

**The Effects of Legal Institutions on Access to Credit:
Evidence from American Indian Reservations**

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Abstract

This paper examines the relationship between credit markets and legal institutions by exploiting exogenous variation in jurisdiction over debt contracts on American Indian reservations. The variation is due to federal legislation, passed in 1953, giving states jurisdiction on some reservations while tribes retained their jurisdiction on other reservations. Based on evidence from historical and modern data, state jurisdiction increased per capita credit for American Indians, and their probability of having a home loan application accepted, by over 50 percent. The sovereignty that tribes have struggled long and hard to retain appears to be a liability for Native Americans seeking loans.

JEL classifications: K40, K12, G21

Key words: Legal institutions, contract enforcement, credit, American Indians

I. Introduction

Credit markets are inextricably linked to legal institutions because those institutions set the parameters for the enforcement of debt contracts. A widely cited series of papers on law and finance provides empirical evidence for this link across countries (see La Porta et al. 2008). Controlling for other variables such as income, it shows that countries under civil law have smaller credit markets when compared to those under common law. A reason for the difference, according to the evidence, is that creditor protection tends to be stronger under common law.¹

This paper also examines the relationship between credit markets and legal institutions, but does so with data from American Indian reservations and the legal system that governs contracting thereon. On some reservations tribal judiciaries have exclusive jurisdiction over most criminal offenses and civil suits, including debt contracts, involving American Indians. On other reservations state legal systems (which are anchored in the common law) have jurisdiction. The variation is due to Public Law 280, which was implemented during the 1950s and 1960s and gave states jurisdiction on some reservations without the consent of affected tribes.

The cross-reservation variation is similar to the cross-country variation in many ways. Approximately 30 percent of the countries studied by La Porta et al. (2008) are under common law compared to 40 percent of reservations under state jurisdiction based on common law. Also, just as cross-country differences are plausibly exogenous because the legal institutions were transmitted through conquest and colonization, the variation across reservations is also largely exogenous. As described in section II, the imposition of state jurisdiction on some reservations was part of a broader federal policy to “assimilate” reservation Indians. The selection of tribes allowed to retain their jurisdiction was determined by U.S. history and geography rather than by the relative economic conditions of reservations. In fact, the data show no pre-P.L. 280 difference in the mean per capita incomes of reservations put under state jurisdiction and those retaining tribal jurisdiction (see table 1).

Relative to cross-country comparisons, however, the reservation setting provides a better laboratory for testing the effects of legal institutions. One reason is that P.L. 280 was not concurrent with a bundle of other interventions. For example, the law did not change reservation land tenure, it did not convey regulatory or taxing power to states, and it was not accompanied

¹ The La Porta et al. explanation is consistent with studies from within the United States that find a positive relationship between credit access and the strength of creditor protections at the state level (see, e.g., Alston 1984, Gropp et. al. 1997, Lin and White 2001, Pence 2006).

by educational interventions. By contrast, the imposition of legal systems across countries was concurrent with a host of other colonial policies (Klerman et. al. forthcoming). Reservations are also a better laboratory because credit on reservations can be compared before and after the switch in legal systems.² Moreover, the credit outcomes of American Indians living just off reservations, and those of non-Indians living on reservations, can be used to help control for culture, geography, and other factors that are often confounded with institutions at the national level.³

Some of the legal and sociology literature argues that the loss of sovereignty disadvantaged tribes, but the economics literature suggests that tribal sovereignty can be both an asset and a liability.⁴ In a general context, North (1981) and Alesina and Spolaore (2003) point out that sovereignty is an asset because it allows rules, laws, and compliance procedures befitting local culture to evolve without interference from outsiders. These researchers also note that sovereignty can be a liability if domestic governments cannot effectively provide public goods, including a reliable legal infrastructure. Cornell and Kalt (2000) study the same tradeoffs in a Native American context. They argue that sovereignty is an asset on Indian reservations because it lets tribes resolve disputes in ways that match indigenous norms of legitimacy. But they also find that sovereignty can be a liability if tribes cannot create and maintain reliable political and legal institutions.⁵

The empirical tests in this paper reinforce anecdotal evidence that tribal jurisdiction is a liability for individual Native Americans seeking credit. For example, the Bureau of Indian Affairs (1987) states that “Lending institutions are reluctant to make loans to Indian operators because foreclosure procedures may lie with tribal jurisdictions.” Consistent with these claims, the evidence in section III suggests that state jurisdiction caused a sharp increase in per capita credit shortly after P.L. 280 was implemented. The data in section III also indicate that large differences in mortgage credit persist today across the two types of reservations.

² Panel data on credit were collected from 1951-1970 by the Bureau of Indian Affairs. By contrast, systematic data on country-level credit before and after colonization are largely unavailable.

³ Non-Indians on reservations are a control because non-Indian versus non-Indian debt contract disputes are not subject to tribal jurisdiction.

⁴ Goldberg-Ambrose (1997, ix-x) refers to the federal legislation as a “calamitous event” and argues that tribes put under state jurisdiction had to “struggle even harder to sustain their governing structures, economies, and cultures.”

⁵ Similarly, Haddock and Miller (2006, 194) argue that tribal sovereignty can be a liability because it threatens “those who might most aid impoverished Indians, namely, potential investors.”

Sections IV and V try to ascertain why credit markets are larger under state jurisdiction by examining two plausible explanations. The first is that creditor rights are systematically weaker under tribal jurisdiction, and the second is that creditor rights are simply less certain to lenders under tribal jurisdiction. Anecdotal support for either explanation can be found in surveys of lenders - and it is possible that both factors are important - but the policy relevance of this study is clearer if the dominant cause can be identified. The evidence in section V, which is based on the outcomes of individual home loan applications, is more consistent with uncertainty being the key explanation.⁶ Uncertainty is high under tribal jurisdiction because there is much less written law and much less precedent to support that which is written (Cooter and Fikentscher 2008).⁷

The paper concludes with two broad comments. First, I discuss how tribes might be able to enhance the functioning of credit markets without submitting to state jurisdiction. The remedies are nuanced, especially because the sparse populations on reservations give tribal courts few opportunities to quickly build precedent.⁸ Second, I comment on the relevance of the findings to indigenous territories outside of the U.S., such as those in Bolivia, that are under the jurisdiction of indigenous courts.

II. The Imposition of State Jurisdiction

The main doctrine governing tribal sovereignty comes from *Cherokee Nation v. Georgia* (30 U.S. 1 [1831]). In that case, the Supreme Court ruled that a tribe is “a distinct political society separated from others, capable of managing its own affairs and governing itself,” but also that reservations are “domestic dependent nations” rather than foreign states. Under this doctrine, tribal authority to create and enforce laws is exclusive unless the federal government exercises its “guardian” power by extending federal or state jurisdiction to reservations.

⁶ By contrast, the cross-county literature comparing credit under common and civil law finds that the larger credit markets under common law are due to stronger creditor rights and debt enforcement (see Djankov et. al 2007; 2008).

⁷ Cooter and Fikentscher note that written commercial laws are absent on some reservations and legal codes are often not available in public places when they exist. Where there is precedent, “tribal judges seldom document their decisions in writings that outsiders can access” (p. 31). The emphasis on uncertainty is also supported by a survey of non-Indian lenders concluding that many think that “Tribal governments had not developed or clearly defined the legal infrastructure for the enforcement of contracts” (Native American Lending Study 2001, 24).

⁸ Only four reservations had American Indian populations exceeding 10,000 in 2000. Aside from the Navajo Nation, with a population of 174,847, the next most populated reservation had a population of only 14,255.

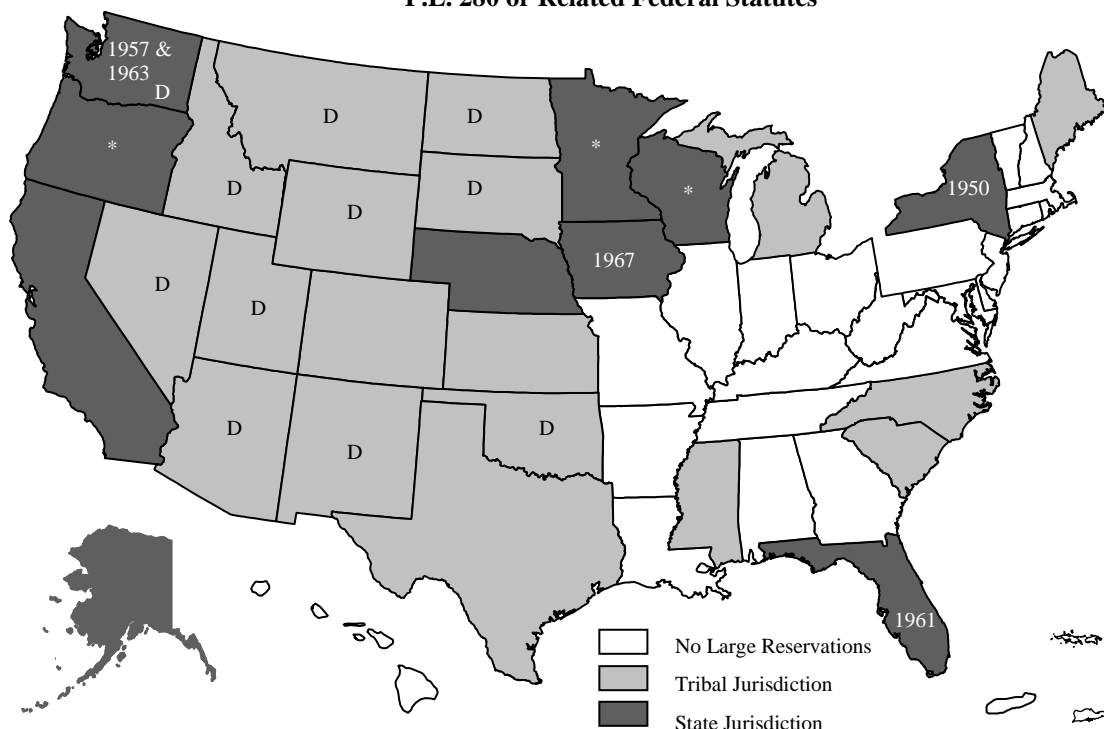
Public Law 280 is the main piece of U.S. legislation authorizing state jurisdiction over Indian reservations. P.L. 280 was passed in 1953 during the height of the ‘termination era’ of federal policy towards Indians extending roughly from the mid-1940s to the mid-1960s. During this period U.S. policy was geared towards the goal of placing reservation Indians under the same laws as other U.S. citizens as rapidly as possible (see Getches et. al. 1998).

P.L. 280 can be viewed as a step towards achieving this goal. It required that jurisdiction over major criminal offenses committed on reservations be transferred from the federal government to the state containing the reservation land. P.L. 280 also transferred jurisdiction over minor criminal offenses and over civil disputes from tribes to states. The key difference for the purpose of this study is that non-Indian creditors can use state courts to enforce payment from Indian debtors in P.L. 280 states. However, this transfer of civil jurisdiction to states was apparently not the primary motivation of P.L. 280. Goldberg-Ambrose (1997, p. 50) argues that Congress was motivated to pass the burden of federal jurisdiction on to states and that the extension of civil jurisdiction was an “afterthought in a measure aimed primarily at bringing law and order to the reservations . . .”

P.L. 280 initially mandated that the transfer apply to most reservations located in Alaska, California, Minnesota, Nebraska, Oregon, and Wisconsin. These states are known as the “mandatory” P.L. 280 states because Congress, not the state legislatures, initiated the transfer. All states were eventually given the option to assume P.L. 280 jurisdiction through legislative action and some exercised this option. Figure 1 shows the states that ultimately assumed jurisdiction over contracts between private parties (including debt contracts) along with the relevant dates for optional states.⁹ Some reservations within Minnesota, Oregon, and Wisconsin were excluded from P.L. 280 and therefore retained tribal jurisdiction.

⁹ The jurisdictional status caused by P.L. 280 is lasting and cannot be undone by tribal actions alone. In 1968, Congress amended P.L. 280 to require tribal consent but no tribes consented thereafter. As figure 1 shows, the final state to assume jurisdiction was Iowa in 1967.

**Figure 1:
States with Jurisdiction over Debt Contracts as Conferred by
P.L. 280 or Related Federal Statutes**



Notes: (1) Dates indicate when the optional states passed the relevant legislation; the states with dark shading lacking dates are the mandatory P.L. 280 states. (2) Congress passed pre-P.L. 280 legislation that transferred civil jurisdiction to New York state in 1950. (3) * indicates that some reservations within the state retained tribal jurisdiction. (4) The state of Washington assumed jurisdiction with legislation in 1957 and 1963. (5) The white states represent states lacking federal reservations with American Indian populations of 250 or greater in 1999. (6) The 'D' indicates the state had a constitutional disclaimer over Indian reservations. The source is Anderson and Parker (2008), Table 1, and the references given therein. Note that some of the gray states assumed criminal jurisdiction over some reservations through P.L. 280 or related federal legislation.

Why were the six mandatory states chosen for state jurisdiction and why were some reservations within these states exempted? The variation across states is explained by the presence or absence of disclaimers over Indian Country in state constitutions. Congressional records indicate that lawyers advising Congress at the time thought that the disclaimers would exclude a legal transfer of jurisdiction to states. The states with constitutional disclaimers when P.L. 280 was passed are indicated by a 'D' in figure 1 and were Arizona, Idaho, Montana, Nevada, New Mexico, North Dakota, Oklahoma, South Dakota, Utah, Washington, and Wyoming.¹⁰ These disclaimers were required by the federal government as prerequisites to gaining statehood for any state not part of the Union as of 1881 (Wilkins 2002).¹¹

¹⁰ The disclaimer states did have the option to assume jurisdiction over reservations without tribal consent but were advised that they would first need to go through the costly political process of amending their constitutions.

Why were the remaining non-disclaimer states not included in P.L. 280 and why were some reservations within Minnesota, Oregon, and Wisconsin exempted? In the case of Kansas, 1940 legislation had already given the state jurisdiction over criminal offenses on its reservations (Getches et. al. 1998). Michigan and North Carolina already had a long tradition of asserting jurisdiction over Indian reservations so P.L. 280 legislation may have been redundant (Taylor 1972). Congress specifically exempted some reservations in Minnesota, Oregon, and Wisconsin on the grounds that they had satisfactory law and order (see Anderson and Parker 2008). The remaining unexplained variation is for states that contain only 12 of 327 federally recognized reservations and whose reservations contained 10,261 of the 512,431 American Indians living on reservations in the most recent decennial census of 2000.

Several features of P.L. 280 make it suitable for identifying the effects of legal institutions on credit. First, the law sharply changed the legal systems governing disputes between non-Indian creditors and Indian debtors on some reservations – from a tribal system to a common-law based system more familiar to non-Indians – creating treatment and control reservations. Second, the treatment was staggered over time (see Fig. 1). As shown in Section IV, these features help identify the average treatment effect of state jurisdiction on per capita credit *for the treated areas*.

Additional features of P.L. 280 may allow us to generalize the average treatment effect to the untreated reservations. Importantly, tribes did not self-select state jurisdiction and this reduces the likelihood that the treatment was on those reservations best positioned to benefit. Although Congress did not randomly select states and reservations, the selection criteria did not target reservations that were already economically advantaged. As Table 1 shows there were differences between the means of the treated and untreated groups in terms of the size of Indian populations on reservations and the population densities in adjacent counties.¹² However, these differences did not translate into a difference in mean per capita incomes, which is the more relevant measure of economic welfare prior to P.L. 280.

Washington is the only state to assume the full jurisdiction available under P.L. 280. Other disclaimer states may have followed Washington's lead but 1968 amendments to P.L. 280 required states to get tribal consent prior to assuming jurisdiction (Goldberg-Ambrose 1997).

¹¹ The disclaimers were apparently in response to a U.S. Supreme Court ruling that states could adjudicate crimes committed on reservations by non-Indians against non-Indians. The forced disclaimers were meant to ensure federal jurisdiction over such crimes (Wilkins 2002).

¹² The mean population of reservations retaining tribal jurisdiction is driven upward by the Navajo reservation -- an outlier with an Indian population of 54,989 in 1950 compared to 6,636 for the next most populated reservation.

TABLE 1
CHARACTERISTICS OF RESERVATIONS BEFORE THE PASSAGE OF P.L. 280

	<i>RESERVATIONS RETAINING TRIBAL JURISDICTION</i>		<i>RESERVATIONS PUT UNDER STATE JURISDICTION</i>		t-STAT FOR DIFFERENCE (ABS. VALUE)
		<i>OBS.</i>		<i>OBS.</i>	
AM. INDIAN PER CAPITA INCOME (2008 \$\$) ^a	2,678	50	2,640	31	0.17
AM. INDIAN POPULATION ^b	2,125	73	786	26	1.05
AM. INDIAN POPULATION PER SQUARE MILE ^b	11.06	73	14.29	26	0.42
POP. DENSITY IN ADJACENT COUNTIES ^c	13.50	73	28.91	26	2.86**

Notes: * p<0.1; ** and p<0.05. The data are for all reservations with American Indian populations exceeding 250 in 1999 for which data are reported. The sources are: (a) documents from the files of the BIA's statistician located in the U.S. National Archives repository in Washington D.C. The data are for 1938, which is the closest pre-1950 year for which I have found per-capita income for a large number of reservations; (b) Bureau of Indian Affairs reports for 1950 reservation population located in the National Archives repository; (c) 1950 U.S. Census.

III. Empirical Analysis of the Size of Credit Markets

This section uses two different data sets to evaluate the effect of jurisdiction on the amount of credit extended to American Indians on reservations. The first is constructed from Bureau of Indian Affairs (BIA) credit reports published for most years between 1951 and 1970. The second is constructed from 2004-2008 Home Mortgage Disclosure Act (HMDA) data.

A. Analysis of Historical BIA Credit Reports

The BIA credit reports give reservation credit estimates that are aggregated up to the level of BIA administrative area. There were seven administrative areas providing credit data before and after P.L. 280. Each administrative area is named after its headquarter city.

The data in the BIA credit reports are suitable for empirical analysis because the BIA administrative areas correlate strongly with jurisdiction status. As Table 2 indicates, the Minneapolis administrative area covered reservations in Minnesota, Wisconsin, Michigan, and Iowa and most reservations in this area were put under P.L. 280. The Portland Area covered reservations in Washington, Idaho, and Oregon and most reservations in this area were put under P.L. 280. In contrast, all of the reservations in the Albuquerque, Billings, and Window Rock administrative areas retained tribal jurisdiction because these administrative areas do not cover P.L. 280 states. The Aberdeen administrative area primarily covered reservations retaining tribal jurisdiction with the exception of reservations in the P.L. 280 state of Nebraska. The Phoenix

area covered areas retaining tribal jurisdiction with the exception reservation populations in southeastern California.¹³

TABLE 2
CREDIT OUTCOMES FOR AMERICAN INDIANS AVERAGED OVER 1951 AND 1952
(BY BUREAU OF INDIAN AFFAIRS ADMINISTRATIVE AREA)

	STATES WITH RESERVATIONS COVERED BY ADMIN. AREA	% OF AM. INDIAN POP. PUT UNDER STATE JURISDICTION BY 1970	ANNUAL PER-CAPITA CREDIT FROM CUSTOMARY LENDERS 1951-1952 (IN 2008 \$S)	% OF CREDIT FROM CUSTOMARY LENDERS 1951-1952
<u>AREAS WITH < 50% OF AM. INDIANS PUT UNDER STATE JURISDICTION</u>				
ALBUQUERQUE	NM, CO, UT	0.0	564	68.0
BILLINGS	MT, WY	0.0	642	39.1
WINDOW ROCK	AZ, NM, UT	0.0	303	64.5
ABERDEEN	SD, ND, NE	6.6	825	53.5
PHOENIX	AZ, NV, CA	13.9	907	35.6
<i>UNWEIGHTED MEAN</i>		---	648	52.1
<i>POPULATION WEIGHTED MEAN</i>		---	582	54.9
<u>AREAS WITH >50% OF AM. INDIANS PUT UNDER STATE JURISDICTION</u>				
MINNEAPOLIS	MN, WI, MI, IA	69.3	215	43.3
PORTLAND*	WA, OR, ID	72.1	312	25.5
<i>UNWEIGHTED MEAN</i>		---	263	34.4
<i>POPULATION WEIGHTED MEAN</i>		---	255	36.0

Notes: The credit estimates are from all customary (generally private) lenders and are provided in the Bureau of Indian Affairs' 1951 and 1952 *Annual Report of Credit and Financing*, and are inflation adjusted and presented in 2008 dollars. The Credit Reports also give estimates for BIA administrative areas in Alaska and Oklahoma. Data for these areas are omitted here because most Alaskan Natives and American Indians in Oklahoma are not under the standard federal reservation system that is prevalent throughout the rest of the country. Estimates of American Indian populations by region are provided in a 1950 BIA report of *Enrolled and Resident Populations of Federal Indian Reservations* retrieved from U.S. National Archives Library in Washington D.C. For the column 3 calculations, American Indian populations for 1951 and 1952 are extrapolated by assuming the average annual growth rate from 1950-1960 using 1960 estimates provided in the *Bureau of Indian Affairs United States Indian Population and Land, 1960*. * Signifies that much of the Portland Area population was not put under state jurisdiction until 1963.

Table 2 separates the BIA areas into those covering reservations that are primarily under tribal jurisdiction and those covering reservations that are primarily under state jurisdiction. It compares the pre-P.L. 280 means of two credit-related outcomes. The first is the per capita amount of credit extended to reservation Indians from mainly private, or “customary”, lenders

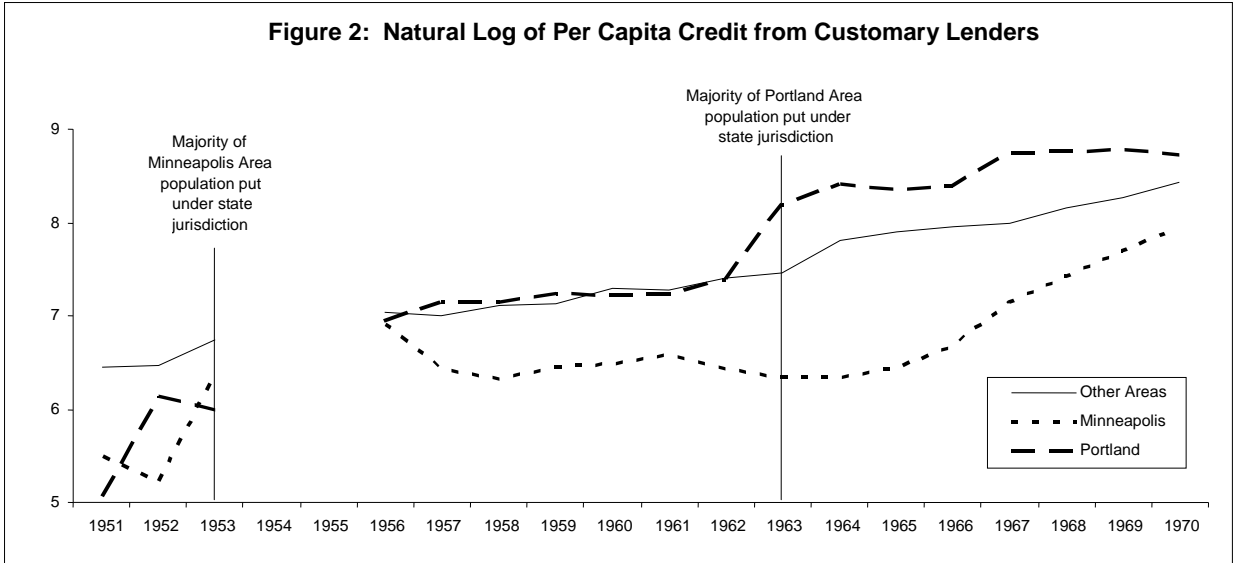
¹³ The Credit Reports also give estimates for BIA administrative areas in Alaska and Oklahoma. Data for these areas are omitted here because most Alaskan Natives and American Indians in Oklahoma are not under the standard federal reservation system that is prevalent throughout the rest of the country. Data for eastern reservations are not reported until estimates for North Carolina and Florida (combined) are first reported in 1958. The reports do not provide credit estimates for the Sacramento administrative area, which included reservations in central California, until 1957 after which the data are combined with the Phoenix area.

(i.e., stores, banks, and auto dealers). This is an estimate of the amount of business, home, and consumer loans extended to Native Americans on reservations from customary lenders. The second outcome is the percentage of total credit received from customary lenders. The denominator in this statistic is the sum of loans from both customary lenders and from the BIA, where the BIA loans were granted to Native Americans who were “unable to receive financing from other lenders or from Indian organizations.”

In Table 2, we see that the BIA areas with only a small percentage of American Indians put under state jurisdiction had healthier credit markets in 1951 and 1952 compared to the BIA areas with a large percentage of American Indians put under state jurisdiction. In other words, the areas that were treated had relatively smaller credit markets prior to treatment. This result holds if we compare means that are weighted or unweighted, where the weights account for the size of American Indian populations across BIA areas.

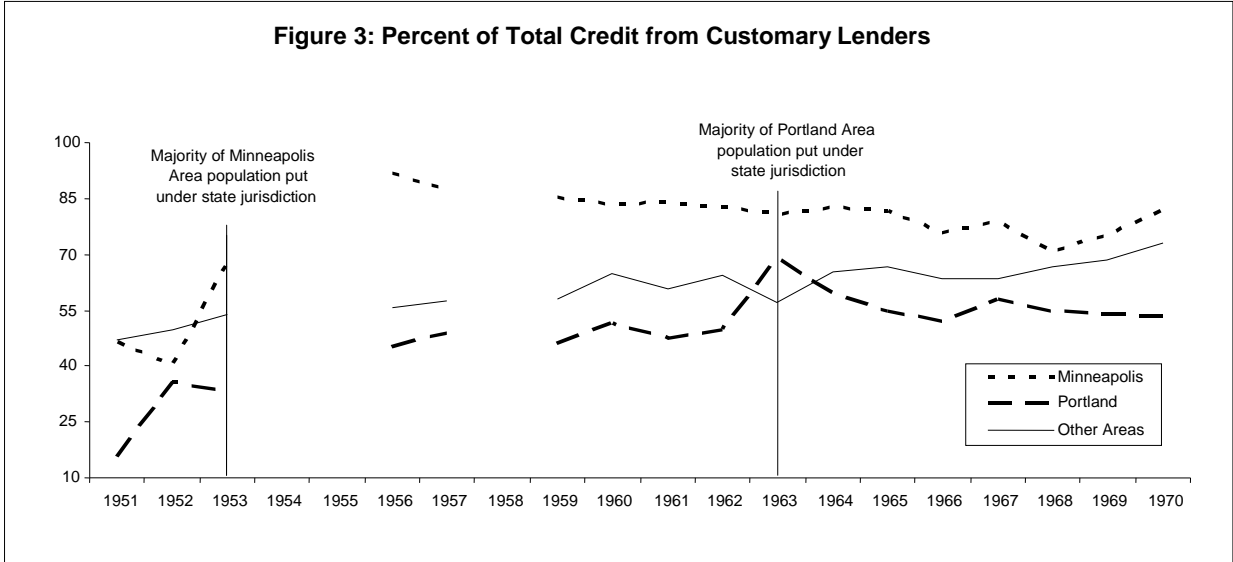
Figure 2 provides visual evidence that the imposition of state jurisdiction increased the amount of customary credit extended to reservations. It plots the natural log of per capita credit for years between 1951 and 1970 for which the customary credit data are reported.¹⁴ As the figure shows, there is an upward spike in 1963, when over 60 percent of the American Indians on reservations in the Portland Area were put under state jurisdiction. There is also an upward spike in 1953 when P.L. 280 put over 50 percent of the American Indians on reservations in the Minneapolis Area under state jurisdiction although there was volatility in credit prior to 1953. The areas retaining tribal jurisdiction did not experience comparable increases in credit, suggesting that P.L. 280 is responsible for the increases rather than general time trends.

¹⁴ The population numbers used to construct per capita statistics are extrapolated from periodic BIA reports published in 1950, 1960, 1962, and 1973, by assuming constant annual growth rates between years. The extrapolations also account for small, discrete changes in the composition of reservations under each administrative area’s authority during 1951-1970. Some of these changes are caused by the termination of federal reservation status for a few reservations in Oregon and Wisconsin during 1951 – 1970. Other small changes are caused by the transfer of authority over a reservation from one administrative area to another.



Notes: The credit data are from the BIA’s 1951 -1970 *Annual Reports of Credit and Financing*. Customary lenders primarily consist of banks and related private lending institutions, stores, and automobile dealers. Area-specific estimates of credit from customary lenders are not reported for 1954 and 1955. The credit reports do not give area-specific estimates after 1970.

Figure 3 provides complementary visual evidence by plotting the percentage of credit from customary lenders. These data are useful indicators of credit-market conditions because total BIA funding was capped and it was rationed to Indians “unable to receive financing from other lenders...” As in Figure 3, there are upward spikes in the reliance on customary sources for credit in the Minneapolis and Portland areas during 1953 and 1963. There are, however, indications of a relapse away from customary credit in the years following the imposition of state jurisdiction. This may mean that credit-constrained individuals switched immediately to customary sources and thus had their credit needs met for several years thereafter.



Notes: The credit data are from the BIA's 1951 -1970 *Annual Reports of Credit and Financing*. Customary lenders primarily consist of banks and related private lending institutions, stores, and automobile dealers. Area-specific estimates of credit from customary lenders are not reported for 1954 and 1955, and for BIA funding in 1958. The credit reports do not give area-specific estimates after 1970.

Table 3 gives regression estimates of the data in figures 2 and 3 using variations of (1):

$$Y_{at} = \alpha_a + \lambda_t + \beta(\text{state_jurisdiction})_{at} + \eta(\text{controls})_{at} + \varepsilon_{at} \quad (1)$$

In these regressions α_a and λ_t are fixed effects for BIA areas and for years and *state_jurisdiction* is the 'treatment' variable. It takes a value between 0 and 1 that is the proportion of the population in each region under state jurisdiction during each year. Partial treatment occurred in most regions when P.L. 280 was passed in 1953 because most areas had at least one reservation put under P.L. 280 (see table 3). The Portland Area is unique in that it received partial treatment through P.L. 280 in 1953, 1957, and 1963 (with the strongest occurring in 1963). The Minneapolis Area also received partial treatment in 1967 when Iowa assumed jurisdiction. Data combined for the Seminole (Florida) and the Cherokee (North Carolina) are available from 1957 – 1970 and are employed in the regressions. This area received partial treatment in 1961 when Florida assumed P.L. 280.

The dependent variable in Panel A is the log of per capita credit from customary lenders. Columns 2-5 employ the full set of controls, which include the log of per capita credit from BIA sources to control for the possibility of crowding out or crowding in. PERCENT IND. TRUST LAND controls for Public Law 450, a 1956 federal law intended to help Indians with land held in trust by the U.S. government acquire mortgages. Subject to permission from the BIA, it allowed creditors to execute a foreclosure on reservation trust land that is otherwise inalienable.¹⁵ The variable used to control for P.L. 450 equals zero for all regions for all years up to 1956. After 1956, the variable is the percent of reservation land in each area that was individually owned but held in trust by the U.S. – these are the lands eligible for mortgages through P.L. 450. Note that the foreclosure process on lands under this policy is still governed by whichever courts have jurisdiction over debt contracts, either tribal or state.

All columns show heteroscedastic-robust standard errors along with standard errors clustered by BIA area as one check on serial correlation within areas. Column 3 weights the data

¹⁵ Reservation land is either owned outright, or held in trust by the Bureau of Indians Affairs. Land that is held in trust is either owned by the tribe ('tribal trust') or by individuals ('individual trust') and cannot be sold or acquired by non tribal members without the BIA's permission (see Anderson and Lueck 1992). Only individual trust lands were affected by P.L. 450.

TABLE 3:
PANEL REGRESSIONS OF ANNUAL BUREAU OF INDIAN AFFAIRS CREDIT REPORT DATA

<i>PANEL A: DEPENDENT VARIABLE IS NATURAL LOG OF PER-CAPITA CUSTOMARY CREDIT</i>					
	(1)	(2)	WEIGHTED (3)	(4)	COLLAPSED (5)
CONSTANT	6.14**	4.40**	4.90**	4.47**	3.47**
STATE JURISDICTION	1.23*	1.27**	0.98*	1.34*	1.33**
ROBUST ST. ERROR	(0.39)	(0.30)	(0.33)	(0.41)	(0.51)
CLUSTER ST. ERROR	(0.63)	(0.27)	(0.50)	(0.57)	(0.28)
LN OF PER-CAPITA BIA CREDIT	-----	0.25**	0.18	0.23	0.43**
PERCENT IND. TRUST LAND	-----	1.53	0.57	-0.08	0.88
FIXED EFFECTS					
YEAR	YES	YES	YES	YES	NO
BIA AREAS	YES	YES	YES	YES	YES
TIME PERIODS	NO	NO	NO	NO	YES
AREA-SPECIFIC TIME TRENDS	NO	NO	NO	YES	NO
OBSERVATIONS	112	112	112	112	26
ADJUSTED R ²	0.88	0.91	0.92	0.93	0.92
<i>PANEL B: DEPENDENT VARIABLE IS THE PERCENT OF TOTAL CREDIT FROM CUSTOMARY LENDERS</i>					
CONSTANT	47.39**	45.52**	47.21**	36.11**	56.40**
STATE JURISDICTION	26.63*	27.00*	35.28**	45.88**	32.75*
ST. ERROR	(6.79)	(6.97)	(6.72)	(12.32)	(12.11)
CLUSTER ST. ERROR	(12.70)	(12.90)	(11.55)	(12.18)	(12.16)
PERCENT IND. TRUST LAND	-----	17.73	32.29	-54.56	13.45
FIXED EFFECTS					
YEARS	YES	YES	YES	YES	NO
TIME PERIODS	YES	YES	YES	NO	YES
BIA AREAS	NO	NO	NO	YES	YES
AREA-SPECIFIC TIME TRENDS	NO	NO	NO	YES	NO
OBSERVATIONS	112	112	112	112	26
ADJUSTED R ²	0.80	0.80	0.64	0.90	0.90

Notes: * p<0.1; ** p<0.05 using standard errors clustered by BIA Area. The areas included as observations are those listed in Table 2 with two exceptions. The Albuquerque and Window Rock areas are combined (into the Gallup area) as the data are reported jointly after 1953 and data for Florida and North Carolina areas are reported jointly for 1955-1970. State jurisdiction is the 'treatment' variable. It corresponds to the proportion of the population in each BIA region under state jurisdiction. Partial treatment occurred in most regions when P.L. 280 was passed in 1953. The Portland Area is unique in that it received partial treatment in 1953, 1957, and 1963. The trust control variable equals zero for all areas prior to 1956 and then equals the proportion of reservation acres held in individual trust. Column 3 weights the regression by a region's population. Column 5 uses data that are collapsed and averaged over four major time periods: 1951-1952 (pre treatment), 1953-1956 (pre secondary treatment); 1957-1963 (pre third treatment); and 1963-1970 (generally post treatment).

by an area's American Indian population. Column 4 includes a linear time trend that is specific to each BIA area. Column 5 employs data that are collapsed in a way consistent with Bertrand et.

al.'s (2004) recommendation of how to deal with potential serial correlation in panels when the number of groups is small. The procedure collapses the panel from $T = 17$ to $T = 4$ time periods with data averaged over the compressed periods. The periods are 1951-1952 (pre treatment); 1953-1956 (pre secondary treatment for Portland); 1957-1962 (pre third treatment for Portland); and 1963-1970 (post treatment with a few minor exceptions). The result is 24 observations: $N = 7$ and $T = 4$ with only 1957–1970 data available for the Cherokee\Seminoles region.

All of the coefficients on STATE JURISDICTION in Panel A and B are positive, statistically significant at the 10 percent level, and robust across specifications. Because STATE JURISDICTION $\in [0, 1]$, the estimates should be interpreted as the treatment effect only if an entire jurisdiction went under state jurisdiction. The smallest coefficient in Panel A – which is found in column 3 – indicates that this regression attributes a 166 percent increase in per capita credit to state jurisdiction. However, no area actually received full treatment. The Portland Area received the most at 0.69. The average treatment effect for this area is calculated by $e^{0.69\beta} - 1$, which implies state jurisdiction is responsible for a 96.6 percent increase in this area. Using the same basis for calculation, the model attributes a 66.5 percent increase to state jurisdiction in the Minneapolis Area. The column 1 coefficient in Panel B means that the full treatment effect of state jurisdiction on the percent of credit from customary lenders is 26.6 percentage points.¹⁶ The estimated effects on the Portland and Minneapolis areas respectively are 18.5 and 13.8 percentage points. In all cases the measured effects indicate that state jurisdiction had an immediate, economically significant, and positive effect on reservation credit from customary lenders.

B. Analysis of Modern Home Mortgage Data

Unlike the BIA credit reports, the Home Mortgage Disclosure Act (HMDA) data were not collected prior to P.L. 280. However, the HMDA data can be matched to specific reservations rather than to only the broader BIA administrative areas. HMDA data track the outcome of each home loan application reviewed by most private U.S. lenders.¹⁷ They indicate

¹⁶ The Panel B regressions are estimated with OLS. Although this estimator can be inconsistent when the dependent variable is bounded (here it is between 0 and 100), this is not likely a problem here because none of the predicted values are close to 0 or 100.

¹⁷ Lenders with any office or branch located in any metropolitan statistical area must disclose information about all of their loan applications. Avery et. al. (2007) estimate that these disclosures cover over 80 percent of all home lending nationwide.

the race and income of the applicant, the size and type of loan requested, and the census-tract location of the property along with other borrower and loan attributes.

The present analysis aggregates to the reservation level 2004-2008 home purchase and improvement credit (i.e., loans applied for and received by applicants). HMDA data for 2004-2008 are more comprehensive than earlier years because of stricter regulations on the disclosure requirements for lenders that were introduced in 2004 (Avery et. al. 2007). Following Lin and White (2001), the analysis here excludes transactions between financial institutions. It includes data from all federally recognized reservations with American Indian populations of 250 or greater for which the census tract identifier in the HMDA data matches a unique U.S. Census tract identifier for the reservation.¹⁸

Panel A of table 4 is consistent with the historical BIA data in that it shows that more credit is extended to American Indians under state jurisdiction. The mean amount of per capita home loans extended to American Indians on reservations under state jurisdiction is three times larger than the mean under tribal jurisdiction. When weighted by American Indian population, the mean under state jurisdiction is five times larger.

TABLE 4
COMPARISON OF 2004-2008 HOME LOAN CREDIT FOR AMERICAN INDIANS ON RESERVATIONS

	RESERVATIONS WITH TRIBAL JURISDICTION	OBS.	RESERVATIONS WITH STATE JURISDICTION	OBS.	t-STATISTIC FOR DIFFERENCE (ABS. VALUE)
<i>PANEL A – RESERVATION LEVEL DATA</i>					
ORIGINATED LOANS PER CAPITA (2008 \$s)	\$1,554	85	\$4,631	56	1.75*
POP. WEIGHTED ORIG. LOANS PER CAPITA (2008 \$s)	\$536	85	\$2,755	56	2.19**
<i>PANEL B – APPLICATION LEVEL DATA</i>					
% OF APPLICATIONS DENIED BY LENDER	56.95	7,143	36.19	2,321	17.67**
% OF OFFERED LOANS REJECTED BY BORROWER	19.86	3,075	14.92	1,481	4.05**
% OF LOAN APPLICATIONS ORIGINATED	34.47	7,143	54.20	2,321	17.17**

Notes: * p<0.1; ** p<0.05. The comparisons are based on home purchase and home improvement loan applications provided by the HMDA for 2004-2008. The comparisons exclude loans that were purchased by another lender.

The following regression analysis attempts to isolate the effects of jurisdiction on home loan credit. Equation (2) defines the reservation-level measure of aggregate housing credit.

¹⁸ Reservations with American Indian populations less than 250 are excluded because it is difficult to match these reservations with HMDA data because census tracts for small reservations are often not cleanly demarcated. This criterion eliminates 51 percent of the 317 federally recognized reservations but only 2 percent of the 512,731 American Indians living on reservations in 1999.

$$diff_loan\$s = \frac{\$ \text{ amount of loans to whites}}{\text{white population}} - \frac{\$ \text{ amount of loans to Am. Indians}}{\text{Am. Indian population}} \quad (2)$$

Each numerator is the sum of loan amounts for home purchases and improvements that were originated during 2004-2008. Each denominator gives the population for reservations.¹⁹ Here the per capita loan activity for whites attempts to control for geographic variation in housing markets and in the proportion of lenders having to report under HMDA regulations. Whites living on reservations are an appropriate control group because debt contracts between whites and non-Indian lenders are under the authority of state courts regardless of P.L. 280 status.²⁰ The empirical model is given by (3).

$$diff_loan\$s_r = \beta_0 + \beta_1(\text{state.jurisdiction})_r + \eta'X_r + \varepsilon_r \quad (3)$$

where r = reservation and X_r denotes reservation-level controls for American Indian incomes, population sizes, geographic isolation, land tenure, casino activity, and other characteristics also controlled for in Anderson and Parker's (2008) analysis of reservation income growth (see Table A1 in the appendix for summary statistics). β_0 is the estimate of $E[diff_loan\$s | TR.jur, X]$ and $\beta_0 + \beta_1$ is the estimate of $E[diff_loan\$s | ST.jur, X]$. The null hypothesis is that $\beta_1 = 0$ and the alternative is that $\beta_1 \neq 0$ (i.e., the credit gap on reservations depends on jurisdiction).

Table 5 shows six regression specifications for (3). Specification 1 is the baseline and excludes the controls. Specifications 2-3 use the reservations for which data on the full set of controls are available, and specification 3 weights the results by the size of a reservation's American Indian population. (Specifications 4-6 employ subsamples as robustness checks.)

The estimate of β_1 is negative in each of the first three specifications and statistically significant in two. The coefficient of -9,299 in column 2, for example, indicates that the difference in per capita credit between whites and American Indians decreases by \$9,299 with state jurisdiction. Because the \$17,969 intercept in column 2 is the mean difference in credit under tribal jurisdiction (when all of the covariates equal zero), the \$9,299 estimate implies that state jurisdiction eliminates 51.8 percent of the difference.

¹⁹ The white population over 2004-2008 can be inferred from the HMDA census-tract level data (as the non-minority population). The American Indian population data cannot, because it is combined with other minority groups, so these data come from the 2000 U.S. Census.

²⁰ Several U.S. Supreme Court rulings have reaffirmed the limited arm of tribal jurisdiction over cases involving only non-Indians. See, e.g., *Plains Commerce Bank v. Long* (U.S. Supreme Court 2008)).

The reservation controls in Table 5 are often statistically insignificant, but the signs of the coefficients are sensible. For example, more casino gambling as measured by increases in the number of slot machines per American Indian is associated with a decrease in the credit gap between American Indians and whites. Relative to tribal trust land, more land with stronger individual property rights (i.e., fee-simple and individual trust land) is associated with a decrease in the credit gap.²¹

TABLE 5:
RESERVATION-LEVEL ESTIMATES OF THE DIFFERENCE BETWEEN THE DOLLAR AMOUNT
OF ORIGINATED LOANS PER CAPITA FOR WHITES AND FOR AMERICAN INDIANS

	ALL RESERVATIONS (1)	ALL RESERVATIONS (2)	WEIGHTED - ALL RESERVATIONS (3)	COMPLIER RESERVATIONS (4)	RES. WITHIN MN, OR, & WI (5)	RES. IN PROP. SCORE SAMPLE (6)
CONSTANT	18887	17969**	12954	17899*	77495	-16127
STATE JURISDICTION ROBUST ST. ERROR	-8973** (3673)	-9299** (4638)	-4423 (3766)	-15451** (5487)	-27422 (18995)	-13145** (6515)
<u>CONTROLS</u>						
AM. INDIAN P.C. INCOME	---	0.606	0.643	1.05	-1.110	2.385
AM. INDIAN POP.	---	-0.110**	-0.064*	-0.124**	-0.384	-0.193
POPULATION PER SQ. MILE	---	25.17	47.75**	31.40	-95.40	-21.04*
% AM. INDIAN POP.	---	0.365	2.148	-0.870	-47.33	40.50**
% FEE SIMPLE LAND	---	-66.63	-91.48*	-43.01	-69.90**	-35.23
% INDIV. TRUST LAND	---	-162.7	-257.2**	-186.5	-64.14	-328.70
POP. DEN. IN ADJ. CNTY	---	-10.72	-0.134	-20.44	-186.2	15.69
SLOT S PER AM. INDIAN	---	-4381*	-5386*	-1623	3031	-1253
STATE FIXED EFFECTS	NO	NO	NO	NO	YES	NO
NUMBER OF OBS.	139	124	124	109	17	54
ADJUSTED R ²	0.032	0.154	0.335	0.208	0.635	0.304

NOTES: * p<0.1; ** p<0.05. The dependent variable is the difference between per capita home purchase and improvement loan amounts for whites and American Indians during 2004-2008. Reservations with American Indian populations exceeding 250 in 1999 and for which the census tracts could be reliably matched with the HMDA are included. Two reservations in urban Arizona -Gila River and Maricopa - are dropped because they are clear outliers. The dependent variables for these observations are respectively 594,254 and 457,451 and the next largest value is 140,491. Including Gila River and Maricopa substantially increases the absolute value of the state jurisdiction coefficient in each specification. Column 3 weights the results by American Indian population. Column 4 employs a subsample of applicants from areas surrounding reservations whose jurisdiction status 'complies' with whether or not the surrounding state has a constitutional disclaimer of jurisdiction on reservation land. The complier subsample excludes reservations in CO, KS, MI, ME, MS, NC, SC, TX and WA. It also excludes the reservations within MN, OR, and WI that were exempted from Public Law 280. Column 5 employs the applications from the sample within Minnesota, Oregon, and Wisconsin. Column 6 employs a propensity-score matched sample of reservations that is summarized in panel B of Table A1 in the appendix.

²¹ Although not directly comparable, this result is compatible with Anderson and Lueck (1992) who show that agricultural productivity on reservations is higher on fee simple and individual trust land when compared to land owned by tribes and held in federal trust.

The estimates of β_1 in columns 1-3 are biased if some omitted determinant of home loan activity is not absorbed by the conditioning variables, or by the white control group, and is also correlated with jurisdictional status on reservations. Columns 4-6 reports estimates from three subsamples used to check the robustness of the main results to potential omitted variable bias.

Column 4 employs a subsample of reservations whose jurisdiction status ‘complies’ with whether or not the surrounding state has a constitutional disclaimer of jurisdiction on reservation land (see figure 1). The complier subsample therefore excludes reservations within CO, KS, MI, ME, MS, NC, SC, TX and WA. It also excludes the reservations within MN, OR, and WI that were exempted from P.L. 280. In column 4, state jurisdiction is estimated to eliminate 86.3 percent of the credit gap compared to the full sample’s estimate of 51.7 percent. Thus, there is evidence that dropping applications from the non-complier areas improves on measurement error in STATE JURISDICTION and has the predictable effect of increasing the absolute value of the point estimate of β_1 . Another benefit of using the complier subsample is that it better controls for potential bias in the unobserved selection criteria of non-disclaimer states that did not enact P.L. 280.

Column 5 reports estimates from a subsample of reservations within Minnesota, Oregon, and Wisconsin. The benefit of this subsample is that it allows for state fixed effects because there is within-state variation in jurisdiction over reservations in these three states as described in section II. The state fixed effects control for the potential effect of differences in the quality of state judicial systems or in the type of state laws affecting mortgages. In column 5, the coefficient on β_1 remains negative but is not statistically significant by conventional standards.

Column 6 employs a subsample that is trimmed by a propensity-score procedure as a final check against omitted variable bias. The procedure uses recent reservation-level measures of American Indian per capita incomes, population sizes, geographic isolation, land tenure mix, casino activity and other characteristics to predict the probability of a reservation having state jurisdiction. The sample is then trimmed to include only the subset of reservations with similar propensity scores. This process creates *ad hoc*, apparently random, samples of tribal and state jurisdiction reservations with no statistical difference in means across the reservation-level characteristics (see Table A1). In column 6 the point estimate of β_1 is negative and statistically significant. Thus, the estimated effects of state jurisdiction are robust to the exclusion of reservations that are observationally most different from each other in ways besides jurisdiction.

To summarize, the evidence from two independent data sets both imply that state jurisdiction caused economically and statistically significant increases in per capita credit for American Indians on reservations. The next section examines two possible explanations for why American Indian credit markets are larger under state jurisdiction.

IV. Two Theories of Credits Markets under State versus Tribal Jurisdiction

There are two different key assumptions one could make in modeling the effect of state jurisdiction on reservation credit. The first is to assume that the rights of creditors - mostly non-Indians - are systematically weaker under tribal jurisdiction. The second is to assume that creditor rights are equally strong under the average tribal court, but that information about creditor rights is more certain to lenders under state jurisdiction. This section develops a simple theory around each of the two assumptions for the purpose of testing the theories against each other with loan application data in section V.²² Although either assumption implies larger credit markets under state jurisdiction under plausible conditions, the second assumption predicts some things about loan application outcomes that the first does not.

A. Setup

The unit of analysis is a potential borrower on a reservation who is an individual Indian or Indian-owned private firm. The loans under consideration include those for business start-up or expansion and for home mortgages. I do not distinguish between loans secured with collateral and unsecured loans in order to keep the framework general.²³ The lender is a profit-maximizing non-Indian firm that knows in advance if it must seek repayment in tribal court in the event of default. The framework ignores the possibility to contract around tribal courts because this is difficult to do.²⁴

²² This approach for identifying the main channels from legal institutions to larger credit markets differs from the approach used in cross-country literature. In that literature, researchers were able to quantify the strength of bankruptcy law on the books (Djankov et al. 2007), and to estimate actual creditor recovery rates (Djankov et al. 2008). By contrast, it does not seem possible to construct systematic measures of creditor rights and debt enforcement for Indian reservations, especially for the 1950s and 1960s. The problem is that written tribal law is sparse and that there is not much legal precedent to support that which is written (Cooter and Fikentscher 2008).

²³ The distinction does not seem critical here because lenders typically have to work through tribal courts to repossess collateral (see Woessner 2006).

²⁴ Creditors and individual, non-governmental debtors on reservations cannot simply agree to have future disputes resolved through outside courts (see Anderson and Parker 2008). And, as Ramirez (2002) notes, efforts to try to

To begin, consider a borrower who has accepted a loan for an investment with an uncertain return. The borrower's gross period 2 wealth (after earning the return but before paying back the loan) is $\theta = W_1 + (1 + \delta)L$ where L is the loan amount, W_1 is period 1 wealth, and δ is the randomly generated return on the investment. If the borrower pays back the loan in full plus interest, then her net period 2 wealth is $\theta - L(1 + r) = W_1 + (\delta - r)L$.

The variable K is the amount of wealth that courts will let the borrower keep if she defaults.²⁵ Because this amount is analogous to a bankruptcy exemption, the model adopts the structure of Fan and White's (2003) theory of the effects of bankruptcy laws on lending.²⁶ To simplify, I assume K takes one of three discrete values on reservations: K_L , K_M or K_H where the "L", "M", and "H" subscripts denote low, medium, and high. The distance between K values is symmetric such that $K_H = K_M + x$ and $K_L = K_M - x$ where x is a positive constant and $K_L \geq 0$. The borrower pays the lender $\max[\theta - K, 0]$ if she defaults. Following Fan and White (2003), denote the borrower's indifference point for defaulting as $\hat{\theta} = K + L(1 + r)$. The borrower will default if $\theta < \hat{\theta}$ and will pay in full if $\theta \geq \hat{\theta}$.

Prior to taking a loan, δ is a random variable with a density that is known to both the risk-averse borrowers and the risk-neutral lender. For convenience assume $f(\delta) \sim \text{uniform}[-1, \bar{\delta}]$. This implies the expected value of the investment increases with $\bar{\delta}$ and that in the worst case scenario the entire investment is lost. It follows that $f(\theta) \sim \text{uniform}[\underline{\theta}, \bar{\theta}]$ where $\underline{\theta} = W_1$ and $\bar{\theta} = W_1 + L(1 + \bar{\delta})$.

If $W_1 \geq K$, a potential borrower will accept an offered loan at rate r if condition (4) holds. If $W_1 < K$, a potential borrower will accept if condition (5) holds.

$$\int_{\underline{\theta}}^{\hat{\theta}} U(K)f(\theta)d\theta + \int_{\hat{\theta}}^{\bar{\theta}} U(L(1+r))f(\theta)d\theta \geq U(W_1) \quad (4)$$

make it appear as if the transaction did not arise on the reservation (e.g., having the contracts signed off the reservation, delivering the goods in question off the reservation) "are of questionable effectiveness."

²⁵ When the loan is secured by collateral, K can be interpreted as the delay cost that is imposed on lenders when courts let the borrower use the collateral for a period of time after defaulting.

²⁶ There are several other strands of literature one could draw from in modeling reservation lending. I choose a bankruptcy model because the structure is conducive for empirical analysis but recognize that this structure does not capture all factors that will affect reservation lending.

$$\int_{\underline{\theta}}^K U(\theta)f(\theta)d\theta + \int_K^{\hat{\theta}} U(K)f(\theta)d\theta + \int_{\hat{\theta}}^{\bar{\theta}} U(L(1+r))f(\theta)d\theta \geq U(W_1) \quad (5)$$

The term on the right-hand side (RHS) is the utility from her certain wealth if she does not borrow. The sum of the terms on the left-hand side (LHS) of either (4) or (5) is the expected utility from accepting the loan offer. This expected utility is the sum of her expected utility of defaulting and keeping θ (which is possible only when $W_1 < K$), her expected utility of defaulting and keeping K , and her expected utility of paying back in full.

The dashed curve in Figure 4a shows a borrower's acceptance curve for loan offers. The exact curve is determined by the particular values of $\bar{\delta}, W_1$, and L and by the degree to which the borrower is risk averse, but the general shape is as illustrated. Along the curve, the potential borrower is indifferent about accepting a loan offer because her expected utility is exactly equal to her certain utility. She will reject any loan offers at combinations of K and r above the dashed curve. She will accept any offer at combinations of K and r below the curve.

Next consider the lenders' decision. All lenders are risk neutral and the market is competitive meaning that lenders earn zero expected profit from lending to each borrower type in equilibrium. ('Borrower type' means a set of borrowers with particular attributes $\bar{\delta}, W_1$, and L , all of which are assumed to be observable to the lender).

If $W_1 \geq K$, the lender earns zero expected profit by offering a borrower an interest rate that sets the LHS of (6) equal to the RHS. If $W_1 < K$, the lender earns zero expected profit by offering an interest rate that sets the LHS of (7) equal to the RHS.

$$\int_{\underline{\theta}}^{\hat{\theta}} (\theta - K)f(\theta)d\theta + \int_{\hat{\theta}}^{\bar{\theta}} L(1+r)f(\theta)d\theta = L(1+\hat{r}) \quad (6)$$

$$\int_K^{\hat{\theta}} (\theta - K)f(\theta)d\theta + \int_{\hat{\theta}}^{\bar{\theta}} L(1+r)f(\theta)d\theta = L(1+\hat{r}) \quad (7)$$

The sum of the terms on the LHS of either equation is the borrower's expected repayment. The term on the RHS is the fixed opportunity cost of the loan where \hat{r} is the guaranteed interest rate the lender could earn on a safe investment (e.g., bonds).

In this model the r offered to the borrower when K is observable to the lender is denoted by the function $r^*(K, \bar{\delta}, W_1, L)$. This function increases at an increasing rate in response to

increases in K as illustrated by the lender offer curve in Figure 4a.²⁷ The intuition for the convexity is that a higher r has a feedback effect because it increases the likelihood of default (Fan and White 2003). At some sufficiently high K , denoted by K_D , no r will earn the lender zero expected profit so lenders will deny the loan applications from this borrower type.²⁸

B. *Implications if Creditor Rights are Weaker under Tribal Jurisdiction*

If we assume that $K = K_M$ under state jurisdiction, then creditor rights are weaker under tribal jurisdiction if $K = K_H$ under tribal courts. This implies that lenders will offer loans at $r^*(K = K_M, \bar{\delta}, W_1, L)$ under state jurisdiction. Borrowers will accept if the LHS of (4) or (5), evaluated at r^* and K_M , exceeds the RHS. Graphically, a borrower will accept if her acceptance curve lies above the lender offer curve at $K = K_M$. The same reasoning holds for borrowers under tribal jurisdiction. Lenders will offer loans at $r^*(K = K_H, \bar{\delta}, W_1, L)$ and borrowers will accept if the LHS of (4) or (5), evaluated at r^* and K_H , exceeds the RHS.

Figures 4a -4c show cases of potential borrower types who differ in terms of their values of $\bar{\delta}$, W_1 , and L .²⁹ There are other possible cases, but the three depicted in figures 4a-4c are sufficient to illustrate the borrower types whose opportunity or decision to take a loan are affected by a shift from tribal to state jurisdiction. Surprisingly, either an increase or decrease in per capita credit is possible with a move from tribal to state jurisdiction. On one hand, lenders under state jurisdiction will offer loans to certain borrower types who would be denied under tribal jurisdiction (as in case 3). On the other hand, certain borrower types who would not take out the loan under state jurisdiction will take the loan under tribal jurisdiction (as in case 2).³⁰ Because the borrower is risk averse, she would prefer a regime of weaker creditor rights even though she pays for it with a higher interest rate.

²⁷ The exact offer curve is determined by the values of $\bar{\delta}$, W_1 , L and \hat{r} but the general shape is as illustrated.

²⁸ In this framework the denial threshold will depend on creditor rights only when $W_1 - K < L(1 + \hat{r})$. If $W_1 - K > L(1 + \hat{r})$, then lender can always recover the full opportunity cost of the loan and would never deny. Holding constant W_1 and L , the denial threshold occurs at smaller values of K with decreases in $\bar{\delta}$.

²⁹ The acceptance curves are plotted assuming that each borrower has the same degree of risk aversion.

³⁰ In case 1, the borrower would take a loan out under either tribal or state jurisdiction.

Figure 4a
Lender Offer Curve and Borrower Acceptance Curve
(Case 1 scenario)

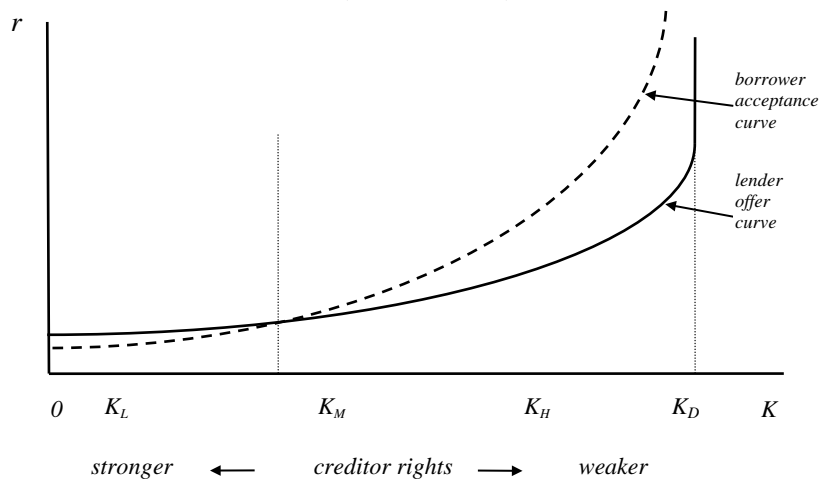


Figure 4b
Lender Offer Curve and Borrower Acceptance Curve
(Case 2 scenario)

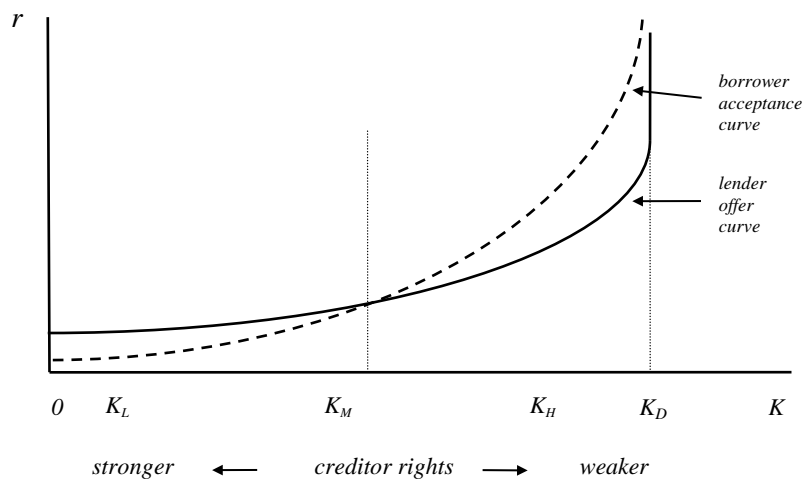
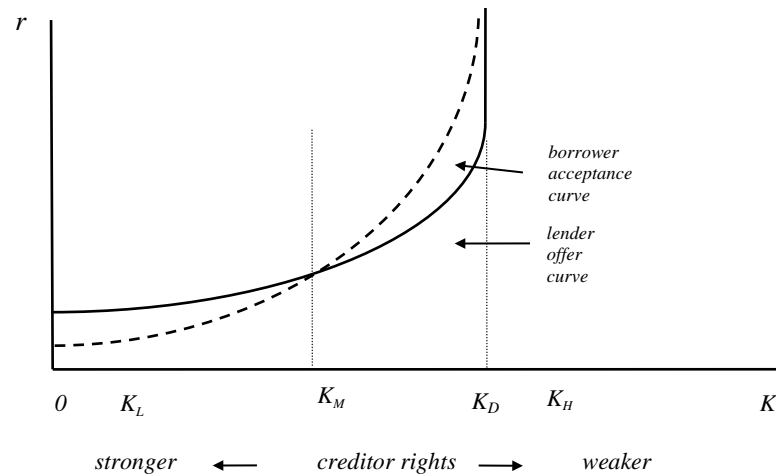


Figure 4c
Lender Offer Curve and Borrower Acceptance Curve
(Case 3 scenario)



The case 3 effect (in which state jurisdiction increases credit) is more likely to dominate if potential borrowers on reservations are poor (i.e., W_I is small) and when the difference between K_H and K_L is large. Given the widespread poverty on reservations prior to P.L. 280 (see table 1) and in 2000 (see table A1), it seems likely that the case 3 effect would dominate. Thus, a move from tribal to state jurisdiction would most likely imply an increase in credit on reservations if that move meant a large and systematic strengthening of creditor rights.

It is important to note that the lending environment described thus far implies that no application mistakes are made. All lenders and borrowers have the same information about K , W_I , and $\bar{\delta}$ so a borrower will only submit an application that will lead to a loan offer at an interest rate she finds acceptable.³¹ No loan applications will be denied by lenders, and no loan offers from lenders will be refused by borrowers.

C. *Implications if Creditor Rights are Uncertain to Lenders under Tribal Jurisdiction*

Compared to the wealthier and more populated states, tribal codes are less complete and more difficult to access. There is also sparse tribal judicial precedent to support the tribal codes that do exist (Cooter and Fikentscher 2008). In this environment, information about creditor rights must be informed by other sources, including an understanding of tribal norms and culture. For this reason, the framework that follows assumes that tribal borrowers have a more precise assessment of creditor rights under tribal law than do non-Indian lenders.

To operationalize this assumption in a simple way, suppose that potential borrowers can observe K with certainty under tribal law. Lenders know the probability distribution of K under tribal jurisdiction rather than the precise value of K . Let P_L denote $P(K = K_L)$, P_M denote $P(K = K_M)$, and P_H denote $P(K = K_H)$. To focus on uncertainty rather than bias, let $P_L = P_H = (1 - P_M)/2$. This implies that creditor rights are equal to states under the average tribal court because $E[K] = K_M$.

We now reconsider the three cases shown in figures 4a-4c under the new assumption of asymmetric information, beginning with case 1. Case 1 borrower types will accept a loan at $r = r^*(K = K_M, \cdot)$ if on a reservation where $K = K_M$ or where $K = K_H$. Because borrowers from

³¹ This is technically true as long as the cost of applying is greater than zero.

reservations where $K = K_H$ would remain in the applicant pool, the lender must make an offer of $r > r^*(K = K_M, \cdot)$ to avoid earning negative expected profits.

What equilibrium interest rate will lenders charge under tribal jurisdiction in these case 1 situations? An equilibrium that always exists is where the lenders offer $r = r^*(K = K_H, \cdot)$ and only K_H borrowers accept. This strategy will yield zero expected profit, and it reduces loan activity from case 1 borrower types relative to state jurisdiction.

Lenders can reach a second equilibrium for case 1 borrower types, if it exists, by finding the r that equates the LHS of (8) to the RHS.³²

$$\left[P_M \left(\int_{\underline{K}}^{\hat{\theta}} (\theta - K_M) f(\theta) d\theta + \int_{\hat{\theta}}^{\bar{\theta}} L(1+r) f(\theta) d\theta \right) + P_H \left(\int_{\underline{\theta}}^{\hat{\theta}} (\theta - K_H) f(\theta) d\theta + \int_{\hat{\theta}}^{\bar{\theta}} L(1+r) f(\theta) d\theta \right) \right] = L(1+\hat{r}) \quad (8)$$

This equilibrium exists if the interest rate solving (8) is low enough to attract case 1 borrower types from reservations where $K = K_M$. This second equilibrium is characterized by $r^*(K = K_M) < r < r^*(K = K_H)$ with K_M and K_H borrowers accepting. In practice, it would take time and experimentation to learn if the second equilibrium exists. The incentive for lenders to deviate from the first equilibrium (at $r = r^*(K = K_H, \cdot)$) is the possibility of earning positive short-run expected profits. (Deviating lenders could earn positive short-run profits by charging an interest rate higher than the interest rate solving (8) but that is low enough to attract borrowers from reservations where $K = K_M$).

Next consider case 2 borrower types. In this case there can only be a single equilibrium at $r = r^*(K = K_H, \cdot)$ with case 2 borrowers accepting loans only if $K = K_H$. There cannot be a second equilibrium because a lower interest rate – even as low as $r = r^*(K = K_M, \cdot)$ – would fail to attract case 2 borrowers from reservations where $K = K_M$.

Next consider case 3 borrower types. In this case there may be two equilibria. The first is one in which all case 3 potential borrowers are denied. A second equilibrium for case 3 borrower types exists if an interest rate solves (5) and remains low enough to attract case 3 borrower types for whom $K = K_M$. The second equilibrium is characterized by $r > r^*(K = K_M)$ with K_M and K_H borrowers accepting. The incentive to deviate from the first equilibrium (in

³² This is the relevant equation if $W_1 \geq K$. If $W_1 < K$, the relevant equation is the same as (5) but with the following substitutions: $\underline{\theta} = K_M$ and $\underline{\theta} = K_H$.

which all lenders deny the potential borrower a loan) is the possibility of earning positive short-run expected profits.

Without adding more structure to the framework, the effect of a move from tribal to state jurisdiction on per capita credit is theoretically ambiguous when lenders are uncertain about creditor rights. On one hand, lenders under state jurisdiction will offer loans to certain borrower types who may be denied under tribal jurisdiction (as in the first equilibrium in case 3). And potential borrowers from reservations with medium creditor rights under tribal jurisdiction may accept loan offers only under state jurisdiction (as in the first equilibrium in case 1). On the other hand, potential borrowers from reservations with weak creditor rights under tribal jurisdiction may accept loan offers only under tribal jurisdiction (as in case 2). Overall, a move to state jurisdiction will increase credit when the case 1 and case 3 first-equilibrium effects dominate. These effects are more likely to dominate when potential borrowers have low wealth (i.e., W_I is small), when the difference between K_H and K_L is large, and when uncertainty is high (i.e. when P_M is a small number).

Unlike the theory based on the strength of creditor rights, the theory based on the uncertainty implies more loan application mistakes will occur under tribal jurisdiction. Mistakes will be more prevalent under tribal jurisdiction because borrowers have incentives to search for the best loan offers. The incentive exists because there can be multiple equilibria (i.e., different lenders responding differently to the same application). Case 1 borrowers have incentives to search for the lowest interest rate, which implies that these borrowers will turn down loan offers more frequently under tribal jurisdiction. Case 3 borrowers also have incentives to search because some lenders may offer them loans, while other lenders will certainly deny them.

Table 6 summarizes the theoretical implications, which are tested in the next section. We see that the effect of a move from tribal to state jurisdiction on reservation credit is theoretically ambiguous regardless of whether we assume the move strengthens creditor rights, or we assume it merely decreases lender uncertainty about creditor rights. Given plausible values for certain parameters in the model (e.g., low borrower wealth), however, both assumptions imply more credit under state jurisdiction. Only the theory based on lender uncertainty implies higher probabilities of application mistakes under tribal jurisdiction.

TABLE 6:
THEORETICAL PREDICTIONS

	PREDICTED SIGN	
	KEY ASSUMPTION: CREDITOR RIGHTS ARE WEAKER UNDER TRIBAL JURISDICTION	KEY ASSUMPTION: CREDITOR RIGHTS ARE UNCERTAIN UNDER TRIBAL JURISDICTION
<i>EFFECT OF MOVE FROM TRIBAL TO STATE JURISDICTION ON:</i>		
RESERVATION CREDIT PER CAPITA	? OR +	? OR +
PROBABILITY THAT BORROWER WILL APPLY FOR A LOAN THAT LENDER WILL REJECT	0	-
PROBABILITY THAT BORROWER WILL TURN DOWN OFFERED LOAN	0	-
PROBABILITY THAT AN APPLICATION WILL RESULT IN A LOAN	0	+

V. Empirical Analysis of Loan Application Data

This section uses 2004-2008 application level data from the Home Mortgage Disclosure Act (HMDA) to test the predictions regarding the probability of loan application mistakes summarized in Table 6. The observations consist of applications from American Indians and whites on reservations or off the reservations but in the county or counties containing the reservation.³³ Applicant-level HMDA data have been used by researchers to try to infer racial discrimination in lending practices (e.g., Munnell et. al. 1994) and to study the effect of state bankruptcy laws on the probability that home loan applications will be denied (Lin and White 2001). The applicant-level data have also been used to assess whether or not American Indian loan applicants on reservations experience higher conditional denial rates compared to Indians living off reservations (Cyree et. al. 2004, Schumacher et. al. 2008).³⁴

Panel B of table 4 reports initial support for the theory based on uncertainty. The individual-level data show significant differences across the two types of reservations in the percent of American Indian applications denied, the percent of approved loans rejected by the borrower, and the percent of applications that were originated (i.e. approved and accepted).

³³ It includes data from all federally recognized reservations (and the surrounding county or counties) with American Indian populations of 250 or greater for which the census tract identifier in the HMDA data matches a unique U.S. Census tract identifier for the reservation. Following Lin and White (2001), the analysis excludes loan applications that were incomplete or withdrawn by the applicant and it also excludes observations that were transactions between financial institutions.

³⁴ The empirical analysis in my paper differs from the earlier studies of reservation applications in several ways. The most important difference is that my study concerned with evaluating how lending outcomes differ across reservations based on which courts have jurisdiction over debt contracts. In contrast, Cyree et. al. and Schumacher et. al. test whether reservation status in general is associated with higher conditional denial probabilities. Another difference is that my study uses more recent data from a broader national sample. Cyree et. al. use 1992-1997 HMDA data of applications in 18 states with large American Indian populations. Schumacher et. al. use 2004-2005 HMDA data of applications within Montana.

A. *Regression Analysis*

This section reports estimates of the effect of state jurisdiction on the conditional probability of different loan outcomes, $P(\text{Outcome} = 1|V)$. The outcomes are three different binary variables. The first is $D=1$ if a loan application is denied by the lender. The second is $R=1$ if an approved loan is rejected by the borrower. The third is $O=1$ if the loan application leads to an originated loan. V is the vector of controls described below.³⁵

The usable data set for the estimates of loan outcomes consist of 41,942 applications from American Indians and 525,317 applications from whites for loans on reservations or off the reservations but in the county or counties containing the reservation. This comprises all applications from American Indians on and adjacent to reservations, all applications from whites on reservations, and a 10 percent random sample of applications from whites adjacent to reservations.³⁶

The empirical models use a spatial and racial difference-in-difference-in-differences (DDD) strategy in an effort to isolate the effect of jurisdiction on lending outcomes. The first of the two difference-in-difference components is the estimate of the differences in $E[P(\text{Outcome} = 1|V)]$ for $[(\text{white}^{on} - \text{white}^{off})^{TR.jur} - (\text{white}^{on} - \text{white}^{off})^{ST.jur}]$. $TR.jur$ means the difference is for areas adjacent to reservations under tribal jurisdiction. $ST.jur$ means the difference is for areas adjacent to reservations under state jurisdiction. The intent of this difference-in-difference is to control for differences in lending outcomes between areas off and on the two types of reservations that are not captured by V and that are not caused by jurisdiction over debt contracts. Jurisdiction is held constant in this difference-in-difference because debt contracts between whites and non-Indian lenders are under the authority of state courts regardless of P.L. 280 status.

The second key difference-in-difference is the estimate of the difference in $E[P(\text{Outcome} = 1|V)]$ for $[(AI^{on} - AI^{off})^{TR.jur} - (AI^{on} - AI^{off})^{ST.jur}]$. This difference-in-difference controls for differences in tribal cultures and lender racism across reservations to the extent that Indians living adjacent to reservations share cultural characteristics with Indians on

³⁵ This section does not analyze interest rates because HMDA regulations require lenders to report interest rate data only on a small percentage of originated loans (Avery et. al. 2007).

³⁶ The random sampling of off-reservation whites makes the size of the data set tractable.

reservations. The strategy is to subtract this difference-in-difference from that of whites to isolate the relationship between $E[P(Outcome = 1 | V)]$ and jurisdiction over debt contracts.

Table 7 shows the DDD comparisons for each loan outcome that are not yet conditioned by V . For all outcomes, the triple differences are economically large, statistically significant, and again consistent with the theory based on lender uncertainty.

TABLE 7
TRIPLE DIFFERENCE COMPARISONS OF HOME LOAN OUTCOMES IN RESERVATION AREAS

	RESERVATIONS WITH TRIBAL JURISDICTION	OBS	RESERVATIONS WITH STATE JURISDICTION	OBS	DIFF	t-STATIC FOR DIFF
<u>% OF APPLICATIONS DENIED BY</u>						
<u>LENDER:</u>						
WHITES ON RESERVATIONS	24.40	23,402	21.31	12,098		
WHITES ADJ. TO RESERVATIONS	19.78	265,530	20.35	224,287		
DIFFERENCE	4.62	----	0.96	----	3.66	
AM. INDIANS ON RESERVATIONS	56.95	7,143	36.19	2,321		
AM. INDIANS ADJ. TO RESERVATIONS	34.93	18,436	31.53	14,042		
DIFFERENCE	22.02	----	4.66	----	17.36	
DIFFERENCE-IN-DIFFERENCE	-17.40		-3.70		-13.70	11.66**
<u>% OF OFFERED LOANS REJECTED BY</u>						
<u>BORROWER:</u>						
WHITES ON RESERVATIONS	12.11	17,678	10.89	9,511		
WHITES ADJ. TO RESERVATIONS	11.55	212,908	10.96	178,417		
DIFFERENCE	0.56	----	-0.07	----	0.63	
AM. INDIANS ON RESERVATIONS	19.88	3,073	14.94	1,479		
AM. INDIANS ADJ. TO RESERVATIONS	15.11	11,990	14.51	9,597		
DIFFERENCE	4.77	----	0.43	----	4.34	
DIFFERENCE-IN-DIFFERENCE	-4.21		-0.50		-3.71	3.15**
<u>% OF LOAN APPLICATIONS</u>						
<u>ORIGINATED</u>						
WHITES ON RESERVATIONS	66.39	23,402	70.05	12,098		
WHITES ADJ. TO RESERVATIONS	70.92	265,530	70.83	224,287		
DIFFERENCE	-4.53	----	-0.78	----	-3.75	
AM. INDIANS ON RESERVATIONS	34.47	7,143	54.20	2,321		
AM. INDIANS ADJ. TO RESERVATIONS	55.21	18,436	58.42	14,042		
DIFFERENCE	-20.74	----	-4.22	----	-16.52	
DIFFERENCE-IN-DIFFERENCE	16.21		3.44		12.77	9.67**

Notes: * p<0.1; ** p<0.05. All comparisons are based on home purchase and home improvement loan applications provided by the HMDA for 2004-2008. All comparisons exclude loans that were purchased by another lender, withdrawn by the applicant, or deemed incomplete by the lender.

The empirical model given in (10) provides a more rigorous test of the theories.

$$Outcome_{ira} = \delta'_a + \delta'_a(AI) + \beta_1(res.tract)_{ra} + \beta_2(AI \cdot res.tract)_{ra} + \beta_3(st.res.tract)_{ra} + \beta_4(AI \cdot st.res.tract)_{ra} + \eta'X_{ira} + \lambda'W_{ra} + \lambda'W(AI)_{ra} + \mu_t + \mu_t(AI) + \varepsilon_{ira} \quad (10)$$

where i = application, t = year, r = reservation, and a = reservation area, which is the county or counties embedding the reservation. AI is a race indicator that equals '1' if the applicant reports being American Indian, and is '0' if the applicant reports being white. The variable $res.tract$ is an indicator for reservation tracts and $st.res.tract$ is an indicator for the subset of reservations that are under state jurisdiction. Thus, β_1 gives the expected reservation effect for whites on tribal jurisdiction reservations conditional on the controls and $\beta_1 + \beta_2$ gives the effect for American Indians. The sum of $\beta_1 + \beta_3$ gives the expected reservation effect for whites on state jurisdiction reservations and $\beta_1 + \beta_2 + \beta_3 + \beta_4$ gives the effect for American Indians.

The model in equation (10) identifies the DDD parameter, β_4 , from *within reservation-area* variation in jurisdiction. This is achieved by estimating reservation-area fixed effects for the 141 areas (δ'_a) that surround the 141 reservations in the sample to capture geographic variation in lending conditions, lender types, and lender coverage under the HMDA regulations. Here δ'_a are the estimates of $P(Outcome = 1|V)$ for white applicants off reservations in each area when all of the other controls are equal to 0. The sum, $\delta'_a + \delta'_a(AI)$, are the conditional intercepts for American Indians off reservations in each of the 141 areas.

The model also controls for X , which denotes characteristics of the loan applications and the applicant. Applicant characteristics include income and loan-to-income ratios. Loan characteristics include loan type (purchase vs. improvement), property type (manufactured vs. site built), lien status (first lien, subordinate lien, or no lien), and whether the loan will be processed through a federally insured or guaranteed loan program. Year effects (μ_t) control for any annual trend in loan denials over 2004-2008, and these are interacted with the AI indicator to allow the trends to differ by race. Tables A2 and A3 show summary statistics for the HMDA data used in the estimation of equation (10).

The model also controls for two reservation-specific factors, denoted by W , that may influence loan outcomes but that are not controlled for by the area fixed effects or by the control groups. These two factors are property rights to reservation land and casino activity. As described above, reservation land is either owned outright, or held in trust by the Bureau of

Indians Affairs. Hence, W includes the percent of fee-simple land (‘100’ off reservations) and the percent of individual trust land (‘0’ off reservations). W also includes the number of casino slot machines per American Indian (‘0’ off reservations). These factors are interacted with AI to allow for different effects for whites and Indians.

Table 8 reports the linear probability model estimates of equation (10). In the model, the dependent variable is measured at the individual level but the area fixed effects are measured only at the reservation-area level. Accordingly, all standard errors are clustered at the area level to account for any unobserved correlation within areas. The over 250 area-specific intercepts and the year effects are not reported to save space. The dependent variable in column 1 is lender denial, in column 2 it is borrower refusal, and in column 3 it is loan origination (i.e., lender and borrower acceptance). In all columns the point estimates of primary interest, β_4 , are denoted by AM. INDIAN*STATE JUR RES.TRACT.

The estimates of β_4 in all columns are the same sign as predicted by the theory based on uncertainty and statistically significant in columns 1 and 3. To interpret the magnitude of the estimates it is useful to look at the ratio of $|\beta_4| / |\beta_2|$, where β_2 is estimated by the coefficients on AM. INDIAN*RESERVATION TRACT and gives the loan-outcome penalty for American Indians on reservations having no casinos and where all land is held in tribal trust. The ratio, $|\beta_4| / |\beta_2|$ is the proportion of the penalty that is eliminated by having state jurisdiction. In the column 3 estimates of the probability that an application will be originated the ratio is $0.0568/0.1101 = 0.516$. That is, state jurisdiction on reservations is estimated to increase the probability of an American Indian’s loan being originated by 51.6 percent.

The estimates on the controls in Table 8 are reasonable and conform with a previous LPM study of HMDA data in a non-reservation context (Lin and White 1999). For example, applications with higher applicant incomes are less likely to be denied and more likely to be originated but these effects diminish as income rises. Interestingly, there is no systematic relationship between income and the probability that an applicant will reject a loan offer. The reservation controls are not always statistically significant, but the signs of the coefficients are sensible. For example, more casino gambling as measured by increases in the number of slot machines per American Indian is associated with an increase in the conditional probability of loan origination for Indian applicants. Relative to tribal trust land, more fee-simple and individual trust land is associated with higher probabilities of loan origination for Indians.

TABLE 8:
LPM DIFFERENCE ESTIMATES OF HOME LOAN APPLICATION OUTCOMES

	Y = DENIED BY LENDER (1)	Y = REJECT BY BORR. (2)	Y = ORIGINATED (3)
RESERVATION TRACT	0.0223** (0.0103)	0.0083 (0.0056)	-0.0273** (0.0108)
AM. INDIAN* RESERVATION TRACT	0.1233** (0.0151)	0.0563** (0.0281)	-0.1101** (0.0178)
ST. JUR. RES. TRACT	-0.0061 (0.0084)	0.0074 (0.0057)	-0.0007 (0.0096)
AM. INDIAN* ST. JUR RES. TRACT	-0.0631** (0.0280)	-0.0208 (0.0240)	0.0568** (0.0281)
<u>APPLICANT CONTROLS</u>			
MALE	-0.0314**	-0.0055*	0.0317**
INCOME (2008 000\$S)	-0.00009**	8.70E-06	0.00008**
INCOME SQUARED	1.20E-08**	-5.62E-10	-1.01E-08**
LOAN TO INCOME RATIO	0.0038**	-0.0002	-0.0033**
<u>APPLICATION CONTROLS</u>			
IMPROVEMENT LOAN	0.2075**	0.0164	-0.1898**
MANUFACTURED HOME	0.1544**	0.0886**	-0.1929**
LOAN AMT (2008 000\$S)	5.52E-07	-0.00001*	0.00001
FIRST LIEN	-0.0299	0.0197	0.0175
SUBORDINATE LIEN	0.0004	0.0387*	-0.0238
TO BE OWNER OCCUPIED	0.0167**	0.0217**	-0.0329**
FSHA	-0.0635**	-0.0548**	0.0974**
VA	-0.0666**	-0.0535**	0.1019**
FSA/RHS	-0.0291**	-0.0789**	0.0975**
HOEPA	-0.4299**	-0.1531**	0.5151**
<u>RESERVATION CONTROLS</u>			
% FEE-SIMPLE LAND	-0.00014	-0.00004	0.00016
AM. INDIAN*% FEE-SIMPLE	-0.00059	-0.00058	0.00062*
% INDIV. TRUST LAND	0.00026	-0.00008	-0.00017
AM. INDIAN *% INDIV.	-0.00285**	0.00035	0.00196*
SLOTS PER AM. IND	0.00039	-0.00123	0.00034
AM. IND* SLOTS PER AM. IND	-0.03335**	-0.00353	0.02687*
<u>FIXED EFFECTS</u>			
YEAR	YES	YES	YES
AM. INDIAN *YEAR	YES	YES	YES
RESERVATION AREA	YES	YES	YES
AM. INDIAN *RES. AREA	YES	YES	YES
NUMBER OF OBS.	546,894	427,976	546,894

NOTES: * p<0.1; ** p<0.05 using standard errors clustered by reservation area. The regressions employ the 2004-2008 HMDA data for home purchase and improvement applications summarized in Tables A2 and A3. The data exclude loans that were purchased by another lender, withdrawn by the applicant, or deemed by the lender to be incomplete.

B. *Robustness Checks*

Table 9 reports estimates from several subsamples used to check the robustness of the main results to potential omitted variable bias. For conciseness, only the loan-origination estimates are reported. The coefficients on the conditioning variables are also not reported to save space. Column 1 shows the full sample results for comparison.

TABLE 9:
ROBUSTNESS CHECKS OF THE LPM DIFFERENCE ESTIMATES OF LOAN ORIGINATION

	ALL APPLICATIONS (1)	COMPLIER STATES (2)	WITHIN MN, OR, & WI (3)	PROP. SCORE SAMPLE (4)	MANUF. HOME APPS (5)
RESERVATION TRACT	-0.0273** (0.0108)	-0.0190 (0.0194)	-0.0131 (0.0591)	-0.0726** (0.0203)	0.0119 (0.0184)
AM.INDIAN* RESERVATION TRACT	-0.1101** (0.0178)	-0.1309** (0.0197)	-0.1563** (0.0225)	-0.0537 (0.0371)	-0.0636** (0.0245)
ST.JUR. RES. TRACT	-0.0007 (0.0096)	0.0041 (0.0146)	-0.0123 (0.0655)	0.0258 (0.0155)	-0.0453* (0.0257)
AM. INDIAN* ST. JUR RES. TRACT	0.0568** (0.0281)	0.0740** (0.0364)	0.2436 (0.1651)	0.0579 (0.0347)	0.0965** (0.0473)
<u>CONTROLS</u>					
APPLICANT	YES	YES	YES	YES	YES
APPLICATION	YES	YES	YES	YES	YES
RESERVATION	YES	YES	YES	YES	YES
RESERVATION*AM. INDIAN	YES	YES	YES	YES	YES
<u>FIXED EFFECTS</u>					
YEAR	YES	YES	YES	YES	YES
AM. INDIAN *YEAR	YES	YES	YES	YES	YES
RE SERVATION AREA	YES	YES	YES	YES	YES
AM. INDIAN *RES. AREA	YES	YES	YES	YES	YES
STATE	NO	NO	YES	NO	NO
AM. INDIAN *STATE	NO	NO	YES	NO	NO
NUMBER OF OBS.	546,894	393,147	59,556	215,528	46,654

NOTES: * p<0.1; ** p<0.05 using standard errors clustered by reservation area. The data exclude loans that were purchased by another lender, withdrawn by the applicant, or deemed incomplete by the lender. Column 1 is the benchmark regression from columns 3 of Table 8. Column 2 employs a subsample of applicants from areas surrounding reservations whose jurisdiction status 'complies' with whether or not the surrounding state has a constitutional disclaimer of jurisdiction on reservation land. The complier subsample excludes reservations in CO, KS, MI, ME, MS, NC, SC, TX and WA. It also excludes the reservations within MN, OR, and WI that were exempted from Public Law 280. Column 3 employs the applications from the sample within Minnesota, Oregon, and Wisconsin. Column 4 employs a propensity-score matched sample of reservations that is summarized in panel B of Table A1 in the appendix. Column 5 employs the sample of applications for manufactured homes.

Columns 2-4 employ subsamples described above (see section III). Column 2 employs applications from complier states; column 3 employs applications within Minnesota, Oregon, and Wisconsin; and column 4 employs applications from a trimmed sample of reservations that

are most similar in their observable characteristics (see table A1, panel B). In all of these subsamples, the point estimate of β_4 is positive and it statistically significant or nearly so.

Column 5 uses a subsample of manufactured homes to better control for potential bias due to the omission of a land ownership control for each application. Although the regression in column 1 controls for the percentage of reservation land owned in fee simple and held in individual trust status, the HMDA data do not distinguish between land-tenure types for an applicant's specific parcel. This distinction is important because, although lenders may obtain a lien over trust land, these liens may be weaker because they are often for long-term leasehold interests rather than for full ownership.³⁷

The potential for bias caused by the lack of parcel-specific data on trust status is less pronounced in the manufactured home sample employed in column 4. Unlike site-built homes, manufactured homes are often portable collateral, similar to automobiles. When the collateral is portable, the lender can fully repossess the home regardless of the trust status of land. The column 5 point estimate of β_4 is larger than the full-sample estimate, indicating the effect of state jurisdiction is robust to a setting where omitted differences in land ownership should not cause bias.

To summarize, analysis of individual home loan applications over 2004-2008 indicates that the large disparities in per capita credit (see section III) may understate the full impact of legal jurisdiction on reservation lending. These estimates indicate that American Indians on reservations under state jurisdiction were more likely to have their applications originated (i.e., approved by the lender with terms agreeable to the borrower) after controlling for a number of differences. Point estimates from the main empirical model indicate that state jurisdiction increased the probability that an American Indian's application was originated by 51 percent. Loans that were not originated can be characterized as mistakes that are costly to would-be borrowers who incur real and opportunity costs to apply. The higher prevalence of mistakes under tribal jurisdiction is consistent with the assumption that the key difference between state and tribal jurisdiction is lender uncertainty about creditor rights.

³⁷ Akee (2009), however, provides evidence suggesting that long-term leasehold rights over trust land may closely approximate the value of full ownership. For practical details on home mortgage issues related to trust land, see A Guide to Mortgage Lending in Indian Country, available at: <http://www.occ.treas.gov/events/country.pdf>. P.L. 280 did not give states the authority to alter the status of federal trust land so state jurisdiction alone does not overcome these federal land constraints.

VI. Conclusions

The paper's general finding - that legal institutions play a fundamental role in determining credit activity on American Indian reservations - is consistent with the broader cross-country literature (see La Porta et. al. 2008). But the reservation setting enables a close view of institutions from below, to use the phrase of Pande and Udry (2006). In the reservation setting it is arguably easier to control for the non-institutional factors that always threaten to confound analysis of institutions (e.g., geography and culture).

The findings of this paper add to a growing consensus in the literature that institutions play a primary role in shaping reservation economies. Some of this literature indirectly hints at the importance of institutions by showing that non-institutional factors fall short in explaining the poor economic outcomes of American Indians on reservations.³⁸ But the bulk of the literature directly measures the impact of institutions and finds that incomplete property rights to land (Anderson and Lueck 1992, Akee 2009), and the lack of separation of powers in some tribal governments (Cornell and Kalt 2000), limits economic performance on reservations.

The finding that credit activity increased almost immediately after the imposition of state jurisdiction also provides a plausible explanation for the findings in Anderson and Parker (2008). Anderson and Parker find that the per capita incomes of American Indians grew 30 percentage points faster from 1969-1999 on reservations that were forced under state jurisdiction. It may be that better access to credit for individual Native Americans led to the faster growth. Although the evidence of the link between institutions and economic growth through better access to credit is tenuous, it is consistent with Native American lending studies claiming that "Indian Country is capable of much higher growth" if more affordable credit were available (NACTA 2001, p. 6).

In any case, this paper's findings are consistent with the theory that lending conditions are improved under state jurisdiction because creditors, usually non-Indians, are less certain about the enforcement of debt contracts under tribal law. Uncertainty may be high because tribes have not clearly defined the legal infrastructure for the enforcement of contracts (Native American Lending Study 2001), because there is sparse precedent on enforcement, and because "tribal judges seldom document their decisions in writings that outsiders can access" (Cooter and

³⁸ Gitter and Reagan (2002), for example, show that American Indian employment on reservations lags behind American Indian employment off reservations for reasons that are not fully explained by differences in human capital as traditionally measured. Trosper (1978) rejects the idea that low agricultural productivity on Indian reservations can be attributed to inferior abilities of Indians to manage land.

Fikentscher 2008, 31). The evidence pointing towards uncertainty distinguishes the implications from this study from those of the legal origins literature (see La Porta et al. 2008). The implication from the legal origins literature is that civil law countries can enhance the functioning of credit markets by strengthening creditor rights. The implication of this paper is that tribes can enhance the functioning of credit markets on reservations by making tribal codes and court decisions more accessible and comprehensible to lenders and by combining court systems to augment precedent. Many tribes are in fact doing this by posting court rulings on tribal court clearinghouses and by creating inter-tribal courts of appeal.³⁹ Still, tribes face serious challenges in establishing clear legal precedent and in conveying that precedent to outside lenders, especially in the short run. An alternative solution - one that sovereign tribes are reluctant to pursue - is for states to assume jurisdiction over debt contracts on reservations.⁴⁰

The focus on legal uncertainty also makes the findings relevant to indigenous territories outside of the U.S. and to countries with developing, immature, or new legal systems. Regarding indigenous territories, the United Nation's 2007 Declaration on the Rights of Indigenous People asserts a right of indigenous people to maintain and strengthen their distinct legal institutions.⁴¹ Bolivia's constitution of 2009 follows the spirit of the declaration by putting indigenous judiciaries on the same footing as the civil law judiciary.⁴² The evidence in this paper indicates that an unintended and negative consequence of adopting this self-determination policy could be further constraints on access to credit for indigenous people.

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³⁹ See <http://www.tribal-institute.org/>, <http://lawschool.unm.edu/AILC/switca>), (www.nics.ws), and (<http://itcnca.org>).

⁴⁰ Tribal reluctance may indicate that the cultural benefits of sovereignty outweigh the economic costs, but this issue is outside the scope of this study.

⁴¹ The UN Declaration is available at www.iwgia.org/sw248.asp.

⁴² An English translation of Bolivia's constitutions is available at http://faculty.smcm.edu/mfbilgin/nueva_cpe.txt.

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TABLE A1
MEAN CHARACTERISTICS OF RESERVATIONS IN 2000

	RESERVATIONS WITH TRIBAL JURISDICTION		RESERVATIONS WITH STATE JURISDICTION		t-STAT FOR DIFFERENCE (ABS. VALUE)
		OBS.		OBS.	
<i>PANEL A: ALL RESERVATIONS</i>					
AM. INDIAN PER-CAPITA INCOME (1999 \$S) ^a	8,876	85	11,854	56	4.40**
AM. INDIAN POPULATION	4,880	85	1,210	56	1.45
PERCENT OF POPULATION THAT IS NON-INDIAN ^a	68.23	85	57.28	56	2.32**
AM. INDIAN POPULATION PER-SQUARE MILE ^a	113.48	85	104.23	56	0.15
POP. DENSITY IN ADJACENT COUNTIES ^a	35.99	85	118.32	56	5.72**
RESERVATION SLOT MACHINES PER AM. INDIAN ^c	0.26	85	0.56	56	2.32**
PERCENT OF LAND HELD IN FEE-SIMPLE ^b	21.82	80	32.54	52	1.85*
PERCENT OF LAND HELD IN INDIV. TRUST ^b	9.55	79	13.40	52	1.29
<i>PANEL B: PROPENSITY SCORE MATCHED SUBSAMPLE²</i>					
AM. INDIAN PER-CAPITA INCOME (1999 \$S) ^a	10,239	31	10,505	31	0.39
AM. INDIAN POPULATION	1,541	31	1,691	31	0.40
PERCENT OF POPULATION THAT IS NON-INDIAN ^a	59.40	31	59.14	31	0.04
AM. INDIAN POPULATION PER-SQUARE MILE ^a	92.85	31	102.55	31	0.14
POP. DENSITY IN ADJACENT COUNTIES ^a	49.18	31	43.58	31	0.49
RESERVATION SLOT MACHINES PER AM. INDIAN ^c	0.69	31	0.74	31	0.22
PERCENT OF LAND HELD IN FEE-SIMPLE ^b	34.37	31	33.13	31	0.13
PERCENT OF LAND HELD IN INDIV. TRUST ^b	8.50	31	9.72	31	0.31

Notes: * p<0.1; ** p<0.05. The data are for all reservations with American Indian populations exceeding 250 in 1999. The sources for the data are as follows: (a) The 2000 U.S. Census; (b) The Bureau of Indian Affairs, U.S. Census, and Anderson and Parker (2008) calculations; (c) Anderson and Parker (2008). To generate a propensity score for each reservation, I estimated the probability of a reservation having state jurisdiction as a function of the observable characteristics of reservations shown above using a probit model. Each state-jurisdiction reservation was then paired with a single tribal-jurisdiction reservation with the nearest propensity score. The matching rules included common support, no-replacement, and a caliper of 0.05. Common support in this context means that all tribal-court reservations having a lower predicted probability of being treated (i.e. having state jurisdiction) than the state-court reservation with the lowest predicted probability of being treated are excluded from being paired. No-replacement means that each reservation is used only once. A caliper of 0.05 means that the differences in the probability of treatment for a pair cannot exceed 0.05.

TABLE A2:
SUMMARY STATISTICS OF HOME LOAN APPLICATIONS BY WHITES

	WHITE APPLICANTS ON RESERVATIONS						WHITE APPLICANTS OFF RESERVATIONS IN RESERVATION AREA					
	RESERVATIONS WITH TRIBAL JURISDICTION			RESERVATIONS WITH STATE JURISDICTION			RESERVATIONS WITH TRIBAL JURISDICTION			RESERVATIONS WITH STATE JURISDICTION		
	OBS.	MEAN	ST. DEV.	OBS.	MEAN	ST. DEV.	OBS.	MEAN	ST. DEV.	OBS.	MEAN	ST. DEV.
YEAR 2008	23402	0.129	0.335	12098	0.124	0.330	265530	0.104	0.305	224287	0.118	0.322
YEAR 2007	23402	0.186	0.389	12098	0.192	0.394	265530	0.161	0.367	224287	0.181	0.385
YEAR 2006	23402	0.244	0.430	12098	0.237	0.425	265530	0.239	0.426	224287	0.229	0.420
YEAR 2005	23402	0.242	0.428	12098	0.236	0.425	265530	0.271	0.444	224287	0.245	0.430
YEAR 2004	23402	0.199	0.399	12098	0.211	0.408	265530	0.226	0.418	224287	0.227	0.418
MALE	23402	0.737	0.440	12098	0.753	0.431	265530	0.719	0.450	224287	0.707	0.454
INCOME (\$2008 000s)	22655	87.41	141.72	11755	103.44	120.41	253943	107.41	167.40	217533	102.28	153.45
INCOME SQ. (\$2008 000s)	22655	27725	886187	11755	25199	174662	253943	39559	1042618	217533	34007	855220
LOAN AMNT (\$2008 000s)	23402	126.87	121.80	12098	153.60	157.78	265530	164.60	167.07	224287	168.65	172.35
LOAN TO INCOME RATIO	22655	1.885	2.968	11755	1.916	4.056	253943	2.006	3.624	217533	2.004	3.048
HOME LOAN	23402	0.795	0.404	12098	0.746	0.435	265530	0.833	0.373	224287	0.765	0.424
IMPROVEMENT LOAN	23402	0.205	0.404	12098	0.254	0.435	265530	0.167	0.373	224287	0.235	0.424
FIRST LIEN	23402	0.814	0.389	12098	0.786	0.410	265530	0.787	0.409	224287	0.753	0.431
SECOND LIEN	23402	0.148	0.355	12098	0.184	0.388	265530	0.195	0.396	224287	0.204	0.403
NO LIEN	23402	0.038	0.191	12098	0.029	0.168	265530	0.019	0.136	224287	0.042	0.201
CONVENTIONAL LOAN	23402	0.907	0.290	12098	0.950	0.219	265530	0.921	0.270	224287	0.930	0.255
FSHA LOAN	23402	0.069	0.253	12098	0.033	0.178	265530	0.052	0.222	224287	0.046	0.210
VA LOAN	23402	0.011	0.106	12098	0.010	0.100	265530	0.019	0.135	224287	0.017	0.130
FSA/RHS LOAN	23402	0.013	0.111	12098	0.008	0.086	265530	0.008	0.091	224287	0.006	0.082
MANUFACTURED HOME	23402	0.163	0.369	12098	0.084	0.277	265530	0.087	0.282	224287	0.059	0.235
TO BE OWNER OCCUPIED	23402	0.817	0.387	12098	0.738	0.440	265530	0.786	0.410	224287	0.846	0.361
HOEPA LOAN	23402	0.001	0.035	12098	0.001	0.027	265530	0.001	0.026	224287	0.001	0.028

TABLE A3:
SUMMARY STATISTICS OF HOME LOAN APPLICATIONS BY AMERICAN INDIANS

	AMERICAN INDIAN APPLICANTS ON RESERVATIONS						AMERICAN INDIAN APPLICANTS OFF RESERVATIONS IN RESERVATION AREA					
	RESERVATIONS WITH TRIBAL JURISDICTION			RESERVATIONS WITH STATE JURISDICTION			RESERVATIONS WITH TRIBAL JURISDICTION			RESERVATIONS WITH STATE JURISDICTION		
	OBS.	MEAN	ST. DEV.	OBS.	MEAN	ST. DEV.	OBS.	MEAN	ST. DEV.	OBS.	MEAN	ST. DEV.
YEAR 2008	7143	0.139	0.346	2321	0.164	0.370	18436	0.106	0.307	14402	0.102	0.304
YEAR 2007	7143	0.195	0.396	2321	0.208	0.406	18436	0.163	0.370	14402	0.167	0.373
YEAR 2006	7143	0.206	0.404	2321	0.208	0.406	18436	0.225	0.418	14402	0.233	0.423
YEAR 2005	7143	0.231	0.420	2321	0.214	0.411	18436	0.255	0.436	14402	0.248	0.432
YEAR 2004	7143	0.229	0.420	2321	0.206	0.404	18436	0.251	0.434	14402	0.251	0.434
MALE	7143	0.511	0.499	2321	0.564	0.496	18436	0.610	0.487	14402	0.610	0.488
INCOME (\$2008 000s)	7074	52.09	43.96	2303	103.21	160.19	17908	83.24	108.45	13723	113.30	150.10
INCOME SQ. (\$2008 000s)	7074	4645	24423	2303	36303	328276	17908	18690	409476	13723	35366	400180
LOAN AMNT (\$2008 000s)	7143	57.69	70.05	2321	124.99	140.04	18436	132.30	128.73	14402	187.35	170.37
LOAN TO INCOME RATIO	7074	1.144	1.261	2303	1.632	1.463	17908	1.927	3.331	13723	2.100	2.005
HOME LOAN	7143	0.536	0.499	2321	0.610	0.485	18436	0.725	0.446	14402	0.722	0.448
IMPROVEMENT LOAN	7143	0.464	0.499	2321	0.380	0.485	18436	0.275	0.446	14402	0.278	0.448
FIRST LIEN	7143	0.647	0.478	2321	0.735	0.441	18436	0.708	0.455	14402	0.690	0.463
SECOND LIEN	7143	0.075	0.264	2321	0.735	0.363	18436	0.229	0.420	14402	0.265	0.441
NO LIEN	7143	0.277	0.447	2321	0.156	0.312	18436	0.063	0.243	14402	0.045	0.208
CONVENTIONAL LOAN	7143	0.889	0.313	2321	0.847	0.360	18436	0.885	0.318	14402	0.912	0.283
FSHA LOAN	7143	0.100	0.299	2321	0.140	0.348	18436	0.087	0.282	14402	0.069	0.252
VA LOAN	7143	0.005	0.074	2321	0.008	0.090	18436	0.021	0.145	14402	0.016	0.127
FSA/RHS LOAN	7143	0.005	0.071	2321	0.004	0.062	18436	0.006	0.075	14402	0.003	0.051
MANUFACTURED HOME	7143	0.351	0.477	2321	0.162	0.368	18436	0.136	0.343	14402	0.052	0.227
TO BE OWNER OCCUPIED	7143	0.947	0.222	2321	0.935	0.247	18436	0.916	0.278	14402	0.921	0.270
HOEPA LOAN	7143	0.003	0.053	2321	0.002	0.041	18436	0.001	0.035	14402	0.001	0.038