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

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Abstract: This paper shows a causal link from legal institutions to growth through better access to credit. The econometric analysis exploits federal legislation, implemented during the 1950s and 1960s, that gave states jurisdiction over debt contracts on some American Indian reservations while tribes retained jurisdiction on others. Aggregate historical data from the Bureau of Indian Affairs indicate that state jurisdiction increased per capita credit to American Indians on reservations by 66 percent shortly after implementation. Recent micro-data indicate that state jurisdiction increases the probability that lenders will approve an American Indian's home loan application (with terms agreeable to the borrower) by 51 percent. These and related findings are consistent with the theory that creditor rights are more certain to lenders under state courts.

JEL classifications: K40, O17, O12, G21
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I.   Introduction

Several prominent studies have set the stage for more detailed analysis of institutions and development by presenting evidence from cross-country data. One set of papers finds robust positive relationships between economic prosperity (e.g., income, output, growth) and measures of the stability of contract enforcement and the protection of property rights (Keefer and Knack 1997, Hall and Jones 1999, Acemoglu et. al. 2001, Acemoglu and Johnson 2005). Another set of papers finds that the strength of a country's legal protection of investors is a strong predictor of financial and credit-market development (La Porta et. al. 2008).

But cross-country data may be of limited use in learning how specific institutional rules and laws affect specific paths of development. As Pande and Udry (2005, 3) note, cross-country measures of institutions do not capture detailed differences across countries and "their coarseness prevents close analysis of particular casual mechanisms from institutions to growth." To understand how institutions affect specific channels, Pande and Udry recommend focusing on variation in institutions within a country where possible. This paper does so by examining the effect that legal institutions on American Indian reservations have on access to credit.

Reservation economies are a good laboratory for testing the effect of institutions because the data are free from some of the reverse-causation and omitted-variable problems found in cross-country comparisons.[1] Reverse-causation problems are mitigated because institutions are often imposed upon reservations by the federal government rather than being endogeneously self-selected by tribes. Omitted variable problems are mitigated because the economic outcomes of American Indians living just off reservations, and those of non-Indians living on reservations, help control for non-institutional differences across reservations (e.g., culture and geography).[2]

One of the most important – but often overlooked - institutional differences across reservations is whether tribal or state courts have jurisdiction over criminal offenses and civil suits. The variation in jurisdiction is due to federal legislation known as Public Law 280. This legislation, which was implemented during the 1950s and 1960s, gave states jurisdiction on some reservations without the consent of affected tribes. Today, state legal systems (which are anchored in the common law tradition) have authority on some reservations and tribal systems of dispute resolution retain authority on other reservations.

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[1] Papers examining institutions across reservations include Anderson and Lueck (1992) and Cornell and Kalt (2000).
[2] Non-Indians on reservations are a control because they are not usually subject to the same institutional constraints.

The legal and sociology literature argues that the imposition of state jurisdiction has disadvantaged the affected tribes, but the economics literature suggests that tribal sovereignty can be both an asset and a liability.[3] 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, for example, tribes cannot create and maintain independent courts.[4]

Two recent papers contribute to this literature by reporting some economic benefits that appear to have resulted from having state jurisdiction. Using data from the U.S. Census, Anderson and Parker (2008) 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. Using the same data, Cookson (forthcoming) finds that present-day casinos are more prevalent on reservations under state jurisdiction when controlling for other factors.

These papers are important steps in demonstrating the link between law, growth, and investment but there are two important shortcomings. First, neither Anderson and Parker nor Cookson can rule out the possibility that tribes put under state jurisdiction were economically advantaged prior to P.L. 280 because neither paper reports economic data for a period before the law was implemented.[5] Second, neither paper shows a key channel through which P.L. 280 directly caused faster growth. For example, casinos were not the key channel because tribes under state jurisdiction were already following a faster growth path before the recent onset of Indian casinos (see Anderson and Parker 2008). Moreover, P.L. 280 did not give states jurisdiction over contracts between casino investors and tribes so the law's effect on casinos is indirect: it may be that P.L. 280 caused growth and growth caused casinos.

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[3] 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."

[4] 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."

[5] Anderson and Parker do not control for preexisting trends in income growth because the income data they use are not available for a time period prior to the implementation of P.L. 280.

This paper identifies a direct causal channel from legal institutions to growth: the effect of P.L. 280 on access to affordable credit for individual Native Americans. The focus on microfinance is appropriate for two reasons. First, P.L. 280 clearly gives states jurisdiction over individual debt contracts so it is clear that there was a 'treatment' of this sort. Second, resources are being devoted to making credit accessible to the poor in developing countries across the world (see, e.g., Armendariz de Aghion and Morduch 2005), and there are claims that more affordable credit would promote development on Indian reservations. For example, credit reports published by the Bureau of Indian Affairs (BIA) up to the 1970s consistently argue that "Indian economic development is stymied for lack of adequate financing" (BIA 1965, p. 2). More recent Native American lending studies claim that "Indian Country is capable of much higher growth" if more affordable credit were available (NACTA 2001, p. 6). The same publications usually list tribal sovereignty among the obstacles to greater financing, as it is easy to find claims such as: "Lending institutions are reluctant to make loans to Indian operators because foreclosure procedures may lie with tribal jurisdictions" (BIA 1987).

The analysis begins in Section II with a description of why some reservations were put under state jurisdiction while others were not. This section also summarizes historical reservation-level income data that I recently found at the U.S. National Archives. These data indicate there was no pre-P.L. 280 difference in the mean per capita incomes of reservations put under state jurisdiction and those retaining tribal jurisdiction. This finding helps validate P.L. 280 as a natural experiment in legal institutions.

Much of the law-and-finance literature suggests that credit will increase with the power creditors have to force repayment, and the theoretical framework in Section III could assume the move to state courts increased creditor rights.[6] The more defensible assumption in this setting, however, is that creditor rights are simply less certain 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] This assumption of uncertainty (rather than bias) forms the basis of theoretical arguments for how state jurisdiction will affect per capita credit. The assumption also

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[6] La Porta et. al. (2008) give a review of the law-and-finance literature.

[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).

forms the basis for more nuanced predictions including the prediction that state jurisdiction will decrease costly borrower mistakes in applying for loans that will either be denied by lenders or that will be approved with terms that are unacceptable to potential borrowers.

Section IV uses 1951-1970 BIA credit report data to estimate the effects of jurisdiction on per capita credit extended to American Indians on reservations from 'customary' (i.e., private) lenders. The credit reports were published before and after P.L. 280, and this allows me to control for pre-existing trends in lending. The evidence from standard panel regressions indicate that state jurisdiction increased per-capita credit to American Indians by at least 66 and 96 percent in the two regions where P.L. 280 was broadly implemented.

Section V employs 2004-2008 micro-data from the Home Mortgage Disclosure Act (HMDA) to estimate the effect of jurisdiction on the conditional probability that loan applications will be originated (i.e., approved by the lender with terms agreeable to the borrower) along with other outcomes. 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. The empirical models use a spatial and racial difference-in-difference-in-difference (DDD) strategy to control for factors other than jurisdiction that may affect lending outcomes aside from the 15 conditioning variables provided by the HMDA.[8] The basic DDD model is supported by robustness checks including a propensity-score matched subsample of reservations that are most similar except for jurisdiction. The evidence suggests state jurisdiction increases the probability that an American Indian's loan application will be originated by 51 percent.

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.

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[8] The spatial differences come from on-versus-off-reservation and the racial differences from Indian-versus-white. These differences control for factors such as regional lending conditions and regional culture or lender racism. The conditioning variables control for factors such as applicant income, loan size, and lien status.

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, e.g., 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.

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,

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[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 last state that assumed jurisdiction was Iowa in 1967.

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]

[Insert Figure 1]

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.

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[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. 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).

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.

[Insert Table 1]

III.   Theoretical Framework to Motivate Empirical Analysis

There are two different key assumptions one could make in modeling the affect 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 more certain to lenders under state jurisdiction. This framework relies on the second, less judgmental assumption to motivate analysis of data on per capita reservation credit, the denial of loan applications by lenders, and the refusal of potential borrowers to accept offered loans.

The unit of analysis is a potential borrower on a reservation who is an individual Indian or Indian-owned private firm (i.e., the borrower is not a tribal government).[13] The loans under consideration include those for business start-up or expansion and for home mortgages. However, the theory does not distinguish between loans secured with collateral and unsecured loans in order to keep the framework general.[14] The lender is a profit-maximizing non-Indian firm which knows if it must seek repayment in tribal courts in the event of default. The model ignores the possibility to contract around tribal courts because this is difficult to do.[15]

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[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.

[13] I confine attention to Indians because tribal courts generally do not have jurisdiction over contracts between non-Indian creditors and non-Indian debtors (see, e.g., *Plains Commerce Bank v. Long* (U.S. Supreme Court 2008)). I confine attention to individual Indians and Indian-owned firms because the sovereign immunity status of tribal governments may preclude them from being sued in any court (McLish 1988, Haddock and Miller 2006)).

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

[15] 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

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The sequence of decisions is as follows. First, potential borrowers decide whether or not to apply for a loan. The loan being considered is for a given amount, L, and will be due for repayment after one time period. Second, lenders decide whether or not to offer the loan and at which interest rate, r. Third, applicants who are offered loans decide whether or not to accept. Fourth, borrowers observe their second-period wealth (which has a random component) and decide whether to repay the loan and interest in full or to default.

The key variable explaining choices is how much wealth the courts on a reservation will let a defaulting borrow retain, K. 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.[16]

A.   Model Basics

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.[17] 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. 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

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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."

[16] 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.

[17] 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.

$f(\delta) \sim uniform\,[-1,\bar{\delta}]$. 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 $f(\theta) \sim uniform\,[\underline{\theta},\bar{\theta}]$ 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 (1) holds. If $W_1 < K$, a potential borrower will accept if condition (2) holds.

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

$$\int_{\underline{\theta}}^{K} U(\theta)f(\theta)d\theta + \int_{K}^{\hat{\theta}} U(K)f(\theta)d\theta + \int_{\hat{\theta}}^{\bar{\theta}} U(L(1+r))f(\theta)d\theta \geq U(W_1) \qquad (2)$$

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 (1) or (2) 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 2a shows a borrower's acceptance curve for accepting a loan offer. 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 because her expected utility is exactly equal to her certain utility. She will reject any loan offer 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. The scope of a lender's activities may be local or national, which is a distinction that will be meaningful later. 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 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 (3) equal to the RHS. If $W_1 < K$, the lender earns zero expected profit by offering an interest rate that sets the LHS of (4) equal to the RHS.

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$$\int_{\underline{\theta}}^{\hat{\theta}} (\theta - K) f(\theta) d\theta + \int_{\hat{\theta}}^{\bar{\theta}} L(1+r) f(\theta) d\theta = L(1+\hat{r}) \tag{3}$$

$$\int_{K}^{\hat{\theta}} (\theta - K) f(\theta) d\theta + \int_{\hat{\theta}}^{\bar{\theta}} L(1+r) f(\theta) d\theta = L(1+\hat{r}) \tag{4}$$

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 2a. [18] 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.[19]

B. Loan Outcomes under State Jurisdiction

A key assumption in this framework is that lenders and borrowers know with certainty that $K = K_M$ under state jurisdiction.[20] 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 (1) or (2), evaluated at r^* and K_M, exceeds the RHS. Graphically, a borrower will accept if her acceptance curve lies below the lender offer curve at $K = K_M$.

Figures 2a -2c show cases of potential borrower types who differ in terms of their values of $\bar{\delta}, W_1$, and L.[21] There are other possible cases, but the three depicted in figures 2a-2c 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. In each of the three cases $K_M < K_D$, which means the lender will offer loans to each of the three borrower types under state jurisdiction. In

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[18] 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.

[19] 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 $\bar{\delta}$.

[20] I address the issue of creditor rights varying across different states in the empirical analysis in section V.

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

cases 1 and 3 the borrower type will accept a loan offer under state jurisdiction. In case 2, the borrower type will decline a loan offer under state jurisdiction.

[Insert Figures 2a – 2c]

C.   *Loan Outcomes under Tribal Jurisdiction*

Under tribal jurisdiction, I assume the lender only knows the probability distribution of K rather than the precise value. Let P_L denote $P(K = K_L$), P_M denote $P(K = K_M)$, and P_H denote $P(K = K_H)$. Here $P_L = P_H = (1 - P_M)/2$. This means that creditor rights are equal to states under the average tribal court because $E[K] = K_M$.

I maintain all of the other assumptions from above including the assumption that borrowers on reservations can observe K with certainty. This specific simplifying assumption is consistent with the more general assumption that tribal members have a better understanding of the norms and laws that mold creditor rights on a specific reservation under tribal jurisdiction when compared to non-Indian lenders.[22]

To simplify the analysis, I also assume that lenders know whether or not a borrower type with observable attributes $\bar{\delta}, W_1, L$ would accept a loan offer at interest rate $r^*(K = K_M, \cdot)$ from experience with lending under state jurisdiction.[23] Lenders cannot observe a borrowers' utility function (i.e. degree of risk aversion), so they do not know the upper bound interest rate that the borrower would pay if $K = K_M$.

We now reconsider the three cases shown in figures 2a-2c, beginning with case 1. The lender knows that 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 $K = K_H$. The lender also knows that, because borrowers from reservations where $K = K_H$ would remain in the applicant pool, it 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, and that is the only equilibrium for 'local' lenders

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[22] Borrowers are informed by their understanding of local culture whereas lenders must rely only on limited precedent and limited or difficult to access written law (Cooter and Fikentscher 2008).
[23] This implies the lender knows if the borrower type's acceptance curve intersects the offer curve below or above $K = K_M$. The assumption also implies that borrowers with certain observable attributes $\bar{\delta}, W_1, L$ share the same degree of unobservable risk aversion.

operate on a single reservation, is where 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.

'National' lenders operating on several reservations may be able to offer case 1 borrower types lower interest rates because they can diversify the risk of tribal adjudication. 'National' lenders can reach a second equilibrium for case 1 borrower types, if it exists, by finding the r that equates the LHS of (5) to the RHS. [24]

$$\left[P_M \left(\int_{\underline{K}}^{\hat{\theta}} (\theta - K_M) f(\theta) d\theta + \int_{\hat{\theta}}^{\bar{\theta}} L(1+r) f(\theta) d\theta \right) + P_H \left(\int_{\underline{\theta}}^{\hat{\theta}} (\theta - K_H) f(\theta) d\theta + \int_{\hat{\theta}}^{\bar{\theta}} L(1+r) f(\theta) d\theta \right) \right] = L(1+\hat{r}) \tag{5}$$

This equilibrium exists if the interest rate solving (5) 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.

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 borrower types 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 borrower types from reservations where $K = K_M$.[25]

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. This is the only equilibrium for 'local' lenders. 'National' lenders can reach a second equilibrium for case 3 borrower types if an interest rate solves (5) and is low enough to attract case 3 borrower types for whom $K = K_M$. This second equilibrium is characterized by $r^*(K = K_M) < r < r^*(K = K_H)$ with K_M and K_H borrowers accepting.

Surprisingly, the framework indicates that either an increase or decrease in per capita credit is plausible with a move from tribal to state jurisdiction. On one hand, lenders under state jurisdiction will offer loans to a certain borrower types who would be denied under tribal

[24] 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 $\underline{\theta} = K_H$.

[25] This outcome suggests that lenders could potentially learn that $K = K_H$ on the borrowers' reservation by observing that this borrower type accepted a loan under tribal jurisdiction, but did not bother applying under state jurisdiction. The possibility of quick lender learning could be ruled out if we relaxed the assumption that borrowers with certain observable attributes $\bar{\delta}, W_1, L$ share the same degree of unobservable risk aversion. If borrowers have different levels of risk aversion, then the lender would not know if the borrower was of the exact type as the borrower who would not apply under state jurisdiction.

jurisdiction (as in case 3). And some potential borrowers from reservations with medium creditor rights under tribal jurisdiction will accept loan offers only under state jurisdiction (as in case 1). On the other hand, some potential borrowers from reservations with weak creditor rights under tribal jurisdiction would accept loan offers only under tribal jurisdiction.[26] While it is theoretically ambiguous as to which effect dominates, it is clear that the only potential borrowers who do not benefit from state jurisdiction (in expectation) are those from reservations with weak creditor rights under tribal jurisdiction.

D.   Borrower Decision to Apply and Predictions

The lending environment described thus far implies that no application 'mistakes' are made because borrowers will only submit applications that will lead to loan offers at acceptable rates. It is useful to relax this assumption of perfect anticipation because the data show that applications are often denied by lenders, and that loan offers are often rejected by applicants. Mistakes will occur if some borrowers use applications to search for information about how different lenders will respond.

Formally modeling the search process is outside the scope of this paper, but the framework does imply that mistakes will be more prevalent under tribal jurisdiction because there are cases of multiple equilibria with 'national' and 'local' lenders responding differently to loan applications. With multiple equilibria, 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 they know that some lenders may offer them loans, while other lenders will deny them. This implies that the lending market under tribal jurisdiction will be characterized by more applicants applying for loans that will be denied, and for loans that applicants will not accept. The framework also implies that 'national' lenders will hold a greater share of loans under tribal jurisdiction (because they can offer loans with more attractive terms).

Table 2 summarizes the theoretical predictions. The next section empirically evaluates the effect of jurisdiction on per capita credit. Section V empirically evaluates the effects of jurisdiction on loan application 'mistakes' and on the market share of national lenders.

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[26] This is because risk-averse borrowers are better off paying high interest rates for weak creditor rights than they are paying lower interest rates for strong creditor rights (see Fan and White 2003).

[Insert Table 2]

IV.   Empirical Analysis of Historical Credit Data

This section uses historical Bureau of Indian Affairs (BIA) credit report data to evaluate the effect of state jurisdiction on the amount of credit extended to American Indians on reservations. The BIA credit reports, published for most years between 1951 and 1970, give reservation credit estimates that are aggregated up to the level of BIA administrative area.[27] Each area is named after the headquarter city.

The data in the BIA credit reports are suitable for empirical analysis because BIA administrative areas correlate strongly with jurisdiction status. As Table 3 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 almost exclusively covered areas retaining tribal jurisdiction with the exception of a small reservation population in southeastern California on the border with Arizona.[28]

Table 3 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 (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

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[27] *Annual Reports of Credit and Financing*, Bureau of Indian Affairs. Washington D.C..
[28] 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 California.

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 3, 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. 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.

[Insert Table 3]

Figure 3 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.[29] 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.

[Insert Figure 3]

Figure 4 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

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[29] 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.

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 with the regime change and thus had their credit needs met for several years thereafter.

Table 4 estimates panel regressions of the data in Figures 3 and 4 using variations of (6):

$$Y_{at} = \alpha_a + \lambda_t + \beta(state\_jurisdiction)_{at} + \eta(controls)_{at} + \varepsilon_{at} \qquad (6)$$

In these regressions α_a and λ_t are fixed effects for BIA are 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.

[Insert Table 4]

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.[30] 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 are that was individually owned but

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[30] 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.

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 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\Seminole 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.[31] The estimated effects on the Portland and Minneapolis areas respectively are 18.5 and 13.8 percentage points. In all cases the measured effects suggest that state jurisdiction had an immediate and economically significant positive effect on reservation credit from customary lenders.

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[31] 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.

V.   Empirical Analysis of Modern Home Loan Data

This section analyzes modern loan data from the Home Mortgage Disclosure Act (HMDA). Unlike the BIA credit reports just analyzed in section IV the HMDA data were not collected prior to P.L. 280. However, the HMDA contain information about individual loan application outcomes and individual lenders and the data can be matched to specific reservations rather than to only the broader BIA administrative areas.

A.   Data Overview

HMDA data track the outcome of each home loan application reviewed by most private U.S. lenders.[32] They indicate 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. 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).

Cyree et. al. (2004) and Schumacher et. al. (2008) study HMDA data to assess whether or not American Indian loan applicants on reservations experience higher conditional denial rates compared to Indians living off reservations. The empirical analysis here differs from these studies in several ways including the following. First, and most importantly, this analysis is 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. Second, this analysis focuses on loan refusals by borrowers in addition to loan denials by lenders. Third, this study uses more recent data from a broader national sample.[33] Fourth, rather than including applicants from all non-reservation areas in the sample, this study limits the spatial analysis to counties containing reservations. This feature allows for non-parametric, reservation-area specific controls that help in identifying the effects of jurisdiction. Fifth, this study analyzes lender market share across reservations in order to test the theory's prediction that 'national' lenders will have a competitive advantage under tribal jurisdiction.

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[32] 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.

[33] 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.

The present analysis employs 2004-2008 data of home purchase and improvement applications. 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 loan applications that were incomplete or withdrawn by the applicant and it also excludes observations that were 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.[34]

Table 5 reports initial support for the theoretical predictions. The individual-level data show significant differences across the two types of reservations in the percent of applications denied, the percent of approved loans rejected by the borrower, and the percent of applications that were originated (i.e. approved and accepted). The reservation-level statistics show that the mean amount of per capita 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.

[Insert Table 5]

B.   *Regression Analysis of Loan Applications*

This sections reports estimates of the effect of state jurisdiction on the conditional probability of different loan outcomes, $P(Outcome=1|V)$. 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

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[34] 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.

[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).

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 $E[P(Outcome=1|V)]$ for $[(white^{on}-white^{off})^{TR.jur}-(white^{on}-white^{off})^{ST.jur}]$. *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 generally under the authority of state courts regardless of P.L. 280 status.[37]

The second key difference-in-difference is the estimate of the difference in $E[P(Outcome=1|V)]$ 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 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 6 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 consistent with the theoretical propositions (see table 2).

[Insert Table 6]

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[36] The random sampling of off-reservation whites makes the size of the data set tractable.
[37] Several U.S. Supreme Court rulings have limited the arm of tribal jurisdiction over cases involving only non-Indians. See, e.g., *Plains Commerce Bank v. Long* (U.S. Supreme Court 2008)).

The empirical model given in (7) provides a more rigorous test of the theory.

$$Outcome_{itra} = \delta'_a + \delta'_a(AI) + \beta_1(res.tract)_{ra} + \beta_2(AI \cdot res.tract)_{ra} + \beta_3(st.res.tract)_{ra}$$
$$+ \beta_4(AI \cdot st.res.tract)_{ra} + \eta'X_{itra} + \lambda'W_{ra} + \lambda'W(AI)_{ra} + \mu_t + \mu_t(AI) + \varepsilon_{itra} \quad (7)$$

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 $\beta_1 + \beta_2 + \beta_2 + \beta_4$ gives the effect for American Indians.

The model in equation (7) 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 A1 and A2 show summary statistics for the HMDA data used in the estimation of equation (7).

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. Reservation land is either owned outright, or held in trust by the Bureau of Indians Affairs. Land that is held

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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 (Anderson and Lueck 1992). 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 7 reports the linear probability model estimates of equation (7).[38] 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.

[Insert Table 7]

The estimates of β_4 in all columns are the same sign as predicted by the theory 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 7 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

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[38] Probit and logit estimators generate similar results.

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.[39]

C.   Robustness Checks

The estimates of β_4 in Table 7 are biased if some omitted determinant of loan outcome

that is not absorbed by the conditioning variables or control groups is also correlated with

jurisdictional status on reservations. Table 8 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.

[Insert Table 8]

Column 2 employs a subsample of applicants from 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

applications from 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 2, state

jurisdiction is estimated to increase the probability of an American Indian's loan application

being originated by 0.074 compared to the full sample's estimate of 0.057. Thus, there is

evidence that dropping applications from the non-complier areas improves on measurement error

in ST. JUR. RES. TRACT and has the predictable effect of increasing the point estimate of β_4.

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[39] Although not directly comparable, this result is consistent with Anderson and Lueck (1992) who show that
agricultural productivity on reservations is negatively related to the percent of land held in tribal trust.

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.[40]

Column 3 of table 8 reports estimates from a subsample of loan applications 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, allowed to differ for whites and American Indians, control for the potential effect of differences in the quality of state judicial systems or in the type of state laws affecting mortgages. Omitting state fixed effects in the full sample could bias upwards the difference in $[(AI^{on} - AI^{off})^{TR.jur} - (AI^{on} - AI^{off})^{ST.jur}]$ if the average state lacking reservation jurisdiction has a more predictable legal environment or has laws more favorable to creditors. There is evidence that this is not the case. The U.S. Chamber of Commerce annually ranks the quality of state courts as perceived by businesses.[41] The average 'quality' ranking for states lacking reservation jurisdiction is lower than that for states having reservation jurisdiction. In addition, the two types of states are very similar in terms of average homestead exemptions allowed under bankruptcy, which have been shown to affect the probability of loan denials (Lin and White 2001).[42] This circumstantial evidence suggests that omitting state fixed effects in the full sample should, if anything, bias the coefficient of β_4 towards zero. The results in column 3 support this inference because we observe a larger estimate of β_4, compared to the main estimates, although the coefficient is not as precisely measured.

Column 4 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

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[40] An alternative approach is to employ a state's disclaimer status as an IV for state jurisdiction in a 2SLS estimate of the full sample of applications. This model was run but the estimates are not reported here because the instrument is somewhat weak in the first stage with all of the fixed effects and controls in the model.

[41] The rankings are at: www.instituteforlegalreform.com/component/ilr_harris_poll/60.html?year=2008.

[42] In both types of states 22 percent offer unlimited exemptions and the mean exemption value is slightly higher for those states lacking reservation jurisdiction. The average homestead exemption for states lacking reservation jurisdiction is $80,893 and $73,157 for states having jurisdiction. The data come from: www.assetprotectionbook.com/state_resources.htm.

lien over trust land, these liens may be weaker because they are often for long-term leasehold interests rather than for full ownership.[43]

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 3 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.

Column 5 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 A3 in the appendix). In column 5 the point estimate of β_4 is almost identical to the point estimate from the main model. 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 state versus tribal jurisdiction.[44]

To summarize, the bulk of the evidence from individual loan applications is consistent with the predictions of theoretical reasoning. The theory is concerned with predicting the direct effects of state jurisdiction (i.e., those attributable to lender uncertainty over enforcement of debt contracts) and thus holds constant attributes of the borrower and application to make *ceteris*

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[43] 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.

[44] In column 5, the denial penalty for American Indians under tribal courts is closer to zero when compared to the full sample (-0.0537 compared to -0.1101). This is perhaps because tribal legal institutions are stronger for the reservations included in this sample compared to those in the full-sample. The fact that Indian per capita incomes on reservations in the propensity-score sample exceed the per capita incomes of the full sample by $1,234 is consistent with this explanation (see Table A3).

paribus predictions. The empirical analysis tries to simulate the *ceteris paribus* conditions using several non-parametric controls and control groups, parametric controls, and different subsamples. The resulting estimates of individual applications suggest that observationally comparable American Indian applicants are more likely to have loans originated if their reservations are governed by state jurisdiction.

It is important to note, however, that some of the effects of state jurisdiction on recent, 2004-2008 lending may be indirect and not through the direct channels emphasized in the theory. For example, although there was no significant difference in mean per capita incomes across reservation types prior to the imposition of state jurisdiction (table 1), per capita incomes for reservations under state courts are now significantly higher (table A3).[45] Considering that loan applications are more likely to be originated with increases in applicant income (table 7), there is evidence that state jurisdiction is now indirectly causing better loan-application outcomes through the income channel. A second indirect channel is relevant if American Indians migrate off reservations under tribal jurisdiction to improve their chances of getting a loan. If migrating applicants are more creditworthy, then the migration channel may contribute to the poorer lending outcomes under tribal jurisdiction.[46]

D.   Reservation-Level Credit

In the theoretical framework state jurisdiction has an ambiguous effect on per capita credit at the reservation level, but the empirical analysis of historical data in section IV shows that state jurisdiction had a large positive impact on per capita credit during 1951-1970. This section estimates the effect of state jurisdiction on 2004-2008 per capita housing credit at the reservation level. Equation (8) defines the reservation-level measure of aggregate housing credit that is employed in the regressions.

$$diff\_loan\$s = \frac{\$ \text{ amount of loans to whites}}{\text{white population}} - \frac{\$ \text{ amount of loans to Am. Indians}}{\text{Am. Indian population}} \qquad (8)$$

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[45] Note that the differences in per capita income are even larger in 2000 if we restrict the comparison to only those reservations with per capita income data prior to P.L. 280.

[46] The simple comparisons of credit outcomes in Table 5 allow for direct and indirect effects and therefore may reasonably approximate the full reduced-form effects of state jurisdiction.

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.[47] 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 usually under the authority of state courts regardless of P.L. 280 status as described earlier. The empirical model is given by (9).

$$diff\_loan\$s_r = \beta_0 + \beta_1(state.jurisdiction)_r + \eta'X_r + \varepsilon_r \qquad (9)$$

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 A3 in the appendix for summary statistics). β_0 is the estimate of $E[dif\_loan\$s\,|\,TR.jur, X]$ and $\beta_0 + \beta_1$ is the estimate of $E[dif\_loan\$s\,|\,ST.jur, X]$. 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 9 shows six regression specifications for (9). Specification 1 is the baseline and excludes the controls. Specifications 2-3 use all 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 that are described above.

[Insert Table 9]

The estimate of β_1 is negative in all specifications and statistically significant in four. 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 1 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. Thus, the evidence from the HMDA data is consistent with the evidence from historical data in that both imply that state jurisdiction significantly increases per capita credit for American Indians.

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[47] The white population over 2004-2008 can be inferred from the HMDA census-tract level data. The American Indian population data cannot, so these data come from the 2000 U.S. Census.

E.   Lender Market Share

The theoretical framework predicts that the share of American Indian loans held by 'national' lenders (i.e., those operating in several reservations) will be higher under tribal jurisdiction. This is because lenders operating in several reservations are better able to diversify risk related to tribal adjudication of debt contracts.

Figures 5a and 5b provide support for this prediction. The figures are constructed from the 2004-2008 HMDA data, which give the identity of each lender receiving loan applications. Figure 5a plots the lender-loan-share cumulative density functions for American Indian borrowers on reservations under state and tribal jurisdiction. The x-axis in figure 5a shows the fraction of reservations within each jurisdictional category covered by a lender. Hence, the height of the state jurisdiction line when the x-axis is 0.2 (about 0.75) means that 75% of the loans to Indians on the 56 reservations under state jurisdiction are held by lenders extending loans to Indians on less than 20% of those reservations. The height of the tribal jurisdiction line when the x-axis is 0.2 (about 0.69) means that 69% of the loans to Indians on the 85 reservations under tribal jurisdiction are held by lenders extending loans to Indians on less than 20% of those reservations. Figure 5a is consistent with the theory because it shows that a larger share of loans to American Indians under state jurisdiction is concentrated among 'local' lenders (i.e., those operating on a small fraction of the reservations under state jurisdiction).

Figure 5b shows that the theory-consistent relationship in figure 5a is not driven by regional differences in the geographic scope of lenders. The plots in figure 5b are for white borrowers on reservations but otherwise have the same interpretation as the plots in figure 5a. Figure 5b shows that lending activity for whites - a control group of borrowers – is actually more concentrated among 'national' lenders on reservations under state jurisdiction. Tribal jurisdiction over Indian borrowers therefore appears to be a driving force behind the relative dominance of 'national' lenders in extending loans to American Indians under tribal jurisdiction.

VI.   Conclusions

The finding that legal institutions play a fundamental role in promoting or discouraging income growth on American Indian reservations (see Cornell and Kalt 2000, Anderson and Parker 2008) is consistent with the broader cross-country literature. But the reservation setting enables a close 'view from below', to use the phrase of Pande and Udry (2005). The setting

allows the researcher to measure how much legal institutions matter to development in a broad sense, but also to propose and test specific hypotheses about the mechanisms using micro-data.

This paper shows a causal effect from law to economic development through better access to credit. The econometric analysis exploits federal legislation, implemented during the 1950s and 1960s, that gave state courts jurisdiction over debt contracts on some reservations while tribal courts retained jurisdiction on other reservations. Regression estimates of 1951-1970 Bureau of Indian Affairs credit report data indicate that state jurisdiction increased per capita credit from customary sources to American Indians by 66 and 96 percent in the two regions where P.L. 280 was broadly implemented. Regression analysis of more recent 2004-2008 Home Mortgage Disclosure Act data, aggregated to the reservation level, suggests that state jurisdiction eliminated half of the gap between the dollar amount of per capita home loans extended to whites and American Indians on reservations.

Analysis of individual home loan applications over 2004-2008 indicates that the large disparities in per capita credit 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.

These 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 Fikentscher 2008, 31).

The focus on legal uncertainty differs from Cornell and Kalt (2000) who were among the first to recognize the importance of tribal courts to reservation economies. They emphasize the political independence of tribal courts from tribal governments as being a key to promoting growth. The focus on uncertainty suggests that even independent tribal courts can improve

lending conditions 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.[48] Still, tribes face serious challenges in establishing clear legal precedent and in credibly 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.[49]

If the legal uncertainty of foreign creditors is a robust explanatory factor for suppressed credit markets in the broader developing world, then the experience of American Indian tribes with P.L. 280 is relevant to the discussion of policy options. It demonstrates how the credible submission of judicial jurisdiction to a larger sovereign with centuries of precedent that outsiders can easily find and understand, can lead to impressive gains in borrowing opportunities within the smaller nation. Moreover, the negative aspects of the loss in sovereignty are likely mitigated when the smaller nation can freely choose to give it up, an option not available to tribes put under P.L. 280.

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[48] see http://www.tribal-institute.org/, http://lawschool.unm.edu/AILC/switca), (www.nics.ws), and (http://itcnca.org).

[49] Tribal reluctance may indicate that the cultural benefits of sovereignty outweigh the economic costs, or that the benefits of sovereignty are disproportionally accrued by tribal members with political power, but these issues are outside of the scope of this study.

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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.

Figure 2a
Lender Offer Curve and Borrower Acceptance Curve
(Case 1 scenario)

r

*borrower
acceptance
curve*

*lender
offer
curve*

0   K_L K_M K_H K_D *K*

stronger ⟵ *creditor rights* ⟶ *weaker*
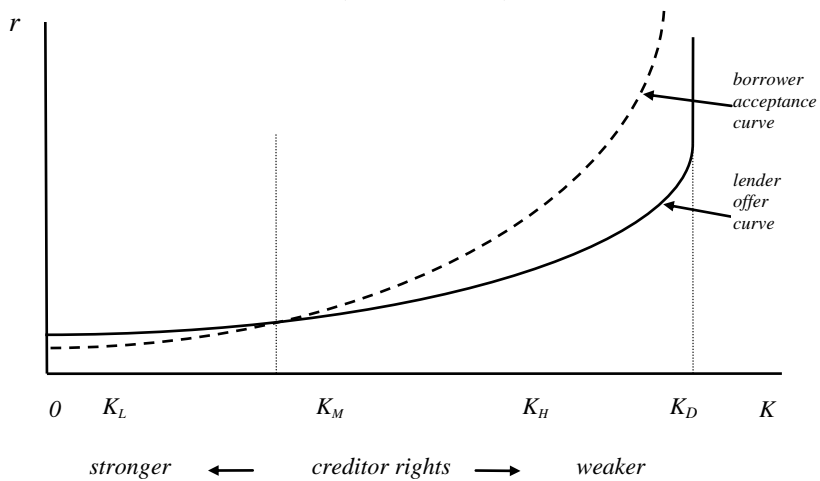
Figure 2b
Lender Offer Curve and Borrower Acceptance Curve
(Case 2 scenario)

r

*borrower
acceptance
curve*

*lender
offer
curve*

0   K_L K_M K_H K_D *K*

stronger ⟵ *creditor rights* ⟶ *weaker*
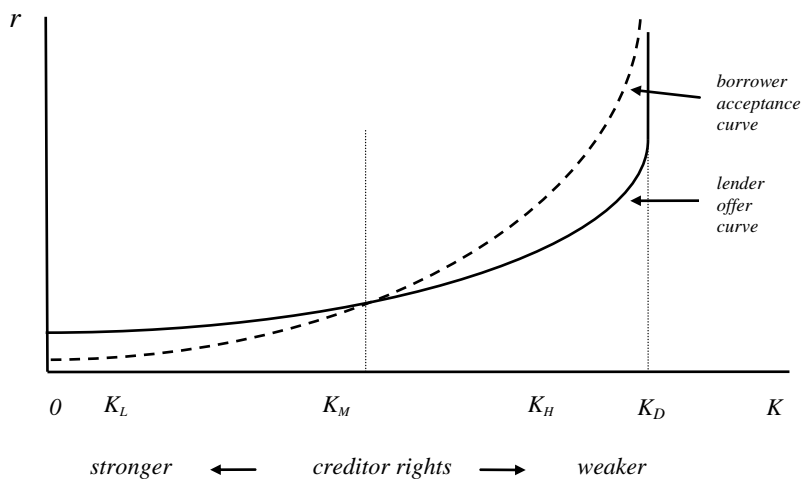
Figure 2c
Lender Offer Curve and Borrower Acceptance Curve
(Case 3 scenario)
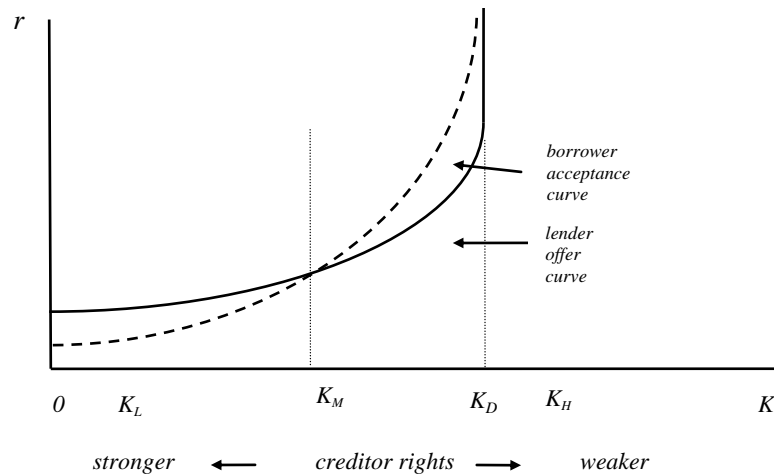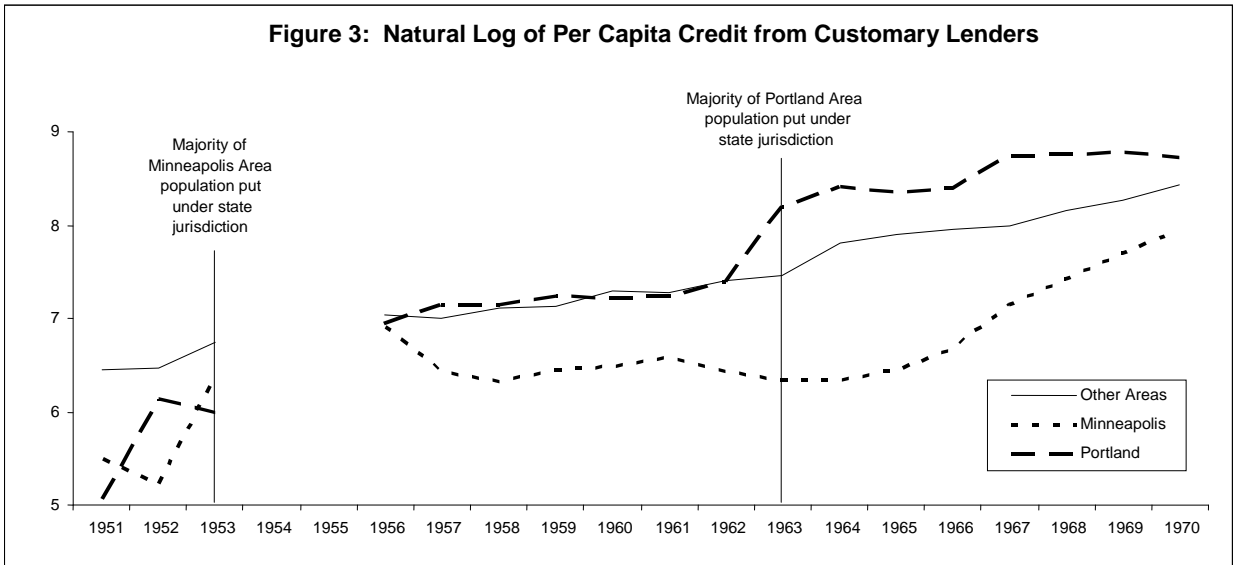
r

*borrower
acceptance
curve*

*lender
offer
curve*

0   K_L K_M K_D K_H *K*

stronger ⟵ *creditor rights* ⟶ *weaker*

Figure 3: Natural Log of Per Capita Credit from Customary Lenders

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.
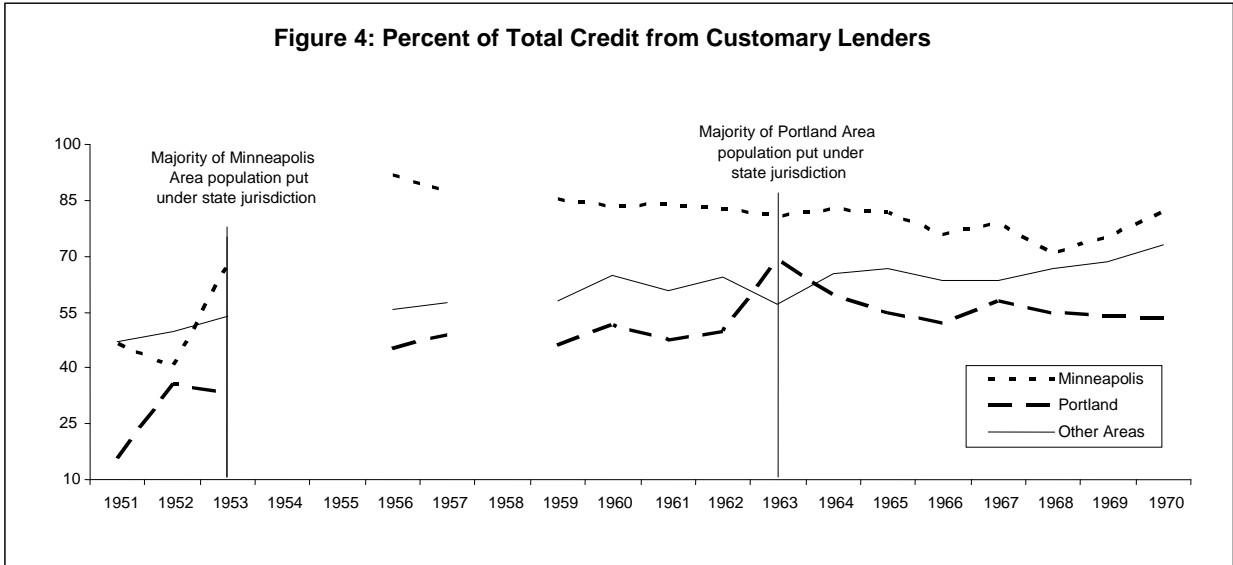
Figure 4: Percent of Total Credit from Customary Lenders

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.

Figure 5a: CDF of Lender Loan Share by Geographic Scope of Operation

For American Indian borrowers during 2004-2008
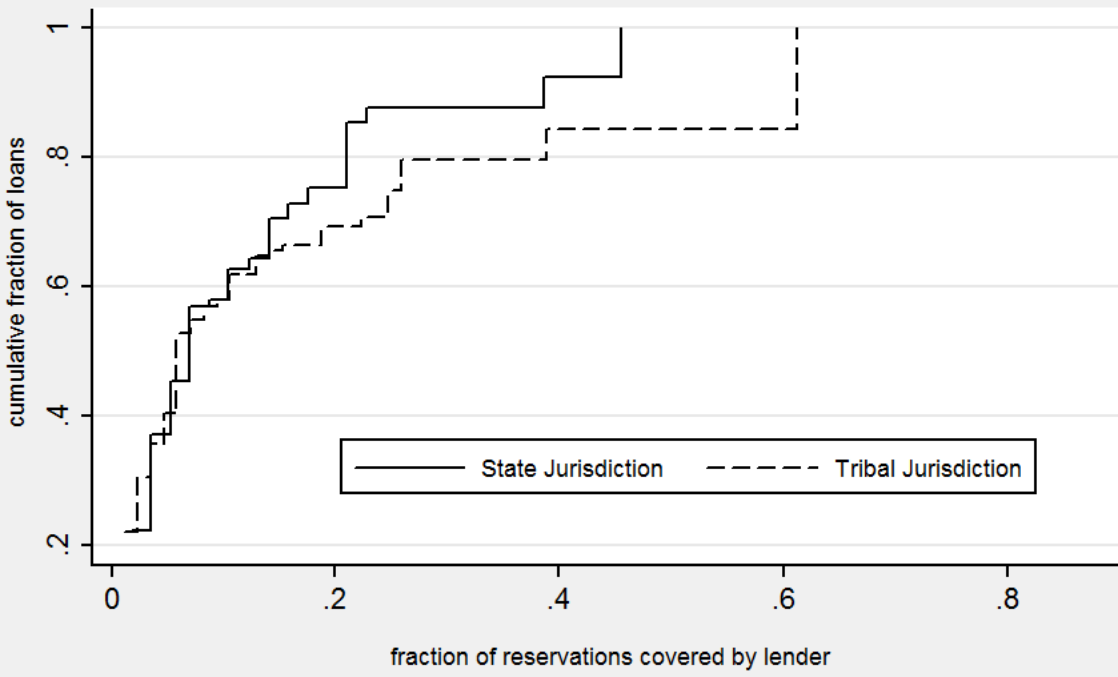
Figure 5b: CDF of Lender Loan Share by Geographic Scope of Operation

For White borrowers during 2004-2008
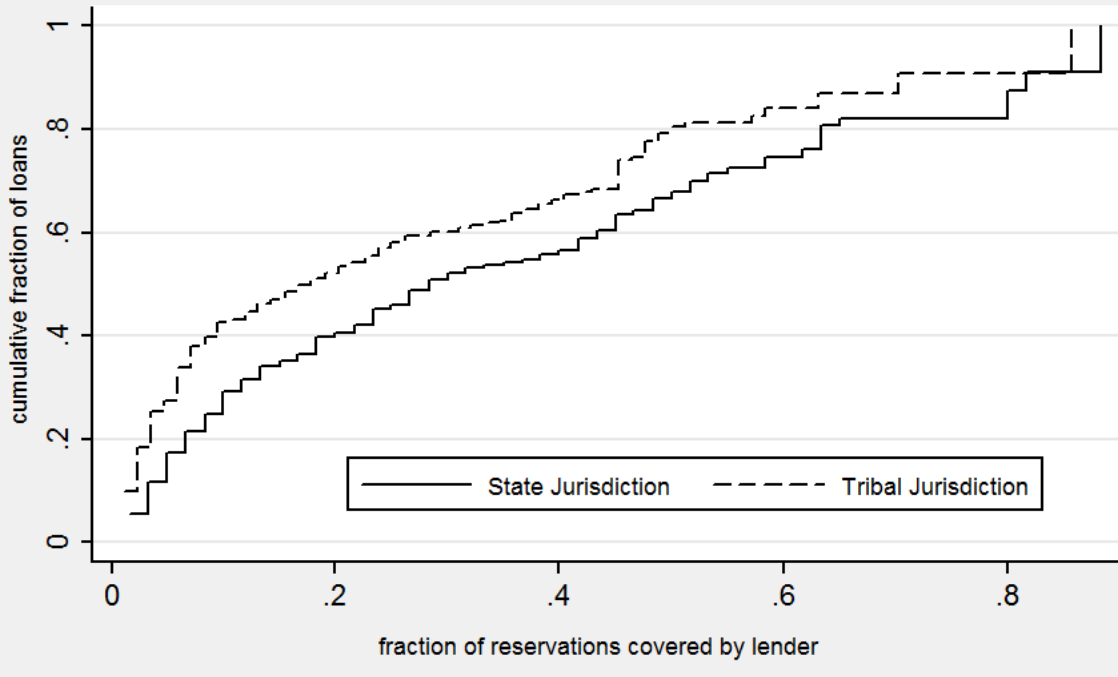
TABLE 1

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

	RESERVATIONS RETAINING TRIBAL JURISDICTION	*OBS.*	*RESERVATIONS PUT UNDER STATE JURISDICTION*	*OBS.*	t-STAT FOR DIFFERENCE (ABS. VALUE)
AM. INDIAN PER CAPITA INCOME (2008 $s) [a]	4,579	50	4,514	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 1940, 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.

TABLE 2

SUMMARY OF THEORETICAL PREDICTIONS

	PREDICTED SIGN
EFFECT OF MOVE FROM TRIBAL TO STATE JURISDICTION ON:	
PER CAPITA RESERVATION CREDIT	*?*
THE PROBABILITY THAT A LENDER WILL DENY A BORROWER'S APPLICATION	-
THE PROBABILITY THAT A BORROWER WILL TURN DOWN AN OFFERED LOAN	-
THE PROBABILITY THAT AN APPLICATION WILL RESULT IN A LOAN	+
THE SHARE OF RESERVATION LOANS HELD BY 'NATIONAL' LENDERS	-

TABLE 3
CREDIT OUTCOMES FOR AMERICAN INDIANS BEFORE THE PASSAGE OF P.L 280
(BY BUREAU OF INDIAN AFFAIRS administrative area)

	STATES WITH RESERVATIONS COVERED BY ADMIN. AREA	% OF AM. INDIAN POP. INITIALLY PUT UNDER STATE JURISDICTION	ANNUAL PER-CAPITA CREDIT FROM CUSTOMARY LENDERS (IN 2008 $'S)	% OF CREDIT FROM CUSTOMARY LENDERS
AREAS WITH < 50% OF AM. INDIANS PUT UNDER STATE JURISDICTION				
ALBUQUERQUE	NM, CO, UT	0.0	564	68.2
BILLINGS	MT, WY	0.0	642	39.1
WINDOW ROCK	AZ, NM, UT	0.0	303	64.5
PHOENIX	AZ, NV, CA	0.1	908	35.6
ABERDEEN	SD, ND, NE	6.8	825	53.5
UNWEIGHTED MEAN		---	*648*	*52.2*
POPULATION WEIGHTED MEAN		---	*580*	*56.5*
AREAS WITH > 50% OF AM. INDIANS PUT UNDER STATE JURISDICTION				
MINNEAPOLIS	MN, WI, MI, IA	52.2	215	43.3
PORTLAND*	WA, OR, ID	68.7	312	25.5
UNWEIGHTED MEAN		---	*264*	*34.4*
POPULATION WEIGHTED MEAN		---	*255*	*36.0*

Notes: The credit estimates are from all customary (generally private) lenders and are provided in the Bureau of Indian Affair's 1951 and 1952 *Annual Report of Credit and Financing*. 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. Column 3 shows the average annual credit from customary lenders to American Indian borrowers over 1951 and 1952. For these calculations the 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*. The data in columns 3 and 4 are averages over 1951 and 1952. * Signifies that much of the Portland Area population was not put under state jurisdiction until 1963.

PANEL A: DEPENDENT VARIABLE IS NATURAL LOG OF PER-CAPITA CUSTOMARY CREDIT

	(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	(0.38)	(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	0.42**
PERCENT IND. TRUST LAND	-------	1.53	0.57	-0.08	0.82
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

PANEL B: DEPENDENT VARIABLE IS THE PERCENT OF TOTAL CREDIT FROM CUSTOMARY LENDERS

CONSTANT	47.39**	45.52**	47.20**	36.11**	56.40**
STATE JURISDICTION	26.63*	27.00*	35.28**	45.88**	32.81*
ST. ERROR	(6.67)	(7.68)	(6.72)	(12.32)	(12.17)
CLUSTER ST. ERROR	(12.70)	(12.90)	(11.55)	(12.18)	(12.26)
PERCENT IND. TRUST LAND	-------	17.73	32.29	-54.56	13.57
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 3 with two exceptions. The Albuquerque and Window Rock areas are combined 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).

TABLE 5

COMPARISON OF HOME LOAN OUTCOMES FOR AMERICAN INDIANS ON RESERVATIONS

	RESERVATIONS WITH TRIBAL JURISDICTION	OBS.	RESERVATIONS WITH STATE JURISDICTION	OBS.	t-STASTIC FOR DIFFERENCE (ABS. VALUE)
INDIVIDUAL-LEVEL DATA (2004-2008)					
% 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**
RESERVATION-LEVEL DATA (2004-2008)					
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**

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.

	RESERVATIONS WITH TRIBAL JURISDICTION	OBS	RESERVATIONS WITH STATE JURISDICTION	OBS	DIFF	t-STASTIC FOR DIFF
% OF APPLICATIONS DENIED BY LENDER:						
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**
% OF OFFERED LOANS REJECTED BY BORROWER:						
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**
% OF LOAN APPLICATIONS ORIGINATED						
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.

	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)*
APPLICANT CONTROLS			
MALE	-0.0314**	-0.0055*	0.0317**
INCOME (2008 000$S)	-0.00009**	8.70E-06	0.00008**
INCOM E SQUARED	1.20E-08**	-5.62E-10	-1.01E-08**
LOAN TO INCOME RATIO	0.0038**	-0.0002	-0.0033**
APPLICATION CONTROLS			
IMPROVEMENT LOAN	0.2075**	0.0164	-0.1898**
MANUFACTURED HOME	0.1544**	0.0886**	-0.1929**
LOAN AMT (2008 000$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**
RESERVATION CONTROLS			
% 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*
FIXED EFFECTS			
YEAR	YES	YES	YES
AM. INDIAN *YEAR	YES	YES	YES
RE SERVATION 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 A1 and A2. The data exclude loans that were purchased by another lender, withdrawn by the applicant, or deemed incomplete by the lender

TABLE 8:
ROBUSTNESS CHECKS OF THE LPM DIFFERENCE ESTIMATES OF LOAN ORIGINATION

	ALL APPLICATIONS (1)	COMPLIER STATES (2)	WITHIN MN, OR, & WI (3)	MANUF. HOME APPS (4)	PROP. SCORE SAMPLE (5)
RESERVATION TRACT	-0.0273**	-0.0190	-0.0131	0.0119	-0.0726**
	(0.0108)	(0.0194)	(0.0591)	(0.0184)	(0.0203)
AM.INDIAN*	-0.1101**	-0.1309**	-0.1563**	-0.0636**	-0.0537
RESERVATION TRACT	(0.0178)	(0.0197)	(0.0225)	(0.0245)	(0.0371)
ST.JUR. RES. TRACT	-0.0007	0.0041	-0.0123	-0.0453*	0.0258
	(0.0096)	(0.0146)	(0.0655)	(0.0257)	(0.0155)
AM. INDIAN*	0.0568**	0.0740**	0.2436	0.0965**	0.0579
ST. JUR RES. TRACT	(0.0281)	(0.0364)	(0.1651)	(0.0473)	(0.0347)
CONTROLS					
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
FIXED EFFECTS					
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	46,654	215,528

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 7. 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 the sample of applications for manufactured homes. Column 5 employs a propensity-score matched sample of reservations that is summarized in panel B of Table 3A in the appendix.

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)	RES. IN COMPLIER STATES (4)	RES. WITHIN MN, OR, & WI (5)	RES. IN PROP. SCORE SAMPLE (6)
CONSTANT	18887	17969**	12954	17899*	77495	-16,127
STATE JURISDICTION	-8973**	-9299**	-4423	-15451**	-27422	-13145**
ROBUST ST. ERROR	(3673)	(4638)	(3766)	(5487)	(18995)	(6515)
CONTROLS	---	0.606	0.643	1.05	-1.110	2.385
AM. INDIAN P.C. INCOME	---	-0.110**	-0.064*	-0.124**	-0.384	-0.193
AM. INDIAN POP.	---	25.17	47.75**	31.40	-95.40	-21.04*
POPULATION PER SQ. MILE	---	0.365	2.148	-0.870	-47.33	40.50**
% AM. INDIAN POP.	---	-66.63	-91.48*	-43.01	-69.90**	-35.23
% FEE SIMPLE LAND	---	-162.7	-257.2**	-186.5	-64.14	-328.70
% INDIV. TRUST LAND	---	-10.72	-0.134	-20.44	-186.2	15.69
POP. DEN. IN ADJ. CNTY	---	-4381*	-5386*	-1623	3031	-1253
SLOT S PER AM. INDIAN						
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 5 employs a propensity-score matched sample of reservations that is summarized in panel B of Table 3A in the appendix.

Data Appendix

TABLE A1:
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

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

TABLE A3
MEAN CHARACTERISTICS OF RESERVATIONS IN 2000

	RESERVATIONS WITH TRIBAL JURISDICTION	OBS.	RESERVATIONS WITH STATE JURISDICTION	OBS.	t-STAT FOR DIFFERENCE (ABS. VALUE)
PANEL A: ALL RESERVATIONS					
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
PANEL B: PROPENSITY SCORE MATCHED SUBSAMPLE[2]					
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.