self-Sufficiency Act of 1998), Source: Indian Gaming in California at http://www.igs.berkeley.edu/library/htIndianGaming.htm accessed on Aug. 29, 2005.

to 18. But the California Supreme Court struck down Proposition 5 in the following August for violating the 1984 state Lottery Act. Then Governor Gray Davis negotiated new compacts with about 60 tribes. The new compacts i) allowed Nevada-style gambling, ii) legalized video slot machines, iii) allowed casino employees to unionize, and iv) provided $1.1 million annually for non-gaming tribes. It required the tribes to pay quarterly profits tax based on the number of slot machines and some of the funds were used to run state-sponsored gambling addiction programs. The compacts were contingent on the passage of a constitutional amendment, proposition 1A. Although non-Indian gaming industry asserted that Proposition 1A, which offered preferential treatment based on ethnicity, was unconstitutional, the Ninth Circuit Court of Appeals found in 2003 that federal law allowed states to grant Indian tribes a monopoly on Nevada-style casinos.[16] In 2004, non-Indian gaming proposed Proposition 68, which required all 53 gambling tribes to pay 25 percent of net slot machine revenue to the state and refusal of payment broke a monopoly of slot machines. In reply, the Agua Caliente Band of Cahuilla Indians proposed a competing measure, which required Indian gaming operations pay 8.84 percent corporation tax for their casinos and removes all limits on the size in tribal gaming. But these two measures were rejected by voting. In 2004, governor Arnold Schwarzenegger signed new compacts and the state legislature approved new compacts.[17] The compacts gave the tribes' monopoly on casino-style gambling in return for an initial $1 billion payment to the state and additional annual payment

[16] Indian Gaming in California at http://www.igs.berkeley.edu/library/htIndianGaming.htm.
[17] National Conference of State Legislatures, http://www.ncsl.org/programs/statetribe/trgaming.htm.

estimated between $150 million and $275 million. Tribes were allowed to exceed the 2000 limit on the number of slot machines with more payment to the state.[18]

In Michigan, seven tribes signed tribal-state compact in 1993. Compact required each tribe to pay 8 percent of their slot machine and electronic video gaming profits to the State, and 2 percent to local municipalities. Tribes have an exclusive right to conduct Class III gaming in the state but this payment to the state was ceased when the Michigan Gaming Control Board (MGCB) issued a Detroit casino license in 1999. The payment to local municipalities was not affected by issuing of commercial casino license which the MGCB issued. Four more tribes signed compact with the state of Michigan in 1998. Their payment of 8 percent and 2 percent of electronic video gaming and slot machine profits were not affected by the issuance of a Detroit casino license by the MGCB unlike 1993 compact tribes. The 1998 compact permits one casino per tribe and requires $50,000 (plus annual adjustment by consumer price index) payment to the MGCB for oversight service while the 1993 compact required $25,000 payment to the MGCB for oversight service.[19]

Like California, Indian tribes in New Mexico started gaming operations without a tribal-state compact. In 1990, Governor Bruce King tried to negotiate compacts with tribes by appointing a task force but, in the end, he refused to sign two negotiated compacts. Then new Governor Gary Johnson signed 13 identical compacts in 1995. However, the New Mexico Supreme Court ruled that Governor

[18] Indian Gaming in California at http://www.igs.berkeley.edu/library/htIndianGaming.htm accessed on 5/16/06.
[19] Source: Michigan Gaming Control Board at http://www.michigan.gov/mgcb/0,1607,7-120-1380_1414_2182-11370--,00.html accessed on Aug. 29, 2005.

Gary Johnson lacked the authority to sign the compacts on behalf of the state. In 1997, the legislature approved the compacts and Governor Johnson signed them. The New Mexico legislature formalized the process for compact negotiation by adopting the Compact Negotiation Act in 1999. New gaming compacts were negotiated and signed by almost all gaming tribes in 2001.[20] The 2001 compact gave exclusive right of Class III gaming in the state to tribes and required 8 percent (3 percent for smaller casinos) of net wins on slot machines in exchange.[21]

In Arizona, 15 tribes out of 21 operate gaming sites as of Aug. 1, 2005. The Yavapai-Prescott Indian tribe was the first tribe which started gaming in November of 1992. The compacts called for tribal payments to the state with a sliding scale based on the amount of Class III net winning. Tribes pays 1 percent for the first $25 million in net winning and payments increases to 3 percent, 6 percent, and 8 percent, for the next $50 million, the following $25 million, and when net winnings exceed $100 million, respectively.[22] A total of 12 percent of tribal contribution is distributed by the tribe to cities, towns, and counties and the remainder is distributed to the Arizona Benefit Fund. These funds are earmarked for education service (56 percent), health service (28 percent), tourism fund (8 percent), and wildlife conservation fund (8 percent) after administrative costs.[23]

Tribes in some states such as Rhode Island and South Carolina are unable to

[20] Source: New Mexico Gaming Control Board at http://www.gcb.state.nm.us/tribal/history.htm accessed on Aug. 29,2005.
[21] New Mexico Attorney General at http://www.ago.state.nm.us/cia/cia_intergovagree_gcrs.htm accessed on Aug. 29, 2005.
[22] Source: http://www.azstarnet.com/allheadlines/126551 accessed on 5/16/06.
[23] Arizona Department of Gaming at http://www.gm.state.az.us/contributions.htm accessed on Aug. 31, 2005.

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

2.2. Growth of Indian Gaming

There are 562 federally recognized Indian tribes in the U.S. Among them, 224 tribes are operating Class II or Class III gaming and they have 354 gaming facilities in 28 states.[24] Indian gaming has been growing over time in both the number of operations and the revenue generated. The growth of revenue in tribal gaming has been remarkable compared to total gaming industry in the country. Table 2.1 reports the gaming revenues in constant 2000 dollars. In 1988, tribal gaming revenues were below one billion dollars. By 1999, revenue exceeded 10 billion dollars and reached 15.7 billion dollars in 2003, which was almost 2000 percent increase in 15 years. The share of tribal gaming from total gaming industry has been growing. It was 12 percent in 1995 and the share almost doubled in 2003 and it

[24] Source: National Indian Gaming Association.

counted 23 percent of the total revenue generated by all gaming industry. Between 1995 and 2003, tribal gaming revenue increased by 12 percent annually, which is three times faster than the growth of revenues in total gaming industry or commercial casinos. In the same period, total gaming industry and commercial casinos revenues have grown by 4 percent per year.[25]

In most cases, as a return to the exclusive right of gaming in the state, tribal governments pay some part of their gaming revenues to the states. The conditions and the amount of tribal payment to the state are listed in the compact. Table 2.2 reports estimated payment to the states in 2004 and 2005 fiscal year. Six states were paid over 635 million dollars from Indian gaming operation. Due to the issuance of another gaming license, the state of Michigan was paid least amount. Total payments are expected to increase to over 681 million dollars in fiscal year 2005.

[25] If calculated between 1993 and 2003, commercial casino revenue and total gaming revenue grew by 7 percent and 5 percent per year.

Chapter 3: Data

This study uses restricted-use versions of the 1990 and 2000 decennial census long-form samples. 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, 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 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 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 casino impacts. For example, half of all people living on reservations are non-Indians. Since I suspect the benefits of a new casino might differ for Indians compared to non-Indians, the SF data may miss this heterogeneity in treatment.

Likewise, individual-level data from the long-form survey are 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 the Public Use Microdata Area (PUMA) level, which 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 U.S. population. More importantly, our restricted-use data contains detailed geographic information that includes census block (or block part), state, county, congressional district, and metropolitan statistical area (MSA) 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.[26] 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 I delete these tribes from our sample. Although the state of Oklahoma has the most Indians belonging 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 I delete data for Oklahoma as well. A small number of tribes such as the

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

Mohegans from Connecticut did not exist in 1990 but have been recognized since. I delete any tribe that only has one year of census data. Finally, I 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. The final sample consists of 265 of these tribes, of which, 142 had opened a Las Vegas-style casino by the end of 1998. Many of these tribes have opened more than one casino. I 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. Therefore, the model identifies the impact of casinos for people that remain on the reservation. As I demonstrate below, this is the vast majority of original reservation residents.

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 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.[27] 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 the 2000 long-form sample, only 3 percent

[27] Source: 1990 Summary Tape File1- 100 percent data, Census 2000 Summary File1- 100 percent data.

of people on reservations reported a multiple race code. In the 2000 Census, I code as Indian any person, who reported an Indian race, either singly or in combination with other race codes.[28]

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 each chapter, I will not use all observations, but instead, focus on several distinct subsamples. For example, in the next chapter I examine the economic changes such as employment and labor force participation generated by gaming. For this analysis, I use working-age reservation residents such as those 18 to 64 and 30 to 64. Likewise, in the chapter describing the impact on the demand for education, I document the rise in economic opportunities likely to be faced by young adults. Therefore, I 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. To examine how economic changes affected the demand for education, I use high school-age and college-age reservation residents. In the chapter describing the impact on the marriage decision, reservation residents aged 18 to 25 are included in the sample.

Indian Gaming Regulatory Act (or IGRA) requires tribes who want to operate class II and III gaming to negotiate a compact with the state. But some tribes opened a casino before a compact negotiation. To determine the opening date, I compare

[28] The results are not sensitive to this specification. I obtain very similar results if I define those with multiple race codes and at least one race as Indian as non-Indian.

actual casino open date and a date of compact.[29] If a casino opens after compact negotiation, I set casino open date as actual open date. If a compact is negotiated after a casino opens, casino open date is set as compact date. For tribes operating casinos and never negotiating a compact, I set casino open date as an actual open date.[30]

[29] Casino open date will be used in the sensitivity test, which examines whether casino impact varies by casino open date.

[30] There are 20 casinos in this case. 15 opened on or earlier than 1995 and 5 opened after 1995.

Chapter 4: Economic Outcomes

This chapter uses restricted use data from the 1990 and 2000 Census Long Form Data to examine how Indian casino operations have changed economic outcomes on reservations. Given the growth in the number and size of Indian gaming operations, there are surprisingly few studies that have examined this issue. To date, most scholars have examined the impact of the Foxwoods Casino in Ledyard, Connecticut. This casino has been the focus of a number of full-length books, plus numerous pieces in magazines, newspapers and television news programs. Its economic impacts on Connecticut are described nicely in Carstensen et al. (2000), a study by the Connecticut Center for Economic Analysis at the University of Connecticut. The study estimates that the Foxwoods Casino has created 13,000 jobs since 1992 and real gross state product has increased by $1.2 billion on average. Tribal payments to the state from slot machine revenues reached $1 billion in 2000. Foxwoods is however not the typical Indian casino. With 5000 slot machines and over a half million square feet of gaming space, Foxwoods is the largest casino in the world and twice the size of the largest casino in Las Vegas. Evans and Topokeski (2002) note that the median Indian casino has only about 500 slot machines. Subsequently, the experience at Foxwoods is not representative of most Indian tribes with casinos.

Evans and Topoleski (2002) estimated the social and economic impact of American Indian casinos using Bureau of Indian Affairs (BIA) data. The BIA data report outcomes for tribal members and the data is released every two years. They

estimate that four years after tribes open casinos, tribe population increased by 12 percent, employment increased by 26 percent, unemployment rate fell by 4.4 percentage points and the fraction of adults who were working but poor declined by 5.5 percentage points. The data is limited because it only reports information for tribal members and as we mentioned above, these members can live on or off reservations. Likewise, only half of reservation residents are tribal members. Therefore, these results may provide an incomplete picture of the impact of casinos.

Evans and Topoleski also examined the impact of casinos on the surrounding areas, focusing on counties where a casino opened. The authors estimate that four years after a casino opened on a county, bankruptcy rates increased by 10 percent. Similarly, they also found that four or more years after a casino opened in a county, property crimes, violent crimes, auto thefts and larceny increased by roughly 8-11 percent.

A report (Taylor and Kalt, 2005) by the Harvard Project on American Indian Economic Development used data from the 1990 and 2000 census at the reservation level to examine the impact of casinos on reservation life. According to this report, between 1990 and 2000, real per capita income increased by 21 percent for non-gaming reservations, 36 percent for gaming reservations, and 11 percent for the nation as a whole. Over the same period, they estimate that the unemployment rate decreased by 1.8 percentage points for non-gaming reservations and by 4.8 percentage points for gaming reservations. The fraction of children in poverty decreased by 8 to 12 percentage points and gaming reservations had bigger changes. We should note that this report does not report standard errors on estimates or

statistical tests of hypotheses. Because the report is using public use census data, they only report estimates at the tribe level and they cannot examine the heterogeneity in estimates based on whether reservation residents are Indian or non-Indian, or comparisons of younger versus older workers.

4.1 Sample Characteristics

This chapter examines how casino operations on federally recognized Indian reservations have changed economic outcomes. Most of the variables available in the Census Long Form are data on labor market outcomes so in this analyses, we focus on samples of the working-age population such as respondents ages 18 to 64 or 30 to 64.

Table 4.1 presents sample statistics of reservation residents in different sub-samples. I report data by Census year, by whether the reservation will eventually get a casino by 1998, and by the racial identify of the respondent. As I mentioned in a previous chapter, I break the sample up into two racial groups: Indians and non-Indians. With multi-race codes in the 2000 census, I classify as Indian those who report Indian as race with and without other race codes. I report means for four outcomes: population living on the reservation, labor force participation, unemployment rates for those in the workforce, and total personal income in real 2000 dollars. All cell entries are calculated using sample weights.

Focusing on the top two panels in the table, we see that on gaming reservations in 1990, there were more non-Indians than Indians. The share of non-Indians aged 18 to 64 was over 59 percent. In contrast, on reservation that will not

open a casino by 1998, about 70 percent of the population was Indian in 1990. The population on reservations has increased at similar rates between 1990 and 2000 on the two types of reservations. Population increased by 21 percent on gaming reservations and by 19 percent on non-gaming reservations. The population growth has been especially large among Indians on reservations that will eventually get a casino. On reservations that will eventually get a casino, the Indian population increased by 26 percent but non-Indian population increased by 17 percent. The corresponding numbers for reservations without casinos are 22 and 10 percent, respectively. Therefore, the share of Indian residents has been increasing on both types of reservations.

The previous literature in this area has demonstrated that casino operations on Indian reservations have improved local labor market conditions. The advantage of the census long form data is that I can examine the impact for certain subgroups. I begin the analysis of subgroups by examining the means of outcomes by whether reservations have casinos.

In the 18-64 year old sample, non-Indians had higher labor force participation rates, lower unemployment rates, and higher personal incomes than Indians in both time periods and for both types of reservations. The unemployment rates of non-Indians were about one fourth rate Indians. In 1990, unemployment rate of Indians was around 25 percent and that of non-Indians was around 7 percent among labor force participants aged 18 to 64. The gaps in labor market performance between Indians and non-Indians remained through 2000 through it appears the gap fell more on reservations with casinos. The labor force participation rate among non-Indians

did not move much between 1990 and 2000 on either type of reservation. However, the participation rate increased by 1.5 percentage points for Indians on reservations with casinos, and only 0.6 percentage points on other reservations. The unemployment rate was among Indians on reservations with casinos fell by 6 percentage points between 1990 and 2000 but by only 4 percentage points on other reservations. Among non-Indians, the unemployment rate only fell by 1.1 percentage points on reservations with a casino and by less than a half point on other reservations. Real income of Indians grew by about $1350 more on reservations with casinos than on other reservations but non-Indians showed similar patterns of income growth on the two types of reservations.

Obviously, reservation residents aged 30 to 64 had better performance in labor markets than residents aged 18 to 64. In the case of Indians, the labor force participation rates were similar but unemployment rate was much lower for 30 to 64 than 18 to 64. Real income was also higher for 30 to 64 group. Indians aged 30 to 64 earned more than 18 to 64 group by 12 to 16.5 percent in average.

The fraction of Indians aged 0 to 17 who were in poverty was triple as high as that of non-Indians. Poverty rate of Indian kids was around 42 to 46 percent and that of non-Indians was 12 to 14 percent in 1990. Poverty rate fell by around one-fifth for Indian kids but it remained still high on reservations. Poverty rate of Indian kids was 31 to 36 percentage points and that of non-Indian kids was 11 to 13 percentage points in 2000.

A few trends are evident in the means from Table 4.1. First, economic outcomes for Indians on reservations are incredibly poor with between one fifth and one fourth of the population unemployed. Second, this situation has improved on both reservations with and without casino gaming, however the growth appears to be larger on reservations with casinos. Third, the growth in labor market opportunities for non-Indians on reservations appears to be the same regardless of casinos status of the reservation. These numbers suggest that casinos have improved the economic outcomes for Indians on reservations. However, it is clear from Table 4.1 that casinos are not panacea. In 2000 on reservations with casinos, the unemployment rate among adults in the labor force was still almost 20 percent and personal incomes were only $20,000. To provide some basis of comparison, note that in the 2000 census, the average unemployment rate for the US was 5.8 percent and the average personal income was $21,587. Median earnings for full-time full-year workers were $37,057 for males and $27,194 for females.

4.2 Econometric Model

The Cabazon decision was issued in 1987 and the Indian Gaming Regulatory Act was passed in 1988. According to the law, tribes must first establish a compact with the state before it can open a casino. In some states, compact negotiations took some time so the majority of casinos opened during the 1990s. In the sample, 17 casinos 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 casinos 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, the econometric analysis will compare the growth in outcomes for tribes that obtained a casino by the end of 1998 and those that did not. I hold constant tribe specific characteristics and secular changes in outcomes common to all tribes, and therefore, the econometric framework is a basic difference-in-difference model, which can be described by the following equation:

$$(4.1) \qquad Y_{ijt} = X_{ijt}\beta + YEAR2000_t * CASINO_j\alpha + v_j + u_t + \varepsilon_{ijt}$$

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 $YEAR2000_t * CASINO_j$, where YEAR2000 equals 1 if an observation comes from the 2000 census and $CASINO_j$ equals 1 if an observation belongs to a tribe that opened a casino by 1998.[31] 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, model allows the errors within a tribe/year group to be correlated. Individual sample weights are used in all econometric models.

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

Although many of the outcomes are dichotomous, I estimate all equations as linear probability models. This type of model has disadvantage but when the probabilities are in a certain range and the number of observation is large enough, its estimates are known to be close to the estimates of logit or probit models (Powers and Xie, 2000).

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 casinos. 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.

4.2.1 Sampling Weight and Clustering

Data used in this dissertation are from the Census survey. Each observation in the Census long form sample is chosen to represent the population and is given sampling weight. The probability of selection is not equal for all individuals of the population. If an observation has sampling weight of 5, it represents 5 individuals from the population. Therefore, each observation should be treated differently to estimate the characteristics of the population. In the estimation, sampling weights are used to compute population estimates and the standard errors of those estimates.

One more adjustment of the standard errors of the estimates is used in addition to sampling weight. Since observations from the same Indian reservations are not independent, this correlation should be incorporated in the estimation. Clustering adjusts standard errors for intra-reservation correlation. The size of standard errors increases by clustering.

4.3 Changes in Economic Outcomes

In this section, I report linear probability model of equation 4.1, for key economic outcomes such as labor force participation, the unemployment rate, and real income. We estimate the model for two samples: those aged 18 to 64 group and those aged 30 to 64 group. As noted above, the model estimates the changes attributable to the casino, holding constant the changes that would have occurred anyway between

1990 and 2000. Table 4.2 reports the estimated changes of various economic outcomes for the population aged 18 to 64.

Notice in the first row of Table 4.2 that if we were to examine all reservation residents together, we would estimate that casinos had virtually no impact on unemployment rates, labor force participation rates or poverty rates. The estimated casino effects in all three of these models are small and statistically insignificant. However, the results are very different if we look at particular subsamples. Labor force participation rates of Indians increased by a statistically significant 1.7 percentage points. All of this effect is due to a large increase in participation rates among females of 3.9 percentage points. Our estimates suggest participation rates for males were not affected by casino operations. Our estimates also suggest there is no impact of casinos on the labor force participation of non-Indians. Likewise, casinos are estimated to have reduced the unemployment rate of all reservation residents by a statistically insignificant 0.7 percentage points. However, while the unemployment rate for non-Indians was not impacted by casinos, the unemployment rate of all Indians fell by a statistically significant 3.1 percentage points. By gender, male Indians experienced a 3.5 percentage point drop and female Indians did a 2.5 percentage point drop and both of these results are statistically significant. Individual annual income increased by $1,228.31 for all residents on gaming reservations relative to all residents on non-gaming reservations. But there was no statistically significant increase for non-Indians. For Indians, casinos are estimated to increase female incomes by $1,548 and male incomes by $1,234. However, when I looked at the annual income among the employed, casinos had a slightly larger impact on male

Indians incomes compare to female Indians. Real income increased by $1,918 for employed female Indians and by $1,992 for employed male Indians and both estimates are statistically significant. The fraction of population aged 0 to 17 in poverty decreased in 1990s (shown in Table 4.1). But there was no statistically significant difference between gaming and non-gaming reservations even though individual income increased on gaming reservations.

I investigated the same economic outcomes for the sample aged 30 to 64. This group has been affected more strongly by casino operation. Table 4.3 reports the estimated casino effect on various economic outcomes. Because Indians are strongly affected by casino operations in the models for the ages 18 to 64, I investigate the impact in more detail by educational categories for Indians. Educational categories are less than high school degree (or LHS), high school degree (or HSD), and college education (or COL). This will see the possible heterogeneity in casino effects varying by education level among Indians.

Non-Indians on gaming reservations did not experience statistically significant changes in economic outcomes except unemployment rate during 90's. The LFP of non-Indians was staying around 74 to 75 percent. The LFP of Indian females increased by 3.8 percentage points. By education level, the college educated Indians had 4.9 percentage point increase in LFP. The unemployment rate of Indians decreased by 2.8 percentage points. Among Indians, males experienced 3.6 percentage point drop and females did 2.0 percentage point drop in their unemployment rate. Among Indians, the lowest educated had biggest decrease in unemployment rate (4.4 percentage point drop). Annual income increased by

$1779.36 for all Indians. While income of 18 to 64 increased more for females among Indians, income of 30 to 64 increased more for males. Male Indians' income increased by $1896.06, which was $200 more than income increase of female Indians. The more educated Indians got more increase in annual income. Among the employed, income increased more for those with less than a high school degree than for those with a high school degree. This is related to larger increase in demand for low-skilled workers on gaming reservations.

4.4 Conclusion

So far, I investigated the impact of casino operations on the economic outcomes by comparing changes during 1990s on gaming reservations to changes on non-gaming reservations. The features of economic changes brought by casino operation on Indian land are the followings. Casino operation increased labor force participation of Indian females. Unemployment rate fell for all people on gaming reservations. But reduction in unemployment rate was bigger for Indians than for non-Indians. Among Indians, least educated group had biggest decrease in unemployment rate. Annual income increased for Indians by about $1800. Even though highest educated people had largest increase in income, high school dropouts had bigger increase in income than high school graduates among the employed. More detailed changes in economic outcomes for young adults will be presented in the chapter 5 and I relate local economic changes to the demand for education.

Chapter 5: The Demand for Education

In this chapter, I analyze the impact of local labor market conditions on the demand for education among reservation residents using the rise in American Indian casinos as an identifying shock to local economies. The analysis will be focused on high-school aged children and young adults. Casino operations can affect the demand for education through two channels. First, as we established in the previous section, casinos increase economic opportunities primarily for Indians so if education is a normal good, casinos can increase the demand for schooling through an income effect. In contrast, there might be negative impact on the demand for education. As we demonstrate below, the opening of a casino primarily improves economic opportunities for lower-skill workers. Subsequently, the return to higher skills (education) has been reduced, possibly discouraging educational attainment. The total impact on the demand for education will be determined by the strength of these two opposing forces.

5.1 Introduction

Although tuition is a large cost of attending college, foregone earnings are, for most students, the largest direct 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.[32] In contrast, full-time/full-year workers with a high school degree aged 18 to 21 had labor earnings of $18,144 in 2003.[33] 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.

The rise in casino gaming may exert both positive and negative forces on educational attainment of young adults. As we saw in the previous chapter, 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 of their children. Anecdotal evidence from a number of tribes indicates that profits from casinos are used to improve education for tribal members such as improving the quality of K-12 education or providing tuition subsidies for post-secondary education.[34] In contrast,

[32] http://www.collegeboard.com/press/article/0,,38993,00.html.
[33] Authors' calculations based on data from the March 2003, Current Population Survey.
[34] 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

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.

In the first part of the results section, I 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 increase in employment was primarily in service sector jobs and mostly in entertainment industry sub-sectors. I 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 I consider that many tribes with casinos also instituted tuition programs to help pay for some college education.

The chapter proceeds as follows. In section 5.2, I review the literature linking local labor market outcomes and college enrollment. In section 5.3, I document the sample employed in this analysis and in section 5.4, I present the results. In section 5.5, I conclude the chapter.

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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.

5.2 Related Literature

A number of authors from the fields of economics, sociology, education, and demography, have examined the social and economic forces that alter the demand for education. The decision to continue with formal education is affected by a number of factors including the direct costs of education (e.g., tuition and fees, the generosity of financial aid), indirect costs such as foregone earnings, the expected returns from education, the psychic costs/benefits of education, plus a variety of other factors such as parents' socioeconomic background. In this study, I am interested in how local labor market conditions impact high school graduation and college entrance rates. The predictions of human capital theory in this case are not clear. 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 effects.

A number of authors have examined the correlation between local unemployment and wages and educational attainment. That bulk of the estimates in this group of studies come from models that address different issues but have, as one set of controls, characteristics of the local labor market. For example, Manski and Wise (1983) used data from the National Longitudinal Study of the High School Class of 1972 to estimate discrete choice models of college entrance and college completion. A major focus of their work was the impact of family background characteristics and tuition on enrollment decisions, but they did control for local labor

market conditions such as the manufacturing wage and local unemployment rate. Their results "weakly support the presumption that there is some interaction between local labor market opportunities and the continuation of schooling…" (p. 69).

The weak link between local labor market conditions and educational attainment has been found by others. Card and Lemieux (2000) used data on high school and college enrollment from the School Enrollment Supplements to 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 20th 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 rates.

Some authors have found a strong role for local labor markets as determinants of educational attainment, but only for certain subsamples. Kane (1994) uses data from the School Enrollment Supplements to the October Current Population survey to analyze the time series pattern of college enrollment for black youths from 1973 to 1988. Kane examines data from this period because college enrollment among blacks declined sharply in 1980-84 but recovered after 1985. Kane found that the decline in the early 1980s was explained by an increase in the direct costs of college and the recovery was attributed to an increase in parental educational attainment of black youths. Kane found that the state unemployment rate had no 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.

Black and Sufi (2002) examined a similar question to that passed by Kane by with more recent data. They used data from the 1968-1998 March CPS to explore the determinants for the differences in black/white college enrollment rates. Black and Sufi found that college enrollment of whites are 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. Looking at the results for whites and blacks more closely, Black and Sufi found that whites from lower socioeconomic groups were much more responsive to state labor market conditions and tuition costs. In contrast, the authors found that blacks from all socioeconomic backgrounds were not responsive to state labor market conditions.

The variance in results in the four studies mentioned above could be due to many factors, but, one common thread through these four studies 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. For example, Rivkin (1995) used data from the High School and Beyond class of 1982 to examine the causes of the black/white differentials in high school graduation and college entrance rates. Rivkin found that higher county-level unemployment rate raised the probability of attending school for both high school students and high school graduates. In most models,

Rivkin found that the school enrollment decision was much more sensitive to the county-level unemployment rate for black compared to whites.[35]

Rees and Mocan (1997) examined the link between local labor markets and high school dropout rates using a panel of data of school districts from New York State over the 1978-87 period. The authors 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 point, which is about 2 percent of the sample mean high school dropout rate of 3.7 percent. Rees and Mocan found a much smaller impact of unemployment on Blacks and a much larger impact for Hispanics, compared to whites.

My 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.

[35] Models are done for high school students and graduates separately by gender. Black female high school graduates are less sensitive than their white counterparts to unemployment rate.

In contrast to the variance in estimates across studies that measure the labor markets at the state level, the three studies that measure labor markets at the county level demonstrate a more consistent set of results. 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 found 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.

5.3 Sample Characteristics

In this section, I demonstrate how gaming operations have altered the labor market outcomes of reservation residents. Since the focus of this chapter is how local conditions alter the demand for education among young adults, I focus on a sample of workers who young adults might reasonably expect to use as a gauge for the local

labor market conditions. As a result, I estimate models similar to those in equation (4.1) for residents aged 25-40. Table 5.1 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 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 on reservations without a casino by 6.2 percent. Looking at the composition of the population by education level, I 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.[36]

In Table 5.2, I 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. 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 2.2, I 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.

[36] 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.

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

5.4 Results

5.4.1 Changes in Labor Market Outcomes for Younger Adults

In this section, I report estimates of equation 4.1 using as dependent variables the labor market outcomes for adults aged 25-40. I focus on 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 employed full-time and full-year). To examine the heterogeneity in the treatment effect across different types of residents, I 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 5.3. 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 5.3, I 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.[37] 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 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-

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

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 5.3, 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, I estimate that casinos only increased wages by a statistically insignificant $0.51/hour for Indian women with less than a high school

degree. I estimate statistically insignificant wage changes induced by the opening a casino for non-Indians from all gender/education subsamples.

I 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.

Finally, I look at whether the adoption of casino gaming changed the industrial composition of employment. In Table 5.4, we report the results of a series of linear probability models where the dependent variable in each row is an indicator that equals 1 if a respondent is employed in a particular industry group. The sample in each case contains respondents, aged 25 to 40, who were in the labor force. Each table element represents the coefficient on the casino treatment effect from a different regression and results from different sub-samples of the population are reported in different columns.

In all sub-samples except non-Indians, there is a large increase in the probability people in the labor market are employed in the arts, recreation, etc., industry, which is the broad industry category that would include gaming casinos. Among Indians, employment in this industry increased by 7.4 percentage points, with similar increases among Indian males and females. Indians experienced a one percentage point increase in employment in other services, a half percentage point increase in professional industries, but a 1.5 percentage point drop in employment in

construction and a 3.5 percentage point drop in manufacturing. There was no statistically significant coefficient in any regression for the non-Indian sub-sample except construction. Non-Indian employment in construction increases by 1.2 percentage points.

The nature of economic changes brought by casino operation can be summarized as follows. The rise of casino gaming on reservations increased labor force participation rates, employment, full-time/full-year employment, and wages of full-time/full-year workers. The benefits were however concentrated in a few demographic groups. Labor force participation rates increased only for Indian women and among this group, the results were largest for low-educated Indian women. The change in employment was greatest for Indians compared to non-Indians and among Indians and non-Indians, the largest changes in employment were concentrated among low-skilled workers. Among those in the labor market, the probability of having a full-time/full-year job increased for Indian males and females. Among Indian males, the effect was larger for low-skilled workers, but among Indian females, the impact was largest among the highest skilled. Among full-time/full-year workers, wages increased for all groups of Indian males and females, but the largest absolute change (and hence an even greater percentage change) was for low-skilled workers.

5.4.2 Changes in Educational Attainment

The results in Table 5.3 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 more education have fallen. Likewise, the opportunity costs of education have increased with the increasing returns to low-skill work. Subsequently, I suspect that the movement towards casino gaming may have also dampened the demand for formal education among young adults. In this section, I test this explicitly by using a variety of samples and measures of education.

First, I look at the high school enrollment rate of 15 to 18 year-olds. In this sample, I define students as enrolled if they are formally going to class or if they are a high school graduate. I estimate a model similar to those in Table 5.3 but in this case, I allow the treatment effect to vary by age and race. I estimate this as a linear probability model and the results are presented in Table 5.5. In these models, I allow for separate year effects for each age/race group.

The results in Table 5.5 show that after a casino opened on a reservation, Indians aged 17 to 18 experienced a statistically significant decline in high school enrollment. 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. The 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.[38]

The results in Table 5.5 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, I estimate that casinos generate statistically insignificant drops in enrollment of 1.4 to 2.2 percentage points. I estimate positive but statistically insignificant treatment effect for 17-year-old non-Indians. Among 18 year old non-Indian boys, I 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, I look at the change in educational attainment of the population on the reservations. Although casinos should mostly impact the educational decisions of younger adults, I begin by looking at a broader range of ages and narrow the sample down to high school and college ages later. Initially, I include people aged 20 to 40. The older half of this age group can be though of as a specification check in that the

[38] The results on marriage and childbearing for Indian females are reported in Chapter 6.

impact of casinos should have little impact on these people. I use two outcomes, whether the individual graduated high school or had some college education. In each model, I 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). I allow the year effects to vary by age group and race and I estimate separate models for males and females. The results from these models are reported in Table 5.6.

The results in Table 5.6 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 declines by 11.5 percentage points for 20-24 group and by 9.3 percentage points for 25-29 group. Impacts are getting weaker by aging. 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 college education by age groups, results show that gaming operation and economic changes entice 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. I 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 I 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.

The results above suggest that the economic opportunities generated by casinos enticed young adults out of school. For this story to be correct, it must also be the case that these young adults are also working more. We examine this in the next table. Table 5.7 estimates the impact of casino operation on the employment of the same age group as in Table 5.6. Casino impact varies by age group, education level, gender, and race. There was corresponding increase in employment among the lowest skilled workers in younger age groups. The employment of Indians aged 20-29 increased for both genders by from 5.3 up to 12.2 percentage points. The low educated had the biggest increase in employment. For non-Indians, all statistically significant increases in employment were for the least educated.

To see whether it is a reasonable decision to drop out of high school or not to enroll college, I calculate expected present value of lifetime earnings of three different individual who starts work at 16, 18, and 20, respectively. 'A' drops out of

high school and starts work at 16. 'B' graduates from high school and starts work at 18. 'C' has two years of college education and starts work at 20. I assume workers retire at 60 of age. I assume that interest rate is 5 percent per year and that people usually work 2000 hours per year. Wages and the probability of employment by education level are from the sample of Indians lived on gaming reservations in 1990. Hourly wage rates were $9.89, $10.63, and $12.11 for high school dropouts, for high school graduates, and for those with some college, respectively. The probabilities of employment are assumed to be 62 percent, 74 percent, and 83 percent for these three education levels. The expected discounted value of lifetime earnings for A, B, and C are $228,872.8, $289,841.3, and $365,044.8, respectively. The expected return of additional two years of high school is $60,968.48 and that of two years of college education is $75,203.58. Therefore, if a person drops out of high school at 16 and starts work, he/she looses about $61,000 of earnings in discounted value. Because there are no out-of-pocket expenses for high school, the sole cost of staying in school for an additional two years is the opportunity cost of lost wages. At $9.89/hour and 2000 hours per year, a high school dropout can expect to make $39,560 at ages 16 and 17 by dropping out of school and working full time for those two years. Therefore, the decision to drop out of high school appears to not make sense from a monetary standpoint. However, whether a person pursues two years of college education is dependent on its costs. Foregone earnings will eliminate nearly half the difference between the discounted earnings of those with some college and those with a high school degree. If two year education costs are in excess of $30,000, then economically, it makes sense to forgo those two years of education.

5.4.3 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 graduates from these tribes are disproportionately likely to attend college off the reservation. In this section, I exploit the migration data in the census long-form data to identify individuals who have either recently joined or left the reservation and to examine whether these migration patterns impact my 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. However in the restricted-use versions of the data I am 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, I 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 I want to include non-Indians in the data set. Half of all reservation residents are Indians but among those who live within 10 mile of a reservation, I calculate that only 1 to 2 percent of people are Indians. Subsequently, if I add back to the sample all people who lived on or near a reservation five years ago, I 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, I 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, I generate three separate samples of Indians aged 20 to 29.[39] First, I identify people who live on the reservation both at census time and five years prior to the census. Second, I identify people who did not live on the reservation five years prior to the census but live on the reservation at census time. Third, I 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 live on the reservation at the time of the census, which is the population used in the models reported in Table 5.6.

Counts of Indians by sample type, year, casino status, and education level are reported in Table 5.8. 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

[39] I focus on the 20-29 year age groups since these were the subsamples identified in Table 5.6 that were most impacted by the presence of casinos on reservations.

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 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. The fraction of the college educated was 37.7 percent for incoming migrants, 44.6 percent for out-migration while it was 26.9 percent for group1 Indians. Therefore, the exclusion of out-migrants (e.g., the samples in Table 5.6) 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, I estimate linear probability models for the high school completion and college entrance outcomes for three different subsamples. First, I 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 5.8 and the sample is similar to the one used in Table 5.6 except that now I 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 emigrated to other parts of the country. Finally, I look at those who lived on the reservation five years prior to the census and at the time of the census (Group 1 only). I estimate separate models for males and females, and within each model, I estimate separate treatment effects for those age 20-24 and 25-29.

The results from these models are reported in Table 5.9. 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 5.6. In the next column, I 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. I 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 5.9, I 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.

5.4.4 Sensitivity Tests

This section examines the sensitivity of the results to a number of alternative specifications. I examine three different concerns about the specifications examined above. First, the tribes that opened casinos may be systematically different from those that did not so there is a concern that our control reservations are not adequate. For example, there are two types of tribes that did not open casinos: those unable to do so because of state laws and those eligible but unwilling to do so. If those unwilling to open a casino have faster growing levels of education, then we would be

overstating the negative impacts of casinos on education. For example, The Navajo nation is the largest tribe in our sample and they twice rejected casino operations in nationwide referendums. To examine the sensitivity of the results to inclusion of the Navajos on the data set, I estimate models without them. The second concern is that estimated casino impacts might be due to changes in the off-reservation economic environment. This argument is reasonable if there are noticeable economic changes in off-reservation areas near gaming reservations and reservation residents have chances of employment from off-reservation areas. To examine whether our results are capturing these omitted factors, I created a new sample that includes only residents living off reservations and within 25 miles of a reservation.[40] Casinos are very small employers relative to the number of employers in surrounding areas and therefore, the impact of the casino should not be large for non-reservation residents. However, if we detect a large casino effect for non-residents then we suspect the models estimated above are subject to an omitted variables bias. Finally, I examine whether the impact of casinos varies based on the elapsed time since a casino was opened. Evans and Topoleski (2002) showed that the impacts of casinos on employment and job creation grow over time. Therefore, I want to examine whether the impact of casino operations on labor markets and the demand for education vary based on the age of the casino.

To see whether the results are sensitive to the inclusion of the Navajos in the control sample, I remove these residents from the basic models. The sample size

[40] Distances are measured from a starting point to the geographical center of census blocks. A starting point is the geographical location of a casino if there is a casino in reservation or the center of mostly populated census block otherwise.

reduces by 9,621 and the results are reported in Table 5.10, 5.11, and 5.12, which correspond to the results in Table 5.3, 5.5, and 5.6, respectively. Without Navajo residents in the models, labor force participation of Indian females loses statistical significance for all education levels. Other labor market outcomes such as employment and full-time/full-year employment are similar whether Navajos are included or not. Hourly wage increased for Indian males with high school degree by $1.21 and for non-Indian males with college education by $1.04. Next, high school enrollment rate for those aged 15 to 18 also have similar impact. The case including the Navajo have negative impact on 18 year-old Indian male and 17 and 18 year-old Indian females. However, the results excluding the Navajo have negative impact on high school enrollment rate of 18 year-old Indian males and positive impact on 15 year-old Indian males. The negative impact on 18 year-old Indian females gets slightly weakened and the impact on 17 year-old Indian females is almost eliminated. High school graduation and college education rates among residents aged 20 to 40 have weaker magnitude. Indian males do not have any statistically significant impacts on high school graduation rate and college education rate. Indian females still have negative impact and those are statistically significant. The sample excluding the Navajo reduces the gap in the demand for education between gaming reservations and non-gaming reservations. Therefore, the estimated results support the argument that there might be a possible relationship between self-decision on casino operation and the demand for education.

In the second sensitivity test, I examine whether the model is simply capturing local labor market conditions. To examine this hypothesis, I construct a new sample

which consists of off-reservation residents living within 25 miles of reservations. I estimate the same model as the case of reservation residents. Therefore, the estimation results show whether there was notable difference in economic changes between off-reservation areas of gaming reservations and off-reservation areas of non-gaming reservations. There are possible spillover effects that some off-reservation residents take employment opportunities created by casino operation. Given this argument, the labor market changes around gaming reservations are expected to be little or small, if any. Table 5.13 presents the results of labor market changes of off-reservation residents within 25 miles. Off-reservation labor force participation did not change while labor force participation on gaming reservations increased for Indian females. Employment rate also shows different pattern from employment rate of reservation residents. Among Indians, only males with high school degree had 3.1 percentage point increase in employment. Among non-Indians, those with college education had increase in their employment rate. Even though they are statistically significant, magnitudes are very small and the estimates are around the half of 1 percentage point. Full-time/full-year employment increased for Indians males with less than high school education by 7.8 percentage points. They might be employed on reservations. For non-Indians, only those with high school degree had increase in their full-time/full-year employment. But their increases are slightly over 1 percentage point. Given these results, economic situations off-reservation areas of gaming reservations and of non-gaming reservations were not different from each other. Therefore, I confirm that estimated economic changes on

gaming reservations are truly from gaming operation not from the economic changes of off-reservation areas.

The last check is to see whether there is any difference in labor market conditions and in the impact on the demand for education by casino open date. In the original sample, I included casinos open by the end of 1998 as operating casinos. Among operating casinos, 38 casinos opened in 1992 or earlier, 55 opened in from 1993 to 1995, and 49 opened in 1996 and later. For this check, I allow the casino impact to vary additionally by casino open date using dummy variables indicating 1992 or earlier, from 1993 to 1995, and from 1996 to 1998. I present the impact of casino operations on the demand for education in Table 5.14, 5.15.

Indian high school enrollment rate among those aged 15 to 18 shows different pattern by casino open date. Youngest casinos increased high school enrollment rate for 15 and 16 year-old Indian males. Decrease in high school enrollment happened for reservations with casinos mainly opened 1992 or earlier even though casinos opened in 1996 or later decreased 18 year-old Indian females' high school enrollment rate by 14.6 percentage points. Oldest casinos decreased high school enrollment rate of 15 and 16 year-old Indian females by 8.0 and by 4.3 percentage points. For non-Indians, statistically significant changes in high school enrollment happened on reservations opening casinos in 1992 or earlier. Their high school enrollment rate decreased for 15 and 16 year-olds but increased for 18 year-olds. Older casinos had strong negative impact on high school enrollment rate.

High school graduation rate for Indians decreased only for residents aged 20 to 29. For Indian females, the decrease in high school graduation rate happened regardless of casino open date. But older casinos decreased high school graduation rate more than younger casinos opened in 1996 or later. The college education was affected by casinos opened in 1995 or earlier for those in ages 20 to 29. Some in the early 30's were affected by casinos opened in 1992 or earlier.

From above sensitivity tests, I found the followings. First, using the sample excluding the Navajo, the decrease in demand for education was weakened. That means residents in Navajo had higher level of education than other reservations. But casino operation had still negative impact on the demand for education among Indian females. Second, I found evidence that economic changes in off-reservation areas were not different between off-reservation area of gaming reservations and off-reservation area of non-gaming reservations. This confirms that changes in labor market outcomes on gaming reservations are coming truly from casino operation not from the changes in off-reservation areas. Last, there were some difference in labor market changes and the demand for education by casino open date. But most difference in changes by casino open date exists in its magnitude of impacts not in its direction of impacts.

5.5 Conclusion

In 1988, the Indian Gaming Regulatory Act was passed with the stated goal of enhancing tribal self sufficiency. The estimates in this dissertation and reports by 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 chapter suggest that the greater availability of higher-paying, low skill jobs may have had some unintended negative consequences. I 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, my results are in line with recent research that demonstrate pronounced behavioral responses to labor market conditions when the local market is defined at a much lower level of aggregation. The methodology and findings are closest to the work of Black, McKinnish, and Sanders (2005) who 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.

These 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, the 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 by offering generous tuition subsidy programs. Yet even with these benefits, high school attendance, high school graduation and college enrollment rates fell relative to the performance in non-casino reservations.

Chapter 6: Marriage, Marital Dissolution, and Fertility

6.1 Introduction

Is marriage a result of love or utility maximization? Obviously, marriage is an economic decision, at least, for economists. Becker (1973) assumes that a person who wants to marry tries to maximize utility from marriage and that marriage market is in equilibrium. Marriage is also described as a search process within a marriage market. People continue to search until they find a match that satisfies their reservation quality. In any case, the expected gains from marriage are an important criterion within these economic models. Each partner going into marriage certainly expects more utility from being married than from remaining single. Otherwise, they will remain single. One empirical feature of most marriage markets is positive assortative mating, that is, people tend to marry people similar in terms of age, intelligence, education, height, religion, race, and many others (Becker, 1973; Johnson, 1980; Mare, 1991; Schwartz and Mare, 2005).

Although social scientists from a variety of disciplines have examined the correlates of marriage, the focus of each discipline tend to vary. For example, the difference in view between sociologists and economists is expressed well in Cutright (1970) who notes that "… the work by sociologists on factors in mate selection has naturally tended to emphasize social and psychological characteristics of brides and grooms and to ignore the role of male income …" (p. 632).

Historically, Indians on the reservations are among the poorest and least educated groups in the U.S. However, casino operations provided new employment opportunities, especially for Indians and low skilled workers. As shown in Table 2.1, gaming revenue have been growing at a rapid pace. These favorable changes are expected to affect individual incentives for marriage through two conflicting forces. First, as income grows, an individual is less likely to fall in financial need for marriage. Therefore, a person is more likely to live independently (or less likely to marry). But an individual with a higher income is likely to receive higher-quality offers in the marriage market. This makes marriage more likely (Burgess et al., 2003; Alm and Wihttington, 1999).

This chapter examines the role that local labor markets play in marriage formation and dissolution, using the economic shock generated by Indian casinos as an identifying event. As the changes in the economic environments affected the demand for education in previous chapter, these same changes are expected to affect individual incentives to marry as well. This chapter focuses on various stages of family formation such as marriage, marital dissolution, and child-bearing. Indian reservations are unique in that there is more racial mixing in housing than in most areas of the country: only half of residents on Indian reservations are Indian. This chapter also examines the possible heterogeneity in reactions by race, as well as gender and age.

The chapter proceeds as follows. In section 6.2, I review related literature and in section 6.3, I describe sample characteristics. In section 6.4, I present the results. In section 6.5, I conclude the chapter.

6.2 Related Literature

A number of authors have analyzed the relationship between economic activities and marriage, marital dissolution, and fertility. One of the most studied questions is the impact of income on marriage. Cutright (1970) begins his analysis with the hypothesis that women will marry a man at or above economic self-sufficiency. He showed from the 1960 census that the likelihood of marriage for men increased as income grew.[41] But higher income also affects the demand for privacy (Michael et al., 1980). According to this argument, the propensity to live alone is a normal good and therefore, it increases as incomes grow. Researchers have found that with higher incomes, the number of one-person household increased (Michael et al., 1980; Pampel, 1983).[42] These two findings appear to conflict, but Leppel (1985) resolved this conflict by introducing a third option: household sharing. People, who don't want to marry or are financially strapped, might share a household for cost-saving purposes. As income grows, some of them, who have enough money, marry. Others, who previously share housing due to unaffordable high costs of living alone, start to form one-person households with increased income.

Recently, numerous authors have analyzed the impact of economic factors on the marriage decision. Men and women have been found to behave differently. Burgess *et al*. (2003) found from the NLSY that for men, a greater earnings potential

[41] Table 5 in Cutright (1970) shows that percent single decreased as income grew in the 1960 census.
[42] Cutright (1970) works on the year of 1960, Michael *et al*. (1980) on 1970 cross-state data, and Pampel (1983) on 1960-1976.

increased the chance of marriage and decreases the chance of divorce.[43] In contrast, high earnings potential of women leads them to less marriage and no effect on marriage dissolution. Some studies have examined how changes in the tax treatment of marriage alter the incentive to marry and divorce. This type of study compares income taxes paid by an individual when he/she is a single person to income taxes when he/she is a married person and examines how this difference alters marriage propensity. Alm and Whittington (1999), among others, found that increase in total income taxes paid by married versus single women affects negatively the likelihood of marriage. However, taxes do not alter the likelihood of marriage for males.

A number of studies have analyzed how marriage affects labor market performance. Empirical studies provide evidence of an earnings differential between married men and unmarried men. Korenman and Neumark (1991) summarize two hypotheses for this result from many other studies. First, marriage may make men more productive. Second, more productive men may be 'selected' in the marriage market. Becker (1981) hypothesized that specialization within the household makes married men more productive than single men. This specialization makes married men invest more in human capital than unmarried men, which in turn leads to higher productivity. As another benefit of marriage, Benham (1974) found a positive effect of the wife's education level on the husband's labor market performance, but, this could also indicate selective mating (Welch, 1974).

[43] Burgess *et al*. (2003) used data from the National Longitudinal Survey of Youth (NLSY) from 1979 up to 1992.

There are a number of studies that demonstrate the second hypothesis that more productive men are more likely to be married. For example, unemployment rates are lower for the married than for the unmarried in Britain (Nickell, 1980).[44] Bergstrom and Schoeni (1996) show that age-at-marriage are related to the probability of success in the labor market. Males who are capable of success in the labor market delay their marriage until the success is revealed. Females tend to marry earlier than males because a delay of marriage may adversely impact child bearing. Using census data, Bergstrom and Schoeni show that males married in late 20's had greater incomes later life. Males married before and after this age had incomes in later life that were lower than incomes for males married in late 20's.

Marital dissolution is as important a demographic institution as marriage formation. Many of the same factors affecting marriage are also known to affect marital dissolution as well. A persistent result in most analyses is that young married couples and people married at younger ages tend to have much higher divorce rates. According to Rindfuss (1991), young males and females (those in the ages of 18 to 30) represent 32 and 42 percent, respectively, of divorces, even though young males and females only represent 15 and 20 percent of the stock of married people. With higher chances of employment and higher income today compared to decades ago, married females gain financial independence more easily than before. And they get higher mean quality offers from outside (Burgess *et al*., 2003; Alm and Wihttington, 1999). Furthermore, they might demand more privacy as income grows. These incentives might increase marital dissolution in a growing economy. Numerous

[44] Nickell (1980) used the 1972 General Household Survey.

empirical studies provide analyses on the relationship between income and marital dissolution. A number of studies have demonstrated that males with higher earnings have a lower probability of divorce (South and Spitze, 1986; Hoffman and Duncan, 1997). But female labor income and labor hours and positively associated with marital dissolution (South and Spitze, 1986; Spitze and South, 1985; Greenstein, 1990, Van de Klaauw, 1996). It is however not clear if this last relationship is casual. It could be the case that women with a greater probability of divorce are actually working more so as to shield themselves from the downside financial risk of marital dissolution.

Theoretically, there should be an ambiguous relationship between changing economic conditions and fertility. Greater economic opportunities increase the opportunity cost of having children. At the same time, if children are normal goods, better economic conditions will increase fertility. There are numerous studies analyzing the relationship between economic activities and fertility. Many studies in this area examine fertility over the business cycle using time-series data. These studies have found that fertility is procyclic. Among others, Butz and Ward (1979) analyzed U.S. fertility from 1947 to 1974. Butz and Ward explained sharp decline of fertility in the 1960s by countercyclical behavior using income effect (increase in male income) and price effect (increase in female employment and wage). Rising male income in the 1950s brought the baby boom and increase in female wage and income in the 1960s brought the baby bust. After 15 years, Macunovich (1995) revisited the results in the Butz-Ward paper with more recent data. In this more recent work, Macunovich found the Butz-Ward model does not fit well more recent

data or the data after 1954.[45] Mocan (1990) examined the dynamic interrelationship between fertility and sex-specific unemployment rates, the divorce rate, and the proportion of young marriage in the U.S. using multivariate VAR models. An increase in female or male unemployment rate generated a decrease in fertility when he includes only fertility and unemployment (procyclical fertility). After including the divorce rate and the proportion of young marriage in the model, fertility increases with an increase in unemployment rates (countercyclical fertility).

There is a large class of studies that have analyzed the impact of the business cycle on fertility using OECD data. Most of these studies found a negative relationship between fertility and female labor force participation until the mid 1980s. Samples that include data after that point find the opposite result. The authors explain this reversal in the sign around 1985 using reduced incompatibility between childrearing and female employment such as greater availability of child-care and rising income effect of female wage. Ahn and Mira (2002) is one such study. They examined the cyclical behavior of fertility using OECE time-series data from 1970 to 1995. They found that the correlation between fertility and female participation rate was negative until the early 1980s. Then the sign reversed in the late 1980s. Kogel (2004) also found a negative correlation using data before 1985 but when data after 1985 was included in models, the relationship weakened but was not reversed.

[45] Macunovich attributed misestimates of Butz and Ward (1979) to the quality of original data on economic aspect postwar period.

6.3 Sample Characteristics

Because the focus of this chapter is on marriage formation, I restrict our attention to a younger population and primarily focus on Indians and non-Indians in the ages of 18 to 25. In most states, 18 is the minimum age at which a person can marry without parental consent.[46] In the 1990 and 2000 census data, there are some limitations for a marriage study which also necessitate that I focus on a younger group. First, the census does not ask whether the current marriage is the first one, nor does it identify when the first marriage occurred. In the 2000 census, female respondents were not asked their number of live births. Therefore, it is impossible to identify individuals married between 1990 and 2000 among 2000 census respondents. To lower the risk of include people who got married before 1990 in the 2000 data, I restrict the sample to include only young adults aged 18 to 25. This restriction should capture a large fraction of people who will ever be married. The estimated median age at first marriage in the U.S. was 26.1 for men and 23.9 for women in 1990. Over time, as both men and women delayed marriage, the estimated median age at first marriage in 2000 was 26.8 for men and 25.1 for women.[47]

On Indian reservations in the sample, there were 81,600 people in the ages of 18 to 25 in 1990 and 91,529 in 2000.[48] The size of this group grew at 13.4 percent on gaming reservations and at 10.6 percent on non-gaming reservations. The Indian

[46] Mississippi requires 21 years of age and Nebraska does 19 years of age to marry without parental consent.

[47] U.S. Census Bureau estimates median age at first marriage using Current Population Survey March and Annual Social and Economic Supplements. The estimates are accessible at http://www.census.gov/population/socdemo/hh-fam/ms2.pdf.

[48] Population count was calculated by applying personal weight to each observation.

population in the ages of 18 to 25 grew faster than the non-Indian population on gaming reservations. In contrast, the non-Indian population aged 18-25 grew faster than the same aged Indian population on non-gaming reservations in the 1990's.

Table 6.1 shows detailed information on marital status of individuals aged 18 to 25 by year, race, gender, and the gaming status of the tribe. Due to young ages, ever married rates of those aged 18 to 25 are much lower than those of 40 to 54 years of age. Detailed information on population aged 40 to 54 is shown in Table 6.2. Among young adults, Indian males on gaming reservations had the lowest ever-married rates. The ever-married rate of Indian males was 16.3 percent in 1990 and it dropped to 15.0 percent in 2000. Non-Indian females on non-gaming reservations had the highest ever-married rate, which was 47.4 percent in 1990 and dropped to 40.2 percent in 2000.

The results in Tables 6.1 and 6.2 highlight three interesting statistics about marriage rates in this sample. First, the ever married rate of non-Indians is much higher than that of Indians. This might be related to financial status on reservations. As I showed in Table 4.1, the employment rates and earnings of non-Indians was greater than that for Indians in both 1990 and 2000 and both on reservations with and without casinos. Second, fewer people got married in 2000 regardless of their race, gender, and the gaming status of the tribe. Third, marriage rates of females are higher than that of males regardless of race, year, and the gaming status of the tribe. The last two features are consistent with national trends.

Because most people who will be ever married do so by age 30, I also investigate older population aged 40 to 54 assuming that their ever-marriage decision will be less affected by economic changes. Not surprisingly, ever married rates were much higher in this group. There are however gaps in the ever married rates between males and females, but differences were much smaller than among young adults. Ever married rates were higher for females regardless of race, year, and gaming status. A smaller fraction of the sample was ever married in 2000 than in 1990. Non-Indians had higher ever married rate than Indians.

Marital dissolution rates are reported in Table 6.1 for ages 18 to 25 and Table 6.2 for ages 40 to 54. Marital dissolution includes divorce and separation and its rates are calculated for those ever married. The results in Table 6.1 indicate that females had higher marital dissolution rate than males except non-Indians on non-gaming reservations in 1990 and in 2000 and Indians on gaming reservations in 2000. Another feature of the sample is that marital dissolution rates were higher for Indians on gaming reservations. On non-gaming reservations, non-Indians had higher marital dissolution rates than Indians in most cases. Among 40 to 54 residents, females had higher marital dissolution rates than males by race, year, and gaming status except non-Indian males on non-gaming reservations in 2000. Regardless of gender, year, and gaming status, Indians had higher marital dissolution rates than non-Indians.

Table 6.1 also reports the fraction of females having a child regardless of marital status among reservation residents aged 18 to 25. These rates fell over time and fell more for Indians than for non-Indians.

6.4 Results

6.4.1 Marriage Formation

First, I investigate whether the opening of a casino affected the marriage formation of young reservation residents using the difference-in-difference model outlined in equation 4.1. These results are presented in Table 6.3 through Table 6.8. This section looks at the ever married and currently married rate for the population aged 18 to 25. I also allow the casino impact to vary by race, age, and gender.

Over all, when the impact is not allowed to vary based on observed characteristics, casinos do not appear to have a statistically significant impact on marriage rates.[49] But when casino effect varies by age, relatively young Indians aged 18 and 19 experienced statistically significant increases in ever married rates by 2.9 and 4.5 percentage points, respectively. Ever married rate of Indian males aged 20 to 25 did not show any difference from that of Indian males on non-gaming reservations. Among non-Indian males in the same age range, I estimate a statistically significant increase in marriage rates for only 18-year old. In this group, casinos are estimated to increase the ever married rate by 7.5 percentage points.

According to the results in chapter 5, the high school enrollment rate of Indian males aged 18 dropped on gaming reservations by 4.8 percentage points. The results from this chapter provide suggestive evidence that part of the reason for greater drop out rates in this group could be greater marriage rates. We do not however know the

[49] "Ever married" includes currently married, separated, widowed, and divorced.

direction of causation. For example, we do not know whether male teens dropped out of high school to enjoy new employment opportunities and then got married or whether they dropped out of school because they had the added responsibilities of marriage. The results for non-Indians are suggestive that increased marriage rates among teens may not be causing the greater drop out rates. Among 18 year-old non-Indian males, casinos are estimated to increase both high school enrollment and marriage rates. Alternatively, it could be the case that marriage rates have increased because teen men with jobs are more attractive potential mates than teens in school.

Table 6.4 presents the results for the ever married equations for females aged 18 to 25. The results indicate that casinos have not changed the ever married rate for young Indian women. Only Indians aged 24 experienced a statistically significant drop in the ever married rate and that amount was 7.0 percentage points. The results indicate that non-Indians did not experience any statistically significant change in their ever married rate.

As shown in chapter 5, casinos appeared to increase the high school dropout rate of Indian females aged 17 and 18. The high school enrollment rates dropped on gaming reservations by 5.1 for 17 year-old Indian females and by 8.7 percentage points for 18 year-olds. However, gaming did not impact the high school enrollment rate for non-Indian females. The results in this chapter are at least suggestive that the large increase in dropout rate caused by casinos was not due to an increase in marriage rates for young women. The results in this section lend support to the hypothesis that the results from the previous chapter are attributable to the greater

employment opportunities for low skilled workers provided by casinos. That is, more employment opportunities ever attracted high school students away from school.

The results using currently married as the outcome of interest for the populations aged 18 to 25 are reported in Table 6.5 and Table 6.6. Those results are very similar to ever married results in the previous two tables. For Indian males aged 18 and 19, casinos increased currently married rates by 2.9 and 5.7 percentage points, respectively. Among non-Indian males, only 18 year-olds showed a statistically significant increase in currently married rate and that change was 5.8 percentage points. Indians females aged 24 experienced a statistically significant drop in the currently married rate by 5.6 percentage points and non-Indians aged 19 experienced a statistically significant increase in currently married rate of 9.2 percentage points.

The results using the ever married and currently married outcomes indicate that Indian males but not Indian females were impacted by casinos. Since the ages of spouses are so strongly correlated, a basic question arises: whom did the young Indian males marry? To solve this puzzle, I examine ever married rate and currently married rate for females aged 15 to 17 based on the argument of Burgess *et al.* (2003).[50] These results are presented in Table 6.7 and 6.8. The ever married rate of 15 to 17 year-old females increased for Indian females and non-Indian females by statistically significant 2.0 and 1.4 percentage points, respectively.[51] Even with statistically significant increases in ever married rate, their high school enrollment rate did not

[50] Burgess *et al*. (2003) note that in the NLSY, females marry men two years their senior and males marry women two years their junior.

[51] I also check whether casinos altered the ever married and currently married rates for males aged 15 to 17, but I find there is no statistically significant change.

decrease for most ages. 17 year-old Indian females had decrease in high school enrollment rate by 5.1 percentage points on gaming reservations. But I cannot find any connection between high school enrollment rate and ever married rate for other Indians and non-Indians. For non-Indians, their high school enrollment rate increased but the standard errors are large.

Burgess *et al*. (2003) found that higher incomes for females lead to lower marriage rate of females. The results for females in this chapter show a different pattern from the finding of Burgess *et al*. Casino operations increased income for young Indian females. However, their ever married rate did not change. It might be the reason that increases in their income might not be high enough to trigger changes in their marriage behavior. Another factor which is known to be affecting marriage formation is the size of the pool of possible partners. The number of male population aged 18 to 25 increased by 17.6 percent for Indians and 10.3 for non-Indians in 1990s. Although male population increase was higher than female population increase, ever married rates for females were not affected.

6.4.2 Fertility

In Table 6.9, I report results where I investigate the impact of casinos on fraction of females aged 18 to 25 having a child, regardless of marital status. In the 1990 census, female respondents were asked how many children they have had. But in 2000, this question was not asked. To estimate fertility for women, I matched a female and her children within households using the detailed relationship variable as well as subfamily codes and information on subfamily relationships. This matching

is however not without error. Since the Census survey is a household-based survey, if the child is away from the household for any reason, that person is not reported in the same household as other family members. Therefore, if a child is living with their father or a grandparent in a household away from the mother, I am not able to match a mother and children. I attempt to minimize this problem by restricting my attention to mothers who are 18 to 25 years of age.

On gaming reservations, the fraction of females having at least one child decreased by a statistically significant 3.4 percentage points for Indians and by 3.7 percentage points for non-Indians. Unlike most other outcomes in this dissertation, the overall effects for Indians and non-Indians look similar. When I allow the effects to vary by age, the results for Indians and non-Indians differ. The fraction of Indian females having children decreased among relatively younger women (18-21), while the fraction of non-Indian females having any kid decreased for relatively older group (22-25).

According to my analysis using the female sample aged 18 to 25 and having at least one child, which is not presented in the table, there was no statistically significant difference in number of children between females on gaming reservations and females on non-gaming reservations for both Indians and non-Indians. No difference in number of children along with the decreasing fraction of females having kids means that fertility on gaming reservations fell in the 1990s.

Childbearing as well as early marriage is one of well-known reasons for high school dropouts among teenage females. Most studies found a negative association

between teenage childbearing and economic and social outcomes. Women bearing children as teenagers are more likely to leave high school without a diploma, more likely to earn less than women not bearing children as teenagers. In contrast, Hotz *et al*. (2005) found that poor outcomes of women bearing children as teenagers are more from the circumstances where they have been rearing than from early childbearing. According to Hotz *et al*. (2005) women with early childbearing are more likely to have a GED and work more than women without early childbearing. The results in this chapter again point to the fact that marriage and childbearing are NOT the reason for the greater dropout rate among teens on reservations with casinos. In chapter 5, I found that the high school enrollment rate for Indian females aged 18 dropped by 8.7 percentage points on gaming reservations. But childbearing decreased among 18 year old females. Therefore, lower high school enrollment of Indian females is neither because they had children nor because they got married.

The results in this chapter appear to demonstrate that fertility for younger women is counter-cyclic – as the economy on reservations improved because of casino operations, fertility declined. Most of the other literature that examines the fertility and business cycle relationship has examined time series data at the national level. This chapter has examined the association between fertility and a permanent shock to a local economy. Although the two research methods are very different, both sets of results demonstrate that fertility exhibits countercyclical behavior.

6.4.3 Marital Dissolution

In the previous section, I demonstrated that economic changes brought about by casinos affect marriage formation among young adults. These same conditions may also impact marital dissolution. The results on marital dissolution are reported in Table 6.10 and Table 6.11. Samples are restricted to include only those ever married in the aged of 18 to 25. The marital status variable in the Census long form identifies current marital status not whether the person has ever been divorced. Therefore, the outcome in this section is a variable that equals 1 if the person is currently divorced. It is possible that a person could have been married, divorced and re-married. This will be recorded as someone not currently divorced.

As the results in the tables indicate, the impacts of casinos vary considerably by race and gender. The presence of a casino is estimated to increase marital dissolution probabilities for Indian males by 5.2 percentage points and decreased them for non-Indian males by 5.2 percentage points. This different behavior might be related to the income level between Indians and non-Indians. Even after casinos opened, Indians still had on average lower incomes than non-Indians, although their incomes were growing at a faster rate. Other studies have documented that among males, divorce and income and negatively related. (South and Spitze, 1986; Hoffman and Duncan, 1997). However, there is some evidence of a positive relationship between income levels and marital dissolution. Lillard and Waite (1993) found that household income is positively associated with marital dissolution for those in the lowest quartile of the income distribution using PSID data. In Table 6.10, casino is estimated to have statistically significant impact for 22-25 group and no impact for

18-21 group. 22-25 group might have longer duration of marriage than 18-21 group, if they married at similar age. Therefore, 18-21 group was not yet at their stage to reverse their marriage choice.

Table 6.11 reports the results for female marital dissolution rate. The results for non-Indian females follow a similar pattern to that of non-Indian males. Their marital dissolution decreased by 5.1 percentage points. Although the results in previous chapters do suggest that economic impacts for Indian females were large, their marital dissolution rate however was not affected by gaming on reservations.

When results are allowed to vary by age, the results for non-Indian females is driven by the older women (aged 22-25) in the sample. Casinos are estimated to have a statistically significant negative impact on marital dissolution among non-Indian females aged 22-25. As in marriage rate of Indian females, marital dissolution rate of Indian females did not change. The economic changes faced by Indian females might not be strong enough to lead them change their marital behavior. While other studies found positive relationship between female labor income and marital dissolution, the results in this chapter do not find positive relationship.

Since most people who will ever be married have done so by age 40, casino operations should not impact their 'ever married' rate. But marital dissolution among people in this age group is potentially impacted by the presence of a casino. In Table 6.12, I examine the impact casinos on marital dissolution for the sample of ever married people in the 40-54 age range. Casinos are estimated to increase divorce and separation rates by 2.6 percentage points for Indian males and to increase by 3.4

percentage points for Indian females. When these results are disaggregated by age groups, the sample results appear to be driven by an increase in marital dissolution rates among Indian males in their late 40's. By age groups, Indian females experienced a statistically significant 4.4 percentage point increase in early 40's and a statistically significant 5.5 percentage increase in late 40's. Indian females in early 50's did not show any change.

In contrast to the results for Indians, marital dissolution rate of non-Indian males decreased by 4.7 percentage points while casinos had no statistically significant impact on rates for non-Indian females. When results are disaggregated by age group for non-Indian males, marital dissolution rate decreased by 6.1 percentage points for people in their early 50's, by 3.7 percentage points for people in their late 40's, and by 4.6 percentage points for people in their early 40's.

The marital dissolution was affected by economic changes generated by the casinos regardless their ages and race. While marital dissolution of old males (aged 40 to 54) moved in the same direction as young males, marital dissolution of old females (aged 40 to 54) moved in the different direction from young females (18-25). Marital dissolution rate did not change for young Indian females but it increased for old Indian females. Divorce or separation among non-Indian females decreased for young group but did not change for old group.

6.5 Conclusion

This chapter analyzes the impact that Indians casinos have had on marriage, marital dissolution, and fertility among resident on Indian reservations. As I noted

early, casino operations increased employment rates and hourly wages. Furthermore, there are various welfare programs run by tribal governments using gaming revenue. With these direct and indirect economic benefits, people faced different incentive scheme and behaved differently from what they might have done if they never opened casinos.

Among males, ever married rate increased for younger group aged 18 to 21 for both Indians and non-Indians. Females did not show any statistically significant changes in marriage rate. Male's marital dissolution rate among the married increased for Indians and decreased for non-Indians. However, the impact of casino operations on separation and divorce was focused on 22-25 group not on 18-21 group. For females, only non-Indians aged 22 to 25 had statistically significant decrease in marital dissolution rate.

The fraction of young females having children fell on gaming reservations by a statistically significantly amount and the number of children born conditional on having children was not impacted by the presence of a casino operation. Therefore, fertility on gaming reservations fell relative to non-gaming reservations.

Finally, this chapter, with the results in chapter 5 analyzing the impact on the educational demand, confirms that early marriage and childbearing were not major reasons for young adults to leave high school on gaming reservations. Casino operations changed economic opportunities and then young adults left high school and did not enroll college to enjoy economic boom on reservations. Additionally,

their expectations that casino operations affect their economies permanently rather than temporarily made them easy to adjust their behavior.

Chapter 7: Conclusion

This dissertation examines whether gaming has improved the economic outcomes of Indians on reservations. I have also examined whether the changing economic environment has altered social outcomes such as decisions about education, marriage, and fertility.

In 1988, the IGRA was passed with the goal of self sufficiency of Indian tribes. By many measures, the IGRA has been successful. Total gaming revenue was less than $1 billion in 1988. However, it exceeded $10 billion in 1999 and reached $15.7 billion in 2003. Revenue growth in Indian gaming outperforms revenue growth of total commercial gaming industry and revenues from Indian casinos are second only to state lotteries in number.

Results in chapter 4 indicate that casino operations increased both employment and wages. These benefits are largest for Indians and especially for low skilled Indians. A 23 percent decrease in unemployment rate and a 22 percent increase in real income are big changes. But the poverty rate for children on gaming reservations is still high at 31 percent. So while casinos have changed the economic fortunes of many, it is clearly no panacea.

The rise of Indian casinos has accomplished the written goal of the IGRA. Unfortunately, the adoption of casino style gaming may have had some unintended consequences. The results in chapter 5 indicate that increased availability of high paying jobs is associated with a sharp decrease in educational attainment. Many

tribes have used casino profits to improve the quality of K-12 education and to offer generous tuition subsidies. Even with tuition subsidies, the results indicate that other factors may be much more important in the college enrollment decision than tuition levels.

The results in chapter 5 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.

Through economic changes, some marriages became more unstable. More Indian males got into marriage and more of them got out of marriage on gaming reservations than similarly defined Indians on non-gaming reservations. Fertility fell mainly due to the opportunity costs.

As we have seen above, casinos produced some negative impacts on education and marital stability. Even though the introduction of casinos was permanent shock to reservations, estimated impacts in this dissertation might be transitory. There are some possibilities with which I expect that Indians might behave differently in the future. First, Indians have only had 18 years of experience with gaming at most. Even though Indians are primary beneficiaries of economic changes, casino operations seem not to have alleviated economic problems. The unemployment rates are still higher than rates in the rest of the country. Poverty rates on reservations are

still very high. So, economic opportunities are more attractive than other things such as education. But as income grows and they move along the income distribution, they might value the education more than current economic opportunities. Second, casino operations on reservations are still expanding. If labor markets become more stable, Indians might behave differently. Third, a number of Indian tribes poured casino profits into education programs such as improving the quality of K-12 education or providing tuition subsidies for post-secondary education. These efforts not have produced benefits yet in terms of high school graduation or college entrance.

Table 1.1: Sample Statistics, 1990, Weighted

Variable	Age	On Reservations		The U.S.
		Indians	Non-Indians	
Laborforce Participation	18-64	58.7%	75.0%	77.1%
Unemployment	18-64	25.9%	7.1%	6.0%
Real Income	18-64	16,860.96	23,767.13	22,945.20
Poverty	0-17	44.3%	12.8%	19.5%
Ever married	18-25	21.8%	32.2%	26.2%
Marital Dissolution	18-25	14.7%	12.3%	13.6%
High School Degree	25-40	36.6%	35.7%	29.8%
College Education	25-40	32.6%	49.7%	54.8%

The means for reservation residents are calculated from the sample and the means for the U.S. are calculated from 1% public use microdata sample of the 1990 Census. Marital dissolution includes divorce and separation and is calculated among the ever-married people. Real income is in constant 2000$'s and only for wage and salaries.

Table 2.1: Gaming Revenues, in constant 2000 $'s

Year	Total Revenue, Indian Gaming, in billion $'s	Total Operations, Indian Gaming	Total Revenue, Commercial Casinos, in billion $'s	Total Revenue, Total Gaming, in billion $'s
1988	0.8			
1993			13.3	41.3
1994			16.0	46.2
1995	6.2	215	18.1	51.0
1996	6.9	232	18.8	52.7
1997	8.0	265	19.5	54.5
1998	9.0	297	20.9	58.2
1999	10.1	310	22.9	60.0
2000	11.0	311	24.3	61.4
2001	12.5	330	24.9	61.4
2002	14.1	348	25.4	66.0
2003	15.7	330	25.4	68.5

Source: National Indian Gaming Commission, American Gaming Association

Table 2.2: Estimated Gaming Revenue Sharing, in Million Dollars

State	Tribal Payment in FY2004	Tribal Payment in FY2005
Arizona	34.8	50.4
California	130.0	130.0
Connecticut	320.0	345.0
Michigan	14.6	15.7
New Mexico	34.7	36.4
Wisconsin	101.3	104.2

Source: National Conference of State Legislatures

Table 4.1: Sample Statistics of Reservation Residents, Weighted

	Tribes with a Casino		Tribes without a Casino	
	1990	2000	1990	2000
Indian, 18-64				
Population	97,492	123,348	118,173	145,248
LFP	.6183	.6329	.5613	.5676
Unemployed	.2569	.1984	.2613	.2259
Real Income	16,585.17	20,222.02	17,088.48	19,391.32
Non-Indian, 18-64				
Population	141,249	165,790	49,472	54,735
LFP	.7532	.7513	.7396	.7443
Unemployed	.0711	.0597	.0690	.0657
Real Income	24,064.52	27,594.35	22,918.05	25,181.16
Indian, 30-64				
Population	61,339	83,936	73,911	99,961
LFP	.6378	.6465	.5758	.5720
Unemployed	.2024	.1555	.2031	.1824
Real Income	18,964.18	22,737.98	19,916.68	21,900.56
Non-Indian, 30-64				
Population	105,432	129,794	37,688	42,112
LFP	.7511	.7498	.7413	.7448
Unemployed	.0594	.0488	.0536	.0520
Real Income	26,685.50	30,437.35	25,194.26	27,741.59
Indian, 0-17	82,940	100,697	99,611	114,587
In Poverty	.4161	.3099	.4645	.3640
Non-Indian, 0-17	65,253	70,511	25,692	24,993
In Poverty	.1248	.1116	.1357	.1327

Labor force participation is among all residents and unemployment rate is among labor force participants. Real income is only for the employed and in constant 2000 dollars.

Table 4.2: Impact of Indian Casinos on Economic Outcomes, Reservation Residents Aged 18 to 64

	All	Non-Indians	Indians		
			All	Male	Female
LFP	.0068	-.0078	.0168	-.0057	.0386
	(.0065)	(.0070)	(.0086)	(.0078)	(.0116)
# of Obs	258,486	141,118	117,368	56,300	61,068
R^2	.1482	.1305	.1303	.1114	.1441
UNEMP	-.0074	-.0045	-.0306	-.0354	-.0251
	(.0043)	(.0038)	(.0080)	(.0108)	(.0087)
# of Obs	178,147	105,453	72,694	37,640	35,054
R^2	.1219	.0459	.1021	.0893	.1086
INCOME	1228.31	539.57	1393.01	1233.67	1547.85
	(218.39)	(377.93)	(202.41)	(312.78)	(213.37)
# of Obs	258,817	141,392	117,425	56,347	61,078
R^2	.1694	.1558	.1465	.1222	.1880
INCOME w/job	1513.28	497.37	2004.59	1992.27	1918.15
	(283.39)	(376.37)	(306.76)	(422.57)	(304.75)
# of Obs	155,454	98,747	56,707	27,798	28,909
R^2	.1559	.1558	.1411	.1389	.1564
POVERTY (aged 0-17)	.0012	-.0142	-.0214		
	(.0147)	(.0139)	(.0140)	-	-
# of Obs	162,141	65,030	97,111		
R^2	.1131	.0709	.0595		

Each cell is from a separate estimation. Standard Errors in parentheses. Incomes are in constant 2000 dollar.

Table 4.3: Impact of Indian Casinos on Economic Outcomes, Reservation Residents Aged 30 to 64

	All	Non-Indians	Indians					
			All	Male	Female	LHS	HSD	COL
LFP	.0126	-.0065	.0221	.0055	.0378	.0205	.0267	.0491
	(.0074)	(.0079)	(.0091)	(.0093)	(.0115)	(.0121)	(.0166)	(.0209)
# of Obs	186,147	108,471	77,676	36,824	40,852	25,209	25,310	27,157
R^2	.1604	.1481	.1465	.1122	.1742	.1102	.0653	.0463
UNEMP	-.0107	-.0070	-.0284	-.0360	-.0198	-.0436	-.0258	-.0285
	(.0040)	(.0034)	(.0083)	(.0121)	(.0108)	(.0169)	(.0111)	(.0096)
# of Obs	130,017	80,880	49,137	25,172	23,965	11,347	16,769	21,021
R^2	.0844	.0369	.0664	.0564	.0690	.0720	.0462	.0403
Income	1414.76	434.48	1779.36	1896.06	1699.58	1407.46	1651.61	3267.35
	(267.65)	(448.57)	(228.23)	(337.25)	(247.20)	(288.78)	(393.91)	(401.82)
# of Obs	186,309	108,617	77,692	36,837	40,855	25,210	25,315	27,167
R^2	.1518	.1457	.1252	.0944	.1707	.0603	.0815	.0645
Income	1713.75	544.02	2367.16	2494.56	2133.16	2307.17	1498.70	3401.95
w/job	(352.52)	(474.46)	(360.66)	(503.02)	(363.35)	(504.38)	(554.72)	(532.33)
# of Obs	117,397	76,718	40,679	19,852	20,827	8,295	13,669	18,715
R^2	.1326	.1388	.1012	.1078	.1047	.0937	.1136	.0929

Each cell is from a separate estimation. Standard Errors in parentheses. Incomes are in constant 2000 dollar.

Table 5.1: Sample Composition, Individuals Aged 25-40 Living on Federally Recognized Reservations, 1990 and 2000 Census

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

Table 5.2: Sample Characteristics, Individuals Living on Federally Recognized Reservations, 1990 and 2000 Census

		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 constant 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 5.3: Impact of Indian Casinos on Labor Market Outcomes, Reservation Residents Aged 25-40

	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												
< H.S. 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)
H.S. 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)
> H.S. 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)
Non-Indian												
< H.S. 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)
H.S. 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)
> H.S. 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)
# of Obs.	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	.1064	.0980	.0931	.1064	.1198	.0971	.1052	.1598	.0672	.1922	.1783	.1702

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, race and education fixed-effects, year effects that vary by education/race status, and where appropriate, a male dummy variable.

Table 5.4: Impact of Indian Casinos on Employment by Industry, Reservation Residents Aged 25-40

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 Obs.	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 5.5: Impact of Indian Casinos on High School Enrollment, Reservation Residents Aged 15-18

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 Obs.	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 5.6: Impact of Indian Casinos on High School Graduation, Any College, Reservation Residents Aged 20-40

	High School Graduate		Any College	
Race/Age	Male	Female	Male	Female
Indian				
20-24	-.0955	-.1147	-.0530	-.0876
	(.0310)	(.0202)	(.0175)	(.0196)
25-29	-.0396	-.0931	-.0277	-.0636
	(.0196)	(.0194)	(.0175)	(.0185)
30-34	-.0252	.0085	-.0447	.0201
	(.0166)	(.0177)	(.0156)	(.0189)
35-40	.0251	-.0177	.0144	.0028
	(.0189)	(.0187)	(.0188)	(.0184)
Non-Indian				
20-24	-.0308	-.0338	.0339	.0207
	(.0264)	(.0256)	(.0433)	(.0444)
25-29	-.0239	-.0572	-.0169	-.0653
	(.0371)	(.0302)	(.0533)	(.0456)
30-34	-.0313	.0079	-.0736	.0401
	(.0326)	(.0332)	(.0531)	(.0483)
35-40	-.0204	-.0404	-.0318	-.0475
	(.0261)	(.0263)	(.0350)	(.0378)
# of Obs.	64,656	67,391	64,656	67,391
R^2	.0943	.0836	.0861	.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 5.7: Impact of Indian Casinos on Employment by Age Group and Education Level, Reservation Residents Aged 20-40

Age	Education Level	Male		Female	
		Indian	Non-Indian	Indian	Non-Indian
20-24	<HSD	.0892*	.0978*	.0505	.0159
		(.0413)	(.0450)	(.0517)	(.0437)
	HSD	.0508*	.0135	.1218*	-.0111
		(.0299)	(.0296)	(.0314)	(.0403)
	>HSD	.0039	-.0282	.0488*	-.0220
		(.0496)	(.0217)	(.0283)	(.0206)
25-29	<HSD	.1076*	.1006*	.0816*	.0184
		(.0359)	(.0466)	(.0391)	(.0656)
	HSD	.0800*	.0172	.0533*	.0329
		(.0327)	(.0379)	(.0253)	(.0314)
	>HSD	-.0044	-.0258	.0022	-.0019
		(.0296)	(.0179)	(.0174)	(.0149)
30-34	<HSD	.0005	.0530	.0734*	-.0195
		(.0312)	(.0390)	(.0412)	(.0462)
	HSD	.0717*	.0467	.0406	-.0210
		(.0264)	(.0436)	(.0284)	(.0367)
	>HSD	.0345	-.0280	.0526*	.0096
		(.0266)	(.0182)	(.0267)	(.0220)
35-40	<HSD	.0374	.0561*	.0278	-.0262
		(.0248)	(.0203)	(.0311)	(.0472)
	HSD	.0279	-.0145	.0010	-.0012
		(.0230)	(.0147)	(.0276)	(.0221)
	>HSD	.0048	.0003	-.0195	-.0110
		(.0233)	(.0170)	(.0168)	(.0155)
# of Obs.		52,138		44,950	
R^2		.1313		.1035	

Table 5.8: Population Counts by Migration Status, Indians Aged 20-29

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

Table 5.9: Impact of Casinos on High School Graduation, Any College, Indians Aged 20-29

	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			
	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
			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.

Table 5.10: Impact of Indian Casinos on Labor Market Outcomes, Reservation Residents Aged 25-40, Excluding the Navajos

	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												
< H.S. DEGREE	.0092	-.0153	.0354	.0506	.0308	.0783	.0143	.0142	.0018	-.76	-.53	-1.23
	(.0229)	(.0221)	(.0346)	(.0239)	(.0308)	(.0346)	(.0277)	(.0323)	(.0430)	(.51)	(.79)	(.85)
H.S. DEGREE	.0256	.0105	.0337	.0459	.0561	.0333	.0574	.0498	.0620	.90	1.21	.31
	(.0210)	(.0211)	(.0264)	(.0183)	(.0258)	(.0172)	(.0240)	(.0283)	(.0310)	(.35)	(.44)	(.38)
> H.S. DEGREE	.0211	.0137	.0253	.0325	.0280	.0415	.0396	-.0025	.0757	.45	.42	.31
	(.0165)	(.0201)	(.0213)	(.0144)	(.0243)	(.0130)	(.0166)	(.0233)	(.0208)	(.32)	(.48)	(.33)
Non-Indian												
< H.S. DEGREE	-.0204	-.0176	-.0178	.0511	.0737	-.0041	.0304	.0220	.0431	.41	.60	.14
	(.0227)	(.0305)	(.0419)	(.0151)	(.0193)	(.0367)	(.0258)	(.0229)	(.0531)	(.59)	(.68)	(.87)
H.S. DEGREE	.0059	.0189	-.0058	.0200	.0221	.0129	.0224	.0327	.0052	.41	.39	.41
	(.0121)	(.0141)	(.0176)	(.0132)	(.0146)	(.0169)	(.0202)	(.0229)	(.0356)	(.36)	(.48)	(.33)
> H.S. DEGREE	.0016	.0063	-.0041	.0098	.0005	.0205	-.0049	-.0061	-.0012	.70	1.04	.19
	(.0132)	(.0147)	(.0206)	(.0133)	(.0182)	(.0107)	(.0134)	(.0209)	(.0166)	(.48)	(.63)	(.41)
# of Obs.	94,302	46,153	48,149	72,354	38,884	33,470	72,354	38,884	33,470	42,710	24,084	18,626
R^2	.0990	.0926	.0806	.1027	.1210	.0907	.1051	.1603	.0676	.1949	.1882	.1660

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, race and education fixed-effects, year effects that vary by education/race status, and where appropriate, a male dummy variable.

Table 5.11: Impact of Indian Casinos on High School Enrollment, Reservation Residents Aged 15-18, Excluding the Navajos

Race/Age	All	Male	Female
Indians			
15	.0121	.0400	-.0134
	(.0151)	(.0187)	(.0217)
16	-.0185	.0010	-.0342
	(.0156)	(.0228)	(.0217)
17	-.0158	-.0295	-.0048
	(.0256)	(.0245)	(.0354)
18	-.0531	-.0258	-.0800
	(.0309)	(.0371)	(.0399)
Non-Indians			
15	-.0186	-.0178	-.0192
	(.0247)	(.0264)	(.0270)
16	-.0113	-.0132	-.0090
	(.0123)	(.0190)	(.0181)
17	.0229	.0104	.0354
	(.0280)	(.0285)	(.0362)
18	.0543	.0757	.0386
	(.0361)	(.0347)	(.0501)
# of Obs.	29,481	15,099	14,382
R^2	.1200	.1303	.1297

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 5.12: Impact of Indian Casinos on High School Graduation, Any College, Reservation Residents Aged 20-40, Excluding the Navajos

	High School Graduate		Any College	
Race/Age	Male	Female	Male	Female
Indian				
20-24	-.0159	-.0876	-.0269	-.0478
	(.0313)	(.0246)	(.0285)	(.0244)
25-29	-.0245	-.0462	-.0316	-.0356
	(.0227)	(.0218)	(.0240)	(.0284)
30-34	.0049	.0314	-.0295	.0264
	(.0212)	(.0242)	(.0213)	(.0242)
35-40	.0277	.0116	.0071	.0141
	(.0214)	(.0190)	(.0226)	(.0222)
Non-Indian				
20-24	-.0105	-.0160	.0563	.0529
	(.0230)	(.0221)	(.0393)	(.0360)
25-29	.0097	-.0326	.0284	-.0242
	(.0288)	(.0246)	(.0389)	(.0322)
30-34	-.0026	.0324	-.0245	.0853
	(.0274)	(.0277)	(.0368)	(.0311)
35-40	-.0010	-.0181	.0018	-.0078
	(.0239)	(.0208)	(.0207)	(.0189)
# of Obs.	58,705	60,948	58,705	60,948
R^2	.1079	.0926	.0897	.0747

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 5.13: Impact of Indian Casinos on Labor Market Outcomes, Off-Reservation Residents Aged 25-40 and Living Within 25 Miles

	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												
< H.S. DEGREE	.0082	.0218	-.0067	-.0155	.0098	-.0517	.0185	.0778	-.0748	.66	1.46	-.20
	(.0208)	(.0285)	(.0249)	(.0218)	(.0255)	(.0334)	(.0244)	(.0352)	(.0378)	(.46)	(.62)	(.59)
H.S. DEGREE	-.0055	.0200	-.0326	.0177	.0310	.0010	.0184	.0338	-.0003	.06	-.12	.43
	(.0134)	(.0194)	(.0215)	(.0116)	(.0179)	(.0154)	(.0185)	(.0236)	(.0267)	(.43)	(.60)	(.41)
> H.S. DEGREE	.0086	-.0004	.0143	.0029	.0071	-.0014	.0276	.0239	.0275	-.16	-.02	-.56
	(.0095)	(.0138)	(.0123)	(.0051)	(.0089)	(.0076)	(.0138)	(.0145)	(.0204)	(.36)	(.53)	(.37)
Non-Indian												
< H.S. DEGREE	-.0089	.0013	-.0215	-.0084	-.0031	-.0192	-.0056	.0027	-.0199	-.28	-.12	-.39
	(.0096)	(.0076)	(.0136)	(.0084)	(.0073)	(.0115)	(.0100)	(.0104)	(.0124)	(.36)	(.38)	(.37)
H.S. DEGREE	.0020	.0014	.0023	.0015	.0016	.0014	.0112	.0102	.0134	.32	.36	.28
	(.0058)	(.0051)	(.0075)	(.0022)	(.0024)	(.0035)	(.0051)	(.0046)	(.0076)	(.26)	(.30)	(.21)
> H.S. DEGREE	.0068	.0037	.0095	.0057	.0063	.0053	.0094	.0127	.0062	.02	.04	-.01
	(.0055)	(.0046)	(.0076)	(.0024)	(.0027)	(.0025)	(.0033)	(.0037)	(.0042)	(.30)	(.36)	(.23)
# of Obs.	2,018,963	984,732	1,034,231	1,669,262	900,392	768,870	1,669,262	900,392	768,870	1,184,828	690,542	494,286
R^2	.0889	.0411		.0251	.0229	.0314	.0554	.0404	.0264	.1557	.1355	.1302

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, race and education fixed-effects, year effects that vary by education/race status, and where appropriate, a male dummy variable.

Table 5.14: Impact of Indian Casinos on High School Enrollment by Casino Open Date, Reservations Residents Aged 15-18

			All	Male	Female
Indian	15	1992 or earlier	-.0317	.0150	-.0803
			(.0188)	(.0194)	(.0274)
		1993 to 1995	.0151	.0068	.0296
			(.0125)	(.0180)	(.0215)
		1996 or later	.0103	.0450	-.0328
			(.0201)	(.0227)	(.0288)
	16	1992 or earlier	-.0291	-.0135	-.0430
			(.0153)	(.0229)	(.0234)
		1993 to 1995	-.0078	-.0338	.0272
			(.0180)	(.0205)	(.0296)
		1996 or later	.0263	.0580	-.0043
			(.0213)	(.0280)	(.0297)
	17	1992 or earlier	-.0379	-.0276	-.0481
			(.0220)	(.0271)	(.0339)
		1993 to 1995	-.0227	-.0300	-.0263
			(.0314)	(.0318)	(.0425)
		1996 or later	-.0535	-.0217	-.0815
			(.0393)	(.0393)	(.0508)
	18	1992 or earlier	-.1296	-.1089	-.1482
			(.0322)	(.0407)	(.0487)
		1993 to 1995	-.0220	-.0261	-.0226
			(.0209)	(.0262)	(.0328)
		1996 or later	-.0789	-.0259	-.1458
			(.0424)	(.0513)	(.0461)
Non-Indian					
	15	1992 or earlier	-.0523	-.0485	-.0583
			(.0249)	(.0265)	(.0280)
		1993 to 1995	-.0294	-.0357	-.0235
			(.0240)	(.0258)	(.0271)
		1996 or later	-.0085	-.0039	-.0129
			(.0288)	(.0311)	(.0322)
	16	1992 or earlier	-.0237	-.0133	-.0345
			(.0155)	(.0218)	(.0201)
		1993 to 1995	-.0135	-.0076	-.0240
			(.0148)	(.0185)	(.0230)
		1996 or later	-.0194	-.0283	-.0050
			(.0179)	(.0277)	(.0245)
	17	1992 or earlier	.0211	.0076	.0310
			(.0275)	(.0308)	(.0377)
		1993 to 1995	.0157	.0101	.0176
			(.0315)	(.0294)	(.0416)
		1996 or later	.0123	.0016	.0258
			(.0315)	(.0342)	(.0402)
	18	1992 or earlier	.0676	.0970	.0443
			(.0385)	(.0401)	(.0496)
		1993 to 1995	.0376	.0572	.0213
			(.0479)	(.0501)	(.0624)
		1996 or later	.0367	.0499	.0350
			(.0406)	(.0386)	(.0572)
# of Obs.			33,195	16,990	16,205
R^2			.1103	.1177	.1199

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 5.15: Impact of Indian Casinos on High School Graduation, Any College, Reservation Residents Aged 20-40

			High School		College	
			Male	Female	Male	Female
Indian	20-24	1992 or earlier	-.0685	-.0974	-.0790	-.0929
			(.0396)	(.0301)	(.0275)	(.0320)
		1993 to 1995	-.1280	-.1460	-.0450	-.1086
			(.0339)	(.0244)	(.0193)	(.0256)
		1996 or later	-.0628	-.0807	-.0388	-.0481
			(.0442)	(.0433)	(.0361)	(.0345)
	25-29	1992 or earlier	-.0311	-.1024	-.0477	-.0802
			(.0253)	(.0215)	(.0240)	(.0295)
		1993 to 1995	-.0623	-.1012	-.0419	-.0679
			(.0259)	(.0204)	(.0205)	(.0239)
		1996 or later	-.0061	-.0711	.0198	-.0382
			(.0365)	(.0367)	(.0300)	(.0303)
	30-34	1992 or earlier	-.0358	.0047	-.0815	.0576
			(.0230)	(.0244)	(.0250)	(.0285)
		1993 to 1995	-.0203	.0144	-.0281	.0129
			(.0179)	(.0159)	(.0221)	(.0206)
		1996 or later	-.0219	.0005	-.0347	-.0040
			(.0344)	(.0435)	(.0241)	(.0343)
	35-40	1992 or earlier	.0264	-.0051	.0231	.0379
			(.0252)	(.0204)	(.0274)	(.0226)
		1993 to 1995	.0261	-.0107	-.0086	-.0301
			(.0203)	(.0195)	(.0215)	(.0268)
		1996 or later	.0232	.0833	.0466	-.0247
			(.0414)	(.0319)	(.0308)	(.0245)
Non-Indian						
	20-24	1992 or earlier	-.0118	-.0255	.0065	.0275
			(.0324)	(.0356)	(.0313)	(.0432)
		1993 to 1995	-.0129	-.0344	.1052	.0930
			(.0327)	(.0373)	(.0684)	(.0659)
		1996 or later	-.0503	-.0349	-.0049	-.0312
			(.0304)	(.0270)	(.0444)	(.0387)
	25-29	1992 or earlier	.0026	-.0143	.0468	.0173
			(.0395)	(.0264)	(.0633)	(.0496)
		1993 to 1995	.0125	-.0520	.0215	-.0312
			(.0386)	(.0305)	(.0579)	(.0455)
		1996 or later	-.0550	-.0755	-.0623	-.1180
			(.0410)	(.0404)	(.0556)	(.0518)
	30-34	1992 or earlier	.0097	.0382	-.0347	.1329
			(.0336)	(.0345)	(.0522)	(.0494)
		1993 to 1995	-.0141	.0240	-.0818	.0180
			(.0314)	(.0327)	(.0547)	(.0469)
		1996 or later	-.0577	-.0122	-.0873	.0103
			(.0394)	(.0377)	(.0587)	(.0552)
	35-40	1992 or earlier	.0211	-.0377	.0160	-.0170
			(.0271)	(.0264)	(.0366)	(.0398)
		1993 to 1995	-.0190	-.0194	-.0405	-.0444
			(.0249)	(.0226)	(.0436)	(.0395)
		1996 or later	-.0423	-.0512	-.0527	-.0642
			(.0351)	(.0358)	(.0361)	(.0421)
# of Obs.			64,656	67,391	64,656	67,391
R^2			.0949	.0843	.0872	.0723

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 6.1: Marital Status, Reservation Residents Aged 18 to 25, Weighted

	Reservations with a Casino		Reservations without a Casino	
	Male	Female	Male	Female
***1990*:**				
Indian				
Population	11,573	12,147	14,405	14,736
Ever Married	.1631	.2520	.1787	.2720
Currently Married	.1368	.2013	.1593	.2328
Marital Dissolution	.1611	.1924	.1068	.1305
Having Kids	-	.4482	-	.3708
Non-Indian				
Population	11,122	10,543	3,517	3,557
Ever Married	.2163	.3946	.2846	.4737
Currently Married	.1944	.3360	.2499	.4203
Marital Dissolution	.0989	.1433	.1219	.1074
Having Kids	-	.3118	-	.3613
***2000*:**				
Indian				
Population	13,610	14,039	16,074	15,629
Ever Married	.1503	.1972	.1553	.2275
Currently Married	.1253	.1663	.1443	.2040
Marital Dissolution	.1623	.1478	.0697	.0945
Having Kids	-	.3348	-	.2965
Non-Indian				
Population	12,271	11,567	4,289	4,050
Ever Married	.1822	.3146	.2581	.4020
Currently Married	.1669	.2763	.2236	.3506
Marital Dissolution	.0778	.1149	.1337	.1179
Having Kids	-	.2638	-	.3400

Ever married rate and currently married rate are the fraction of total population. Marital dissolution includes divorce and separation and its fraction is among ever married population. The fraction of having kids is regardless of marriage.

Table 6.2: Marital Status, Reservation Residents Aged 40-54, Weighted

	Reservations with a Casino		Reservations without a Casino	
	Male	Female	Male	Female
***1990*:**				
Indian				
Population	11,876	12,560	13,757	15,412
Ever Married	.8439	.8779	.8603	.8796
Currently Married	.5857	.5236	.6978	.6202
Marital Dissolution	.2760	.2907	.1674	.2051
Non-Indian				
Population	21,514	21,426	7,753	7,492
Ever Married	.9253	.9584	.9307	.9379
Currently Married	.7712	.7638	.7851	.7493
Marital Dissolution	.1570	.1620	.1486	.1691
***2000*:**				
Indian				
Population	18,018	19,698	21,415	23,729
Ever Married	.7739	.8076	.7841	.8079
Currently Married	.5182	.4684	.6119	.5498
Marital Dissolution	.3115	.3434	.2042	.2487
Non-Indian				
Population	31,047	31,077	10,405	10,396
Ever Married	.8863	.9335	.8926	.9180
Currently Married	.7132	.7273	.7072	.7139
Marital Dissolution	.1868	.1956	.1974	.1881

Ever married rate and currently married rate are the fraction of total population. Marital dissolution includes divorce and separation and its fraction is among ever married population.

Table 6.3: Impact of Indian Casinos on Ever married Rate, 18-25, Males

	(1)		(2)		(3)	
	Indian	Non-Indian	Indian	Non-Indian	Indian	Non-Indian
All	.0173	.0063				
	(.0121)	(.0191)				
By Age						
18			.0288	.0754		
			(.0138)	(.0292)		
19			.0447	.0484		
			(.0221)	(.0421)		
20			.0180	.0290		
			(.0188)	(.0410)		
21			.0067	.0402		
			(.0241)	(.0370)		
22			-.0052	.0052		
			(.0270)	(.0535)		
23			-.0001	.0119		
			(.0267)	(.0700)		
24			.0223	-.0513		
			(.0388)	(.0735)		
25			.0095	-.0921		
			(.0333)	(.0564)		
By Agegroup						
18-21					.0263	.0504
					(.0133)	(.0208)
22-25					.0060	-.0340
					(.0176)	(.0385)
# of Obs.	23,735		23,735		23,735	
R^2	.1324		.1397		.1375	

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, race and education fixed effects, year effects that vary by education/race status or by age-group/race status where appropriate.

Table 6.4: Impact of Indian Casinos on Ever married Rate, 18-25, Females

	(1)		(2)		(3)	
	Indian	Non-Indian	Indian	Non-Indian	Indian	Non-Indian
All	-.0005	-.0047				
	(.0132)	(.0258)				
By Age						
18			.0219	.0131		
			(.0248)	(.0503)		
19			.0070	.0882		
			(.0185)	(.0553)		
20			.0357	-.0440		
			(.0255)	(.0367)		
21			.0085	-.0803		
			(.0268)	(.0590)		
22			-.0241	.0114		
			(.0434)	(.0562)		
23			.0138	-.0505		
			(.0307)	(.0478)		
24			-.0696	.0428		
			(.0328)	(.0593)		
25			-.0213	-.0216		
			(.0377)	(.0624)		
By Agegroup						
18-21					.0169	-.0025
					(.0147)	(.0282)
22-25					-.0244	-.0064
					(.0190)	(.0343)
# of Obs.	23,744		23,744		23,744	
R^2	.1670		.1755		.1713	

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, race and education fixed effects, year effects that vary by education/race status or by age-group/race status where appropriate.

Table 6.5: Impact of Indian Casinos on Currently Married Rate, 18-25, Males

	(1)		(2)		(3)	
	Indian	Non-Indian	Indian	Non-Indian	Indian	Non-Indian
All	.0077	.0149				
	(.0105)	(.0177)				
By Age						
18			.0287	.0577		
			(.0132)	(.0255)		
19			.0569	.0344		
			(.0201)	(.0380)		
20			.0188	.0311		
			(.0181)	(.0322)		
21			.0037	.0314		
			(.0211)	(.0362)		
22			-.0050	.0092		
			(.0275)	(.0437)		
23			-.0193	-.0105		
			(.0270)	(.0728)		
24			-.0246	-.0040		
			(.0347)	(.0740)		
25			-.0331	-.0194		
			(.0309)	(.0408)		
By Agegroup						
18-21					.0294	.0408
					(.0119)	(.0189)
22-25					-.0200	-.0065
					(.0168)	(.0355)
# of Obs.	23,735		23,735		23,735	
R^2	.1116		.1192		.1170	

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, race and education fixed effects, year effects that vary by education/race status or by age-group/race status where appropriate.

Table 6.6: Impact of Indian Casinos on Currently Married Rate, 18-25, Females

	(1)		(2)		(3)	
	Indian	Non-Indian	Indian	Non-Indian	Indian	Non-Indian
All	.0035	.0139				
	(.0125)	(.0245)				
By Age						
18			.0292	.0244		
			(.0216)	(.0471)		
19			.0237	.0924		
			(.0168)	(.0492)		
20			.0314	.0037		
			(.0254)	(.0303)		
21			-.0037	-.0746		
			(.0253)	(.0612)		
22			-.0091	-.0109		
			(.0417)	(.0525)		
23			.0069	.0053		
			(.0308)	(.0491)		
24			-.0559	.0484		
			(.0304)	(.0644)		
25			-.0192	.0238		
			(.0368)	(.0528)		
By Agegroup						
18-21					.0197	.0143
					(.0133)	(.0243)
22-25					-.0180	.0145
					(.0194)	(.0352)
# of Obs.	23,744		23,744		23,744	
R^2	.1325		.1403		.1362	

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, race and education fixed effects, year effects that vary by education/race status or by age-group/race status where appropriate.

Table 6.7: Impact of Indian Casinos on Ever married Rate, 15-17, Females

	(1)		(2)	
	Indian	Non-Indian	Indian	Non-Indian
All	.0200	.0139		
	(.0047)	(.0055)		
By Age				
15			.0185	.0020
			(.0062)	(.0115)
16			.0131	.0149
			(.0072)	(.0079)
17			.0282	.0237
			(.0091)	(.0091)
# of Obs.	12,746		12,746	
R^2	.0334		.0343	

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, race and education fixed effects, year effects that vary by education/race status or by age-group/race status where appropriate.

Table 6.8: Impact of Indian Casinos on Currently Married Rate, 15-17, Females

	(1)		(2)	
	Indian	Non-Indian	Indian	Non-Indian
All	.0139	.0150		
	(.0048)	(.0057)		
By Age				
15			.0105	.0029
			(.0055)	(.0091)
16			.0123	.0158
			(.0068)	(.0086)
17			.0185	.0250
			(.0089)	(.0102)
# of Obs.	12,746		12,746	
R^2	.0276		.0284	

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, race and education fixed effects, year effects that vary by education/race status or by age-group/race status where appropriate.

Table 6.9: Impact of Indian Casinos on Any Kid, 18-25, Females

	(1)		(2)		(3)	
	Indian	Non-Indian	Indian	Non-Indian	Indian	Non-Indian
All	-.0337	-.0374				
	(.0179)	(.0183)				
By Age						
18			-.0715	-.0142		
			(.0274)	(.0429)		
19			-.0392	.0430		
			(.0309)	(.0459)		
20			-.0825	.0446		
			(.0280)	(.0436)		
21			.0305	-.1055		
			(.0309)	(.0426)		
22			-.0232	-.0889		
			(.0336)	(.0508)		
23			.0060	-.0454		
			(.0396)	(.0546)		
24			-.0092	-.0947		
			(.0376)	(.0560)		
25			-.0638	-.0396		
			(.0408)	(.0659)		
By Agegroup						
18-21					-.0435	-.0090
					(.0186)	(.0241)
22-25					-.0217	-.0665
					(.0242)	(.0353)
# of Obs.	23,744		23,744		23,744	
R^2	.1392		.1411		.1394	

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, race and education fixed effects, year effects that vary by education/race status or by age-group/race status where appropriate.

Table 6.10: Impact of Indian Casinos on Marital Dissolution, Among Ever Married Males Aged 18 to 25

	(1)		(2)		(3)	
	Indian	Non-Indian	Indian	Non-Indian	Indian	Non-Indian
All	.0519	-.0523				
	(.0218)	(.0234)				
By Age						
18			.0563	.0073		
			(.1378)	(.1682)		
19			-.1786	.0296		
			(.0388)	(.0463)		
20			.0057	-.1342		
			(.0419)	(.0718)		
21			.0126	-.0013		
			(.0504)	(.0548)		
22			-.0140	-.0275		
			(.0514)	(.0431)		
23			.0665	.0410		
			(.0658)	(.0461)		
24			.1565	-.0985		
			(.0601)	(.0614)		
25			.0882	-.0916		
			(.0594)	(.0551)		
By Agegroup						
18-21					-.0212	-.0218
					(.0391)	(.0467)
22-25					.0839	-.0567
					(.0305)	(.0289)
# of Obs.	4,245		4,245		4,245	
R^2	.0697		.0878		.0735	

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, race and education fixed effects, year effects that vary by education/race status or by age-group/race status where appropriate.

Table 6.11: Impact of Indian Casinos on Marital Dissolution, Among Ever Married Females Aged 18 to 25

	(1)		(2)		(3)	
	Indian	Non-Indian	Indian	Non-Indian	Indian	Non-Indian
All	-.0087	-.0511				
	(.0206)	(.0183)				
By Age						
18			-.0269	-.0881		
			(.0494)	(.0628)		
19			-.0690	-.0074		
			(.0644)	(.0448)		
20			.0657	-.1420		
			(.0540)	(.0702)		
21			.0843	-.0132		
			(.0548)	(.0506)		
22			-.0754	.0890		
			(.0389)	(.0712)		
23			.0179	-.1266		
			(.0566)	(.0542)		
24			-.0402	-.0458		
			(.0377)	(.0542)		
25			-.0160	-.0758		
			(.0410)	(.0397)		
By Agegroup						
18-21					.0284	-.0580
					(.0290)	(.0365)
22-25					-.0275	-.0493
					(.0244)	(.0249)
# of Obs.	6,851		6,851		6,851	
R^2	.0586		.0654		.0593	

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, race and education fixed effects, year effects that vary by education/race status or by age-group/race status where appropriate.

Table 6.12: Impact of Indian Casinos on Marital Dissolution, Among the Ever Married Aged 40 to 54

	(1)		(2)	
	Indian	Non-Indian	Indian	Non-Indian
	Males			
All	.0256	-.0473		
	(.0148)	(.0123)		
By Agegroup				
40-44			.0318	-.0458
			(.0264)	(.0161)
45-49			.0382	-.0366
			(.0227)	(.0191)
50-54			.0032	-.0607
			(.0230)	(.0198)
# of Obs.	34,765		34,765	
R^2	.0453		.0457	
	Females			
All	.0336	-.0143		
	(.0169)	(.0172)		
By Agegroup				
40-44			.0442	-.0223
			(.0163)	(.0177)
45-49			.0545	-.0179
			(.0257)	(.0180)
50-54			-.0061	-.0013
			(.0212)	(.0327)
# of Obs.	37,539		37,539	
R^2	.0483		.0488	

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