

AN EMPIRICAL ANALYSIS OF CASINO ENTRY DECISIONS BY AMERICAN
INDIAN TRIBES

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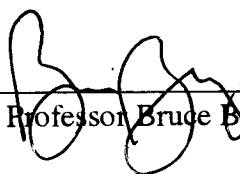
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A THESIS

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Approved by:

A handwritten signature in black ink, appearing to be 'B Blonigen', written over a horizontal line.

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Title: AN EMPIRICAL ANALYSIS OF CASINO ENTRY DECISIONS BY AMERICAN
INDIAN TRIBES

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With the passage of the Indian Gaming Regulatory Act of 1988, American Indian tribes could legally own and operate casinos on their tribal lands. Many tribes in the Western United States operate their own casinos. However, the states with the highest concentration of tribes, do not have a saturated market of Indian gaming. The tribes in these states are used to observe which factors a tribe uses to determine whether to enter the casino market. The reasons a tribe decides to operate a casino are attributed to their availability of individual resources as well as their proximity to their customers.

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I. INTRODUCTION

The most recent wave in full-scale casino gaming in the United States has come from the construction of casinos by American Indians on tribal lands. Unlike Las Vegas or Atlantic City, Indian gaming casinos can offer full-scale operations all over the country. They have made gambling more convenient and accessible for most Americans. With the passage of the Indian Gaming Regulatory Act in 1988, tribes could offer casino gambling in states other than Nevada and New Jersey. By 1998, Indian gaming casinos were operating in 24 states (Christiansen, 1998).

Because Indian gaming is a relatively new sector of the casino gaming industry, there have been few studies conducted on the economic behavior of its market. Indian gaming casinos are quickly appearing all over the Western United States, but not all of the tribes in this region operate casinos. This thesis will further analyze the factors that affect a tribe's decision to enter the Indian gaming casino market. It is an economic analysis of profitability based on a standard industrial organization model, and does not try to promote or oppose any social views of gambling.

Researchers in Indian gaming struggle when studying this topic because Indian gaming casino revenues are not publicly available. Because this information is not accessible, many researchers are forced to analyze the industry in other ways. This study looks at Indian gaming from a new perspective. It examines both a tribe's individual characteristics as well as the specific market conditions that allow for a casino to be successful.

II. LEGAL HISTORY

Casino gaming on American Indian reservations is a recent addition to the gambling industry. Tribal gaming began in the 1970's, as states such as Florida, Connecticut, Wisconsin, and California allowed low-stakes bingo to take place on the reservations. The tribes wanted to reduce their dependence on the federal government and start to develop their own economy. Although they were allowed to conduct gaming activities in bingo halls, they faced limitations on the size of the jackpot and the frequency of the games. In the early 1980's, tribal leaders fought against state and local law-enforcement officials to build their jackpots and increase their hours of operation. The tribes claimed they were sovereign nations that did not have to obey the laws expected by the state. The governments, however, believed that the tribes were not exempt from following these laws (McNeil, 1994).

In 1987, the Supreme Court ruled in favor of the American Indian's right to conduct large scale gaming on their reservations. In the *California vs. Cabazon* (1987) case, the Supreme Court ruled that tribes could conduct and regulate any gaming activities that were legal elsewhere in the state. For example, if the state allowed charitable bingo halls, then the tribes could conduct their own high stakes bingo halls. The Court also ruled that state and local gaming ordinances did not apply to on-reservation gaming. The Cabazon decision allowed tribes to expand their gaming operations without fearing state intervention. It was a landmark ruling that changed the face of the gaming industry for the 1990's (U.S. General Accounting Office, 1997).

In direct response to the Cabazon decision, Congress enacted the Indian Gaming Regulatory Act (IGRA) in 1988. The primary goal of this act was to promote economic development in the tribes and to build strong, self-sufficient tribal governments. The IGRA

defines three types of gambling and establishes regulations for each type. Class I gaming includes all social games and traditional forms of Indian gaming that are used in tribal celebrations or ceremonies. This type of gaming is governed by the individual tribes only. Games such as bingo, lotto, poker, and pull tabs are all included in Class II gaming. Class II gaming is not regulated by the state, but is subject to the supervision of the National Indian Gaming Commission (NIGC) and the tribe in which the gambling is taking place. All other forms of gaming, which include slot machines, blackjack, lotteries, craps, and pari-mutuel betting, are classified under Class III gaming. The regulation of this class is much more complex. Congress wanted to acknowledge the tribes as sovereign, but they also wanted the tribes to negotiate fairly with other governments. If a tribe wishes to offer Class III gaming at their casino, they must form an agreement with the state, known as a compact. Both parties must negotiate in "good faith" when forming a compact. If the state does not negotiate under these terms, they are subject to the laws set by Congress. Since the IGRA was passed ten years ago, states and tribes have developed civil and friendly relationships with each other, and new Indian casinos are appearing all over the nation (Eadington, 1990).

Because the tribes are considered sovereign nations, they are exempt from paying federal, state, and local taxes on their revenues. The money they save from this exemption is used to build their own public programs and services. The IGRA states that tribal governments must use their gaming profits for law enforcement, economic development, tribal courts, and infrastructure improvement. Before a tribe opens a casino, they must determine short and long range goals for how to allocate the proceeds. Many tribes have used their casino profits to fund social service programs, scholarships, health care clinics,

new roads, new sewer and water systems, and adequate housing. (National Indian Gaming Association, 1999).

III. LITERATURE REVIEW

Since Indian gaming is a relatively new industry, there has been little research on its economic or market potential. The most recent studies of Indian gaming focus on the economic impacts of its entry into the casino market. When a tribe opens a casino, the economic effects of its presence affect the tribe and the local area surrounding the casino. Researchers who are interested in studying the economic performance of individual casinos are forced to use a statistic other than gaming revenues. Tribes are not legally required to report their revenues to the public, so researchers find other ways to analyze the performance of the individual casinos.

Many studies on Indian gaming examine the social and economic impacts on the reservation as well the area around the casino. Stephen Cornell, Joseph Kalt, Matthew Krepps, and Jonathan Taylor (1998) performed a study on five Midwestern and Eastern Indian gaming operations. The authors of this study believe it is important to know the economic consequences of Indian gaming before deciding if the IGRA is a good policy. The research indicates that the tribes with the worst economic conditions have opened casinos. They have found that the economic benefits of the casinos both on and off the reservation outweigh the costs. Therefore, they conclude the IGRA is a good public policy for American Indians.

Gary C. Anders, Donald Siegel, and Munther Yacoub (1998) recently performed a study on the effect of Indian gaming on state economies. They used Arizona as their test state because of its high concentration of tribes, and, therefore, large number of casinos. They found that Indian gaming may be shifting consumer spending from taxable to non-taxable sectors. Because this hurts the state economy, these results suggest the state should

renegotiate the gaming compacts to share casino profits. The tribes will greatly oppose this request, but it may be necessary for the sake of the Arizona economy.

Because revenue data on Indian gaming is inaccessible to the public, researchers sometimes develop their own model for determining revenues. In the 1997 Casino Revenue Survey, ECONorthwest (1998) visited the seven casinos in Oregon and estimated gaming revenues for each of the casinos. They estimated hourly betting frequencies and payout rates and incorporated the data with ODOT traffic statistics to model gaming revenues. This is a huge effort, so many researchers do not model revenues. The results of this study stress the importance of a casino's proximity to its customers. The survey found that since most of the Indian gaming casino customers are local residents, the casinos have encouraged higher visitation rates by including more low denomination machines.

Rather than focus on economic impacts once the casino is formed, this study determines whether or not a tribe will open a casino in the first place. The results of studies like the 1997 Casino Revenue Survey support the idea that successful casinos are located near customers. This study tests this concept for the Western U.S. It also looks at the individual tribe characteristics that further affect a tribe's decision to open a casino.

IV. INDUSTRY BEHAVIOR

After the passage of the IGRA, many tribes quickly signed compacts with the states, and started to open casinos in the early and mid 1990's. Most of the Indian gaming casinos in the Western U.S. started operating between 1994 and 1996. Since then, casinos have entered the market at a slower rate. In the Western U.S., the states with the lowest concentration of tribes offer Indian gaming in almost all of the reservations. Since nearly all of the tribes in Idaho, Oregon, Montana, and Colorado operate casinos, there is little room for growth. States such as Arizona, New Mexico, and Washington are highly concentrated with Indian tribes, so many of them do not have casinos. This study focuses on the tribal casino markets in these three states.

The Indian gaming industry is unique in that the firms cannot determine the location of their casino. This poses several limitations for the tribe. If a tribe is located far from its market, it cannot move to the best location. Also, some tribes do not have enough land to build the casino size they desire. These restrictions will continue to exist in the future. Tribes do not obtain federal recognition easily, and once they do, it is difficult to find land. Most Indian tribes were federally recognized in the 18th and 19th centuries. A tribe cannot form a compact with the state unless it is federally recognized. In order for a tribe to become federally recognized, it must undertake a lengthy and complex recognition process with the Bureau of Indian Affairs (BIA). This process is called the Federal Acknowledgment Process. Before the tribe submits its request, they must first meet several anthropological and genealogical requirements. After they submit a lengthy report to the Bureau of Indian Affairs, it takes at least a year to review the request. According to Mrs. Clifford at the BIA, most tribes take several years to write the report. She said they usually have to hire outside

sources to help them produce the document. It is not very often that a group goes through this process because of the monetary and time limitations. If a tribe does become federally recognized and wants to own land, they must go to the local BIA agency in the area to request it. Most of the land is already claimed by other sources, so not much of it is available. (National Indian Gaming Association, 1999, and Personal Communication with Mrs. Clifford of the BIA)

Since a tribe needs to be federally recognized before it can form a compact with the state, it is difficult for a group of individuals to not only become part of this industry, but to also choose where to build their casinos. These restrictions support the goals of my thesis, which are to determine which tribes will enter the casino market. The Bureau of Indian Affairs makes the Federal Recognition Process very detailed to ensure that the proper tribes receive federal recognition. According to the Branch of Acknowledgement and Research of the Bureau of Indian Affairs, there has been 181 new petitioners since October 1978. 41 of these petitions have been resolved while 13 have been denied. The others are still completing the Federal Recognition Process. (Branch of Acknowledgement and Research, 1999).

V. ANALYSIS

Economic Model

When a tribe decides to open a casino, they evaluate their expected profitability. If they expect to earn positive profits, they will enter the casino market. These profits are determined by a firm's costs and revenues. The difference between the revenues and costs is equal to the profit a firm receives. Therefore, a tribe must consider its costs as well its ability to earn revenues when opening a casino.

A tribe's set up costs are important when evaluating the possibility of opening a casino. Setting up a casino requires political and logistical coordination by a tribe. The task of starting a casino can be costly if the tribe does not have the certain characteristics necessary to be efficient. When a tribe decides to open a casino, they also determine the demand for the casino and the operating cost conditions they will face once the casino is open. This model assumes that all tribes incur the same costs to operate their casino. Therefore, it will only analyze the individual characteristics of the tribe and the factors that drive the demand for a casino. Since there is no observable data on operating costs, I am assuming the costs are the same because it is convenient. These costs may be captured by the distance variables in the study. A tribe's location may be costly if the distributors will have to travel a far distance when transporting supplies.

Even though revenue and profit information is not available, it is possible to determine which tribes will expect to profit, and hence, open a casino. This decision can be observed using a probit model. The dependent variable in this model is a tribe's entry decision, $CASINO_i$.

When: Profits (π_i) > 0, then $CASINO_i = 1$

and

When: $\pi_i \leq 0$, then $CASINO_i = 0$

When profits are positive, the dependent variable will be equal to 1. When they are negative, $CASINO_i$ will be equal to zero. This relationship can be estimated as a probit regression of the dependent variable on the regressors using a statistical package. For this study, LIMDEP was used to estimate the model.

Model Expectations

The independent variables in this model are split into two categories: the variables that influence set-up costs, and those that determine revenue capabilities. Based on theory, I expect the coefficients of the independent variables to have the following signs:

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$CASINO = f(\text{POP}, \text{EDUC}, \text{INCOME}, \text{LAND FRWY}, \text{MSA}, \text{COMP}, \text{DENSITY}, \text{PERCAP})$

where,

Dependent variable:

$CASINO = 1$ if casino, 0 if no casino

Independent variables that influence casino set-up costs:

POP = tribe population

EDUC = tribal percentage of high school graduates or above

INCOME = tribal per capita income

Independent variables that influence revenue:

LAND = tribal land (gross acres)

FRWY = tribe's distance from the freeway (miles)

MSA = dummy variable where 1 = tribe is in an MSA or PMSA¹,
and 0 = tribe is not in an MSA or PMSA

COMP = number of competitors * 1 if the tribe is in an MSA or
PMSA, 0 otherwise

DENSITY = Density of those residents 21 and over who live in the
same county as the tribe

PERCAP = Income per capita of the residents in the same county as
the tribe

¹ Metropolitan Statistical Areas (MSAs) are defined as cities with 50,000 or more inhabitants, or Census Bureau-urbanized areas (of at least 50,000 inhabitants) and a total metropolitan population of at least 100,000. Consolidated metropolitan statistical areas (CMSAs) are areas that are MSAs and have a population of one million or more. These areas are made of up several component areas. These component areas are known as Primary Metropolitan Statistical Areas (PMSAs) (U.S. Census Bureau, 1999).

A negative sign indicates a one unit increase in the independent variable will lead to a decrease in the dependent variable. A positive sign means the opposite: an increase in the independent variable will lead to an increase in the dependent. A question mark means that I cannot make a prediction on what kind of effect the independent variable will have on the dependent.

The first three independent variables are tribal characteristics that influence the set-up costs of operating a casino. These variables--POP, EDUC, and INCOME--cannot be determined based on theory. The more populated tribes may have more manpower in deciding to open a casino, but they may also have too many members to start an organized project such as a casino. High school graduation attainment statistics are also ambiguous because a highly educated tribe may be more affluent and not need to build a casino to rebuild their economy. An educated tribe may also be more able to negotiate a compact with the state or handle the logistics of starting a casino enterprise. The income variable works the same way. A tribe with higher incomes may not need to start a casino to boost their economy. However, they may be able to pay the start up costs with more ease than a tribe with a lower per capita income.

The second set of variables describes the effects of a casino's location in relation to their customers. A tribe's land acreage is expected to be positively related to its probability of having a casino. The larger the acreage, the more location possibilities exist for a casino. A tribe's distance from the freeway is negatively related. The further away a tribe is from a freeway, the less likely the tribe will have a profitable casino. Tribes located within a Metropolitan Statistical Area (MSA) or Primary Metropolitan Statistical Area (PMSA) are expected to be more successful than those outside these areas. However, if the tribe is in an

MSA or PMSA and there are competitors, their probability of opening a profitable casino declines as the number of competitors increase. Thus, I include an interactive variable that multiplies the MSA dummy variable by the number of competitors in the MSA or PMSA. The density of the residents 21 and over in the same county as the tribe will have a positive relationship with the tribe's probability of having a successful casino. The more people there are of legal age in the area near the tribe, the more successful the casino. The per capita income in the county produces this same relationship with the dependent variable. The more money these people have, the more disposable income they will have to gamble in the casinos.

Data

Indian gaming is widespread throughout the Western U.S. However, in some states, there are a significant number of tribes without casinos. In the Western U.S., Indian gaming is allowed in each state except Utah. However, this study focuses solely on the states of Arizona, New Mexico, and Washington. California, Colorado, Idaho, Montana, Oregon, and Wyoming have been omitted from the study even though the tribes do operate casinos. Almost all of the tribes in Colorado, Idaho, Montana, Nevada, Oregon, and Wyoming operate casinos. I also chose to eliminate the California tribes from the study because of the political issues currently affecting the Indian gaming casino industry in this region. In 1998, only five of the 106 tribes had formed compacts with the state. Even though they have compacts, they can only operate casinos with lotteries and pari-mutuel gambling. Several other tribes in California operate casinos, but they are illegal (Christiansen 1998). Nevada tribes are not included in this study because of the impact of non-Indian gaming casinos in the market.

The characteristics of the Indian gaming casino markets in Arizona, New Mexico, and Washington appropriately match the goals of this study. Each state is relatively the same size and there is a significant amount of tribes with casinos and without casinos. These states all allow Class III gaming on Indian lands, but since each state forms individual compacts with the tribes, there are different regulations in each state. The casinos in Arizona cannot have table games, but reel slots, video poker, and video keno are allowed. Unlike the other states in this model, the number and size of the casinos each tribe is permitted to operate is dependent upon the size of the tribe. In New Mexico, all types of casino gaming are permitted on the compacted tribes with the exception of reel slots. Currently, the State of New Mexico requires the casinos to contribute 16 percent of their profits to the state. However, the law is being contested. The State of Washington limits the casinos to table games only; no electronic devices of any kind are allowed. However, several tribal casinos in eastern Washington operate casinos with slot machines illegally (Alder and Gerstein, 1998). Despite these differences, the individual state effects on each of the variables are not significant. Therefore, the differences do not affect the significance of the model when all of the observations are together.

The first step in the data collection portion of this study was to determine how many tribes were in each state, and also to find out which ones operated casinos. Several sources were used in this process. Because I wanted to find the most recent information, I searched several websites. I also traveled to the University of Nevada-Las Vegas to visit the Gambling Studies Research Collection. The Global Gaming Almanac (1998) was used as a starting point for this process. I supplemented the research by searching the internet.

There were two types of data collected in this study. The first set of data includes all of the individual economic reasons for a tribe to operate a casino. The individual economic characteristics of the tribe include: the population, per capita income, and educational attainment statistics. These statistics were collected from the U.S. Census Bureau and several websites on the internet. All of the tribal information data represents their characteristics in 1990.

Each tribe's location was also evaluated to determine the market demand for their casino(s). The market characteristics researched were the tribe's land size, distance from a freeway, distance from a Metropolitan Statistical Area or Primary Metropolitan Statistical Area, the density of those 21 and over in the county in which the tribe is located, and the income per capita in the county. The distances were measured using a 1994 road atlas. The other data were obtained through the 1990 U.S. Census Bureau. This data represents the economic and market conditions at the time the tribes decided to open casinos. After the IGRA was passed, most of the tribes that currently operate casinos applied to form compacts with the states in the early 1990's, so the decision to enter by the tribes currently in the market was made approximately in 1990.

The ideal measure for determining demand would be to study the people within a 100 square mile radius of the tribe. This number would include all permanent residents, as well as visitors to the area. However, this data is unavailable. Instead, I have included a tribe's distance from a freeway and its distance from an MSA or PMSA. I also expect error to occur in the measures of county statistics. Not all counties are the same geographic size, so the density and income per capita variables may include error due to this inconsistency.

Table 1 gives descriptive statistics for the key variables in the analysis. The average distance between a tribe and a freeway is 37.05 miles. The closest tribe is on the freeway and the furthest tribe is 143 miles away from a freeway. The amount of land owned by the tribes ranges from 1 acre to 2,800,000 acres. The average tribe has 195,593 acres of land. The mean tribe population is 3,374 members. The smallest tribe has 12 members while the largest has 32,406 members.

Table 1: Summary statistics for key variables

Regressors	Mean	Standard Deviation	Minimum	Maximum
Distance to nearest freeway (miles)	37.05	40.63	0	143
Tribal Land (gross acres)	195593	448565	1	2800000
Tribe Population	3374	5670.6	12	32406
Density of those residents 21 and over who live in the same county as the tribe	57.58	98.31	2.15	519.69
Income Per Capita in the same county as the tribe	11878	2527.68	6628	18587
Percentage of Tribal Members with a High School Diploma or above	62.53	14.98	25.5	89.7
Tribal Income Per Capita	6915	3665	319	18897

Statistical Analysis

The first set of models investigate the effects that influence a tribe to enter the Indian gaming casino market.. The regression results from Models A, B, and C are reported in Table 2. These results show the marginal effects, not the coefficient estimates. When there is a one unit increase in the independent variables, there is a change in the dependent. These results show that change. Model A represents the relationship between a tribe's distance from a freeway and its likelihood of having a casino. Model B examines the distance from a freeway variable as well as the effect of a tribe's location in an MSA or PMSA and the impact of competitors in that area. The last model in this set, Model C, adds several more

variables to the equation to see if a tribe's land, population, or county statistics influence a tribe to enter the casino market.

Table 2: Marginal Effects at the Means on Models A, B, and C
Dependent Variable: Casino

	Model A	Model B	Model C
Intercept	0.2333 (0.0709)	0.1879 (0.0921)	0.0919 (0.3553)
Distance to the nearest freeway (miles)	-0.0074* (0.0014)	-0.0022 (0.0016)	-0.0023 (0.0018)
Dummy: Tribe is in an MSA or PMSA=1 Tribe is not in an MSA or PMSA=0		0.3923 (0.2902)	0.2221 (0.3412)
# of competitors * 1 if tribe is in an MSA or PMSA (value of zero if tribe is not in an MSA or PMSA)		-0.0682 (0.0581)	-0.0363 (-0.0660)
Tribal Land (gross acres)			1.1×10^{-8} (2×10^{-7})
Tribe Population			2.3×10^{-5} (2.3×10^{-5})
Density of those residents 21 and over who live in the same county as the tribe			1.5×10^{-4} (8.5×10^{-4})
Income Per Capita in the same county as the tribe			1.2×10^{-6} (3.0×10^{-5})
Chi-Squared	3.9999*	5.9773	7.2295
Observations	73	73	69

*Indicates statistical significance at least at the 10 percent significance level.

Model A tests the impact of a tribe's distance from a freeway. The results indicate that the further away a tribe is from the freeway, the less likely their casino will be successful. With each additional mile separating a tribe from a freeway, there is a 0.7 percent decrease in its probability of success at the means of the independent variables. Because the chi-squared statistic and the distance to the freeway variable are both statistically significant, I can confidently report the accuracy of the results.

Table 3a shows that Model A is a good predictor of determining which tribes will have successful casinos. Of the 73 tribes in the sample, 63 percent were correctly predicted.

Five of the tribes without casinos were predicted correctly. This model is a better predictor of tribes with casinos. 41 of the 46 tribes with casinos were predicted correctly.

Table 3a: MODEL A PREDICTION TABLE

		Predicted		
		0	1	Total
Actual	0	5	22	27
	1	5	41	46
	Total	10	63	73

Model A demonstrates the effect of a tribe's distance from a freeway, but the other effects are not measured. Model B analyzes the impact of a tribe's distance from a freeway, as well as the impact of being located in an MSA or PMSA and the effect of competition. A dummy variable is used to describe a tribe's location in an MSA or PMSA. A value of "1" is assigned to all tribes located in an MSA or PMSA while the other tribes take on a value of "0". If the tribe is located in an MSA or PMSA, the value of one is multiplied by the number of competitors within 30 miles of the MSA or PMSA. Table 2 shows the results from Model B. The results of this model are much noisier than the results from Model A. A tribe's distance to a freeway is no longer statistically significant. In fact, none of the variables are statistically significant and neither is the chi-squared statistic. The coefficients of the MSA/PMSA variable indicate that a tribe located in an MSA or PMSA will be 39 percent more successful in operating a casino than one outside these areas. For each competitor within the 30 mile radius of the MSA or PMSA, a tribe's probability of having a profitable casino decreases by 7 percent.

According to Table 3b, Model B and Model A predictions are the same. Even though the chi-squared is not statistically significant in Model B, the prediction tables indicate it is just as good a model as Model A. These conflicting conclusions may be due to the low number of observations.

Table 3b: MODEL B PREDICTION TABLE

		Predicted		
		0	1	Total
Actual	0	5	22	27
	1	5	41	46
	Total	10	63	73

Model C includes all of the variables in Model B, plus a tribe's land acreage, population, and variables representing the density of those over the age of 21 and the income per capita of those who live in the same county as the tribe. Model C is not as good a model as Model A. None of the results are statistically significant. Table 2 shows these results.

Table 3c shows that Model C is also a good predictor of determining which tribes will have casinos. Two-thirds of the tribes in the sample were predicted correctly. Nine of the 27 tribes without casinos were predicted correctly. Just like Models A and B, Model C is better at predicting which tribes will operate casinos. 37 of the 42 tribes with casinos were predicted correctly.

Table 3c: MODEL C PREDICTION TABLE

		Predicted		
		0	1	Total
Actual	0	9	18	27
	1	5	37	42
	Total	14	55	69

The second group of models has fewer observations, so I would expect the results to be less significantly significant. The U.S. Census Bureau does not report data on tribal high school attainment and income per capita for all of the tribes. Thus, the number of observations is less in this second set of models. Table 4 shows the results of these regressions. Once again, these results are marginal effects, not coefficient estimates.

Table 4: Marginal Effects at the Means on Models A, D, E, and F
Dependent Variable: Casino

	Model A	Model D	Model E	Model F
Intercept	0.2094 (0.0846)	-0.6646 (0.3798)	-0.1087 (0.1854)	-0.6050 (0.3912)
Distance to the nearest freeway (miles)	-0.0036* (0.0016)	-0.0025 (0.0019)	-0.0029 (0.0018)	-0.0026 (0.0019)
Dummy: Tribe is in an MSA or PMSA=1 Tribe is not in an MSA or PMSA=0		0.5952* (0.3439)	0.4478 (0.3298)	0.5860* (0.3456)
# of competitors * 1 if tribe is an MSA or PMSA (value of zero if tribe is not in an MSA or PMSA)		-0.1161* (0.0684)	-0.1003 (0.0672)	-0.1213* (0.0693)
Percentage of Tribal Members with a High School Diploma or above		0.0127* (0.0056)		0.0102 (0.0070)
Tribal Income Per Capita			4.2×10^{-5} * (2.3×10^{-5})	1.6×10^{-5} (2.8×10^{-5})
Adjusted R-Squared	0.0668	0.1176	0.0904	0.1049
Chi-Squared	5.0980*	12.1618*	10.2999*	12.5009*
Observations	61	61	61	61

* Indicates statistical significance at least at the 10 percent significance level.

Even with fewer observations, Model A is still statistically significant. According to this model, an additional mile away from a freeway causes a 0.3 percent reduction in the probability of opening a casino at the means of the independent variables. The variable and the chi-squared statistic are statistically significant, so this is still a good model.

Table 5a shows the prediction table for Model A. 66% of the tribes were predicted correctly. 10 of the 26 tribes without casinos were predicted correctly. Once again, Model A is a better predictor of tribes with casinos. It predicted 29 of the 35 correctly. Even with fewer observations, Model A is still a good predictor.

Table 5a: MODEL A PREDICTION TABLE

		Predicted		
		0	1	Total
Actual	0	10	16	26
	1	6	29	35
	Total	16	45	59

Model D includes a tribe's distance from a freeway, the effect of being located in an MSA or PMSA, the effect of competitors within MSAs and PMSAs, and the percentage of tribal members with a high school diploma or above. This model is similar to Model B, but it also includes an educational attainment variable. With the addition of this variable, the model becomes statistically significant. All of the variables are statistically significant except for the distance from the freeway variable. It shows that if a tribe is located within an MSA or PMSA, it will be 60 percent more likely to have a profitable casino. For the tribes within an MSA or PMSA, the addition of each competitor makes them 12 percent less likely to operate a casino. This model also shows that with each percentage increase in educational attainment, there is a 0.9 percent increase in the probability of a successful casino.

Model D is the best model, and it is a good predictor of the true observations. Table 5b shows the prediction table for this model. 72 percent of the tribes were predicted correctly. 15 of the 26 tribes without casinos were predicted correctly while 29 of the 35 tribes with casinos were accurately predicted.

Table 5b: MODEL D PREDICTION TABLE

		Predicted		
		0	1	Total
Actual	0	15	11	26
	1	6	29	35
	Total	21	40	61

Model E is similar to Model D except that it evaluates the tribal income per capita instead of the tribal educational attainment. The results from this model are shown in Table 4. The only variable to be statistically significant in this model is tribal income per capita. As the income per capita of the tribe increases by one thousand dollars, the likelihood the tribe will have a successful casino will be 4% higher at the means of the independent variables.

In Table 5c, 67 percent of the tribes were correctly predicted. 13 of the 26 tribes without casinos were predicted correctly. Model E is also a better predictor of tribes with casinos. 28 of the 35 tribes with casinos were accurately predicted.

Table 5c: MODEL E PREDICTION TABLE

		Predicted		
		0	1	Total
Actual	0	13	13	26
	1	7	28	35
	Total	20	41	61

Model F uses the variables from Model B and combines them with educational attainment and income per capita variables. As Table 4 shows, most of the effects are not statistically important. This is expected due to the high correlation between income per capita and educational attainment. The correlation between educational attainment and tribe income per capita is 0.68. In this model, the MSA/PMSA and competition variables are statistically significant. The chi-squared statistic is also significant.

Table 5d shows that Model F is another good predictor. Of the tribes in the sample, 70 percent accurately predicted the true observations. 15 of the 26 tribes without casinos were predicted corrected in this model. As with the other models, Model F is a better predictor of tribes with casinos. 28 of the 35 tribes with casinos were predicted correctly. All of the models were better at predicting which tribes have casinos than the tribes that do not. Each of the tribes predicted the true observations with relatively the same accuracy.

Table 5d: MODEL F PREDICTION TABLE

		Predicted		
		0	1	Total
Actual	0	15	11	26
	1	7	28	35
	Total	22	39	61

VI. APPLYING THE MODEL

Using the results from the regression, it is possible to determine whether or not entry would be a good idea for tribes not currently operating a casino. This model may also be able to explain why the casino on the Lummi Reservation has closed. To determine how well the model predicts future Indian gaming casino entries and exits, I entered the data for each tribe individually using the coefficient estimates from Models A and D. These models were the best according to the statistical analysis. After entering the data for each tribe into the equations using the coefficient estimates from Models A and D, I determined whether or not a casino would be successful by using a standard normal cumulative distribution. In the probit model, the expected probability of the dependent variables taking the value of "1" is the cumulative probability of the linear combination of the estimated coefficients and the regressors. I determined that a tribe would open a casino if the probability of a successful casino exceeded 0.50. If the results showed that the tribe's probability of a successful casino was between 0 and 0.50, then the model predicts that the tribe would not have a casino.

The Lummi Reservation in Washington closed its casino in August 1997. Both Models A and D did not predict this tribe would exit. Table 6 shows these results. This casino may have closed for reasons not included in these models. These reasons may have included issues concerning their relationship with the State of Washington, management problems within the tribe, or some other explanatory variable not included in my analysis.

Table 6
Exit Decision

Tribe	State	Exit Date	Did Model A Predict Exit?	Did Model D Predict Exit?
Lummi	Washington	8/97	No	No

The tribes in Table 7 have formed compacts with their respective states, but they have not built casinos, yet. For two of the tribes—Hualapai in Arizona and Lower Elwha in Washington—Model A predicts entry, but Model D does not. For all the other tribes, Models A and D make the same predictions. It will be interesting to see how well these predictions match the market as it behaves in the future. Some of the compacts were signed several years ago which indicate the tribes may have reconsidered opening a casino since the compact was made.

Table 7
Entry Decisions

Tribe	State	Compact Date	Does Model A Predict Entry?	Does Model D Predict Entry?
Hualapai	Arizona	4/15/94	Yes	No
Salt River Pima-Maricopa	Arizona	9/10/98	Yes	Yes
Nambe	New Mexico	11/5/97	Yes	Yes
Laguna	New Mexico	8/29/97	Yes	Yes
Picuris	New Mexico	11/5/97	Yes	No
San Ildefonso	New Mexico	6/12/98	Yes	Yes
Santa Clara	New Mexico	8/29/97	Yes	Yes
Lower Elwha	Washington	2/19/93	Yes	No
Port Gamble	Washington	4/12/95	Yes	Yes
Quileute	Washington	10/6/95	No	No
Quinault	Washington	10/15/96	No	No
Skokomish	Washington	9/6/95	Yes	Yes

VI. CONCLUSIONS AND FINDINGS

The results of the models studied in this thesis reinforce previous studies that stress the importance of a casino's location. The closer a tribe is to a freeway, the more successful the casino. Because tribes cannot choose their land, the tribe may have to reconsider opening a casino if they are far from a freeway. It is also important that a tribe be in a metropolitan area. Many of the tribes located in MSAs and PMSAs are not the only ones in the Indian gaming casino market. When there are other tribes in these areas, the element of competition lessens a tribe's likelihood of having a profitable casino.

There are also tribal characteristics that influence a tribe's decision to enter the casino market. These characteristics are often important in the set-up process. The higher the percentage of high school graduates and above, the more likely the tribe is to open a casino. Educational attainment and per capita income are highly correlated, so the tribal income per capita works the same way—the higher the per capita income, the greater the chances of the tribe opening a casino. These individual characteristics are important to the tribe's decision to enter the casino market.

In the literature review, I discussed the study performed by Cornell, Kalt, Krepps, and Taylor (1998). They found that the tribes with the worst economic conditions are more likely to open casinos. My results do not match these findings. I found that the higher the tribal per capita income and educational attainment, the more likely the tribe is to operate a casino. These differences in findings provide evidence that the likelihood of a tribe opening a casino may have regional effects. My study was of the Western U.S. while the tribes in their sample were from the Midwest.

The results of this study are statistically significant, but the model would have been more accurate if there were more tribes in the Western U.S. An increase in the observations would assure the results I have found. It may have been useful to include all the states in the model. This would have increased the number of observations and represented the country as a whole.

Because Indian gaming is a fast growing industry, it is difficult to keep track of the casinos as they are being built. I have had to rely on Internet sources for the most recent data. These sources may not be entirely valid, so my data on which tribes have casinos may be inaccurate. Some of the casinos may have closed while some of the tribes may have opened casinos.

Hopefully, this study will expand in the future as tribes start to open more casinos and maybe even shut down their operations. According to this model, not every tribe that has a casino will be profitable, so they should eventually shut down. It will be interesting to monitor the behavior of this market in the coming years.

Appendix A: Data on Arizona Tribes

Tribe/Reservation	Land size (gross acres)	Casino	Tribe Population (1990)	Distance from nearest MSA, PMSA	Distance from nearest frwy	Tribe Income Per Capita (1990)	Tribe Percentage of High School Degree and above (1990)	Density 21 Per Capita (1990)	Income Per Capita (1989)
Ak-Chin Indian Community	21840	Harrah's Ak-Chin Casino	446	36	19			14.41	9228
Yavapai-Apache Indian Community	636	Cliff Castle Casino	1026	54	0			9.93	12657
Cocopah Reservation	6009	Cocopah Casino	515	0	0	319	36.1	12.7	10428
Colorado River Reservation	268691	Blue Water Casino	6790	117	37	1914	62.2	2.15	9240
Fort Apache Reservation	1064984		10394		56	4241	51.6	5.46	7586
Fort McDowell Reservation	24680	Fort McDowell Gaming	640	14	14	6517	65	159.78	14970
Fort Mojave	32979	Spirit Mountain Casino	454			4576	56.8	5.23	11933
Gila River Indian Community	371933	Gila River-Lone Butte	9450	46	6	3354	37.1	14.41	9228
		Wild Horse Pass		24	8			14.41	9228
Havasupai Tribal Council	188077		423	174	101	4840	42.2	3.15	10580
Hopi Tribal Council	1561213		7360	137	75	4953	63.9	4.46	7586
Hualapai Tribe	992463		822	111	48	3711	53.3	5.23	11933
Kaibab Paiute	120827	Pipe Springs Casino	165	195	62	6938	61.7	5.23	11933
Paseva Yaqui	895	Casino of the Sun	2412	0	0	3138	28.6	50.67	13177
Quechan Indian Tribe	43589	Paradise Casino	***	0	0	***	***	12.7	10428
Salt River Pima-MariCopa Indian Community	54000		4852	0	0	6521	58.3	159.78	14970
San Carlos Apache Tribe	2854	Apache Gold Casino	7294	92	92	3366	50.3	5.91	10297

Data on Arizona Tribes (continued)

Tribe/Reservation	Land size (gross acres)	Casino	Tribe Population (1990)	Distance from nearest MSA, PMSA	Distance from nearest frwy	Tribe Income Per Capita (1990)	Tribe Percentage of High School Degree and above (1990)	Density 21 Per Capita (1990)	Income Per Capita (1989)
Tohono O'odham	2800000	Desert Diamond Casino	18730	0	0	***	***	50.67	13177
Tonto Apache		Mazatzal Casino	102	78	52	***	***	5.91	10297
White Mountain Apache		Hon Dah Casino	***	153	64	***	***	***	***
Yavapai-Prescott Tribe	1399	Bucky's Casino	143	71	33	***	***	9.93	12657
		Yavapai Bingo and Gaming Center		71	33			9.93	12657

Sources: 1. American Indian and Alaska Native Areas 1990 Census <<http://govinfo.kerr.orst.edu/cgi-bin/ai/an-state>>

2. Rand McNally Road Atlas, 1994

3. Reservation Roster <<http://www.indiandata.com/roster.htm>>

4. Global Gaming Almanac, 1998

5. USA Casinos <<http://www.tinytreasures.com/Chips/Library/Directory.htm>>

Note: * indicates missing data

Appendix B: Data on New Mexico Tribes

Tribe/Reservation	Land size (gross acres)	Casino	Tribe Population (1990)	Distance from nearest PMSA	Distance from nearest freeway	Tribe Income Per Capita (1990)	Tribe Percentage of High School Degree and above (1990)	Density 21 Per Capita (1990)	Income Per Capita (1989)
Alamo (Navajo)	63108		1271	***	***	3075	30.3	***	***
Canoncito Band of Navajos	76813		1189	***	***	3162	42.5	286.45	13594
Cochiti Pueblo	50669		1342	***	***	8646	73.1	11.03	10849
Isleta Pueblo	211034	Isleta Gaming Palace	2915	0	0	7417	68.2	286.45	13594
Jemez Pueblo	89619		1750	45	30	4775	68.4	11.03	10849
Jicaniilla Apache	823580	Apache Nuggat	2617	130	130	6164	71.7	3.7	7859
Laguna Pueblo	461099		3731	45	0	6266	73.1	3.23	6803
Mescalero Apache	460678	Casino Apache	2695	94	126	4603	65.9	5.08	10053
Nambe Pueblo	19076		1402	0	0	11949	71.7	36.33	15327
Picuris Pueblo	14947		1882	68	72	5957	58.2	7.05	9158
Popaque Pueblo	1842	Cities of Gold Casino	2556	0	0	11833	81.8	36.33	15327
Pueblo of Acoma	263611	Sky City Casino	2590	63	0	4130	64.8	3.23	6803
Pueblo of Sandia	22871	Casino Sandia	3971	0	0	7307	62.4	286.45	13594
Ramah (Navajo)	146953		194	179	39	2868	34.9	3.23	6803
San Felipe Pueblo	48930	San Felipe Casino	2434	21	0	5162	58.2	11.03	10849
San Ildefonso Pueblo	26198		1499	0	0	11266	81.2	36.33	15327
San Juan Pueblo	12237	Ohkay Casino	5209	28	32	7038	67.2	7.05	9158
Santa Ana Pueblo	61414	Santa Ana Star Casino	593	16	0	6858	75.6	7.05	9158
Santa Clara Pueblo	45748		10193	24	29	9346	72.6	36.33	15327
Santo Domingo Pueblo	69260		2992	26	5	5361	60.8	11.03	10849
Taos Pueblo	95341	Taos Mt. Casino	4745	70	74	8711	76	7.05	9158
Tesuque Pueblo	16813	Camel Rock Casino	697	0	0	10706	76.5	36.33	15327
Zia Pueblo	117680		637	34	18	4893	64	11.03	10849
Zuni Pueblo	409182		7412	154	76	4486	58.7	6.29	6628

Sources: 1. American Indian and Alaska Native Areas 1990 Census <<http://govinfo.kerr.orst.edu/cgi-bin/aian-state>> 2. Rand McNally Road Atlas, 1994.

3. Reservation Roster <<http://www.indiandata.com/roster.htm>> 4. Global Gaming Almanac, 1998.

5. USA Casinos <<http://www.tinytreasures.com/Chips/Library/Directory.htm>>

Note: * indicates missing data

Appendix C: Data on Washington Tribes

Tribe	Land size (gross acres)	Casino	Tribe Population (1990)	Distance from nearest MSA or PMSA	Distance from nearest frwy	Tribe Income Per Capita (1990)	Tribe Percentage of High School Degree and above (1990)	Density 21 Per Capita (1990)	Income Per Capita (1989)
Colville Confederated Tribes	1063043	Mill Bay Casino	6957	145	92.5	18897	72.3	12.43	12533
		Coulee Dam Casino		88	78			9.68	12071
		Okanogan Bingo and Casino		153	135			4.3	10346
Confederated Tribes of the Chehalis Reservation	2076	Lucky Eagle Casino	491	12	5	5871	44.2	152.59	13901
Hoh	443		96	122	122	5234	25.5	23.46	12798
Jamestown S'Klallam Tribe of Indians	11	Seven Cedars Casino	22	51	51	12221	80	23.46	12798
Kalispel	4557		100	50	50	6330	43.1	4.3	9556
Lower Elwha Klallam	427		137	68	68	4959	42.6	23.46	12798
Lummi Tribe	7678	Lummi Casino	3147	0	0	10684	78.6	41.65	13753
Makah Reservation	27244		1214	137	137	7577	71.9	23.46	12798
Muckleshoot Indian Tribe	1275	Muckleshoot Indian Casino	3841	24	0	11371	77.9	519.69	18587
Nisqually Tribe	930	Red Wind Casino	578	0	0	8905	77.2	152.59	13901
Nooksack Indian Tribe of Washington	10	Nooksack River Casino	556	14	14	6463	70.1	41.65	13753
Ozette	719		12	***	***	***	***	23.46	12798
Port Gamble (S'Klallam)	1303		552	45	32	6808	70.2	323.4	14311
Port Madison (Suquamish)	7811	Clearwater Casino	4834	45	28	13920	86	323.4	14311
Puyallup Tribe of Indians	18000	Emerald Queen Riverboat Casino	32406	0	0	13760	80.7	237.84	13439
Quileute	814		381	143	143	5324	50.3	23.46	12798

Data on Washington Tribes (continued)

Tribe/Reservation	Land size (gross acres)	Casino	Tribe Population (1990)	Distance from nearest MSA, PMSA	Distance from nearest frwy	Tribe Income Per Capita (1990)	Tribe Percentage of High School Degree and above (1990)	Density 21 Per Capita (1990)	Income Per Capita (1989)
Quinault Nation	129221		1216	89	89	7662	66.7	23.2	11787
Sauwille Tribe	1		625	39	16	***	***	32.05	13804
Sauk-Suiattle Tribe	23		120	41	31	6092	55.7	152.39	15769
Shoalwater Tribe	335		743	71	71	3816	74.1	14.14	10952
Skokomish	2987		614	22	22	7331	69	28.53	12050
Spokane Indian Tribe	133302	Spokane Indian Bingo & Casino	1502	50	50	6022	70	8.18	10584
		Double Eagle Casino		50	50			8.18	10584
		Two Rivers Casino		38	38			8.18	10584
Squaxin Island	971	Little Creek Casino	157	50	22	3789	68.5	28.53	12050
Stillaquamish	3107		113	17	4	3667	50	152.39	15769
Swinomish Indian Tribal Community	6400	Swinomish Indian Bingo & Casino	2282	39	16	17264	89.7	32.05	13804
Tualip Tribe of Washington	10667	Tualip Bingo & Casino	7103	10	0	14120	80	152.39	15769
Upper Skagit Indian Tribe	74	Harrah's Skagit Valley Casino	180	16	5	3860	67	32.05	13804
Yakima Nation	1130286	Legends Casino	27668	0	4	7327	53.3	28.66	10735

Sources: 1. American Indian and Alaska Native Areas 1990 Census <<http://govinfo.kerr.orst.edu/cgi-bin/aian-state>>

2. Rand McNally Road Atlas, 1994

3. Reservation Roster <<http://www.indiandata.com/roster.htm>>

4. Global Gaming Almanac, 1998

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