THE RELATIVE POVERTY OF AMERICAN INDIAN RESERVATIONS

WHY DOES RESERVATION POVERTY PERSIST DESPITE RICH NEIGHBORS?

by

John Anthony Cookson, Jr.

A thesis submitted in partial fulfillment
of the requirements for the degree

of

Master of Science

in

Applied Economics

MONTANA STATE UNIVERSITY
Bozeman, Montana

March 2006

APPROVAL

of a thesis submitted by

John Anthony Cookson, Jr.

This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

Dr. Robert K. Fleck

Approved for the Department of Agricultural Economics and Economics

Dr. Richard Stroup

Approved for the College of Graduate Studies

Dr. Joseph Fedock

STATEMENT OF PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a master's degree at Montana State University, I agree that the Library shall make it available to borrowers under rules of the Library.

If I have indicated my intention to copyright this thesis by including a copyright notice page, copying is allowable only for scholarly purposes, consistent with "fair use" as prescribed in the U.S. Copyright Law. Requests for permission for extended quotation from or reproduction of this thesis in whole or in parts may be granted only by the copyright holder.

John Anthony Cookson, Jr.
March 2006

ACKNOWLEDGEMENTS

I wish to thank my advisor, Rob Fleck, for insightful and timely comments. His patience and careful criticism encouraged me to try harder, while not discouraging me. Not only did his guidance make the research process enjoyable, but his positive and enthusiastic nature brought out the best in me.

I would also like to thank the rest of my committee: Andy Hanssen for helpful advice and several rounds of comments, Dino Falaschetti for introducing me to the field of economic growth and for setting a high standard for my work, and Terry Anderson for sharing his wisdom and providing much of the data used for this project.

Last, but not least, I would like to thank my parents, Jack and Patty, and my fiancée, Shanna, whose love, understanding, and patience have made the years of graduate study the best of my life.

TABLE OF CONTENTS

1. INTRODUCTION 1

2. CONVERGENCE AND ECONOMIC GROWTH LITERATURE.....6

Resource Curse and Institutions.....8
American Indian Growth and Convergence 10

3. METHODOLOGY AND IDENTIFICATION STRATEGY 11

Factors Affecting American Indian Reservation Incomes.....11
How Adjacent County and Reservation Incomes Vary Together.....14
Identification Strategy.....16

4. DATA AND ECONOMETRIC SPECIFICATION 17

Dependent Variables.....17
Econometric Specification and Independent Variables 19
Legal Environment.....20
Land Tenure 21
Investment.....22
Human Capital 24
Geography.....24
Tribal Government 26
Culture.....27
Robustness Control Variables.....27

5. REGRESSION RESULTS FOR AMERICAN INDIAN INCOME AND GROWTH 29

6. REGRESSION ANALYSIS OF ADJACENT COUNTY INCOME AND GROWTH 35

Regression Results – Adjacent County Economic Performance 35

7. THE RESERVATION-ADJACENT COUNTY INCOME GAP AND CONVERGENCE.....41

Regression Results – Income Gap 42
Human Capital 44
Indian Casinos.....45
Location 46
Institutions.....47

TABLE OF CONTENTS – CONTINUED

Robustness Checks....49
Lessons for Convergence....49
Specifying Convergence of Incomes....51
Regression Results – Convergence of Incomes....52
Human Capital....53
Indian Casinos....54
Location and Other Controls....54

8. CONCLUDING REMARKS....56

REFERENCES CITED....59

APPENDIX A: Supplemental Tables and Figures....65

LIST OF TABLES

Table Page

1. Descriptive Statistics for Dependent Variables 17
2. Descriptive Statistics for Independent Variables.....20
3. OLS Estimation of American Indian Per Capita Income in 1999 29
4. OLS Estimation of American Indian Per Capita Income Growth 30
5. OLS Estimation of Adjacent County Per Capita Income in 1999 36
6. OLS Estimation of Adjacent County Per Capita Income Growth 37
7. OLS Estimation of the Per Capita Income Gap in 1999.....43
8. OLS Estimation of 1990s Per Capita Income Convergence.....52
9. Quadratic Specifications for Government Size.....65
10. Quadratic Specifications for Slot Machines 66
11. Sensitivity to California Observations.....67
12. Sensitivity to Dropping Barona, CA.....70
13. Sensitivity to Clustered Standard Error Estimation.....71
14. Estimation of the 1989 Income Gap 72
15. Sensitivity of Income Gap Estimation to Regional Controls.....73

LIST OF FIGURES

Figure Page

1. Residual Diagnostic Plots for Income Gap 68

2. Residual Plots for Income Gap After Dropping Barona Obs. 69

ABSTRACT

American Indian reservations have per capita incomes $9,000 lower than adjacent counties. This paper seeks to explain why using an approach akin to the analysis of country-level data. I estimate differences in levels of income and income growth for a decade where Indian economies were transformed greatly by casino gambling – the 1990s. I test several recent innovations in the theory of economic growth within the context of American Indian economies and assess how economic performance depends on veto players, human capital investment, and windfall wealth. I find that measures of rule of law, rent seeking, and human capital are the most economically significant predictors of the per capita income gap. In addition, the size of Indian casinos is strongly correlated with convergence and economic growth, suggesting that tribal investment in Indian casinos plays an important role in reservation economies. From the work done here, promoting economic growth through enhancing a stable investment climate appears to be the most successful development strategy. Moreover, this study contributes to the broader literature on economic growth by providing new insight into the way institutional quality affects the speed of, or potentially lack of, convergence.

CHAPTER 1

INTRODUCTION

The setting of the American Indian reservation is an important natural experiment to test a variety of hypotheses – from resource management to economic growth and convergence. Reservation Indians mired in poverty just a few miles away from the some of the wealthiest communities in the world creates a puzzling contrast. It is no wonder that reservation poverty has been an active area of research for more than two decades.[1] The American Indian setting lends itself well to assessing broader economic questions and has been the motivation for research that has greatly extended what is known about bureaucracies, land tenure, credible commitments and how these institutions affect economic outcomes.[2]

The aim of this project is to extend the American Indian literature's contribution to the literature on convergence of incomes and economic growth.[3] While this topic has been typically addressed with an international dataset, examining growth in the reservation setting can contribute much to economic thought in general for several

---

[1] See Baden, Stroup and Thurman (1981) for an early contribution to the literature.

[2] See Anderson (1995) on Indian bureaucracy and the legacy of federal intervention on Indian reservations, Anderson and Lueck (1992) on land tenure and agricultural productivity, Cornell and Kalt (1992) on why it is expensive to establish institutions that promote growth on reservations, and Anderson and Parker (2005) on how mandatory Public Law 280 works as a credible commitment that has led to a great deal of growth on some American Indian reservations.

[3] In doing so, I provide a framework for the study of trust and economic growth, the resource curse, and other topics typically addressed with an international dataset. Weil (2005), for example, presents a series of chapters rationalizing why national incomes have not converged. This treatment will build on these rationalizations in the context of American Indian development. Knack and Keefer (1997) conduct an analysis of how trust and growth are related in the international setting. Their inference is limited by having few degrees of freedom, a problem not recurrent in the American Indian reservation setting. See Sachs and Warner (1995), Gylfason (2001), and Sala-i-Martin and Subramanian (2003) for a discussion of the resource curse literature in the international setting. Johnson (2005b) looks at the resource curse among states within the U.S.

reasons: (1) Geography and climate cannot explain the gap between reservation income and income in adjacent counties because reservations and their adjacent counties have very similar climates and locations. (2) The analysis of international non-convergence of incomes must attempt to control for many idiosyncratic factors (including the legal system and other governmental institutions) that cause each country to be unique, while American Indian reservations vary less on these dimensions.[4] (3) Because the United States government compiles most of the data available, the dataset for American Indian reservations is more consistent than an international dataset, making it more reliable and amenable to analysis.

This study is novel because it extends the literature on reservation economies to provide insight into questions recently raised in the economic growth literature. Specifically, I sort through competing arguments for the non-convergence of incomes and economic growth by examining American Indian reservation income convergence over a decade where tribes experienced a substantial windfall in the form of Indian gaming. Doing so in this manner brings a new perspective to the literature on the question of non-convergence of incomes.

The 1990s are an informative setting in which to study economic convergence because of the widespread influence of gaming on Indian economies induced by an important policy change. In 1988, the Indian Gaming Regulatory Act clearly recognized tribes' sovereign right to operate Las Vegas style casinos on reservations. This

[4] A chief concern over institutional variation in the international setting is that much of it is unobserved. A key contribution of the dataset employed by this analysis is that there is little unobserved heterogeneity and substantial observed heterogeneity in institutions. That is, the lack of institutional variation described in the main text does not create a problem in identifying an effect between institutions and economic performance. Rather, it makes the estimation cleaner.

legislation effectively endowed American Indian reservations with a windfall of wealth – if they could exploit the opportunity.[5] Some tribes benefited greatly, while others have operated unsuccessful gaming operations or have not opened a casino at all.

The Indian gaming industry has grown to account for a substantial portion of reservation economic activity over the 1990s. This rapid growth in gaming on Indian reservations has led some authors to refer to high-stakes gaming operations as the "new buffalo," which is evidenced by the fact that Indian gaming industry earned over $10 billion in revenues last year.[6] Yet with this great shock to American tribal wealth in the 1990s, incomes for the average American Indian reservation have not converged much, if at all, to incomes of their adjacent counties. In both 1989 and 1999, the level of the per capita income gap (in 1999 dollars) between reservations and adjacent counties was roughly the same at $9,300. While it appears the casinos did not cause reservation incomes to converge to anything near typical United States' levels, such a large influx of opportunities is bound to affect reservation economies deeply. This is to say that American Indian reservations during the 1990s contain a mix of constancy and variability that allows us to ask an assortment of interesting questions about economic growth and what stands in the way of convergence of incomes.

---

[5] Certainly, the negative effects of Indian casinos have been stressed in the literature. For a survey of the issues of the economics of gaming see Eadington (1999). Evans and Topoleski (2002) provide evidence that casinos have both costs and benefits. Notably, Grinols and Mustard have written a series of papers (Grinols and Mustard (2001), Grinols and Mustard (2004)) estimating the crime costs of Indian gaming.

[6] Spread evenly over the American Indian population of the United States in 1999, $10 billion dollars equates to over $3,000 per capita revenues accrued to tribes from gaming. Given that not all tribes operate casinos and not all American Indians in the United States are tribal members, revenues from casino gambling on Indian reservations are much more concentrated than this number would indicate. In fact, the $10 billion number is a conservative statement. The American Gaming Association reports approximately $17 billion in gaming revenues accrued to tribes in 2004 (American Gaming Association (2005)).While these numbers neglect the presence of costs, the magnitude of the Indian gaming industry is staggering and is sure to generate substantial rents to the tribes involved in the industry.

To address what this setting can tell us about convergence of incomes and the income gap, I undertake a three-step analysis. First, I conduct an investigation into factors related to levels of income and amount of growth in American Indian reservation income over the 1990s. Next, I consider the potential overflow of reservation economic activity into adjacent counties or vice versa. Finally, I use the first two parts of this analysis to motivate the direct estimation of non-convergence of reservation incomes to incomes in adjacent counties.

From the econometric specifications, I find that an increase in the percent of people with a high school diploma on a reservation about the mean (an increase of approximately two standard deviations of education – from 60 to 80 percent) explains as much as 20 percent of the gap in incomes between reservations and their adjacent counties. Also, reservations that lost much control of their court system through mandatory Public Law 280 are found to have a per capita income gap 15-30 percent smaller than comparable reservations with tribal courts. These results are evidence for the overarching story that institutions and incentives to undertake forward-looking investment matter for economic growth and convergence. [7]

The remainder of this thesis is structured as follows. In Chapter 2, the economic growth and convergence literature is described to serve as a springboard for the empirical analysis. In Chapter 3, I explain the methodology and identification strategy of this

[7] In the regression specifications, an increase of 1 slot machine per American Indian resident is associated with around $1,500 in income convergence over the 1990s. While the estimates for casino investment are large, casino activity is likely to be a reflection of the health of reservation economies, rather than a driver of economic growth and convergence. Moreover, it is clear that the casino investment results in this analysis are subject to some degree of reverse causation. The idea that casino investment does not take place in a vacuum is an issue that has not received due attention in the literature on Indian casinos' effects. While I do not fully resolve this tension in the present study, sorting out the details of casino investment's endogeneity is a topic I undertake in a working paper, Cookson (2006).

analysis in more detail. I describe the data, descriptive statistics, collection techniques and the basic econometric model in Chapter 4. In Chapter 5, I describe and test an empirical model for American Indian reservation economic performance. In Chapter 6, I investigate the extent to which adjacent county and American Indian reservation incomes are codetermined. In Chapter 7, I incorporate the previous two chapters into an analysis of the income gap and convergence of incomes. Finally, I offer concluding remarks and implications for policy and future research in the final chapter.

CHAPTER 2

CONVERGENCE AND ECONOMIC GROWTH LITERATURE

Since Adam Smith, economics has been fundamentally concerned with studying the determinants of "the wealth of nations (Smith 1776)." The reason today's richest countries enjoy per capita incomes more than thirty times greater than the poorest countries in the world is a question of interest to anyone studying human behavior. For this reason, considerable research has been conducted on the topic of economic growth and convergence of national incomes. Much of the recent research on the topic involves the study of political economy rationalizations of cross-country differences in income; focusing on the effects of governing institutions and how economic growth arises from credible commitments in governance.

While Adam Smith initiated the modern study of economic growth in *The Wealth of Nations* (Smith 1776), the topic was not addressed with a formal theoretical model until Robert Solow developed his model of capital accumulation and growth in 1956 (Solow 1956). More recently, the new institutionalists of the 1970s and 1980s (North 1990) deepened the analysis of economic growth and set the foundation for much recent empirical literature that seeks to explain the root causes of economic growth and poverty. For the purposes of this literature review, I pick up with North's ideas and describe the more recent innovations in the field since his initial work.

North (1990) establishes a framework for analyzing institutions-driven economic growth. Building on the need to economize on transaction costs and mitigate uncertainty,

his theory of institutions rationalizes why we see such a great divergence in institutions and economic performance across countries and time. Establishing a credible governing authority, North argues, is a difficult problem to solve and cannot take place immediately or easily because institutional change takes place slowly and incrementally.

North and Weingast illustrate a case study to this point – seventeenth century England (North and Weingast 1989). They argue that the Glorious Revolution, which was preceded by a century of political turmoil and civil war, led to a set of governing institutions that were conducive to economic growth. Specifically, they note the role of Parliament, the crown, and a newly established judicial authority. Each checked the others' power to expropriate investment, thus, making sunk investment, loans, and economic growth profitable to individual Englishmen. The new institutions served as a foundation for the subsequent financial market boom and surge in investment, setting the stage for the Industrial Revolution in England and the ascension of England to a world power.

A central component of North and Weingast's analysis was that of veto players – authorities who must sign off on a decision to change the investment climate. A society with fewer veto players leads to a scenario where investment is not secure from ruler expropriation and, thus, fewer people invest in the first place. Based in this argument, a society with more veto players is expected to enhance growth.[8] Other sorts of credible commitments and types of governing institutions have been analyzed in the economic

[8] Henisz (2000) constructs an index of political stability to be used as a proxy for this idea. The story is shown (albeit, imperfectly) to have empirical merit in Henisz (2000) and other analyses.

growth literature, as well, but work veto players and economic growth has remained at the center of accepted economic growth theory.[9]

Resource Curse and Institutions

A sub-category of the literature on economic growth is focused on understanding the phenomenon of the "Resource Curse." That is, countries with more natural resources tend to have slower rates of economic growth. Three stories to explain the resource curse have been put forth: (1) resource endowments cause lower investment in education, which slows growth;[10] (2) a resource windfall crowds out investment in an economy's growth enhancing sectors;[11] and (3) large resource endowments encourage the degradation of institutions, which in turn, slows economic growth.[12]

---

[9] Specifically, Barro (1996), Acemoglu, Johnson, Robinson and Yared (2005), and Persson (2005) are analyses of democracies and growth. Persson (2005) addresses different types of democracies and their relationship with growth. Specifically, he argues that parliamentary and proportional systems are more conducive to economic growth because they disperse power more evenly in society. The other analyses of income and democracy are more general and, simply, address whether there is a causal relationship between democracy and growth. Knack and Keefer (1997) find evidence that trust is associated with economic growth; and, Alesina and Rodrik (1994) and Sokoloff and Engerman (2000) provide theoretical and empirical support that income inequality affects growth through institutions.

[10] This rationalization of the "Resource Curse" is put forth by Gylfason (2001). He argues that resource abundance, generally, leads to the neglect in education and presents a series of correlations and a SUR estimation of economic growth and education in support.

[11] This class of explanations is known in the literature as the "Dutch Disease," after the experience of the Netherlands in response to the discovery of vast quantities of natural gas. The first decade and a half after the discovery of the new resource was a period of substantial growth, but after the initial boom, the country's economy stagnated. See Johnson (2005b) for an analysis of "Dutch Disease" among the 50 U.S. states. Proponents of this class of arguments are Jeffery Sachs and Andrew Warner, who have a series of papers on the topic that model the problem (Sachs and Warner (1997)) and address it empirically (Sachs and Warner (1995), Sachs and Warner (2001)).

[12] Tornell and Lane (1999) provide the theoretical foundation for an institutional voracity effect, where poor institutions decrease economic growth in the face of an economic windfall. Leite and Weidmann (1999), Sala-i-Martin and Subramanian (2003), Stroup and Scarborough (2005) all provide empirical evidence in support of the thesis that the resource curse bears itself out on institutional grounds. Also, Stroup and Scarborough (2005) and Fleck and Hanssen (2006) make the point that the type of endowment matters for how the resource curse bears itself out.

Cross-country comparisons, like most work on the resource curse, suffer from potentially too much unobserved variation in institutions. To mitigate this problem, Johnson examined the resource curse in the context of the United States, using states as observations in a panel study (Johnson 2005b). He concludes that resource states do worse, but expanding the time series sample would likely reverse this finding and the perceived resource curse in the United States is largely due to variation in population density among states. However, he says,

> Clearly, one contribution of numerous studies of the determinants of economic growth across countries has been the finding that institutions, the rules of the game, seem to matter. Institutional factors, especially on a country-by-country basis are likely important for understanding how some countries managed to misspend their natural wealth (Johnson 2005b).

The problems with the resource curse literature highlighted in Johnson's work are shared with the literature on economic growth and convergence. Countries have too much unobserved institutional variation, but states have too little variation to identify an effect. American Indian reservations are an econometrically useful middle ground. American Indian reservations have had a common experience with U.S. national institutions and policies, reducing variation in Indian institutions. Yet, these federal policies have created important variation in reservation institutions. Reservations have different court structures, tribal governments and land ownership schemes. Thus, institutional variation is lower than comparing countries, but higher than comparing states. This intermediate setting is an advantage when looking at the arguments in the convergence literature because it enables us to look more directly at the incentive mechanisms that set the table for economic growth and convergence.

American Indian Growth and Convergence

While most work on economic growth and convergence has employed international data, the breadth of the institutional story of growth extends into the American Indian reservation literature, as well. Cornell and Kalt base their analyses of reservation economies in a North-type institutional study (Cornell and Kalt 1992; Cornell and Kalt 2000), while Anderson and Parker find that the presence or lack of state court authority on American Indian reservations is an important determinant of American Indian income and growth (Anderson and Parker 2005). In the context of the international studies, the state court can be seen as a veto player and their finding is analogous to cross-country studies like Henisz (2000).

Because of the direct applicability of these analyses to the setting at hand and the obvious parallel of the theory behind the literature on reservation economies, I couch my empirical analysis within the context of this American Indian literature. In building on the American Indian literature in this manner, I am able to extend the general economic growth literature into a specific and concrete setting that provides a new source of data and that allows for a new set of tests of economic growth hypotheses. This concreteness will go a long way toward uncovering new ideas in the general literature, as well as innovations in American Indian policy.

CHAPTER 3

METHODOLOGY AND IDENTIFICATION STRATEGY

In this study, two general questions are addressed: (1) What are the sources of variation in American Indian reservation incomes? (2) How are reservation and adjacent county incomes co-determined? Upon this foundation, non-convergence of incomes is studied in a way that can be extended to the more general setting. In this section, these questions are addressed with insight from previous thought on economic development and use this analysis to develop a theory of non-convergence of incomes. In subsequent chapters, empirical tests of this chapter's hypotheses are offered.

Factors Affecting American Indian Reservation Incomes

The factors that influence American Indian reservation development have received a great deal of attention. In response to the early economic growth literature, policymakers for American Indian reservations focused on directly enhancing endowments of resources, investing in human capital, and increasing the level and adoption of technology. Policies grounded in these basic explanations failed to close the gap, suggesting that something was missing from the theory of economic growth at the time.

As subsequent studies would establish, these initial explanations were incomplete because they did not account for the *incentives* of individuals to invest in technologies, education, and productivity. More recent research has analyzed the institutional

framework and asked how to get the incentives right for productive investment. Empirical and theoretical work amassed over the past two decades has identified institutions, both formal and informal,[13] as a primary driver of variation in American Indian reservation income and growth.[14]

Anderson and Lueck identified fee simple ownership of land as an important institution that enhances productivity (Anderson and Lueck 1992). They provided evidence that the incentive structure of fee simple land provided an environment where workers could be more productive, specifically in agricultural production. Since agriculture is a major industry on American Indian reservations, reservations with more fee simple ownership of land performed better economically.

Building on these analyses and recent innovations in economic growth theory, Anderson and Parker combined an analysis of land tenure with an examination of the judicial institutions of American Indian reservations. They found that reservations that relinquished control of their judicial institutions (through Public Law 280) performed better, illustrating that the expression of sovereignty has its costs. Better performance of Public Law 280 reservations, they argue, can be attributed to a more stable investment environment for outside investors under state courts than under tribal courts (Anderson and Parker 2005).

---

[13] Cornell and Kalt (1992), Cornell and Kalt (2000) identified cultural institutions, their legitimacy, and their relationship to the formal institutions of American Indian reservations as important factors in explaining variation in American Indian incomes. They argue that to the extent that traditional conceptions of legitimate power match the structure of the government, the reservation economy will perform better. While theoretically grounded, their argument is not easily testable and will, thus, remain in the background of this discussion.

[14] The lessons from the American Indian setting can be applied to the international setting because many features of nations are shared by American Indian reservations. Specifically, tribes have distinct cultures, histories, and governing authority. While tribes are subordinate to state and federal government in many scenarios, the features of self-determination make for an ideal setting in which to observe institutions.

The regression analysis of Anderson and Parker highlights another factor that cannot be ignored when discussing American Indian incomes – Indian casinos. They find a strong association between larger casinos and higher American Indian reservation incomes – a finding consistent with other analyses on American Indian casinos and incomes.[15] More than being an important component of Indian economies, Indian casino investment is a reflection of investment, growth, and overall economic performance on American Indian reservations. Uncovering the determinants of Indian casino investment can, therefore, inform what we can say more generally about Indian economies.[16]

The general economic growth literature provides several hypothesized explanations for variation in American Indian incomes. Specifically, differences in culture and size of government are put forth as explanations for different levels of income and growth. Larger governments are posited to slow economic growth through disincentives created by greater threat of redistribution,[17] corruption,[18] or threat of expropriation of investment. Cultural explanations typically fail to generate precise testable hypotheses and are, therefore, difficult to test.[19] However, one cultural explanation of growth that bears promise is that of trust and economic growth (Knack and

---

[15] Specifically, Evans and Topoleski (2002) and Taylor, Krepps and Wang (2000) find that where there are casinos in Indian country, unemployment is lower and incomes are higher.

[16] To this end, I enrich this analysis of convergence with a treatment of the determinants of Indian casinos and casino management in a working paper, Cookson (2006).

[17] Buchanan (1995) develops a theory of rent seeking that is useful in fleshing out the threat of redistribution channel of economic non-convergence.

[18] For a discussion of American Indian bureaucracy and its effects, see Anderson (1995), Chapter 6

[19] Jorgensen (2000) has argued that American Indian reservations perpetuate cultural institutions. For the present study, it is sufficient to note that two American Indian tribes (Crow and Apache) differ in culture less than two countries (China and Mexico). This is because the policies of assimilation undertaken in the 19th and 20th century by the Federal government caused the traditional cultures to migrate towards or to pin themselves against the U.S. culture in similar ways, resulting in a convergence of cultures.

Keefer 1997). More trust in a society lowers contracting and transaction costs, making for a better framework for investment.[20]

In sum, several factors influence the performance of reservation economies. An understanding of tribal governments, institutions, and investment incentives facing American Indians is fundamental to explaining variation in American Indian reservation income. In addition, examining how the pervasive influence of Indian gaming on reservation economies relates to these explanations provides a tangible setting where we can more directly analyze the barriers to economic development.

How Adjacent County and Reservation Incomes Vary Together

It is apparent that adjacent county economic performance both is influenced by and influences reservation economies. My purpose in analyzing how adjacent county incomes co-vary with reservation incomes is to more clearly identify which variables are endogenous or are biased by omitted variables. To motivate why I separate the estimation, three examples are illustrative – one where reservation characteristics influence adjacent county economic performance, another where the reverse happens, and a third scenario where some extraneous factor is causing the two to trend together.

First, consider the example where a reservation population exogenously becomes better educated. To the extent that there are productivity spillovers from improvements in reservation human capital, we observe improvements in adjacent county well-being associated with increases in Indian education. That is, human capital improvements on

[20] Distinguishing interpersonal trust measures from omitted institutional variation is difficult in practice, but if a reliable proxy for trust can be found, whether trust matters for economic performance can be tested.

American Indian reservations are expected to elevate the economic performance of adjacent counties. In this scenario, spillovers from the reservation cause predictors of reservation economic performance to predict adjacent county economic activity.[21]

Consider another example where a county with good schools is adjacent to a reservation. The reservation may benefit from this because their children have the opportunity to attend these superior schools, injecting greater human capital into the reservation. If this story were true, reservation human capital would significantly predict adjacent county income, but this coefficient estimate would not be evidence that human capital affects adjacent county income. Rather, under this scenario, better adjacent county economic performance would cause better reservation human capital.

Finally, consider a third scenario where a university near the reservation and its adjacent counties gives local people a strong incentive to graduate from high school and attend college. This incentive may cause educational attainment in the adjacent counties and on the reservation to increase, causing the variables measuring economic performance to trend together. In this case, the omitted variable is driving the co-variation and must be taken into account in a reasonable analysis of the per capita income gap between reservations and their adjacent counties.

To learn more about which direction the causation runs in these arguments, separate equations for American Indian income and adjacent county income are

[21] Along the same lines, one can consider a reservation government that is prone to rent seeking. Due to less competition, adjacent county governments do not have to work as hard to maintain the same constituent base and may, therefore, be of lesser quality than if the reservation were better governed. Fleck and Hanssen discuss this argument in the context of an international setting (Fleck and Hanssen 2004), while Tiebout discussed the political markets related to geographic sorting and local public expenditures more generally (Tiebout 1956).

estimated. The adjacent county specifications can be seen as a robustness test to isolate which variables have the greatest problem with assigning causation. If education and institutional variation significantly predict both reservation income and adjacent county income, more work is needed to sort out the endogeneity of these effects. If the predictors significantly predict only reservation or adjacent county income, we have more confidence in the American Indian income and growth results.

Identification Strategy

The close proximity of reservations to their adjacent counties makes understanding the determinants of economic performance on reservations and in adjacent counties essential before putting the pieces together in a full analysis of the income gap. For this reason, American Indian income and growth is specified first. Next, the regression analysis of adjacent county income and growth is presented as a robustness test. Finally, I proceed with a regression analysis of the reservation-adjacent county income gap and the economic convergence between the two.

CHAPTER 4

DATA AND ECONOMETRIC SPECIFICATION

Table 1 displays descriptive statistics of the dependent variables employed in this analysis, as well as the location of the extreme values of the variables when the maximum or minimum is unique. The unit of observation employed by this study is an American Indian reservation with a critical population of at least 250 American Indian residents in 1999.[22] In the primary sample, there are 127 observations, while some control variables are not available for the entire set of reservations and, thus, reduce the number of observations in regressions designed to test robustness of coefficients.

Table 1: Descriptive Statistics of Dependent Variables

Variable	Mean	Std.	Min	Min. Location	Max	Max. Location
AIINCOME99	9991.16	3967.595	4043.00	Crow Creek, SD	38647.00	Barona, CA
AIINCOME89	7297.38	1978.733	2940.92	Millie Lacs, MN	14520.55	Grand Portage, MI
ADJINCOME99	19406.53	2799.299	14006.00	Tule River, CA	28077.20	Brighton, FL
ADJINCOME89	16599.35	2722.511	11368.25	Ute Mountain, UT,CO, NM	23333.49	Hollywood, FL
AIGROWTH8999	39.48	45.699	-19.82	Santo Domingo, NM	315.93	Barona, CA
ADJGROWTH8999	17.60	8.939	-9.74	Tule River, CA	49.63	Santa Rosa, CA
INCOMEGAP89	9301.96	3029.514	1067.59	Grand Portage, MI	17311.36	Muckleshoot, WA
INCOMEGAP99	9415.37	4056.072	-15650.02	Barona, CA	17324.48	Port Gamble, WA
CONVERGENCE	113.41	3594.266	-26218.00	Barona, CA	4831.83	Tuscarora, NY

N = 127. Source: U.S. Census Bureau

Dependent Variables

The dependent variable of interest to this study is actually the difference between two variables – American Indian reservation per capita income (AIINCOME) and adjacent

[22] This arbitrary cutoff was employed to ensure reliability and ease of collecting the data. Reservations with this critical population are thought to be less subject to idiosyncratic behavior of a few American Indians on a reservation and more representative of systematic phenomena in Indian Country.

county per capita income (ADJINCOME). The source for AIINCOME and ADJINCOME is the U.S. Census Bureau online datasets at www.census.gov (U.S. Census Bureau 2000). The Census provides income data broken down by counties, reservations, race, and other identifiable characteristics and geographic areas.[23]

An adjacent county measure of income was constructed by obtaining the counties in which a reservation has land from Tiller's Guide to Indian Country (Tiller 1996). Next, income and population data were obtained for the reservation counties and those adjacent[24] and the population weighted average per capita income among those counties was computed by netting out the contribution of the American Indian reservation income. The result is ADJINCOME.

From the primary dependent variables, I constructed the following variables, which are more direct to the point of this study:

AIGROWTH $= (AIINCOME_{99} - AIINCOME_{89})/(AIINCOME_{99})$

ADJGROWTH $= (ADJINCOME_{99} - ADJINCOME_{89})/(ADJINCOME_{89})$

INCOMEGAP $=$ ADJINCOME $-$ AIINCOME (constructed for both '89 and '99)

CONVERGENCE $= INCOMEGAP_{99} - INCOMEGAP_{89}$

AIGROWTH has a mean of 39.48 percent, while ADJGROWTH has a mean of 17.60 percent. This blunt statistic indicates that American Indian reservation income growth over the 1990s was greater in percentage terms than adjacent county growth. However, the nearly 12 percent differential rate of growth over the 1990s only caused American

[23] Income data from 1989 were inflated to 1999 dollars using the Consumer Price Index deflator at http://www1.jsc.nasa.gov/bu2/inflateCPI.html (NASA 2005).
[24] County maps, found in the QuickFacts section of the U.S. Census website, were used both to identify the adjacent counties and to obtain population and per capita income data for those counties U.S. Census Bureau (2000).

Indian incomes as a percentage of adjacent county incomes to increase from 44 percent to 51.5 percent. That is, there is still a large gap in incomes to be explained.

This gap, INCOMEGAP, had a mean of $9301.96 in 1989, which *increased* to $9415.37 in 1999. Whether there was convergence of American Indian reservation incomes to their adjacent counties, therefore, depends on whether convergence is expressed in percentage or absolute dollar terms. With the goal of analyzing the gap of incomes, this study takes absolute dollar value convergence as the convergence measure of choice – CONVERGENCE.

CONVERGENCE has a mean of $113.41, which indicates a small amount of divergence of incomes over the 1990s. Around this mean, there is much variation to be explained within the context of this study, as the average movement of incomes (convergence or divergence) is $2,153.79.

Econometric Specification and Independent Variables

The literature on reservation economies identifies similar factors in determining American Indian income and American Indian income growth. In the interest of parsimony, I present the following general regression specifications for the level and growth in American Indian income.

$$aiincome_{99},\ aigrowth = \alpha_1 + \beta_1*(\text{legal environment}) + \beta_2*(\text{land tenure}) + \beta_3*(\text{human capital}) + \beta_4*(\text{investment}) + \beta_5*(\text{geography}) + \beta_6*(\text{government}) + \beta_7*(\text{culture}) + \varepsilon$$

In the footsteps of previous literature and empirical work on economic growth and convergence of incomes, the effects of American Indian legal environment and land

tenure, investment, human capital, geography, and tribal government and culture are examined as predictor variables. In the income growth specifications, the level of income in 1989 is included, as well. Table 2 displays descriptive statistics of the independent variables.

Table 2: Descriptive Statistics of Independent Variables

Variable	Mean	Std. Dev.	Min	Min	Max	Max
EDU89	64.66	11.316	25.22	Santa Rosa, CA	89.73	Swinomish, WA
EDU99	70.89	9.917	32.45	Catawaba, SC	91.72	San Ildefonso, NM
EDUGROWTH	6.23	8.837	-30.92	Swinomish, WA	30.79	Millie Lacs, MN
HEALTH89	8.12	4.198	0.00	*	25.44	Pleasant Point, ME
CASINO99	0.52	0.244	0.00	*	1.00	*
CASINO89	0.06	0.502	0.00	*	1.00	*
SLOTSPIND99	0.43	0.758	0.00	*	3.70	Millie Lacs, MN
SLOTSPIND89	0.14	0.826	0.00	*	5.91	Isabella, MI
CONTRACT	0.13	0.333	0.00	*	1.00	*
DISTANCE	255.37	179.965	15.53	Salt River, AZ	809.29	Fort Peck, MT
AMSCALE	2.44	3.345	-3.40	Stockbridge-Munsee, WI	11.15	Hoopa Valley, CA
PUBADMIN89	13.63	7.854	0.00	Tuscarora, NY	41.38	Grand Traverse, MI
PEROLANG89	19.24	22.673	0.00	2 reservations	91.50	Jemez, NM
PERFEE	26.68	32.839	0.00	*	99.88	Nooksack, WA
ACRES	391521	694323	192	Santa Rosa, CA	4331648	Uintah and Ouray, UT
MANPL280	0.21	0.411	0.00	*	1.00	*

Legal Environment

To proxy for variation in the legal environment of Indian reservations, I employ a mandatory public law 280 dummy variable following the analysis of Anderson and Parker – MANPL280. The mean of 0.21 denotes that 21 percent of the reservations in the sample are in mandatory Public Law 280 states. MANPL280 proxies for the authority of state courts ability to trump tribal courts in legal disputes on reservations. Anderson and Parker found evidence that state jurisdiction on Indian reservations led to greater economic performance, which they attribute to a more stable investment environment to

outside investors and a clearly established rule of law.[25] That is, MANPL280 proxies for incentives of individuals to invest on reservations.

Land Tenure

How land is owned and alienated on American Indian reservations is an aspect of economic performance that has received due consideration in the economic literature. This study uses the percent fee simple land ownership, PERFEE, on the reservation as a proxy for the effect of individual land ownership on economic performance.[26] I surveyed regional Bureau of Indian Affairs land offices to ascertain the amount of tribal and individual trust land owned by reservations in their areas (BIA 2005). The amount of land claimed by the BIA regional offices was subtracted from the Census acreage of the entire Indian reservations and taken as a ratio of the total reservation acreage to obtain PERFEE.[27]

Investment

Although a general measure of investment in capital is unavailable for Indian reservations, information on the size of Indian casinos (a significant tribal investment in

[25] See Anderson and Parker (2005) for a more detailed development of the argument that state jurisdiction is important to economic performance of Indian reservations. Anderson and Parker employ a more broad definition of state jurisdiction, which includes New York and some optional Public Law 280 states as states that have assumed jurisdiction. In contrast, the variable I employ includes strictly mandatory Public Law 280 reservations without venturing into questions of whether a state has asserted a critical level of authority. Optional Public Law 280 states exhibit a wide array of jurisdictional environments and it is beyond the scope of this analysis to sort through which states are enough like mandatory states to be lumped into the same category.

[26] Fee simple land ownership represents the extent to which land is held in clear title on the reservation and represents the payoff of enhancing rights of individual ownership. Anderson and Lueck (1992), Cornell and Kalt (2000), Anderson and Parker (2005) all employ some measure of the land mosaic of Indian reservations. Anderson and Lueck (1992) were seminal in the respect that they called attention to the productivity enhancing qualities of owning one's own land.

[27] In the case of discrepancies, PERFEE was bounded between 0 and 100 by setting negative-valued data points to a value of 0.

the 1990s) is generally available. While some gaming operations began as early as 1979, Indian gaming investment primarily took place over the 1990s, making it necessary to control for its effects and possibly deepen the analysis to understand more fully how casinos and economic performance relate. In contrast to MANPL280 and PERFEE, casino investment variables proxy for a significant portion of actual investment on reservations. As such, when all of these variables are included in the specification, care must be taken in the interpretation of results. There is a substantial literature on the effects of Indian gaming, suggesting that gaming is an integral part of Indian economies and must be taken into account, despite the induced difficulty in interpretation.[28]

Proxies for the profitability of a casino operation were gathered from www.gamblinganswers.com, a site that provides information about casinos to prospective gamblers. Contact information, square footage of casino, the type of ownership (tribal or not), the number of slot machines, and types of games played in the casino are all listed systematically on the website.[29] I constructed several variables to proxy for casino investment: $CASINO_{89}$, $CASINO_{99}$, $SLOTSPIND_{89}$, $SLOTSPIND_{99}$, and CONTRACT.

[28] See Eadington (1999) and Grinols and Mustard (2004) for an introduction to this literature. Anderson and Parker (2005) include a variable to proxy for the size of Indian casinos, which they find is strongly correlated with positive economic performance over the 1990s.

[29] The website does not indicate the tribe, which owns the casino. Rather, the only indication of ownership offered is whether a casino was tribally owned and the location of the casino in the contact information. The data on size of casino was matched to the reservation level with a combination of using Tiller's Guide to Indian Country and the Census maps at QuickFacts U.S. Census Bureau (2000). Once these data were recorded and matched to the correct observations, they were verified to be accurate by several other sources, such as "500 Nations Native American SuperSite!" at www.500nations.com, which has information on slot machines, gambling, and the scope of gambling in Indian country Indian Casinos - 500 Nations (2005). Also, conducting a web search for Indian Casinos by the name turns up quite a bit of information to verify the original source.

$CASINO_{89}$ and $CASINO_{99}$ are dummy variables for the presence of a casino in the indicated years. Among the sample of reservations, 6 percent operated a casino by 1989, while 52 percent of the sample reservations operated a casino by 1999.

The size of Indian gaming operations is captured by $SLOTSPIND_{89}$ and $SLOTSPIND_{99}$. These are the number of slot machines in tribal casinos divided by the Census count of American Indian population in that year. For every reservation that does not have a casino, the number recorded is zero, suggesting that the means of 0.43 (in 1999) and 0.14 (in 1989) slot machines per American Indian resident are lower than the mean of SLOTSPIND, *given* that a casino is built. These conditional means are 0.84 for 1999 and 2.22 in 1989.

With a dummy variable, CONTRACT, I consider the effects of casino management contracts to more completely address institutional considerations of Indian casinos. Management companies bring expertise in casino operation, non-politicized hiring, and are bound by the management contract to share the rent stream with the tribe[30] and thus, are expected to increase overall welfare on the reservation.[31] The signing of a management contract with the National Indian Gaming Commission indicates that the reservation has decided to not operate the casino itself in favor of more experienced outside management (NIGC 2005). As of 1999, 13 percent of reservations in the sample

[30] In a model available from the author, management companies act as a mechanism around a time-inconsistency problem in hiring for the tribe. To the extent that the casino operation is more profitable due to the management company, we can expect a positive contribution of a management contract to American Indian well-being.

[31] In Cookson (2006), I take on the question of the institutional roots of Indian casino investment more directly than is done here. In this light, the results of this paper can be taken as a boiler plate for the work done in that analysis.

had signed management contracts to oversee their gaming operations. This amounts to approximately 25 percent of casino operations negotiated under management contracts.

Human Capital

Human capital is clearly established to influence the level and rate of change in income. As a proxy, I employ the percent of the population above 25 years old with a high school diploma in 1989 and 1999, as reported by the Census: EDU_{89} and EDU_{99}. The difference between these two levels of educational attainment was taken to create EDUGROWTH. I employ the 1989 variable in a regression on 1999 income to reduce concern that income causing education is driving the econometric results.[32]

Another control for human capital on American Indian reservations is the percent of people employed in healthcare in 1989 ($HEALTH_{89}$), available from the Census. This variable could also reflect employment opportunities or a response to poor health on the reservation. Therefore, $HEALTH_{89}$ can only be interpreted as a control that may approximate the effects of health human capital.

Geography

The effects of climate and distance to markets on economic performance are explored in line with international work on the topic, while the size of a reservation in

[32] The reverse causation problem is only mitigated by this technique. Prior period education is correlated with prior period income, which is correlated with current period income, making the lagged variable endogenous. An instrument for educational attainment would be preferable, but at this point no such instrument is known. I use EDUGROWTH in the 1999 income regressions to separate the estimation of the effects of education into one variable that can be tentatively interpreted as exogenous (EDU_{89}) and one variable that is clearly endogenous with 1999 income (EDUGROWTH).

acres is used as a control variable. [33] ACRES is the size of the reservation in acres according to the 2000 U.S. Census.[34] AMSCALE is an index of climate and natural amenity factors. In the context of this study, I use AMSCALE and some variables derived from it to test for the effects of climate on convergence and the income gap. The original data were compiled for a USDA Agricultural Report and are county data (McGranahan 1999). To make the data relevant to American Indian reservations as an observation, a strict average of the amenity scale for all reservation counties was taken to achieve a rough proxy for reservation climate quality.

Temperate climates have been observed to have the greatest economic development in the world. Authors have argued that harsh winters encourage growth by encouraging saving habits, enhancing agricultural productivity (by naturally reducing pests), and promoting human capital (fewer diseases). However, geographic mobility and sorting makes predicting income and growth based on climate difficult. For example, people may consume the natural amenities surrounding them in lieu of a bigger paycheck. Alternatively, bigger paychecks could allow people to move somewhere with high amenities. Another point is that high amenities could attract wealthy non-Indians (and therefore more demand for tribal goods and services) to adjacent counties. Therefore, there is no clear test to be had from climate variables and the income gap, though controlling for the influence of climate is important, given previous work on the issue.

---

[33] Notably, Masters and McMillan (2001) argue that the presence of a seasonal frost matters for economic performance. That is, frosts reduce negative pressures on growth from nature (pests and parasites). Sachs (2000) also argues for a causal link between climate and underdevelopment.

[34] Obviously, the Navajo Nation has the largest land area of all of the American Indian reservations in the United States with over 15,000,000 acres. However, due to the reservation's persistence as an outlier in studies of American Indian reservations, data for the Navajo Nation was dropped from the estimation.

There is good reason to believe that greater distances to urban areas are expected to decrease income. Urban areas represent markets for the products of American Indian reservations. To the extent that transportation costs are important to capture some of the metro market, less of the metro market will be captured and less income will be earned for a reservation far away from a city.[35] DISTANCE is the MapQuest driving distance from the reservation headquarters to the nearest city of 1,000,000. The location of the reservation headquarters was given by Tiller's Guide to Indian Country and a list of Census Metropolitan Statistical Areas was provided at the Census website. The Driving Directions portion of www.mapquest.com provided the rest of the information about distance to metro area (MapQuest 2005).

Tribal Government

A government that is prone to expropriate investment, redistribute resources in a way that reduces incentives to create wealth, and engage in rent seeking is harmful to economic growth. The proxy I employ to capture the level of rent seeking in tribal government is the percent of the reservation population classified as working in public administration in 1989 – PUBADMIN89, another U.S. Census variable. To the extent that more people in tribal government indicates a greater incidence of rent seeking on the

[35] Another reason for this expected relationship lies with the capacity for investors in the city to invest in entrepreneurial activity on American Indian reservations. Greater distances of the reservation from a city imply greater monitoring and oversight costs of investment on reservations from entrepreneurs in the city. This leads to less outside investment on the reservation and, therefore, inferior economic performance to a reservation closer to a metropolitan area.

reservation, we would expect to see a negative relationship between PUBADMIN89 and economic performance in the 1990s.[36]

Culture

My variable proxy for strength of cultural heritage is the percent of the American Indian population on the reservation with knowledge of another language – PEROLANG89. Assuming that the other language is the traditional language of the tribe, I test for whether the persistence of historical values is important to economic performance. Knowledge of traditional languages has been used in studies to capture different attributes of culture.[37] Stronger cultural heritage could be indicative of attitudes of solidarity within the tribe and therefore greater potential for economic performance or it could represent a distrust of outsiders, which is bad for economic growth.[38] Thus, the prediction is ambiguous, though controlling for strength of cultural heritage is important.

Robustness Control Variables

Throughout this analysis, I include several variables to control for regional and non-linear effects of the variables. Specifically, I include dummy variables for

[36] Low levels of public administration could indicate a small and corrupt tribal government, while large levels of public administration are indicative of bureaucracies and rent seeking behavior. Because of dual effects, I test for non-linear relationships between the percent of people employed in public administration and economic performance on American Indian reservations. In Appendix Table 9, I present estimation results for quadratic specifications of public administration levels on 1999 American Indian income, 1990s American Indian income growth, 1999 adjacent county income, and 1990s adjacent county income growth. These tests are supportive of a quadratic relationship for the reservation economic performance, with the marginal effect of public administration positive at low levels and negative at high levels.

[37] Jorgensen (2000) uses measures of knowledge of traditional language on American Indian reservations to proxy for the amount of culture that is passed on from generation to generation.

[38] Greater retention of traditional language could be associated with something entirely different that affects growth directly (i.e. schooling). Therefore, more discussion on this issue is reserved for interpretation of results. Whether knowledge of traditional language proxies for meaningful cultural metrics is a valid question at this point and is not entirely be resolved within the four corners of this study.

reservations with a population density of greater than 150 people per square mile, reservation within 100 miles of cities of 1,000,000 or more, dummy variables for the top and bottom quintiles of the amenity distribution, and regional dummy variables for eastern, California, and Minnesota reservations.

I identified these regions as candidates based on their unique experiences. Specifically, California and Minnesota have had a distinct experience with Indian gaming. California reservations forced the hand of the state government to allow for Indian casinos in the state, while Minnesota has unusually large Indian casinos. California also has a great deal more reservations than nearly any other state and the state government has arguably been more invasive in trumping tribal sovereignty. Eastern reservations, largely because of their closer proximity to non-Indian populations at formation, were able to work out special property rights considerations with respect to fee simple land and the Dawes Act of 1887.

CHAPTER 5

REGRESSION RESULTS FOR AMERICAN INDIAN INCOME AND GROWTH

The results from OLS estimation of the determinants of American Indian income are reported in Table 3.[39] The results of the model conform well to previous thought on economic growth of national incomes, as well as American Indian development. That is, higher levels of human capital are associated with better economic performance, Indian casinos are a large and pervasive component of reservation economies, location is associated with economic development, and proxies for variation in rent seeking and credible commitments explain a good portion of economic performance.

Table 3: OLS Estimation of American Indian Income in 1999

Independent Variables	(1)	(2)#	(3)#
	-	-	568.10
AIINCOME99	-	-	(3.07)***
Human Capital Variables			
	129.96	117.25	53.99
EDU89	(5.34)***	(4.51)***	(1.78)*
	110.77	105.59	84.07
EDUGROWTH	(3.32)***	(3.07)***	(2.68)***
	92.99	73.61	71.85
HEALTH89	(2.09)**	(1.48)p=0.148	(1.32)p=0.191
Casino Variables			
	-1723.93	-1339.37	-1122.88
CASINO99	(-2.87)***	(-2.19)**	(-1.98)**
	1544.67	1471.91	1351.82
SLOTSPIND99	(3.17)***	(2.57)**	(2.42)**
	283.96	512.68	731.66
CONTRACT	(0.58)	(0.80)	(1.16)
Location Variables			
	-681.98	-304.39	-206.29
DISTANCE	(-5.13)***	(-1.91)*	(-1.35)p=0.181

[39] The inclusion of dummy variables for densely populated areas decreases the number of observations in equations (2) and (4) by 7 due to lack of data availability on adjacent county population density.

Table 3 (continued): OLS Estimation of American Indian Per Capita Income in 1999

	190.85	339.11	251.52
AMSCALE	(1.58)p=0.117	(2.48)**	(1.69)*
Other Controls			
	-61.45	-50.3	-54.75
PUBADMIN89	(-1.91)*	(-1.84)*	(-1.89)*
	-15.61	-11.45	-5.14
PEROLANG89	(-1.57)p=0.120	(-1.24)	(-0.58)
	1752.16	1067.15	1466.89
MANPL280	(1.71)*	(1.12)	(1.60)p=0.114
	-16.05	-4.43	-0.36
PERFEE	(-2.29)**	(-0.53)	(-0.05)
R-squared	0.46	0.51	0.55
F-statistic	9.84	12.17	13.69
# of observations	127	120	120

t-values are indicated in parentheses. *, **, ***, indicate statistical significance at the 10%, 5%, and 1% or better levels, respectively. Marginally statistically insignificant values are indicated by their p-values for p < 0.20. # indicates that equations 2 and 4 are estimated with robustness control variables: a continuous variable measuring the size of the reservation and dummy variables for California, Minnesota, and Eastern reservations, a dummy for reservations where adjacent counties average over 150 people per square mile., a dummy variable for reservations within 100 miles of a city of 1 million, and dummy variables for high and low amenities (top and bottom quintiles of the amenity distribution). These estimates were derived from an OLS regression.

Table 4 has regressions of per capita income growth over the 1990s. There are two types of growth considered in Table 4 – absolute income growth and percentage income growth.[40]

Table 4: OLS Estimation of American Indian Per Capita Income Growth

Independent Variables	(1)	(2)#$	(3)	(4)#
	-0.43	-0.43	-0.01	-0.01
AIINCOME89	(-2.77)***	(-2.33)**	(-5.74)***	(-5.02)***
Human Capital				
	69.74	53.99	0.98	0.86
EDU89	(2.51)**	(1.78)*	(2.48)**	(2.25)**
	95.34	84.07	1.31	1.34
EDUGROWTH	(2.95)***	(2.68)***	(3.42)***	(3.50)***

[40] In fact, the regressions in Table 3, column (3) and Table 4, column (2) have identical interpretations with respect to changes of explanatory variables on absolute income growth. Therefore, the added value from the first two columns of Table 4 is confined to a different interpretation of the effect of American Indian income in 1989 from Table 3, column (3).

Table 4 (continued): OLS Estimation of American Indian Per Capita Income Growth

	74.59	71.85	0.76	0.81
HEALTH89	(1.67)*	(1.32)p=0.191	(1.39)p=0.166	(1.30)p=0.190
Casino Variables				
	-1369.87	-1122.88	-20.72	-18.71
CASINO99	(-2.05)**	(-1.98)**	(-3.06)***	(-2.60)**
	1441.96	1351.82	24.18	23.57
SLOTSPIND99	(3.00)***	(2.42)**	(4.82)***	(3.96)***
	497.57	731.66	4.32	6.81
CONTRACT	(1.06)	(1.16)	(0.70)	(0.87)
Location Variables				
	-515.51	-206.29	-7.81	-3.22
DISTANCE	(-3.65)***	(-1.35)p=0.181	(-4.56)***	(-1.68)*
	132.79	251.52	0.90	3.35
AMSCALE	(1.32)	(1.69)*	(0.69)	(1.88)*
Other Controls				
	-59.74	-54.75	-0.79	-0.75
PUBADMIN89	(-1.86)*	(-1.89)*	(-2.08)**	(-2.21)**
	-7.23	-5.14	-0.07	-0.10
PEROLANG89	(-0.82)	(-0.58)	(-0.60)	(-0.81)
	1732.00	1466.89	23.99	21.75
MANPL280	(1.74)*	(1.60)p=0.114	(2.12)**	(2.02)**
	-8.06	-0.36	-0.14	-0.05
PERFEE	(-1.17)	(-0.05)	(-1.64)p=0.104	(-0.46)
R-squared	0.36	0.41	0.50	0.54
F-statistic	4.60	5.80	12.77	10.19
# of observations	127	120	127	120

t-values are indicated in parentheses. *, **, ***, indicate statistical significance at the 10%, 5%, and 1% or better levels, respectively. Marginally statistically insignificant values are indicated by their p-values for p < 0.20. # indicates that equations 2 and 4 are estimated with robustness control variables: a continuous variable measuring the size of the reservation and dummy variables for California, Minnesota, and Eastern reservations, a dummy for reservations where adjacent counties average over 150 people per square mile., a dummy variable for reservations within 100 miles of a city of 1 million, and dummy variables for high and low amenities (top and bottom quintiles of the amenity distribution). These estimates were derived from an OLS regression. $ The regression in (2) is identical to that in Table 2 (3), except for the dependent variable is different. Controlling for aipci89 in both specifications (in essence) holds the same things constant and yields the same coefficient estimates (except for aipci89).

Several of the results in Tables 3 and 4 warrant a more detailed interpretation. Outside management of Indian casinos does not appear to have a direct influence on overall economic performance on American Indian reservations. This does not mean that the signing of management contracts is not important to economic convergence. Management contracts may represent a difference in the sharing of the rent stream of

Indian gaming for people off of the reservation. Adjacent county interests in Indian gaming may be bypassed by a management contract since large casino companies usually enter into management contracts with tribes, and these companies are typically not local to Indian reservations.[41]

In the primary level of income regression, $CASINO_{99}$ has a coefficient of -1723.93 and a 90 percent confidence interval that ranges from -726.82 to -2721.03. This strong negative coefficient has several potential interpretations. One interpretation is that casino investment engenders negative economic pressures like political rent seeking and crime, that is independent of the size of the casino, and the impacts of these negative aspects of Indian gaming show up in the coefficient on the dummy variable.[42] Another interpretation is that poorer reservations adopt casinos as a development option, essentially a reverse causation story.[43] This second argument is partially refuted by the fact that the casino dummy variable has a highly statistically and economically significant negative coefficient in the growth regressions as well as level of income specifications.[44]

---

[41] Another possibility for the importance of management contracts for economic performance is the potential for management contracts to influence the size of a casino and in turn, influence the extent to which the casino contributes to American Indian welfare. I take on this issue in Cookson (2006).

[42] For a discussion of political rent seeking in Indian gaming, see Johnson (2005a). Also, Grinols and Mustard have a series of papers on the crime costs of gambling (Grinols and Mustard (2001), Grinols and Mustard (2004)) and Gazel, Rickman and Thompson (2001) estimate the community costs of gambling in a panel study of Wisconsin counties.

[43] A third argument worth considering is that there is a nonlinear relationship in the number of slot machines per American Indian resident. I test for this possibility in a separate regression with a quadratic specification of SLOTSPIND99 and find that there is not strong evidence that a nonlinear relationship is present (at least with quadratic functional form). Quadratic regression specifications for slot machines on American Indian income and both types of growth are reported in Table 10 of the supplemental appendix.

[44] It remains a possibility that reservations that are about to experience worse economic conditions buffer their economic fall by adopting a casino, exhibiting a negative coefficient. However, in an explicit analysis of the determinants of Indian gaming (Cookson (2006)), I further resolve this issue by uncovering the institutional foundations of Indian casino investment with a Heckman selection estimation technique. I show that (contrary to the complicating argument) Indian casinos are adopted where economic conditions are better. Therefore, the correct interpretation of the strong negative coefficient has to look something like the explanation in the main body of the text.

PERFEE is a negative and statistically significant predictor of levels of income, though not highly economically significant – a 10 percentage point increase in the percentage of fee simple land on a reservation is predicted to decrease $AIINCOME_{99}$ by $161. This result is contrary to the finding of Anderson and Lueck (1992), but Anderson and Parker (2005) obtain the same result.[45] The inclusion of regional control variables causes PERFEE to decrease greatly in magnitude and become statistically insignificant; suggesting that the fee simple result is capturing geographic variation as well as landowner incentives.

A final comment on this set of regressions is that the coefficient on MANPL280 is not robust to the inclusion of regional dummy variables. More specifically, the inclusion of a dummy variable for California reservations causes MANPL280 to enter as statistically insignificant and decreases the point estimate to nearly half the magnitude.[46] Whether the California observations ought to be treated as a unique experience (i.e., outlier) or useful information about Public Law 280 is important to determining the empirical merit of the mandatory Public Law 280 institutional argument.

On the other hand, it is important to note that the interpretation of the coefficient on MANPL280 differs from a pure proxy for investment incentives when controlling for

[45] Anderson and Parker (2005) explain that fee simple land tenure has effects where the land is used for agricultural purposes by American Indians. The dataset provides no way to distinguish whether the landowners' income from the fee simple land is going toward American Indian income or non-Indian income. It also does not provide a clean mechanism for distinguishing agricultural and non-agricultural use of the land. Therefore, the result of this study does not invalidate the Anderson and Lueck (1992) result, as the data here are from economies that are largely dependent on Indian casinos, as well as agriculture. Therefore, the dataset employed in this analysis cannot reliably test the Anderson and Lueck (1992) finding.

[46] Including just a dummy for California decreases the magnitude of the mandatory Public Law 280 coefficient from 1752 to 999 and causes the p-value to go from 0.091 to 0.221. This regression is reported in column 1 of Table 11 in the supplemental appendix, along with other specifications including only a California dummy variable as a robustness control variable.

actual investment (i.e. Indian casino investment). Because I control for casino investment, the coefficient estimates of the MANPL280 variable must be interpreted as the marginal linear association between MANPL280 and economic performance, *holding casino investment constant*. Casino investment may be correlated with a large portion of investment within reservation economies. For this reason, mandatory Public Law 280 likely has a bigger effect on reservation incomes than the econometric results indicate.

In general, the qualitative implications of each specification are not sensitive to the inclusion of regional and location-specific control variables, nor are they sensitive to looking at absolute changes versus percentage changes. The core of what is learned from of these specifications is that higher levels of education, more investment, and better locations are associated with better economic performance of Indian economies.

CHAPTER 6

REGRESSION ANALYSIS OF ADJACENT COUNTY INCOME AND GROWTH

As explained earlier, each American Indian reservation variable has the potential to affect economic performance in adjacent counties (and, more plausibly, vice versa). The important point to be made is that the effects of economic institutions and investment on American Indian reservations are not necessarily contained within the borders of the reservation – nor are the effects of adjacent county welfare improvements kept entirely off the reservation. Such an observation requires that we investigate the extent to which adjacent county and American Indian institutions co-vary before considering the ultimate question of convergence.[47] I do so empirically in this chapter before proceeding to analyze the gap in reservation and adjacent county incomes in Chapter 7.

Regression Results – Adjacent County Economic Performance

In Table 5, I report results of regressions of adjacent county per capita income in 1999 on American Indian welfare variables. The level of income specification has an R^2 of 0.56.[48] Table 6 has results on adjacent county income growth. As in the reservation

[47] I include all right hand side variables employed in the American Indian chapter, but use adjacent county per capita income and adjacent county per capita income growth as the dependent variables in the empirical specifications. Including these variables on the right hand side of a regression explaining adjacent county income and growth is not a statement about causality. It is merely a test of how connected (endogenous) adjacent county and reservation economies are with one another. If all of the variables are significant predictors, more work will be needed to sort out causality before proceeding with an analysis of the income gap and convergence.

[48] Omitting the Barona, CA observation (see Table 12) increases the R^2 of the American Indian specifications to be larger than the adjacent county specifications, a more reasonable result. The coefficient estimates across specifications in this paper are not sensitive to the exclusion of the Barona, CA observation. Figures 1 and 2 in the appendix for residual plots identify Barona, CA as an outlier.

income specifications, the inclusion of the lagged income variable in column (3) addresses how reservation economic variables predict adjacent county income growth.

Table 5: OLS Estimation of Adjacent County Per Capita Income in 1999

Independent Variables	*(1)*	*(2)#*	*(3)#*
	-	-	0.86
AIINCOME89	-	-	(13.48)***
Human Capital Variables			
	24.71	-5.59	2.40
EDU89	(0.95)	(-0.21)	(0.13)
	5.00	-19.72	-2.36
EDUGROWTH	(0.14)	(-0.65)	(-0.13)
	-93.88	-94.35	-83.12
HEALTH89	(-1.83)*	(-1.99)**	(-2.67)***
Casino Variables			
	-221.14	-52.44	113.83
CASINO99	(-0.49)	(-0.10)	(0.31)
	224.84	412.63	-321.22
SLOTSPIND99	(1.09)	(1.44)p=0.152	(-1.64)p=0.104
	-1038.25	-836.79	240.10
CONTRACT	(-2.10)**	(-1.56)p=0.121	(0.78)
Location Variables			
	-960.95	-655.36	-114.49
DISTANCE	(-7.50)***	(-4.39)***	(-1.08)
	196.50	230.36	-56.06
AMSCALE	(2.74)***	(2.09)**	(-0.84)
Other Controls			
	-44.83	-20.76	-41.26
PUBADMIN89	(-1.93)*	(-0.75)	(-2.26)**
	1.41	-3.34	8.63
PEROLANG89	(0.13)	(-0.33)	(1.45)p=0.149
	-1002.82	-660.25	402.99
MANPL280	(-2.24)**	(-1.00)	(1.01)
	-4.23	-5.63	-2.92
PERFEE	(-0.58)	(-0.68)	(-0.63)
R-squared	0.56	0.66	0.87
F-statistic	14.72	16.58	56.18
# of observations	127	120	120

t-values are indicated in parentheses. *, **, ***, indicate statistical significance at the 10%, 5%, and 1% or better levels, respectively. Marginally statistically insignificant values are indicated by their p-values for $p < 0.20$. # indicates that equations 2 and 4 are estimated with robustness control variables: a continuous variable measuring the size of the reservation and dummy variables for California, Minnesota, and Eastern reservations, a dummy for reservations where adjacent counties average over 150 people per square mile, a dummy variable for reservations within 100 miles of a city of 1 million, and dummy variables for high and low amenities (top and bottom quintiles of the amenity distribution). These estimates were derived from an OLS regression.

Table 6: OLS Estimation of Adjacent County Per Capita Income Growth

Dependent Variables	Abs. Growth in Per Capita Income		% Growth In Per Capita Income	
Independent Variables	(1)	(2)#$	(3)	(4)#
AIINCOME89	-0.15 (-2.15)**	-0.14 (-2.23)**	0.00 (5.13)***	0.00 (-5.25)***
Human Capital				
EDU89	4.88 (0.29)	2.40 (0.13)	0.02 (0.19)	0.03 (0.22)
EDUGROWTH	-2.16 (-0.13)	-2.36 (-0.13)	-0.01 (-0.14)	0.00 (0.03)
HEALTH89	-75.58 (-2.02)**	-83.12 (-2.67)***	-0.46 (-1.89)*	-0.51 (-2.58)**
Casino Variables				
CASINO99	-172.55 (-0.56)	113.83 (0.31)	-0.28 (-0.15)	1.52 (0.67)
SLOTSPIND99	-103.89 (-0.62)	-321.22 (-1.64)p=0.104	-0.38 (-0.43)	-1.69 (-1.54)p=0.128
CONTRACT	16.68 (0.06)	240.10 (0.78)	0.07 (0.04)	1.36 (0.68)
Location Variables				
DISTANCE	-273.67 (-3.33)***	-114.49 (-1.08)	-1.82 (-3.43)***	-0.92 (-1.36)p=0.176
AMSCALE	-93.92 (-2.17)**	-56.06 (-0.84)	-0.52 (-1.86)*	-0.33 (-0.77)
Other Controls				
PUBADMIN89	-31.69 (-1.86)*	-41.26 (-2.26)**	-0.20 (-1.93)*	-0.25 (-2.13)**
PEROLANG89	7.01 (1.19)	8.63 (1.45)p=0.149	0.04 (1.16)	0.06 (1.48)p=0.141
MANPL280	486.16 (1.54)=0.126	402.99 (1.01)	2.40 (1.21)	1.37 (0.56)
PERFEE	-1.93 (-0.44)	-2.92 (-0.63)	-0.02 (-0.56)	-0.20 (-0.70)
R-squared	0.24	0.36	0.40	0.48
F-statistic	2.68	2.92	5.00	5.39
# of observations	127	120	127	120

t-values are indicated in parentheses. *, **, ***, indicate statistical significance at the 10%, 5%, and 1% or better levels, respectively. Marginally statistically insignificant values are indicated by their p-values for $p < 0.20$. # indicates that equations 2 and 4 are estimated with robustness control variables: a continuous variable measuring the size of the reservation and dummy variables for California, Minnesota, and Eastern reservations, a dummy for reservations where adjacent counties average over 150 people per square mile, a dummy variable for reservations within 100 miles of a city of 1 million, and dummy variables for high and low amenities (top and bottom quintiles of the amenity distribution). These estimates were derived from an OLS regression. $ The regression in (2) is identical in theory to the regression in Table 4 (3). The only difference is the dependent variable and the interpretation on the coefficient estimates of adjctypci89 (discussed in the main body of the text).

The results in Tables 5 and 6 offer several insights for the ultimate questions of convergence and the income gap. First, the location coefficients are of greater economic significance in the adjacent county specifications than in the specifications for American Indian economic performance.[49] These coefficients have the same sign, however, and are both statistically and economically significant. Therefore, while changes in location are associated with bigger changes in adjacent county income, location variables are not expected to be a primary source of variation in the study of convergence of American Indian reservation incomes to their adjacent counties,[50] at least in a meaningful sense.

Another interesting result is the set of coefficients for the management contract dummy variable. In the level of income regressions, the coefficient on CONTRACT is around -$1,000 and generally statistically significant.[51] In the growth regressions, however, the coefficient is slightly positive and not statistically significant. This suggests that management contracts were signed in poorer regions and were not a determinant of convergence, but rather an avenue where tribes selected themselves to deal with management companies based on adjacent county well-being.

Reservation human capital does not appear to have important spillovers between adjacent county and reservation economies. None of the educational coefficients are

---

[49] As will be discussed later, this result for the distance to markets may be just an artifact reflecting that reservations are more like rural areas than urban areas. Therefore, there is a bigger difference in adjacent county income is associated with moving from a big city to the countryside. In essence, reservation economies are more homogeneous than their adjacent counties, possibly due to similar federal policies designed to improve conditions on reservations. Another issue is that of how amenities and distance are measured. Notably, the amenities data are constructed as an aggregation of reservation county data, so that the area measured is greater than the reservation area, but smaller than the adjacent county area.

[50] This was anticipated in the selection of the American Indian reservation setting, but I emphasize the point since location specific arguments are prevalent in the discussion of international convergence of incomes.

[51] In the primary specification, the coefficient is statistically significant at the 5% level, while it has a p-value of 0.104 in the regression with robustness and regional control variables included.

economically or statistically significant and the health proxy for human capital investment enters with a negative coefficient.[52] The interpretation of these results is favorable to education and human capital affecting economic performance of Indian reservations. The lack of prediction of human capital suggests that variation in adjacent county shared effects is not driving the human capital results of Chapter 5.

Most of the reservation institutional variables appear to be confined within the borders of Indian Country, which is favorable in assigning causality to the reservation institutional variables and American Indian income and growth. However, PUBADMIN_{89} is a statistically significant and negative predictor in the level of adjacent county income and growth regressions, with about 1/3 the magnitude of the American Indian regressions. One reason for this result may be that adjacent county institutions compete with reservation institutions in the same manner as Fleck and Hanssen describe in their analysis (Fleck and Hanssen 2004).

We cannot rule out that the variable is picking up some omitted effect within the region that leads higher public administration employment to be correlated with lower incomes. This could be poverty in the region, which invokes a government response, tribal or otherwise. Therefore, the interpretation of the public administration coefficient is not clear enough to justify a rent-seeking explanation of public administration employment and economic performance on Indian reservations.

Most importantly, however, the economic and statistical insignificance of education, mandatory public law 280, and casino activity gives us more confidence that

[52] This could mean that the health employment variable represents differences in job opportunities as well as investment in health. For this reason, the data says little about the importance of health human capital to reservation economies. We are left with what previous thought dictates about health and economic growth.

the corresponding coefficients in Chapter 5 and 7 are representing something fundamental to reservation economic performance. The work done in this section lends credibility to interpreting these coefficients as such and identifies more clearly the variables that have the greatest problem with respect to causal inference.

CHAPTER 7

THE RESERVATION-ADJACENT COUNTY INCOME GAP AND CONVERGENCE

With a better understanding of how reservation incomes and adjacent county incomes co-vary from Chapter 6, we can proceed in putting the pieces together. This chapter merges the determinants of American Indian reservation and adjacent county income into one specification asking how the two move together and apart. For the overall size of the gap in incomes, the empirical equation to be estimated is:

$$incomegap99 = \alpha_1 + \beta_1*(reservation\ legal\ environment) + \beta_2*(land\ tenure) + \beta_3*(human\ capital) + \beta_4*(Indian\ gaming) + \beta_5*(location) + \beta_6*(government) + \beta_7*(culture) + \beta_8*(separation) + \varepsilon$$

Economic forces that are relatively better for reservation incomes than for adjacent county incomes will have a negative coefficient with this specification; that is, they decrease the size of the gap. The mean gap in incomes was approximately $9,300 in 1989 and 1999, meaning that on average no convergence of incomes took place over the 1990s – a decade of significant economic change for tribes. The mean of the absolute value of percentage convergence over the 1990s is 28.82 percent. This persistent and evolving nature makes for an ideal setting to study the determinants of the income gap.

While most of the independent variables employed in this section remain the same, I include a new category of variables in this part of the analysis – separation. To the extent that a reservation is large, the main economic centers on the reservation are farther from those in adjacent counties. More distance and separation from adjacent counties is expected to imply less convergence because it is more costly for reservation

individuals to interact with people in adjacent counties and therefore have the same economic opportunities.

To capture the idea of separation, ACRES is included as an independent variable. Capturing the idea of separation is difficult because there are more factors that lead to separation between a reservation and its adjacent county than raw size of reservation. To see this, consider two reservations of equal size, but one with a good road and the other with a poor road between the reservation and its adjacent county. We could hardly assert that the two reservations have the same degree of geographic separation with their adjacent counties. This measure can only approximately capture the idea of geographic separation and is used as a rough proxy.

Regression Results – Income Gap

The results of OLS regressions of the income gap specifications are reported in Table 7. Column (2) contains results where robustness control variables are added to the specification.[53] Columns (3) and (4) report the estimation on reduced sample sizes to test robustness and to make my results comparable to Anderson and Parker (2005). Finally, in column (5), the income gap in 1989 is included as a control variable to get a rough idea of which variables will be important to convergence and to transition into a discussion of convergence of incomes.

[53] Robustness control variables include dummy variables for reservations in California, Minnesota, east of the Mississippi River, within 100 miles of a city of 1 million, with adjacent counties with population densities exceeding 150 people per square mile, and dummy variables indicating the upper and lower quintiles of the amenity distribution.

Table 7: OLS Estimation of the Per Capita Income Gap in 1999

Independent Vars	(1)	(2)#	(3)#	(4)#	(5)#
Constant	18453.16 (4.99)***	20416.43 (5.21)***	24527.12 (7.32)***	25747.93 (7.34)***	11888.15 (3.22)***
INCOMEGAP89	- -	- -	- -	- -	662.02 (4.74)***
Human Capital					
EDU89	-102.18 (-2.65)***	-118.76 (-2.88)***	-157.42 (-4.28)***	-159.03 (-4.14)***	-70.46 (-2.02)**
EDUGROWTH	-103.05 (-2.02)**	-120.83 (-2.48)**	-185.30 (-4.31)***	-168.19 (-3.03)***	-132.26 (-3.31)***
HEALTH89	-183.42 (-2.92)***	-164.25 (-2.71)***	-185.36 (-3.09)***	-225.05 (-2.27)**	-168.35 (-2.60)**
Casino Variables					
CASINO99	1512.12 (2.05)**	1356.14 (1.78)*	1213.11 (1.64)p=0.103	570.78 -0.8	1023.34 (1.67)*
SLOTSPIND99	-1285.36 (-2.29)**	-1053.31 (1.64)p=0.64	-1352.78 (-2.08)**	-2268.40 (-4.14)***	-1644.64 (-2.46)**
CONTRACT	-1365.21 (-1.96)*	-1398.51 (1.66)*	-1280.14 (-1.52)p=0.132	-1769.26 (-2.29)**	-739.39 (-1.05)
Location Variables					
DISTANCE	-325.84 (-1.99)**	-373.38 (-1.78)*	-350.77 (-1.71)*	-391.63 (-1.89)*	-34.77 (-0.23)
AMSCALE	9.82 (0.07)	-98.28 (-0.61)	-158.23 (-1.00)	-222.29 (-1.25)	-280.05 (-1.93)*
HIGHAMENITIES	- -	2135.51 (1.55)p=0.125	2150.35 (1.52)p=0.132	2310.55 (2.44)**	1700.95 (1.38)p=0.172
Other Controls					
PUBADMIN89	19.58 (0.53)	32.39 (0.91)	8.46 (0.23)	-25.65 (-0.50)	-3.58 (-0.10)
PEROLANG89	16.82 (1.21)	8.04 (0.55)	-3.59 (-0.25)	-0.87 (-0.06)	1.29 (0.13)
MANPL280	-2698.66 (-2.57)**	-1618.62 (-1.33)p=0.185	-1575.51 (-1.36)p=0.177	-588.98 (-0.76)	-1256.35 (-1.28)
PERFEE	10.85 (1.10)	-2.72 (-0.24)	-9.67 (-0.73)	-7.62 (-0.52)	-11.07 (-0.98)
ACRES (100,000s)	34.75 (1.19)	37.00 (1.20)	27.67 (0.88)	31.09 (0.97)	-9.97 (-0.32)
R-squared	0.33	0.40	0.42	0.63	0.54
F-statistic	7.44	7.89	8.59	11.46	15.85
# of observations	127	120	116	74	116

t-values are indicated in parentheses. *, **, ***, indicate statistical significance at the 10%, 5%, and 1% or better levels, respectively. Marginally statistically insignificant values are indicated by their p-values for $p < 0.20$. # indicates that equations 2 through 4 are estimated with robustness control variables: a continuous variable measuring the size of the reservation and dummy variables for California, Minnesota, and Eastern reservations, a dummy for reservations where adjacent counties average over 150 people per square mile, a dummy variable for reservations within 100 miles of a city of 1 million, and dummy variables for high and low amenities (top and bottom quintiles of the amenity distribution). These estimates were derived from an OLS regression.

Human Capital

In all specifications, higher human capital is an important predictor of a smaller income gap.[54] Consider two reservations identical in every respect but educational attainment – one has 70 percent high school graduates and another has 60 percent high school graduates.[55] The latter reservation is predicted by the econometric model to have a $1,030 larger income gap with its adjacent counties, *ceteris paribus*. In the context of the actual income gap, approximately 10.9 percent of the income gap can be attributed to a 10-percentage point increase in EDU_{89}. These estimates are highly statistically significant (typically at the 1 percent level), providing additional confidence that improvements in human capital and in the incentives of tribal members to invest in education would decrease the size of the income gap between reservations and their adjacent counties.

The coefficient estimates of health employment's effects are larger than the educational variables and have high statistical significance (1 to 5 percent or better). While these estimates may be attributed to the beneficial nature of health investment on American Indian reservations, a great deal of the estimated effect could be from the fact that health employment signals other favorable conditions to American Indian reservation development. If health human capital were truly signaled by these estimates, we would

[54] In this specification, an assumption about homogeneity of education among adjacent counties is made. The appropriate human capital variable to explain an income gap is an educational gap variable, not an educational attainment variable. However, it is assumed that education in the United States adjacent counties is relatively homogeneous with respect to the percent of high school graduates of the age 25 and over. Therefore, the variation in the educational attainment on reservations represents a great majority of the variability of the educational gap.

[55] 10 percentage points is slightly less than a standard deviation in the distribution of percentage high school graduates in 1989 (11.36). This is, therefore, an economically reasonable example to consider within the sample of American Indian reservations.

not expect to see negative coefficients on the adjacent county income and growth (as in Table 6). Therefore, calling the health estimate evidence for a human capital story of the income gap would be an error. For this reason, the variable is left in the rest of the specifications as a control with little discussion throughout the remainder of the paper.

Indian Casinos

The estimates of casino activity and the income gap highlight some interesting patterns. For one, $CASINO_{99}$ is associated with a larger gap, with estimates ranging from $500 to $1500 greater difference of incomes. This finding is consistent with what we would expect from the Indian casinos and externalities, and the political economy of Indian gaming literature. If crime and community costs from Indian gaming are significant, we would expect to see a negative effect on local incomes because resources are devoted by individuals to avert the community costs.[56] We would also expect to see a drop in income associated with the mere presence of a casino if rent seeking and lobbying surrounding Indian gaming are important to reservation economies.[57]

While $CASINO_{99}$ is associated with larger income gaps, $SLOTSPIND_{99}$ is strongly associated with smaller income gaps.[58] At approximately one slot machine per American Indian resident on the reservation, the non-convergence effects of casino activity are neutralized by the convergence enhancing aspect of casinos – the rent stream of Indian

[56] Grinols and Mustard (2004) offer direct evidence on the community costs of casino gambling.
[57] Johnson (2005a) tells the story of the political economy of Indian gaming and identifies (by anecdote) the mechanisms of Indian gaming affecting incentives on Indian reservations.
[58] This finding likely arises out of which tribes invest in casinos and how large these casinos are. In other words, selection into the Indian gaming industry appears on its face to be a very strong force in reservation economies. Therefore, while the negative intercept term is to be anticipated in light of casinos' negative impacts, selection into the industry provides an observationally equivalent rationalization. I explore the details of this selection issue in Cookson (2006).

gaming. Specifically, at the mean of slot machines per American Indian resident (0.867 among those with a casino), the predicted effects of the size and presence of a casino offset. These estimates are statistically significant at the 5 percent level in the full sample, while slightly less statistically significant in specifications to test robustness.

Finally, management contracts are associated with a smaller reservation-adjacent county income gap. This is likely due to the fact that management contracts are signed in circumstances where low income adjacent counties are present. Earlier, I showed that management contracts were not associated with higher American Indian income, but were associated with lower adjacent county income, likely because of selection.[59]

Location

While location variables were not expected to be important to convergence because location is shared by reservations and their adjacent counties, the results on location and the income gap offer some interesting insights.

Consider the results in Table 7 on climate (AMSCALE, HIGHAMENITIES). The amenity scale is uncorrelated with the size of the income gap, but the dummy for high amenities enters the specification as statistically significant and with the interpretation that reservations in the top quintile of the amenities distribution experience a $2,000 greater income gap with their adjacent counties – nearly 22 percent of the entire gap. Upon further inspection, it appears that most of the statistical and economic significance

[59] In Cookson (2006), I investigate the idea that management contracts can influence the size of casinos and, therefore, be integral to convergence or divergence.

of HIGHAMENITIES can be attributed to the fact that adjacent counties with better climates attract higher income individuals.[60]

Since distance to urban areas is shared between reservations and their adjacent counties, we would expect to see no difference in the effect of distance to urban areas on the income gap if urban areas present the same opportunities to reservations as adjacent counties. Thus, if we observe a difference between the effect of distance on American Indian and adjacent county income, we can attribute it to a difference in the opportunity that urban centers provide to those in adjacent counties relative to reservations.

Greater distance from urban areas is predicted to decrease the income gap by over $300 per 100 miles and is statistically significant at the 10 percent level or better in all specifications employed. These distance estimates are not particularly large and are opposite in sign from the results on distance with international datasets. A one standard deviation increase in distance from an urban area decreases the income gap by approximately $570 (6 percent of the overall gap).

Institutions

Mandatory Public Law 280 appears to be a major force driving the size of the income gap. The estimate in the base specification accounts for nearly 30 percent of the income gap and is statistically significant at the 5 percent level. This estimate, however, is sensitive to the inclusion regional dummy variables. With the inclusion of regional

[60] I did not report HIGHAMENITIES coefficients in Chapters 5 and 6. I do so now. In the regression reported in Table 5, column (2), the HIGHAMENITIES coefficient is 1424.11 with a p-value of 0.133, while in the regression reported in Table 3, column (2), the HIGHAMENITIES coefficient is -711.40 with a p-value of 0.654. These estimates indicate that the argument that amenities attract high income individuals holds more empirical weight than the argument that climate ruins institutions and hurts economic performance.

dummies, the variable becomes marginally statistically significant and the magnitude of the coefficient drops by nearly half, accounting for approximately 15 percent of the income gap.[61] Narrowing the sample to reservations with American Indian populations of 1,000 and greater[62] decreases the statistical significance further and the estimated magnitude of the mandatory Public Law 280 effect is about 6 percent of the entire gap.

Recall, however, that holding the level of casino investment constant makes the interpretation of mandatory Public Law 280 more restrictive. Specifically, MANPL280 proxies for incentives to invest and controlling for a big channel of that investment is bound to decrease the economic and statistical significance of the estimates. For this reason, the diminished economic significance in these specifications does not warrant much concern over the validity of the theory underlying its inclusion.[63]

Other hypothesized determinants of the size of the income gap are viewed less favorably in light of the data. Consistent with Anderson and Parker (2005), variation in fee simple land ownership does not appear to be important to determining the size of the income gap. Also, more knowledge of the traditional language on the reservation does not appear to be a major influencing factor in the size of the income gap. To the extent that knowledge of traditional language represents a strong cultural heritage or that

---

[61] In Table 15, Column (2), I included just dummy variables for California and Eastern reservations. The estimate of the effect of mandatory Public Law 280 is now -1396.15 with a p-value of 0.104.

[62] Narrowing the sample in this manner makes the estimates of this paper more comparable to Anderson and Parker (2005).

[63] Despite this problem in interpretation, there is good reason to include Indian casino investment in the specifications. The prevalence of the opinion in the literature that casinos are a driving factor in the improvement of conditions in reservation economies makes it imperative to include casino investment in my specifications. In Cookson (2006), I analyze how mandatory Public Law 280 influences the incentives to invest in casinos and find that both the initial decision to build a casino and the decision to expand the casino's size are strongly correlated with whether a reservation is in a mandatory Public Law 280 state.

language barriers and size of the reservation represent separation of the reservation and its adjacent counties, these factors are not primary drivers of the income gap.[64]

Robustness Checks

In columns (2) – (4), I include robustness control variables. As a result of including these variables, not many of the core results changed. As before, the MANPL280 result weakened. The estimated effects of human capital and Indian casinos remained strong and some strengthened substantially. The overall story about the determinants of the income gap remains the same – American Indian reservations that experience high investment in education, good health, and large Indian casinos (as well as other profitable industries) are those where the income gap is smallest.

Lessons for Convergence

At this point, the focus changes from an analysis of the size of the income gap to that of the change in this gap – convergence. Several lessons for convergence can be learned by comparing columns (1) – (3) with column (5) of Table 7, where INCOMEGAP_{89} is employed as a control. Controlling for the previous gap holds constant variation in the past period income gap, and, in effect, makes the coefficient estimates more representative of convergence over the 1990s. Variables that are robust to the inclusion of the previous gap are anticipated to be important to convergence, while variables that lose economic and statistical significance are likely sources of reverse causation.

[64] There are, however, questions about the quality of these variables as proxies for trust and separation. For that reason, more work is needed to attain better proxies for the level of trust on American Indian reservations

While the estimated effect of EDU_{89} decreases substantially, the estimate remains statistically significant at the 5 percent level and an additional 10 percentage point increase of percent high school graduates in 1989 is predicted to decrease the gap by $705, 7.5 percent of the income gap. The coefficient on EDUGROWTH remains in the same range of statistical and economic significance as prior specifications. While endogeneity remains a concern, these results suggest that variation in human capital is important to convergence of American Indian reservation incomes to their adjacent counties.

The casino coefficients and statistical significance remain in the same range as the estimates in the prior specifications. This supports my general interpretation of the results. That is, the rise of the Indian casino industry is largely a 1990s phenomenon and casino investment likely arises out of incentives to invest. CONTRACT loses economic and statistical significance, reaffirming the results of prior sections that management contracts represent selection, not convergence.

The coefficient on DISTANCE decreases by a about factor of 10 and becomes statistically insignificant. This suggests that distance to urban areas is not an important avenue of convergence and implies that urban reservations are more like rural reservations than urban U.S. counties are like rural U.S. counties. In essence, the distance results mean that urban reservations have a taller ladder to climb to close the income gap between them and their adjacent counties.

The estimated effects of amenities are consistent with my prior discussion on amenities and convergence. The HIGHAMENITIES coefficient remains in the same range (1700) and is only marginally statistically insignificant, while the statistically significant

estimate of AMSCALE and convergence further highlights that the effects of amenities can be positive or negative. In the 1990s, these effects contributed to convergence on balance, while this is not generally the case.

The estimates of PUBADMIN_{89}, PEROLANG_{89}, MANPL280, PERFEE, and ACRES confirm the results discussed earlier in this paper. All of these coefficients remain not statistically different from zero, *ceteris paribus*.

Specifying Convergence of Incomes

Since there is considerable variation success in closing the income gap during the 1990s, I also offer an empirical specification to directly explain how the size of the gap in incomes changed over the 1990s:

$$convergence = \alpha_1 + \alpha_2*(incomegap89) + \beta_1*(human\ capital) + \beta_2*(Indian\ gaming) + \beta_3*(location) + \beta_4*(government) + \beta_5*(culture) + \beta_6*(separation) + \varepsilon$$

This specification parallels the adjacent county and American Indian income growth regressions. The study of convergence of American Indian and adjacent county incomes is the study of differential growth of incomes between the two societies. For a demonstration, consider the following set of identities:

$$\begin{aligned} \text{CONVERGENCE} &\equiv \text{INCOMEGAP}_{99} - \text{INCOMEGAP}_{89} \\ &\equiv (\text{ADJINCOME}_{99} - \text{AIINCOME}_{99}) - (\text{ADJINCOME}_{89} - \text{AIINCOME}_{89}) \\ &\equiv \text{ADJINCOME}_{99} - \text{ADJINCOME}_{89} - \text{AIINCOME}_{99} + \text{AIINCOME}_{89} \\ &\equiv \text{(absolute growth in adjctypci)} - \text{(absolute growth in AI pci)} \end{aligned}$$

In addition to the other factors discussed in this paper, it is important to control for the initial income gap in the study of convergence of incomes. Reservations with an

initially larger gap in incomes find it easier to catch up to the economic performance of their adjacent counties if the correct factors for convergence are included as control variables. Thus, a negative sign on the $INCOMEGAP_{89}$ coefficient is expected.[65]

Regression Results – Convergence of Incomes

The results of OLS regressions of the convergence specifications are reported in Table 8. The full sample has an R^2 of 0.33. Columns (1) through (4) run parallel to that of Table 7: Specification (2) includes the same control variables as in previous sections, column (3) reports results on a sample limited by those reservations that did not double in population, and column (4) further limits the sample to those reservations with populations of 1000 or greater.

Table 8: OLS Estimation of 1990s Per Capita Income Convergence

Independent Variables	(1)	(2)#	(3)#	(4)#
Constant	8405.79	8178.04	11888.15	8363.52
	(2.59)**	(2.03)**	(3.22)***	(2.82)***
INCOMEGAP89	-338.44	-301.79	-337.98	-281.85
	(-3.41)***	(-2.17)**	(-2.42)**	(-3.25)***
Human Capital Variables				
EDU89	-51.11	-38.54	-70.46	-39.48
	(-1.69)*	(-1.01)	(-2.02)**	(-1.42)p=0.161
EDUGROWTH	-93.96	-84.71	-132.26	-66.32
	(-2.34)**	(-2.05)**	(-3.31)***	(-1.57)p=0.123
HEALTH89	-151.99	-156.64	-168.35	-139.86
	(-2.75)***	(-2.47)**	(-2.60)**	(-2.16)**
Casino Variables				
CASINO99	1125.42	1156.51	1023.34	725.90
	(1.84)*	(1.87)*	(1.67)*	(1.51)p=0.137
SLOTSPIND99	-1463.07	-1508.65	-1644.64	-2509.01
	(-2.65)***	(-2.42)**	(-2.46)**	(-5.76)***
CONTRACT	-742.68	-742.80	-739.39	-636.25
	(-1.46)p=0.146	(-1.05)	(-1.05)	(-1.21)

[65] Convergence, as I specify it, is actually non-convergence. If there is a larger income gap in 1999 than in 1989, CONVERGENCE will be positive.

Table 8 (continued): OLS Estimation of 1990s Per Capita Income Convergence

Location Variables				
	71.06	-31.66	-34.77	-117.43
DISTANCE	-0.44	(-0.20)	(-0.23)	(-0.83)
	-153.02	-234.05	-280.05	-208.46
AMSCALE	(-1.14)	(-1.62)p=0.109	(-1.93)*	(-1.86)*
	-	1800.85	1700.95	1751.30
HIGHAMENITIES	-	(1.49)p=0.139	(1.38)p=0.172	(1.76)*
Other Controls				
	24.15	18.34	-3.58	-13.30
PUBADMIN89	-0.7	-0.56	(-0.10)	(-0.34)
	11.64	10.08	1.29	14.26
PEROLANG89	-1.19	-0.99	-0.13	(1.62)p=0.112
	-1588.60	-1353.11	-1256.35	-1305.28
MANPL280	(-1.53)p=0.129	(-1.39)p=0.168	(-1.28)	(-1.81)*
	4.51	-4.00	-11.07	0.50
PERFEE	-0.48	(-0.41)	(-0.98)	-0.05
	-7.94	-7.90	-9.97	-1.11
ACRES (100,000s)	(-0.30)	(-0.25)	(-0.32)	(-0.04)
R-squared	0.33	0.39	0.4	0.61
F-statistic	3.61	3.99	5.67	6.55
# of observations	127	120	116	74

t-values are indicated in parentheses. *, **, ***, indicate statistical significance at the 10%, 5%, and 1% or better levels, respectively. Marginally statistically insignificant values are indicated by their p-values for $p < 0.20$. # indicates that equations 2 through 4 are estimated with robustness control variables: a continuous variable measuring the size of the reservation and dummy variables for California, Minnesota, and Eastern reservations, a dummy for reservations where adjacent counties average over 150 people per square mile., a dummy variable for reservations within 100 miles of a city of 1 million, and dummy variables for high and low amenities (top and bottom quintiles of the amenity distribution). These estimates were derived from an OLS regression.

Human Capital

The coefficient estimates on the educational attainment variables are highly statistically significant. A reservation with 10 percentage points higher educational attainment in 1989 than another reservation is predicted to have $511 more convergence in the 1990s – 23 percent of the mean of the absolute value of 1990s income convergence and 5.5 percent of the entire income gap. The change in educational attainment has larger coefficients, which is to be expected because changes in human capital lead to changes in economic performance (and vice versa).

Indian Casinos

Casinos with few slot machines are associated with divergence of incomes, while casinos with many slot machines are in the same places where income convergence in the 1990s occurred. At the mean of slot machines per American Indian resident, the opposing effects offset (1125 – (0.89)*1463 = $177 of convergence). In addition, big casinos may just be a reflection of the economic opportunities of the area, rather than a result that says that casinos are the future of tribal economies.

Location and Other Control Variables

As anticipated at the end of the income gap section, distance is not statistically associated with convergence of incomes. High amenities are associated with divergence, while amenities are, on balance, a factor that is correlated with convergence. Also, fee simple land ownership, public administration employment, size of reservation and knowledge of traditional language are not important predictors of 1990s convergence.

Compared to the income gap specifications, there is more evidence in these regressions that mandatory Public Law 280 reservations experienced a greater degree of economic convergence in the 1990s than other reservations (even controlling for regional effects). The results are generally marginally statistically insignificant,[66] but have a consistent range of coefficient estimates (between -1250 and -1600). The question of the empirical merit of the state jurisdiction, therefore, lies with exploring the relationship of mandatory Public Law 280 with other investment on reservations.

[66] The coefficients in specifications (1)-(4) have p-values of 0.129, 0.168, 0.202, and 0.077.

As I control casino investment on American Indian reservations, the MANPL280 coefficients cannot be taken as evidence of better incentives to invest in casinos or even investment that is correlated with casinos. For this reason, the evidence presented in this paper indicates that mandatory Public Law 280 may influence incentives to invest beyond that which many have anticipated. Notably, mandatory Public Law 280 is related to investment that is uncorrelated with casinos. Given the pervasive nature of Indian casino investment in reservation economies, the evidence for the mandatory Public Law 280 hypothesis is strong and worth further investigation.

CHAPTER 8

CONCLUDING REMARKS

American Indian reservations provide a striking example of non-convergence of incomes. In this study, I have assessed the extent to which the non-convergence of American Indian incomes depends on climate, geography, institutions, and windfall wealth in the form of Indian casinos. In general, theoretical explanations with incentives at their core do the best job in explaining why the income gap is so persistent.

First, in line with previous work on state courts and American Indian incomes, I find that state court jurisdiction on American Indian reservations promotes convergence of reservation incomes to incomes in adjacent counties. Complementing prior research on institutions-driven growth, this finding is evidence that institutions and credible governance matter to economic growth and convergence. Specifically, a stable investment climate is important.

Second, there is no clear evidence that casino wealth causes economic growth and convergence to tribes. While big casinos are associated with small and shrinking income gaps, smaller casinos are associated with a larger income gap. This finding highlights the fact that the role of windfalls in economic growth is more complex than "windfall equals growth," and the findings presented here are similar in spirit to work on the resource curse.

In addition, finding that Indian casinos have an overall ambiguous effect on American Indian incomes contributes to the public debate on the costs and benefits of

Indian casinos. Some previous academic studies have suggested that these casinos are a "new buffalo" or means of sustenance for tribes. The results of this study point out that this may not be the case. In fact, the core point of this study is that rule of law and incentives to invest in forward looking enterprise are integral to economic performance. For this reason, a careful examination of the motivation to build an Indian casino is needed to assess the nature of the interaction between Indian casino investment and economic growth and convergence.

Finally, I find that educational differences between tribes and their adjacent counties appear to be responsible for a substantial portion of the income gap. Thus, getting the incentives right for reservation Indians to invest in human capital is consistent with the hypothesis that increases in education levels will do much to close the per capita income gap. My estimates predict that a policy that would increase educational attainment halfway to the U.S. average (from 70 to 80 percent high school graduates) will decrease the per capita income gap by over 10 percent. This human capital result is another in a long line of results that demonstrate that human capital matters for economic well-being.

The lessons from this study can be applied broadly. For one, this study's results provide additional evidence that appropriate institutions are essential to economic growth. Although an increasing number of studies point in this direction, most of these studies investigate differences across countries, where idiosyncratic factors confound the estimation. Therefore, those who undertake international growth and convergence studies may want to look to the American Indian reservation setting for additional data

and answers to lingering questions in the literature. This is especially true for the study of the resource curse, the importance of veto players and other institutions that enforce credible governance.

Future research on the institutional environment of American Indian reservations bears promise for improving the present understanding of the decisions facing tribal members and to inform the general literature on economic growth and convergence. As better measures for the quality of tribal governments, the persistence and importance of traditional institutions and the state of health across reservations become available, future work will be able to more clearly identify why the reservation-adjacent county income gap is so persistent.

Ultimately, the results, implications, and outlook of this study are at the center of the debate on what causes economic growth and convergence of incomes on American Indian reservations and across the globe. New insight arises from the work done here about the role of investment-enhancing incentives in promoting economic growth. Throughout this analysis, one message rings true: institutions, forward-looking investment, and innovation are the keys to understanding non-convergence of incomes.

REFERENCES CITED

Acemoglu, D., S. Johnson, et al. (2005). "Income and Democracy." *NBER Working Paper No. 11205*.

Alesina, A. and D. Rodrik (1994). "Distributive Politics and Economic Growth." *Quarterly Journal of Economics* 109: 465-90.

American Gaming Association. (2005, December 13, 2005). "American Gaming Association: Fact Sheets: Statistics." Retrieved December 13, 2005, from http://www.americangaming.org/Industry/factsheets/statistics_detail.cfv?id=7.

Anderson, T. L. (1995). *Sovereign Nations or Reservations: An Economic History of American Indians*. San Francisco, Pacific Research Institute for Public Policy.

Anderson, T. L. and D. Lueck (1992). "Agricultural Development and Land Tenure in Indian Country". *Property Rights and Indian Economies*. T. L. Anderson. Lanham, MD, Rowman and Littlefield Publishing.

Anderson, T. L. and D. P. Parker (2005). "Property Rights and Prosperity on American Indian Reservations". *Self Determination: The Other Path for Native Americans*. B. Benson and T. Flanagan.

Baden, J., R. Stroup, et al. (1981). "Myths, Admonitions, and Rationality: The American Indian as a Resource Manager." *Economic Inquiry* 19: 132-43.

Barro, R. (1996). "Democracy and Growth." *Journal of Economic Growth* 1: 1-27.

BIA (2005). "Acrages by Agency and Reservation for Calendar Year Ending 2002". N. Parker and T. Cookson, Bureau of Indian Affairs Regional Offices**:** Facsimile transmissions and telephone conversations for land tenure data.

Buchanan, J. M. (1995). "Rent Seeking and Profit Seeking". *The Economic Analysis of Rent Seeking*, International Library of Critical Writings in Economics. 49.

Cookson, T. (2006). "Where Does the 'New Buffalo' Graze?" *Working Paper*.

Cornell, S. and J. Kalt (1992). "Culture and Institutions as Public Goods: American Indian Development as a Problem of Collective Action."". *Property Rights and Indian Economies*. T. L. Anderson. Lanham, MD, Rowman and Littlefield Publishers.

---------- (2000). "Where's the Glue? Institutional and Cultural Foundations of American Indian Economic Development." *Journal of Socio-Economics* 29: 443-470.

Eadington, W. (1999). "The Economics of Casino Gambling." *Journal of Economic Perspectives* 13: 173-192.

Evans, W. N. and J. H. Topoleski (2002). "The Social and Economic Impact of Native American Casinos." *NBER Working Paper No. 9198*.

Fleck, R. K. and F. A. Hanssen (2004). "How Bad Can a Government Be? Neighborhood Constraints and the Quality of National Governments". *Manuscript*, Montana State University.

---------- (2006). "The Origins of Democracy: A Model with Application to Ancient Greece." *Journal of Law and Economics, Forthcoming Spring 2006*.

Gazel, R. C., D. S. Rickman, et al. (2001). "Casino Gambling and Crime: A Panel Study of Wisconsin Counties." *Journal of Managerial and Decision Economics* 22: 65-75.

Grinols, E. L. and D. B. Mustard (2001). "Management and Information Issues for Industries with Externalities: The Case of Casino Gambling." *Journal of Managerial and Decision Economics* 22: 1-3.

---------- (2004). "Casinos, Crime, and Community Costs", University of Georgia University of Illinois.

Gylfason, T. (2001). "Natural Resources, Education, and Economic Development." *European Economic Review* 45: 847-59.

Henisz, W. J. (2000). "The Institutional Environment for Economic Growth." *Economics and Politics* 12: 1-31.

Indian Casinos - 500 Nations. (2005). "Indian Casinos- World's Most Complete Directory!" Retrieved May - November, 2005, from http://www.500nations.com/indian_casinos.asp.

Johnson, R. N. (2005a). "Indian Casinos: Another Tragedy of the Commons?" *Self-Determination: The Other Path for Native Americans*. B. Benson and T. Flanagan.

---------- (2005b). "Do Resource States Do Worse?" *Political Economy Forum on "The Wealth of Nature: Maximixing it or Dissipating it?"* Chico Hot Springs Lodge, Pray, Montana.

Jorgensen, M. (2000). "Bring the Background Forward: Evidence from Indian Country on the Social and Cultural Determinants of Economic Development". *Economics*. Cambridge, MA, Harvard University.

Knack, S. and P. Keefer (1997). "Does Social Capital Have an Economic Payoff? A Cross-Country Investigation." *Quarterly Journal of Economics* 112: 1251-1288.

Leite, C. and J. Weidmann (1999). "Does Mother Nature Corrupt? Natural Resources, Corruption, and Economic Growth." *IMF Working Paper WP/99/85*.

MapQuest. (2005). "MapQuest Driving Directions." Retrieved November 21, 2005, from www.mapquest.com.

Masters, W. A. and M. S. McMillan (2001). "Climate and Scale in Economic Growth." *Journal of Economic Growth* 6: 167-86.

McGranahan, D. A. (1999). "Natural Amenities Drive Population Change". Food and Rural Economics Division Economic Research Services, U.S. Department of Agriculture. Agricultural Economic Report No. 781.

NASA (2005). "Consumer Price Index Deflator." Retrieved November 21, 2005, from http://www1.jsc.nasa.gov/bu2/inflateCPI.html.

NIGC (2005). "Management Contracts." National Indian Gaming Association. Retrieved December 13, 2005, from http://www.nigc.gov/nigc/index.jsp.

North, D. C. (1990). *Institutions, Institutional Change, and Economic Performance*. Cambridge, MA, Cambridge University Press.

North, D. C. and B. R. Weingast (1989). "Constitutions and Commitment: The Evolution of Institutions Governing Public Choice in Seventeenth-Century England." *Journal of Economic History* 49: 803-832.

Persson, T. (2005). "Forms of Democracy, Policy, and Economic Development." *NBER Working Paper No. 11171*.

Sachs, J. D. (2000). "Tropical Underdevelopment." *CID Working Paper*: Center for International Development at Harvard University.

Sachs, J. D. and A. M. Warner (1995). "Natural Resource Abundance and Economic Growth." *NBER Working Paper No. 5398*.

---------- (1997). "Fundamental Sources of Long-Run Growth." *American Economic Review* 45: 184-88.

---------- (2001). "Natural Resources and Economic Development - the Curse of Natural Resources." *European Economic Review* 45: 827-838.

Sala-i-Martin, X. and A. Subramanian (2003). "Addressing the Resource Curse: An Illustration from Nigeria." *NBER Working Paper No. 9804*.

Smith, A. (1776). *The Wealth of Nations*. Chicago, IL, The University of Chicago Press.

Sokoloff, K. L. and S. L. Engerman (2000). "Institutions, Factor Endowments, and Paths of Development in the New World." *Journal of Economic Perspectives* 14: 217-32.

Solow, R. M. (1956). "A Contribution to the Theory of Economic Growth." *Quarterly Journal of Economics* 70: 65-94.

Stroup, R. L. and B. C. Scarborough (2005). "Property Rights, Plunder, and the Resource Curse". *Political Economy Forum on "The Wealth of Nature: Maximizing it or Dissipating it?"* Chico Hot Springs Lodge, Pray, Montana.

Taylor, J. B., M. B. Krepps, et al. (2000). "The National Evidence on the Socioeconomic Impacts of American Indian Gaming on Non-Indian Communities." *American Behavior Scientist*.

Tiebout, C. (1956). "A Pure Theory of Local Expendatures." *Journal of Political Economy* 64: 4164.

Tiller, V. E. V. (1996). *Tiller's Guide to Indian Country: Economic Profiles of Indian Reservations*, BowArrow Publishing Company.

Tornell, A. and P. R. Lane (1999). "The Voracity Effect." *American Economic Review* 89: 22-46.

U.S. Census Bureau. (2000a). "State and County Quickfacts." Retrieved November 21, 2005, from http://quickfacts.census.gov/qfd/index.html.

----------(2000b). "United States - Datasets - American FactFinder." Retrieved November 21, 2005, from http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=DEC&_lang=en&_ts=.

Weil, D. N. (2005). *Economic Growth*. Boston, Addison-Wesley.

APPENDIX A

SUPPLEMENTAL TABLES AND FIGURES

Table 9: Quadratic Specifications for Government Size

Dependent Variables	Reservations		Adjacent Counties	
	99 PCI	89-99 PCI Growth	99 PCI	89-99 PCI Growth
Independent Variables	(1)	(2)#	(3)	(4)#
Constant	3516.57 (1.55)p=0.123	73.93 (2.46)**	21462.77 (9.42)***	62.14 (4.55)***
AI Per Capita Income in 1989	-	-0.01	-	0.00
(in 1999 dollars)	-	(-5.47)***	-	(-5.16)***
Human Capital Variables				
Percent High School Graduates in 1989	136.37 (6.28)***	1.08 (2.92)***	23.69 (0.93)	0.02 (0.19)
Δ in Percent High School Graduates 1989 -1999	119.79 (3.72)***	1.42 (3.70)***	3.56 (0.10)	-0.02 (-0.14)
%Employed in Health in 1989	95.85 (2.19)**	0.80 (1.50)p=0.136	-94.33 (-1.83)*	-0.46 (-1.89)*
Casino Variables				
Casino Dummy	-1567.82 (-2.78)***	-19.01 (-2.99)***	-246.00 (-0.54)	-0.29 (-0.15)
Slot Machines per AI Resident in 1999	1375.97 (2.78)***	22.25 (4.32)***	251.71 (1.14)	-0.38 (-0.43)
Management Contract Dummy	368.04 (0.76)	5.23 (0.86)	-1051.64 (-2.10)**	0.07 (0.03)
Location Variables				
Distance to a city of 1,000,000(in 100s of miles)	-629.20 (-4.79)***	-7.25 (-4.36)***	-969.36 (-7.34)***	-1.82 (-3.39)***
Amenities Scale	183.96 (1.58)p=0.117	0.84 (0.65)	197.60 (2.76)***	-0.52 (-1.85)*
Other Controls				
% Employed in Public Administration in 1989	-266.06 (-1.82)*	-3.17 (-1.90)*	-12.24 (-0.18)	-0.19 (-0.63)
(% in Public Admin. in 1989)-squared	5.89 (1.67)*	0.07 (1.68)*	-0.94 (-0.58)	0.00 (-0.03)
% AI pop. with knowledge of 'other language'	-13.97 (-1.46)p=0.148	-0.06 (-0.46)	1.15 (0.11)	0.04 (1.17)
Mandatory Public Law 280 reservation dummy	1822.16 (1.74)*	24.81 (2.16)**	-1013.96 (-2.25)**	2.39 (1.20)
Percent Fee Simple Land on Reservation	-17.80 (-2.44)**	-0.17 (-1.84)*	-3.95 (-0.54)	-0.02 (-0.55)
R-squared	0.48	0.51	0.56	0.40
F-statistic	10.46	12.21	13.35	4.66
# of observations	127	127	127	127

These estimates were derived from an OLS regression. t-values are indicated in parentheses. *, **, ***, indicate statistical significance at the 10%, 5%, and 1% or better levels, respectively. Marginally statistically insignificant values are indicated by their p-values for $p < 0.20$. # indicates that equations 2 and 4 are specifications on percent income growth, rather than absolute income growth, which is specified in previous regressions.

Table 10: Quadratic Specifications for Slot Machines

Dependent Variables	American Indian Reservations		
	99 PCI	89-99 Absolute PCI Growth	89-99 % PCI Growth
Independent Variables	(1)	(2)	(3)
Constant	880.61 (0.36)	474.85 (0.24)	44.87 (1.52)p=0.131
AI Per Capita Income in 1989 (in 1999 dollars)	- -	-0.35 (-2.11)**	-0.01 (-4.50)***
Human Capital Variables			
Percent High School Graduates in 1989	147.73 (5.43)***	74.41 (2.46)**	1.02 (2.43)**
Change in Percent High School Graduates 1989 -1999	125.75 (3.48)***	101.96 (2.91)***	1.34 (3.29)***
%Employed in Health in 1989	93.51 (2.11)**	72.04 (1.62)p=0.108	0.71 (1.29)
Casino Variables	-	-	-
Slot Machines per American Indian Resident in 1999	420.95 (0.31)	-97.60 (-0.08)	-12.83 (-0.99)
(Slot Machines per AI Resident in 1999) squared	239.94 (0.49)	407.55 (0.95)	10.78 (2.80)***
Management Contract Dummy	57.04 (0.11)	502.97 (1.06)	7.59 (1.23)
Location Variables	-	-	-
Distance to a city of 1 million people (in 100s of miles)	-650.52 (-4.58)***	-483.67 (-3.42)***	-7.60 (-4.48)***
Amenities Scale	233.39 (1.79)*	150.63 (1.23)	1.01 (0.75)
Other Controls			
% Employed in Public Administration in 1989	-63.98 (-2.00)**	-58.42 (-1.85)*	-0.70 (-1.92)*
% AI pop. with knowledge of 'other language'	-13.35 (-1.31)p=0.193	-4.52 (-0.51)	-0.04 (-0.29)
Mandatory Public Law 280 reservation dummy	1681.95 (1.59)p=0.114	1720.73 (1.69)*	24.75 (2.16)**
Percent Fee Simple Land on Reservation	-19.29 (-2.60)**	-9.16 (-1.35)p=0.180	-0.15 (-1.87)*
R-squared	0.44	0.34	0.50
F-statistic	10.49	5.70	24.52
# of observations	127	127	127

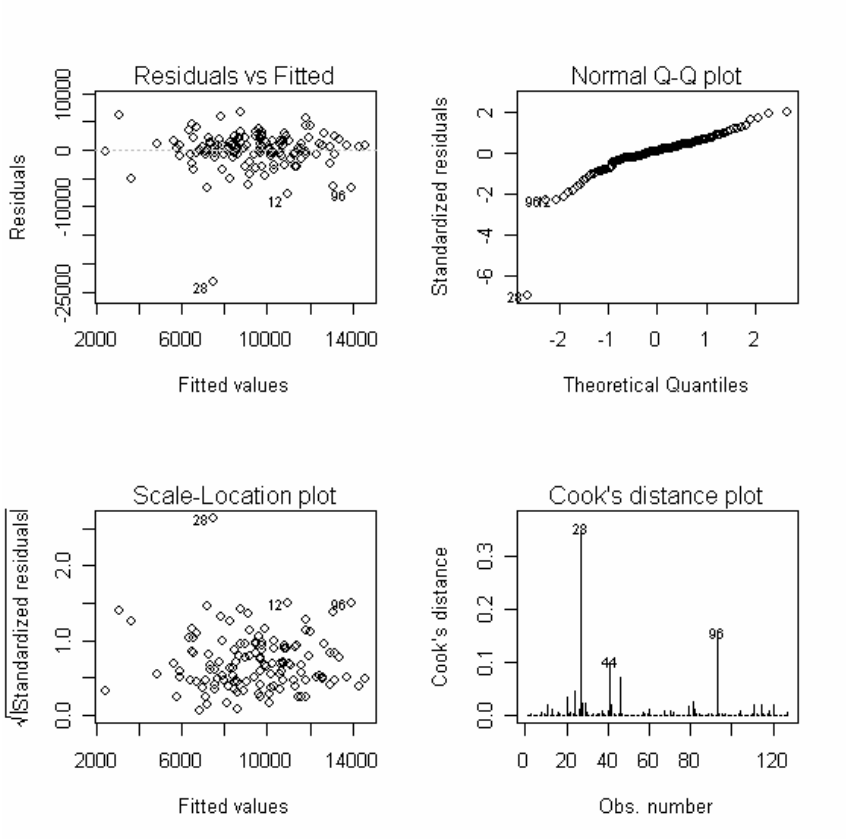
These estimates were derived from an OLS regression. t-values are indicated in parentheses. *, **, ***, indicate statistical significance at the 10%, 5%, and 1% or better levels, respectively. Marginally statistically insignificant values are indicated by their p-values for $p < 0.20$.

Table 11: Sensitivity to California Observations

Dependent Variables	American Indian Reservations		Adjacent Counties	
	99 PCI	89-99 PCI Growth	99 PCI	89-99 PCI Growth
Independent Variables	(1)	(2)#	(3)	(4)#
Constant	2164.84	62.59	21992.50	63.27
	(0.98)	(2.20)**	(9.21)***	(4.75)***
AIINCOME89	-	-0.01	-	0.00
	-	(-5.61)***	-	(-5.24)***
Human Capital Variables				
EDU89	140.62	1.04	17.85	0.01
	(5.61)***	(2.79)***	(0.66)	(0.08)
EDUGROWTH	114.35	1.32	2.70	-0.02
	(3.29)***	(3.35)***	(0.08)	(-0.17)
HEALTH89	78.12	0.70	-84.31	-0.44
	(1.72)*	(1.20)	(-1.72)*	(-1.87)*
Casino Variables				
CASINO99	-1614.50	-20.25	-291.51	-0.41
	(-2.79)***	(-3.13)***	(-0.63)	(-0.21)
SLOTSPIND99	1475.68	23.88	269.21	-0.30
	(3.05)***	(4.65)***	(1.32)p=0.190	(-0.31)
CONTRACT	208.89	3.96	-989.03	0.14
	(0.43)	(0.64)	(-1.94)*	(0.07)
Location Variables				
DISTANCE	-720.74	-8.00	-936.03	-1.79
	(-4.95)***	(-4.41)***	(-7.23)***	(-3.25)***
AMSCALE	97.21	0.48	256.72	-0.40
	(1.07)	(0.41)	(3.01)***	(-1.04)
HIGHAMENITIES	-49.61	-0.73	-52.44	-0.21
	(-1.69)*	(-2.13)**	(-2.17)**	(-1.98)**
Other Controls				
PUBADMIN89	-9.95	-0.05	-2.23	0.04
	(-1.06)	(-0.40)	(-0.20)	(0.98)
PEROLANG89	999.16	20.56	-518.55	3.25
	(1.23)	(2.48)**	(-1.11)	(1.41)p=0.162
MANPL280	-14.25	-0.14	-5.38	-0.02
	(-1.96)*	(-1.54)p=0.126	(-0.76)	(-0.65)
PERFEE	2053.71	9.35	-1320.76	-2.42
	(1.18)	(0.50)	(-1.44)p=0.154	(-0.48)
R-squared	0.47	0.50	0.56	0.40
F-statistic	9.34	11.26	13.16	4.93
# of observations	127	127	127	127

These estimates were derived from an OLS regression. t-values are indicated in parentheses. *, **, ***, indicate statistical significance at the 10%, 5%, and 1% or better levels, respectively. Marginally statistically insignificant values are indicated by their p-values for $p < 0.20$. # indicates that equations 2 and 4 are specifications on percent income growth, rather than absolute income growth, which is specified in previous regressions.

Figure 1: Residual Diagnostic Plots for Income Gap



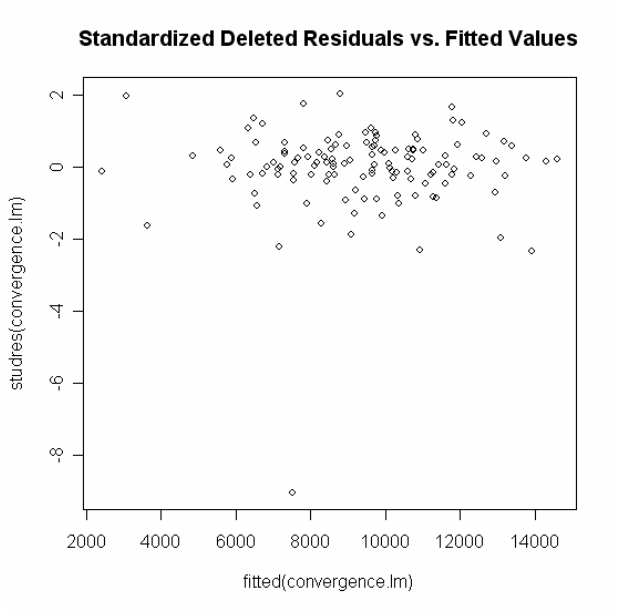
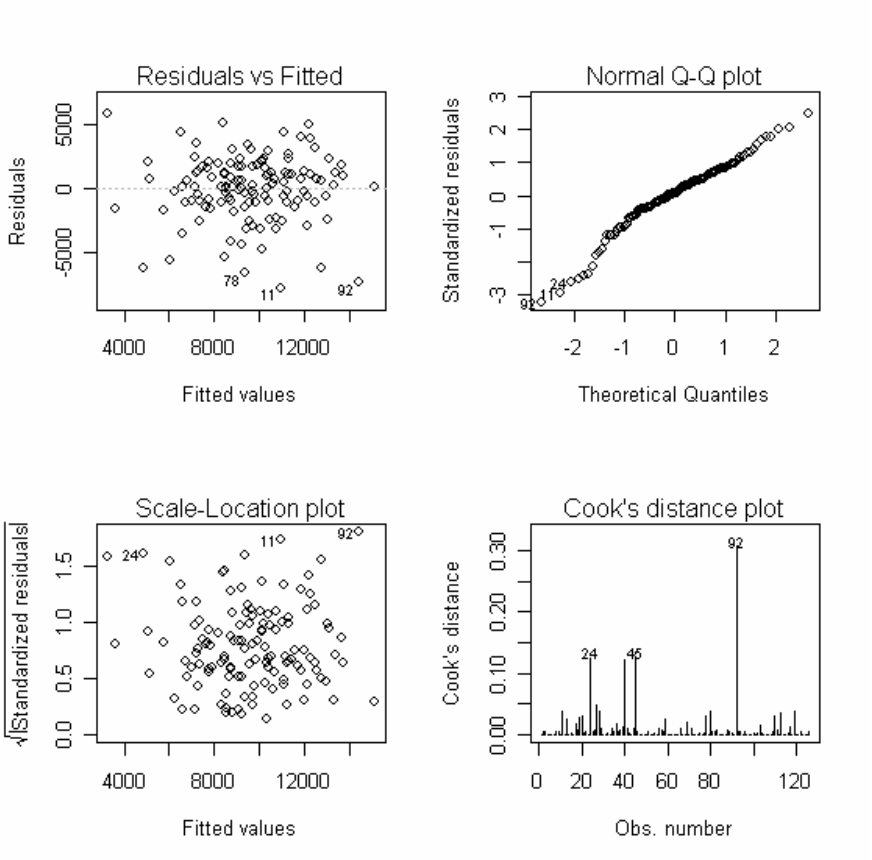


Figure 2: Residual Plots for Income Gap After Dropping Barona Obs.



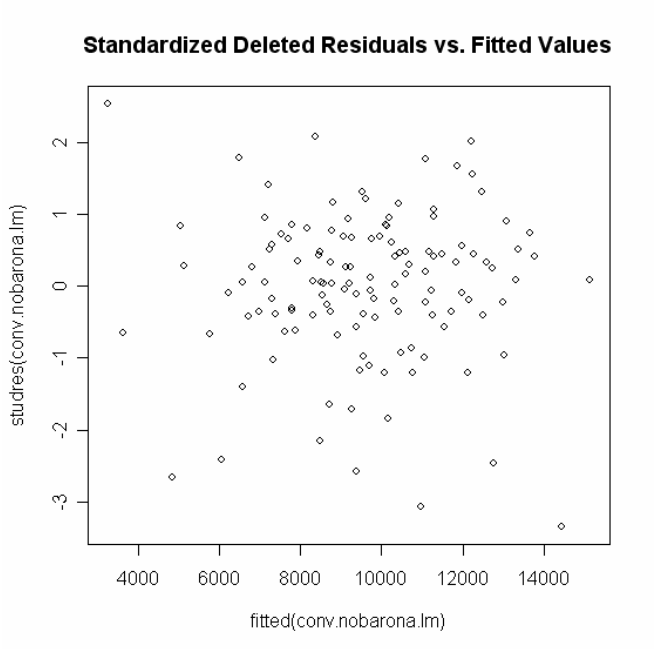


Table 12: Sensitivity to Dropping Barona, CA Observation

Dependent Variables	AI Reservations		Adjacent Counties		Differences	
	99 PCI	89-99 PCI Growth	99 PCI	89-99 PCI Growth	99 Income Gap	89-99 PCI Conv.
Independent Variables	(1)	(2)#	(3)	(4)#	(5)	(6)
	-	-	-	-	-	-350.87
INCOMEGAP89	-	-	-	-	-	(-3.92)***
	-	-10.64	-	-	-	-
AIINCOME89	-	(-6.81)***	-	-	-	-
	-	-	-	-2.05	-	-
ADJINCOME89	-	-	-	(-5.12)***	-	-
Human Capital						
	129.97	1.02	24.71	0.02	-105.26	-51.45
EDU89	(4.74)***	(2.32)**	(0.95)	(0.19)	(-2.62)***	(-1.64)p=0.10
	97.31	1.18	4.88	-0.02	-92.43	-80.31
EDUGROWTH	(3.20)***	(3.41)***	(0.14)	(-0.14)	(-1.86)*	(-2.19)**
	83.20	0.67	-93.96	-0.46	-177.16	-142.23
HEALTH89	(2.10)**	(1.32)p=0.19	(-1.83)*	(-1.89)*	(-2.88)***	(-2.51)**
Casino Variables						
	-1382.66	-17.37	-218.23	-0.27	1164.44	798.79
CASINO99	(-2.94)***	(-3.00)***	(-0.48)	(-0.14)	(1.79)*	(1.64)p=0.10
	1706.55	25.92	226.23	-0.38	-1480.32	-1611.95
SLOTSPIND99	(3.75)***	(5.65)***	(1.09)	(-0.42)	(-2.89)***	(-3.15)***
	228.47	3.62	-1038.72	0.07	-1267.19	-708.60
CONTRACT	(0.43)	(0.57)	(-2.10)**	(0.03)	(-1.79)*	(-1.34)p=0.18
Location						
	-607.52	-7.13	-960.32	-1.82	-352.79	-19.30
DISTANCE	(-5.84)***	(-4.81)***	(-7.47)***	(-3.41)***	(-2.62)***	(-0.16)
	94.68	-0.07	195.68	-0.52	101.00	-54.46
AMSCALE	(1.24)	(-0.08)	(2.70)***	(-1.85)*	(0.91)	(-0.61)
Other Controls						
	-40.52	-0.57	-44.65	-0.20	-4.13	4.07
PUBADMIN89	(-1.80)*	(-1.96)*	(-1.93)*	(-1.93)*	(-0.14)	(0.15)
	-13.55	-0.06	1.43	0.04	14.98	9.67
PEROLANG89	(-1.44)p=0.15	(-0.48)	(0.13)	(1.16)	(1.09)	(1.00)
	875.62	14.89	-1010.29	2.37	-1885.91	-735.30
MANPL280	(1.63)p=0.11	(2.15)**	(-2.23)**	(1.15)	(-3.35)***	(-1.26)
	-13.80	-0.13	-4.20	-0.02	9.59	2.20
PERFEE	(-2.14)**	(-1.56)p=0.12	(-0.58)	(-0.56)	(1.08)	(0.28)
R-squared	0.60	0.64	0.55	0.40	0.43	0.46
F-statistic	13.46	11.89	13.75	4.98	7.76	3.45
# of observations	126	126	126	126	126	126

These estimates were derived from an OLS regression with robust standard errors. Robust t-values are indicated in parentheses. *, **, ***, indicate statistical significance at the 10%, 5%, and 1% or better levels, respectively. Marginally statistically insignificant values are indicated by their p-values for $p < 0.20$. # indicates that equations 2 and 4 are specifications on percent income growth, rather than absolute income growth, which is specified in previous regressions.

Table 13: Sensitivity to Clustered Standard Error Estimation

Dependent Variables	AI Reservations		Adjacent Counties		Differences	
	99 PCI	89-99 PCI Growth	99 PCI	89-99 PCI Growth	99 Income Gap	89-99 PCI Convergence
Indep.Vars	(1)	(2)#	(3)	(4)#	(5)	(6)
	-	-	-	-	-	-350.87
INCOMEGAP89	-	-	-	-	-	(-3.61)***
	-	-10.64	-	-	-	-
AIINCOME89	-	(-17.26)***	-	-	-	-
	-	-	-	-2.05	-	-
ADJINCOME89	-	-	-	(-4.48)***	-	-
Human Capital						
	129.97	1.02	24.71	0.02	-105.26	-51.45
EDU89	(5.06)***	(2.65)**	(1.02)	(0.27)	(-2.44)**	(-1.65)^
	97.31	1.18	4.88	-0.02	-92.43	-80.31
EDUGROWTH	(2.74)***	(3.69)***	(0.14)	(-0.14)	(-1.82)*	(-2.18)**
	83.20	0.67	-93.96	-0.46	-177.16	-142.23
HEALTH89	(3.33)***	(1.98)*	(-1.84)*	(-1.59)^	(-2.69)**	(-1.89)*
Casino Variables						
	-1382.66	-17.37	-218.23	-0.27	1164.44	798.79
CASINO99	(-3.01)***	(-3.38)***	(-0.57)	(-0.16)	(1.80)*	(1.86)*
	1706.55	25.92	226.23	-0.38	-1480.32	-1611.95
SLOTSPIND99	(4.30)***	(10.65)***	(0.84)	(-0.53)	(-3.02)***	(-5.41)***
	228.47	3.62	-1038.72	0.07	-1267.19	-708.60
CONTRACT	(0.47)	(0.63)	(-2.17)**	(0.04)	(-1.83)*	(-1.30)
Location						
	-607.52	-7.13	-960.32	-1.82	-352.79	-19.30
DISTANCE	(-7.09)***	(-5.99)***	(-5.93)***	(-3.66)***	(-2.16)**	(-0.15)
	94.68	-0.07	195.68	-0.52	101.00	-54.46
AMSCALE	(1.77)*	(-0.08)	(2.25)**	(-2.10)**	(0.90)	(-0.82)
Other Controls						
	-40.52	-0.57	-44.65	-0.20	-4.13	4.07
PUBADMIN89	(-1.61)^	(-2.33)**	(-1.80)*	(-1.84)*	(-0.19)	(0.24)
	-13.55	-0.06	1.43	0.04	14.98	9.67
PEROLANG89	(-1.43)^	(-0.57)	(0.14)	(1.25)	(1.32)^	(1.17)
	875.62	14.89	-1010.29	2.37	-1885.91	-735.30
MANPL280	(3.75)***	(5.32)***	(-2.17)**	(1.85)*	(-4.31)***	(-1.94)*
	-13.80	-0.13	-4.20	-0.02	9.59	2.20
PERFEE	(-2.36)**	(-1.66)^	(-0.59)	(-0.53)	(1.15)	(0.34)
R-squared	0.60	0.64	0.55	0.40	0.43	0.46
F-statistic	23.07	55.15	28.59	8.16	15.83	20.55
# of observations	126	126	126	126	126	126

These estimates were derived from an OLS regression with robust standard errors, clustered by state. The regressions are run on the sample without the Barona, CA observation. Robust t-values are indicated in parentheses. ^, *, **, ***, indicate statistical significance at the 20%, 10%, 5%, and 1% or better levels, respectively. # indicates that equations 2 and 4 are specifications on percent income growth, rather than absolute income growth, which is specified in previous regressions.

Table 14: Estimation of 1989 Income Gap

Independent Variables	(1)	(2)#	(3)	(4)#
Constant	14674.63 (6.23)***	15363.76 (4.79)***	8163.25 (4.52)***	10565.00 (5.07)***
INCOMEGAP79	- -	- -	0.58 (8.00)***	0.52 (-2.44)**
EDU89	- -	- -	-27.36 (-1.20)	-53.81 (-2.44)**
EDUGROWTH90S	- -	- -	19.41 (0.80)	-8.62 (-0.36)
Human Capital Variables				
EDU79	-81.31 (-2.47)**	-87.52 (-2.61)**	- -	- -
EDUGROWTH80S	-45.35 (-1.61)p=0.114	-47.94 (-1.58)p=0.120	- -	- -
HEALTH89	-139.08 (-1.07)	-72.92 (-0.55)	-71.15 (-1.66)*	-57.86 (-1.48)p=0.142
Casino Variables				
CASINO99	602.73 (0.85)	447.69 (0.48)	330.00 (0.75)	335.55 (0.68)
SLOTSPIND99	-288.91 (-0.41)	138.02 (0.23)	295.70 (0.92)	404.82 (1.14)
CONTRACT	284.95 (0.22)	-181.29 (-0.16)	-885.86 (-1.82)*	-764.37 (-1.45)p=0.151
Location Variables				
DISTANCE	-394.77 (-1.72)*	-469.66 (-1.54)p=0.129	-516.08 (-3.56)***	-472.86 (-2.72)***
AMSCALE	282.43 (2.35)**	10.35 (0.05)	80.69 (1.17)	17.49 (0.16)
Other Controls				
PUBADMIN89	16.63 (0.33)	38.39 (0.56)	5.71 (0.23)	11.40 (0.47)
PEROLANG89	-7.58 (-0.36)	-0.17 (-0.01)	4.56 (0.58)	-0.57 (-0.07)
MANPL280	-1622.14 (-2.12)**	-131.93 (-0.07)	-1698.43 (-3.08)***	-1028.74 (-1.40)p=0.164
PERFEE	18.87 (1.78)*	12.68 (0.85)	6.27 (0.74)	-1.22 (-0.14)
R-squared	0.35	0.50	0.64	0.69
F-statistic	3.74	3.84	16.16	13.21
# of observations	73	70	121	120

These estimates were derived from an OLS regression with robust standard errors. The regressions are run on the full sample. Robust t-values are indicated in parentheses. *, **, ***, indicate statistical significance at the 10%, 5%, and 1% or better levels, respectively. Marginally statistically insignificant values are indicated by their p-values for p < 0.20. # the regressions in columns (2) and (4) are run with robustness control variables.

Table 15: Sensitivity of Income Gap Estimation to Regional Controls

Independent Variables	(1)	(2)	(3)
Constant	19510.48 (4.89)***	20493.24 (5.70)***	20479.67 (5.59)***
Human Capital Variables			
EDU89	-119.66 (-2.81)***	-116.68 (-2.96)***	-110.49 (-2.78)***
EDUGROWTH	-108.78 (-2.04)**	-112.70 (-2.27)**	-97.13 (-2.06)**
HEALTH89	-158.49 (-2.59)**	-150.65 (-2.51)**	-149.41 (-2.48)**
Casino Variables			
CASINO99	1331.16 (1.79)*	977.82 (1.37)p=0.174	721.40 (1.14)
SLOTSPIND99	-1168.46 (-2.20)**	-1036.56 (-2.05)**	-1234.42 (-2.60)***
CONTRACT	-1243.61 (-1.72)*	-1470.92 (-2.09)**	-1454.97 (-2.02)**
Location Variables			
DISTANCE	-264.79 (-1.51)p=0.134	-415.10 (-2.23)**	-508.66 (-3.22)***
AMSCALE	165.54 (1.31)p=0.192	27.59 (0.21)	74.30 (0.63)
Other Controls			
PUBADMIN89	0.14 (0.00)	11.75 (0.35)	-2.11 (-0.07)
PEROLANG89	7.41 (0.51)	6.64 (0.47)	7.82 (0.57)
MANPL280	-1444.88 (-1.68)*	-1397.08 (-1.64)p=0.103	-962.59 (-1.42)p=0.159
PERFEE	7.78 (0.79)	4.29 (0.42)	3.13 (0.34)
ACRES (100,000s)	37.17 (1.32)p=0.190	26.58 (0.98)	30.66 (1.13)
R-squared	0.35	0.37	0.48
F-statistic	7.48	8.22	8.66
# of observations	127	127	126

These estimates were derived from OLS regressions with robust standard errors. The regressions are run on the full sample. Robust t-values are indicated in parentheses. *, **, ***, indicate statistical significance at the 10%, 5%, and 1% or better levels, respectively. Marginally statistically insignificant values are indicated by their p-values for $p < 0.20$. Column (1) contains a dummy variable for California, (2) contains dummy variables for california and eastern reservations, (3) includes the dummies in (2) while dropping the Barona, CA. observation.