Ethnicity, Nationalism, and Inclusive Growth:

Evidence from Tribal Nations

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Abstract: Research suggests that ethnic polarization will diminish a nation's prospects for inclusive economic growth. We study the extent to which this depends on i) whether citizenship rules are based on ethnic versus civic criterion, and ii) a nation's economic reliance on government enterprise. We do so using a novel empirical setting, comparing the growth-inequality relationships on Native American reservations (sometimes called Tribal Nations) from 1945 to 2010. This setting enables the construction of polarization measures based on the historical distribution of Native American ancestry, which is used to determine tribal citizenship and eligibility for government payments and employment. We find that ethnically homogenous reservations have had relatively inclusive growth whereas polarized reservations have followed the same trend of exclusive growth – i.e., rising inequality - found elsewhere in the United States. Some of the effect of polarization appears to be driven by uneven distribution of returns from tribal enterprise (casino gaming) along ethnic divisions. The findings suggest that a combination of strong government enterprise and ethnic nationalism can limit inclusive growth in ethnically polarized societies.

JEL Codes: D31, O57, P52, C14

Key words: Inequality, growth, ethnicity, polarization, Native Americans, ethnic nationalism, blood quantum

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One really [messed]-up aspect of Indian life is that, unlike any other minority, Indians have rules, based on genetics and "blood quantum," that determine whether someone is *officially* an Indian (Treuer 2013, 279).

1. Introduction

When does economic growth raise income inequality and when does it lower inequality? This question receives significant attention in economics, with oft-cited contributions ranging from Kuznets (1955) to Piketty (2013). Yet there is still uncertainty about what factors determine whether growth will narrow or widen a society's income distribution. So the question remains — are there characteristics of a society that determine if its growth will be *inclusive* or *exclusive*?[1]

A strand of literature suggests inclusive growth is less likely in ethnically heterogeneous societies. Theoretical reasoning holds that heterogeneity reduces a society's preference for equality and hence its willingness to redistribute income (see Benabou 2000, Alesina and Glaeser 2004, Ashraf and Galor 2013). Heterogeneity may inflate inequality because of in-group bias—people are more willing to share with their own ethnic group and less supportive of redistribution across a population that contains groups outside one's own (Dahlberg et al. 2012). Empirically, there is a positive correlation between heterogeneity and inequality across countries, suggesting ethnic composition affects the likelihood of inclusive growth.

In this paper, we examine the role of governance in conditioning the effect of ethnic heterogeneity. We extend the literature by addressing two questions. First, is the effect of heterogeneity stronger when income comes from government owned enterprises as opposed to private ownership? This is important because government allocations to individuals could vary based on ethnicity, and government has more to allocate when it owns enterprise.[2]

Second, is the effect of ethnic composition stronger when national citizenship is based on *ethnic* versus *civic* criterion? We are not aware of empirical study of this question, but scholars of nationalism emphasize the potential importance of citizenship criteria in affecting conflict and inequality (e.g., Smith 1988, Smith 2010, Ignatieff 1993).[3] Ethnic criteria is based on common

[1] Throughout this paper, we refer to inclusive growth as increases in income per capita associated with lower income equity. Exclusive growth is associated with higher income inequality.

[2] Empirical research on the importance of government ownership is thin. In one of few studies on this issue, Fenske and Zurimendi (2017) provide evidence that government oil payments in Nigeria are distributed unequally among ethnic divisions.

[3] Economists have empirically studied the determinants of whether a nation relies on ethnic vs. civic criterion for citizenship (Bertocchi and Strozzi 2010) and the relationship between citizenship criteria and economic growth (Iman

genealogy and ancestry. Civic criteria is based on subscribing to a political creed, regardless of ethnicity, and can be automatically met by place of birth regardless of blood line or parental citizenship. The implication is that ethnic heterogeneity will matter more under ethnic nationalism because eligibility for government allocations requires citizenship, and obtaining citizenship requires meeting ethnic criteria.

We study these questions in the context of Native American reservations, which are sovereign political jurisdictions sometimes called Tribal Nations. We analyze growth-inequality relationships within and across reservations and contrast those relationships with U.S. states and other countries. We focus on 1945-2010, a period of exclusive U.S. income growth on the national scale, at least since the 1970s (see Piketty and Saez 2003, Frank 2008, Piketty 2013, Boustan et al. 2013). Less is known about the growth-inequality relationship on American Indian reservations: our study is the first to quantify inequality among Native Americans over a long period of time. As shown in Section 2, there has been significant growth in the average incomes of Native Americans within and across reservations since 1945. Some of the growth, particularly after 1990, is derived from tribal enterprises (e.g., casinos). We can therefore compare inequality across several income points and also study inequality changes associated with fluctuations in income from government enterprise.[4]

Studying how the growth-inequality relationship on Tribal Nations depends on ethnicity is illuminating because controversial "blood quantum" measurements have and continue to define Native American identity and citizenship. Blood quantum is a system created by the federal government to track the fraction of ancestors documented as full-blooded Indian in the 19th and 20th centuries (Snipp 1997). The blood quantum assessments determined eligibility for federal payments under treaties, land cessions, and litigation settlements (Thornton 1997). Tribes did not use blood quantum to determine membership until the Indian Reorganization Act of 1934, which initiated the modern era of reservation governance under tribal constitutions (Cohen 1942).

Since then, tribes have adopted and maintained constitutions with ethnic criteria for citizenship. The majority specified minimum blood quantum requirements (most commonly one-

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and Kpodar 2019). To our knowledge, there is no empirical study linking ethnic composition, citizenship rules, and inequality as we begin to do here.

[4] Controlling for the overall level of economic development is important because the overall level of development may be systematically related to inequality (see, e.g., Kuznets 1955, Barro 2000, Forbes 2000, Frazier 2006, Sarigiannidou and Palivos 2012, Barro 2008, Gallup 2012, Berg et al. 2018).

quarter or one-half). Other tribes used less restrictive lineal descent, allowing eligibility to anyone descended from a tribal enrollee.[5] Tribes do not use purely civic criterion today – which would abandon blood quantum and lineal descent – possibly because the controversial colonial systems of enumeration convey benefits to incumbent members, and also because federal policy favors ethnic criterion.[6] The upshot is that Tribal Nations practice ethnic nationalism despite historical evidence that, prior to the federal government's blood quantum system, many tribes practiced civic nationalism (see TallBear 2003). The famous Texan, Sam Houston, for example, was made a citizen of the Cherokee Nation in 1829 despite lacking ethnic ties.[7]

We study the interaction between blood quantum assessments made by the Bureau of Indian Affairs (BIA) during the 1930s, as tribal constitutions were being written, and the extent to which income growth since then has been exclusive or inclusive. The BIA data give the percentage of a reservation's population in different bins of percent Native American blood. The bins are: greater than zero but less than 25%, 25% to 49%, 50% to 99%, and 100%. From this information, we construct a measure of ethnic heterogeneity. Reservations with a high variance in blood quantum have high levels of heterogeneity, which peaks where half of the population had 25% or less blood quantum and half the population had 100% blood quantum. Our measure is conceptually similar to concepts of ethnic polarization, developed in the cross-national literature, that also peak when a single minority ethnic group is almost as large as the majority group (see Montalvo and Reynal-Querol 2005, Esteban and Ray 2011). A key difference is that our measure is based on the degree of assimilation of groups through intermarriage (Kuhn and Sweetman 2002).

Using blood quantum data from the 1930s allows us to focus on variation in (BIA reported) ethnic mixture that is predetermined with respect to growth-inequality relationships over 1945-2010. As noted in the literature on the "fluidity of race", using ethnic identifiers that are predetermined helps to overcome the reverse causality problem that economic outcomes can

[5] Blood quantum minimums are more restrictive because a person at the minimum threshold cannot not have children eligible for citizenship with someone with lower blood quantum.

[6] We are aware of only one major exception. A Canadian First Nation has foregone lineal descent and blood quantum and decided to open enrollment to people who have no indigenous ancestry. While such members can vote in tribal elections, and be eligible for any cash settlements the First Nation collects, they are not eligible for any federal financial benefits that come directly from the federal government (e.g., educational tuition waivers, health care) that come with federal designation of Indian identify. See https://www.cbc.ca/radio/asithappens/as-it-happens-tuesday-edition-1.4054748/how-a-non-indigenous-man-became-a-member-of-the-fort-william-first-nation-1.4054752.

[7] While among the Cherokee, Houston wore native dress and allegedly refused to speak English (see Menefee 2010). We thank Adam Crapelle for this example of civic criteria for membership.

dynamically affect a group's ethnic composition as well as race reporting at the individual level (see Guiso et al. 2006, Aherlup and Olsson 2012, Dahis et al. 2019).[8]

Our empirical methodology evaluates how changes in reservation-level income inequality (of the population of people who self-identify as Native American) correlate with changes in reservation-level per-capita income growth (of the same population), and how the correlation varies when interacted with ethnic polarization. The most parsimonious empirical model indicates that, at low levels of income per capita – generally during 1945 to 1980 - reservations experienced rising inequality with income growth regardless of the degree of ethnic polarization. Reservations with low levels of polarization started to experience inclusive growth over 1980 to 2010, sharply diverging from the overall trend of rising inequality in the broader United States. The finding that polarization did not matter before 1980 is interesting because the post-1980 period is a self-determination era in which tribes transitioned from being viewed as merely "administered communities" to more autonomous governments that can, among other things, operate casinos and distribute earnings and jobs to tribal members (Stull 1990, Kalt et al. 2008).

Consistent with the interpretation that ethnic polarization amplifies the effects of government-generated income shocks on inequality, we find that increases in casino gaming intensity are associated with exclusive income gains on ethnically polarized reservations and with inclusive income gains on reservations that are not ethnically polarized. This finding supports our interpretation that citizenship polarization is a key mechanism through which ethnic polarization operates, because access to casino returns generally depends on citizenship. Moreover, we also find that measures of cultural polarization – such as polarization in the percent of the Native American population speaking the indigenous language or the coexistence of multiple tribal groups on the same reservation – are not associated with exclusive growth. This is further evidence that ethnic polarization inhibits inclusive growth through citizenship eligibility rather than channels related more generally to cultural, rather than ethnic, heterogeneity.[9]

As an auxiliary analysis, following an approach employed by Dippel (2014), we demonstrate that newspaper articles containing the words "blood quantum" and "membership"

[8] Ethnic diversity endogenously evolves in many settings as new groups search for resources (Ahelrup and Olsson 2012). On Native American reservations, ethnic composition has also evolved over time, presumably in ways endogenous to economic outcomes (see Snipp 1997).

[9] This finding relates to Desmet et al. (2017), who show that cultural diversity can differ substantively from ethnic diversity.

increase with growth and casino investments on ethnically polarized reservations. We also find that these keywords are associated with mentions of "conflict", "gaming", and "payments" on reservations with high levels of polarization. Taken together, this is suggestive evidence that more conflict around blood quantum and membership arises on reservations with ethnically polarized populations as average incomes rise. This conflict may derive from disagreement over an individual's actual blood quantum, or disagreement over what blood quantum rule should be used for citizenship (see TallBear 2003, Treuer 2013).

Our findings provide quantitative support for qualitative assessments of the importance of blood quantum to reservation life. Treuer (2013, 277-82), for example, describes an Objiwe woman who was deemed barely ineligible under the St. Croix tribe's blood quantum requirement.[10] Despite residing on the reservation, and self-identifying herself as American Indian, she can't vote or run for tribal office, she doesn't receive per capita payments from the tribe's casino, and she is ineligible for tribal housing.

More generally, our empirical finding that federally initiated blood quantum systems affect modern inequality and conflict on Indian reservations contributes to an emerging empirical literature on the importance of colonial history for the modern outcomes of indigenous communities, particularly in the United States and Canada. The literature to date has focused on federal policies directed towards land (Anderson and Lueck 1992, Arágon 2015, Arágon and Kessler 2019, Akee 2019, Leonard et al. 2019, Wheeler 2019, Dippel et al. 2019), education and assimilation (Kuhn and Sweetman 2002, Feir 2016, Gregg 2018, Dippel and Frye 2019), and tribal governments (Cornell and Kalt 2000, Anderson and Parker 2008, Akee et al. 2015a, Frye and Parker 2016). We contribute by studying federal policies that sought to define Native American identity, thereby interfering with self-identity processes thought to be critical for economic well-being at individual and group levels (Akerlof and Kranton 2000).

2. Background: Growth, Ethnicity, and Citizenship on Tribal Nations

There is a large disparity between the modern per capita income of American Indians, especially those living on reservations, and the U.S. national average. The per capita income for Native Americans living on reservations over 2006-2010 was $11,454, compared with $17,981 for

[10] The woman contests her membership denial, arguing it is based on erroneous judgement of her ancestry that puts her slightly below the blood quantum threshold.

Native Americans living off reservations, and $27,344 for the total U.S. population.[11] These modern differences are in part a result of uneven periods of economic growth on reservations over the twentieth century. Table 1 presents growth rates for four distinct eras of reservation development. During the early 1900s, when economic and cultural assimilation were the key tenants of federal Indian policy, there was very little economic growth on reservations relative to the U.S. average.[12] This slow growth ended with a change in federal policy toward increasing the sovereignty of tribal governments through the Indian Reorganization Act. Beginning in the late-1930s, reservation governments adopted constitutions, organized their governance structure, and formed business charters, expanding their economic opportunities.[13]

Table 1:

Annualized Growth Rates in Real Per Capita Income

	1918-1942	1942-2010	Pre-Casino Era 1942-1979	Casino Era 1989-2010
American Indians on Reservations	0.25%	2.52%	3.87%	1.80%
Total U.S. Population	2.29%	1.69%	1.79%	1.34%

Notes: Income data were converted to 2010 $s prior to calculating growth rates. The pre-1970 data used for the reservation calculations come from Bureau of Indian Affairs (BIA) statistical reports, and the data for later years come from the Census Bureau. The 2010 income data are for self-identified American Indians who reported a single race on the Census questionnaire. In the 1980 Census, respondents were not given the option to check multiple races. American Indians were identified by BIA agents in the annual BIA reports. Per capita GDP data from 1918 to 2010 for the total U.S. population are from Bolt and van Zanden (2013).

From 1942 to 2010, per capita income on reservations converged towards the U.S. average as shown in Table 1. During this period, annualized income growth per capita was 2.52 percent on reservations compared to 1.69 percent for the total U.S. population. What is unclear is whether this growth for American Indians on reservations was inclusive or exclusive because previous research has not assessed changes in income inequality on reservations over time. The relatively strong

[11] Throughout this paper the term *reservation* refers to federal American Indian Reservations. Our analysis does not include off-reservation trust lands, state designated tribal areas, and Alaskan Native village areas. These data come from the U.S. Census, which beginning in 2000, gave survey respondents the option to select a single race or multiple races. Throughout our analysis, we employ data for respondents who reported a single American Indian race.

[12] At the direction of the Secretary of Interior, the Institute for Government Research developed a report detailing the causes and consequences of the slow economic growth during the assimilation era (Meriam 1928).

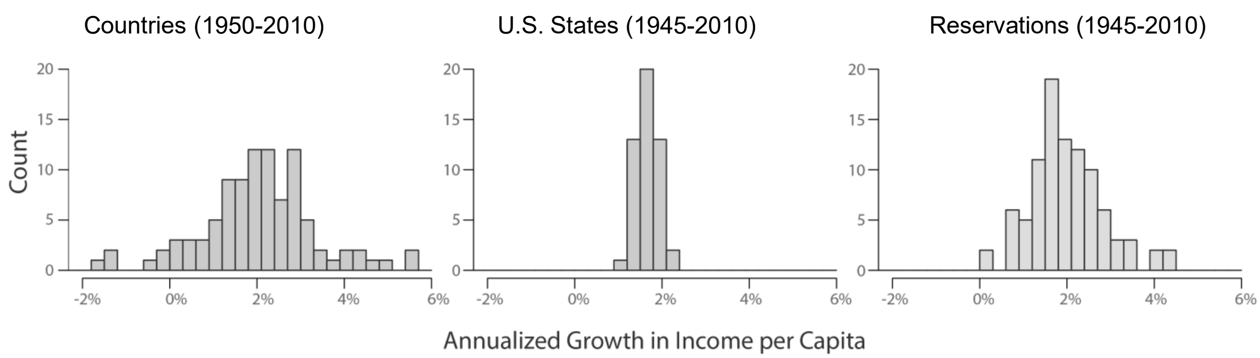
[13] Frye and Parker (2019) document the influence of this increased sovereignty on economic growth and the role of the BIA in influencing that growth over the twentieth century.

growth on reservations preceded the recent growth in tribally owned casinos, which began to flourish in the 1990s (see Cookson 2010, Akee et al. 2015b). As Table 1 shows, significant growth continued during the casino era. As noted in the introduction, our empirical analysis will study if the effects of ethnicity on the growth-inequality relationship across reservations differ when income growth comes from government owned enterprise, such as tribally-owned casinos.

Per capita income growth has been far from uniform across reservations, as shown in Figure 1. Twenty-four percent of the reservations in our sample experienced growth rates in excess of 2.5 percent, while nine percent experienced growth rates below 1.0 percent. By contrast, per capita income growth in all U.S. states fell in the range of 0.98 to 2.19 percent indicating that across-reservation inequality in income growth has been large relative to cross-state inequality in growth. The cross-sectional variation in growth across reservations more closely resembles the variation across countries as shown in the histograms in Figure 1.

Figure 1

Annual Growth Rate in Per Capita Income



Notes: The country-level per capita GDP data are from Bolt and van Zanden (2013). The U.S. state-level per capita income data come from the Bureau of Economic Affairs (BEA) regional tables.

The wide variation in growth across reservations, coupled with the fact that tribes are sovereign entities who are free to determine citizen rules and create governance structures, has motivated empirical research investigating the causes of this variation that is more similar to the cross-country growth literature than it is to studies of local income growth within the U.S. For example, empirical papers have focused on how factors such as judicial independence (e.g., Anderson and Parker 2008), separation of powers between governmental branches (Cornell and

Kalt 2000), and parliamentary vs. presidential styles of democracies (Akee et al. 2015a) contribute to economic growth.[14] No studies, however, have attempted to estimate the role of ethnic composition in affecting income growth or income inequality on Indian reservations, even though ethnic composition has been emphasized in the cross-country literature.[15]

We do not attempt to estimate the effect of ethnic composition on overall levels of growth or on overall levels of inequality but instead study how growth-inequality relationships on reservations are conditioned by ethnic composition from blood quantum data in the 1930s.[16] The cross-country literature suggests that inclusive growth may be less likely on ethnically diverse reservations. Across countries, there is evidence that reluctance to redistribute wealth in ethnically fragmented societies manifests as lower provision of inequality-reducing public goods (Alesina et al. 1999, Miguel and Gugerty 2005, Glennerster et al. 2013).[17] More closely related to our study, there is evidence that ethnic heterogeneity may affect not only the overall level of redistribution, but also the inequality of government distributions. In the context of oil development in Nigeria, for example, Fenske and Zurimendi (2017) show that citizens of certain ethnic groups benefitted to a greater extent than citizens of other ethnic groups. Ethnic heterogeneity may also create heterogeneity in national or regional citizenship if such citizenship hinges on ethnicity. Heterogeneity in citizenship can lead to exclusive growth when governments make payments, monetary or in-kind, to citizens but not to non-citizens. This can lead to a type of "citizen rent" as described in a different context by Milanovic (2016).

With respect to ethnic polarization and ethnic nationalism, we emphasize again that tribal membership typically depends on Native ethnicity, often through precise blood quantum rules. In this way, ethnicity defines the class of persons entitled to share in tribal resources and participate

[14] Other papers that analyze U.S. reservation-level incomes include Dippel (2014), Akee et al. (2015a), Frye and Parker (2016), Brown et al. (2016), Feir et al. (2019), and Leonard et al. (2019). Papers that analyze Native American reserve-level incomes in Canadian employ similar methodological approaches and include Arágon (2015), Pendakur and Pendakur (2017), and Arágon and Kessler (2019).

[15] The role of ethnic diversity, assimilation, and acculturation in the growth process are complex and not well understood. For an overview of the potential role of some these factors, see Cornell and Kalt (1992), Pickering and Mushinski (2001), and Anderson and Parker (2009). For specific empirical research on how assimilation and ethnicity might affect wages and earnings of Native Americans, see Patrinos and Sakellariou (1992), George and Kuhn (1994), Kuhn and Sweetman (2002), Gitter and Regan (2002), and Pendakur and Pendakur (1998).

[16] Our goal is to evaluate how ethnic composition at the time when constitutions were first written correlates with inclusive vs. exclusive growth rather than the more ambitious task of pinpointing the causal effects of ethnic composition on overall growth.

[17] Fewer public goods could raise inequality in the long run because poorer families benefit more from public education, libraries, and infrastructure.

in tribal politics. According to data presented in Gover (2009), 70% of tribes had blood quantum rules as of 2006, with other rules based on lineage (i.e. descendent of a tribal member). This is in contrast with tradition, where an individual's tribal status was determined by lineage, kinship, and family ties (TallBear 2003). The concept of blood quantum was imposed on Native Americans in the late-1800s as a method of defining eligibility for land allotments and determining the allocation of treaty annuities and other federal benefits (Thornton 1997). Blood quantum was determined by the resident Bureau of Indian Affairs agents who may have been motivated in some cases to misrepresent true ancestry (see Akee 2019). Following the passage of the Indian Reorganization Act (IRA) of 1934, tribes began incorporating blood quantum into their membership rules through written tribal constitutions (Cohen 1942).[18] These changes introduced ethnic criterion to tribal membership that are fundamental in tribal membership rules today.[19]

According to Treurer (2013), blood quantum did not become a widespread marker for an Indian's nationality until the 1930s. Prior to then, tribes practiced various means for membership inclusion or exclusion including the adoption of whites who eventually enjoyed an Indian identity and the rights secured by the tribes they joined. This changed with the federal blood quantum system through which federal Indian agents sometimes made decisions based on how reservations residents "looked" as opposed to careful genealogical study.[20]

The upshot is that modern blood rules imply that ethnic fragmentation - whether real or perceived - can lead to exclusive growth through its effects on citizenship fragmentation such that some American Indians on reservations qualify for citizenship and others do not. As is true with other nations, however, citizenship rules on Indian reservations are in constant flux, for example as blood quantum rules become more or less stringent (Thornton 1997, Gover 2009). As has been shown to be true of cross-country rules of citizenship (Bertocchi and Strozzi 2010), tribal

[18] The Bureau of Indian Affairs reviewed and amended IRA constitutions, which typically included a 25% blood quantum membership rule (Rusco 2000).

[19] Federal Indian policy expert David Wilkins is cited in Appleton (2009) in the following way: "The one-quarter blood quantum was a criteria that federal officials devised in the early 1900s to reduce the number of Indians and save themselves some money. And by then, most tribes had been so brow-beaten they weren't in a position to challenge those criteria." There is literature in Native American studies, anthropology, law, and sociology debating the merits of using blood quantum as a membership criteria. Some of the commentators are strongly opposed, arguing that blood quantum rules undermine kinship determinations historically practiced (TallBear 2003). Other commentators take less of a stance, instead emphasizing the challenge facing tribes to make citizen rules that strike a balance between inclusivity and exclusivity when tribal resources are scarce (e.g., Schmidt 2011).

[20] Designations were also sometimes made for strategic reasons of acquiring land for white settlers, which was easier in some cases when Indian owners were declared to have lower blood quantum (see Akee 2019).

membership rules also presumably change dynamically as the ethnic composition of the population changes and different pressures are placed on existing citizenship rules (e.g., to help keep current members children eligible for tribal citizenship).[21] For this reason, we focus not on changing citizenship rules but rather on blood quantum designations imposed upon tribes in the 1930s, when tribes were first writing citizen rules in their constitutions. We next describe the blood quantum data before estimating growth-inequality relationships on reservations.

3. Measuring Ethnic Polarization from Historical Blood Quantum Reports

In order to examine the potential relationship between inequality and historical ethnic make-up, we construct two measures, one for how ethnically assimilated a reservation was and another for the degree of ethnic polarization. Both measures are constructed from blood quantum data collected by the Bureau of Indian Affairs, which we collected from the U.S. National Archives. The quantum data estimate the percentage of the American Indian population on reservations with 100%, 50-99%, 25-49%, and 0-24% American Indian blood in 1938. Anchoring our measures of ethnicity to 1938 has an important empirical advantage. The blood quantum data from this era closely aligns with the formation of early membership rules, which allows us to use variation in blood quantum measured prior to any endogenous membership rule changes that occurred later.

From these data, we construct an ethnic assimilation measure called *Historic Blood Quantum Average (HBQA)* and calculate it as

$$(1)\ HBQA = BQ_{100\%} + 0.50 \times BQ_{50\%} + 0.25 \times BQ_{25\%},$$

where $BQ_{P\%}$ is the percentage of population with *P*% American Indian blood. A reservation whose population was entirely comprised of people with 100% American Indian blood would have an *HBQA* equal to 1.

We also quantify the extent to which a reservation was ethnically homogenous or ethnically fragmented. The following measure, *Historic Blood Quantum Polarization*, serves as a proxy for the degree of ethnic polarization on a reservation:

[21] Using cross-country data, Bertocchi and Strozzi (2010) show that immigration is a key factor that influences a country's propensity to use ethnic criteria for citizenship.

(2) $HBQP = (BQ_{100\%} + BQ_{25\%\,or\,less}) - (BQ_{100\%}^2 + BQ_{25\%\,or\,less}^2)$

where $BQ_{25\%\,or\,less} = BQ_{25\%} + BQ_{0\%}$. A *HBQP* = 0 corresponds to a very ethnically homogenous reservation in which the entire population has either 100% American Indian blood or the entire population has 25% or less American Indian blood. A *HBQP* = 0.5 implies the reservation was ethnically polarized with half of the population having 100% American Indian blood and the other half 25% or less.

Figures 2 and 3 show that the least assimilated and least polarized reservations tended to be in the Southwest, but there are exceptions to this general pattern. For example, the Yavapai-Apache Nation and the Colorado River Reservation, both located in Arizona, have assimilation and polarization measures near the mean values. Additionally, the Sac and Fox reservation in Iowa and the Mississippi Choctaw Reservation in Mississippi both have *HBQA* = 1 and *HBQP* = 0. From this map it is also apparent that the two measures are negatively correlated, with a Pearson correlation coefficient of -0.65. While the two measures are correlated, there is still variability between the two. For example, the *HBQP* for the Mille Lacs Reservation in Minnesota and the Southern Ute Reservation in Colorado are both roughly equal to 0.22; however, the *HBQA* for Mille Lacs is 0.44 and for the Southern Ute it is 0.88. So, while these reservations have roughly the same degree of polarization, they differ a great deal in terms of our measure of historical assimilation.

Much of the cross-reservation variation in our measures of assimilation and polarization is determined by U.S. land allotment policies that concluded before the 1945-2010 period of our analysis. Under the Dawes Act in particular, millions of acres of reservation land were privatized and opened for white settlement and farming during 1887-1934 (Carlson 1981, Anderson 1995, Leonard et al. 2019). Ethnic assimilation tended to be less pronounced on reservations that were neither allotted nor opened for white settlement, or that were allotted late in time, close to 1934. These reservations concentrate in the arid southwest, which has poor rainfall conditions for agriculture.[22] This explains why assimilation is low in the Southwest and higher in the better farming regions of the Midwest and Northwest.

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[22] Empirical research shows that privatization and settlement was more likely on reservations in densely populated and states with rapid population growth over 1880 to 1930. Privatization and settlement were also more likely on

Figure 2
Map of Blood Quantum Average in 1938

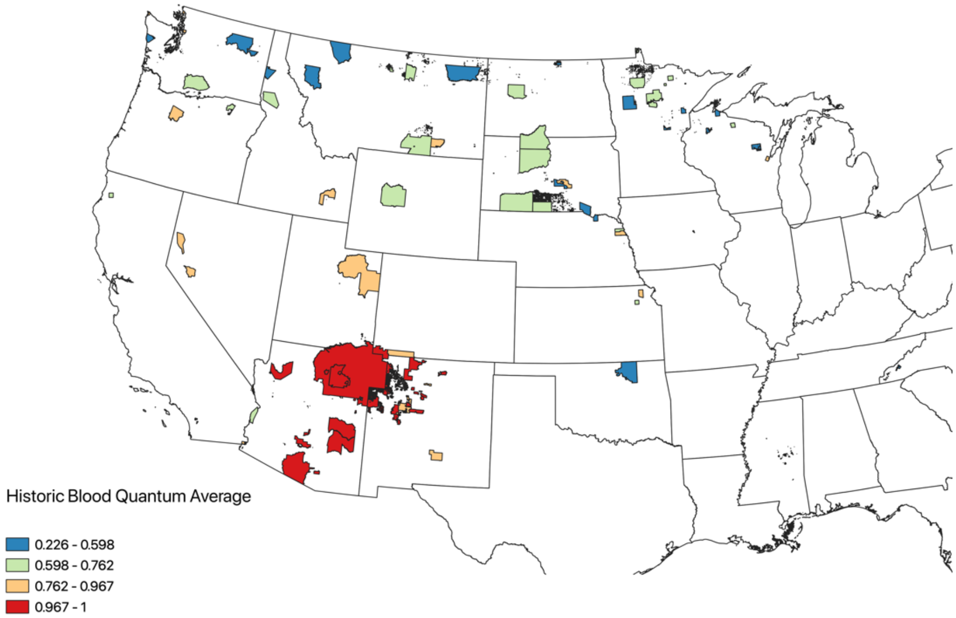
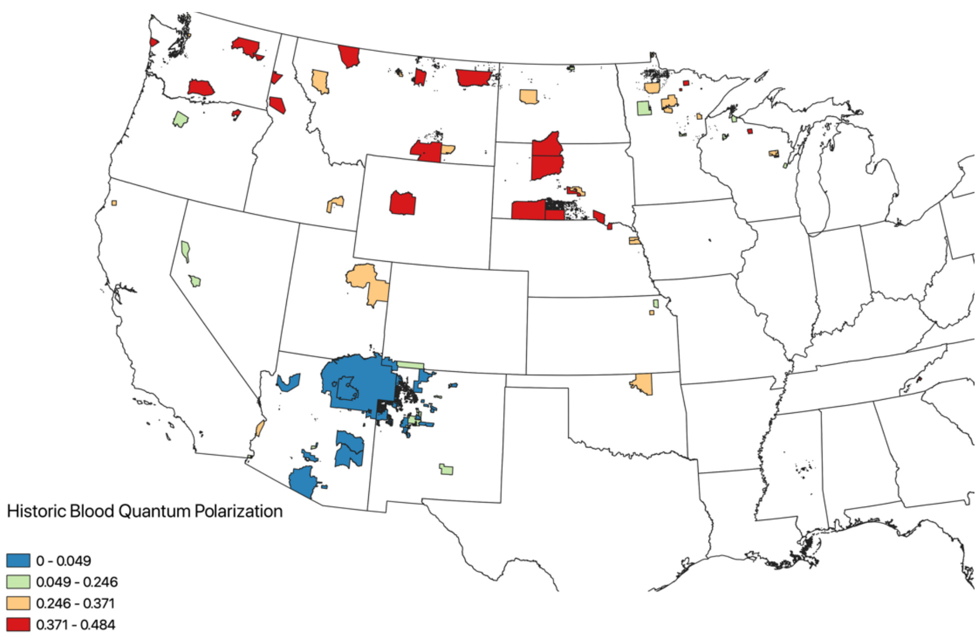


Figure 3
Map of Blood Quantum Polarization in 1938



Note: The figures show the four quartiles of the average and polarization distributions.

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reservations near railroad lines in the late 19th century, and on reservation with good prime land endowments for agriculture (Carlson 1981, Leonard et al. 2019).

In addition to being less ethnically assimilated and polarized, the Southwestern reservations also tend to have more land in tribal ownership. For these reasons, we control for geography and land tenure mix in empirical estimates in an attempt to isolate the role of ethnicity. We find that, in general, the relationships between ethnicity and growth-inequality patterns are robust to these controls as we discuss in more detail below.

4. Measuring Inequality

To conduct the analysis, we must construct reservation-level measures of income inequality. We accomplish this in three steps. First, we collected historical (1943-1945) reservation-level data on family incomes from BIA reports housed at the U.S. National Archives. The reports estimate reservation-level Native American populations, aggregate incomes, and the distribution of families within ten income bins (e.g., under \$100, \$100-\$199, etc.). Second, we collected reservation level data spanning 1970 to 2010 from decadal U.S. Census reports. The census reports provide the same information as the BIA reports except the distribution of families is reported in different sized bins in the different years (e.g., under \$5,000, \$5,000 to \$7,500, etc). Third, we use non-parametric techniques to estimate lower and upper bounds of Gini coefficients and then use the mid-point.

We measure inequality with the Gini Index, because this is the most feasible measure of inequality to estimate, given our data structure.[23] The data report the K intervals with specific income boundaries $0 = y_1^L < y_1^U = y_2^L < y_2^U \ldots y_{K-1}^L < y_{K-1}^U = y_K^L < y_K^U = \infty$ and the number of families (n_k) within each income interval. The data also report the mean income of the entire population. Table 2 shows an example of this type of frequency table from the 1980 census.

[23] Other inequality measures include the coefficient of variation, the Atkinson index, the Theil Index and various quantile-based measures (e.g., share of income within 10th percentile, 90-50th percentile gap, etc.).

Table 2:

Example of Grouped Income Distribution Data

Reservations	Fond du Lac, MN	Fort Apache, AZ	Fort Belknap, MT	Fort Berthold, ND
INCOME IN 1979				
Families	110	1 248	353	492
Less than $5,000	14	376	122	107
$5,000 to $7,499	18	92	50	62
$7,500 to $9,999	5	147	22	49
$10,000 to $14,999	23	254	62	104
$15,000 to $19,999	15	159	32	68
$20,000 to $24,999	11	103	34	50
$25,000 to $34,999	14	81	31	41
$35,000 to $49,999	10	29	-	11
$50,000 or more	-	7	-	-
Median dollars	14 265	10 129	8 011	11 045
Mean dollars	16 113	11 536	10 830	12 663

Notes: The table is a scanned directly from the 1980 U.S. Census.

Table 3 summarizes the structure of the BIA family income data (for 1945) and the U.S. Census income data (for 1970 through 2010). For each year, we have converted the data into 2010 dollars using CPI adjustments. The number of bins ranges from 9 to 16 and the lower limit for the terminal income group ranges from $24,228 (in 1945) to $253,258 (in 2000). We emphasize that, in all cases, the income measures are for Native Americans on reservations and do not include incomes of non-Natives (e.g., people zero percent Native blood).

To estimate Gini coefficients from the data we use nonparametric methods because we do not want to impose a specific distributional functional form on the grouped income data.[24] Our nonparametric method is typical in that it employs optimization techniques to find the upper and lower limits of the Gini subject to the informational constraints inherent in the grouped data.[25] In our case, we know the number of families in mutually-exclusive, non-overlapping income intervals with an unbounded top income group. We also know the mean income across all families, but we do not know the mean family income within each group. We follow the optimization technique described in Murray (1978), which is a blueprint for finding upper and lower bounds of Gini

[24] Based on visual inspection of the empirical distribution of income for various reservations, we find that many reservations have multi-modal income distributions and take forms that would be poorly approximated by the unimodal, right skewed parametric distribution functions commonly used in estimation of county-level income distributions, e.g., log-normal or Singh-Maddala.

[25] For general description of nonparametric estimation techniques, see Cowell and Mehta (1982), Gastwirth and Glauberman (1976) and Cowell (2000). Depending on what information is available, slightly different methods are available for calculating the bounds of inequality measure (see Gastwirth 1972, Cowell 1991, McDonald and Ransom 1981, and Murray 1978).

coefficients from grouped data that has the same structure and information as ours. Part A of Appendix 1 provides more detail on the optimization procedure we employ.

Table 3:

Summary of Grouped Family Income Categories

Year	Number of Bins (K)	Lower limit of terminal bin (2010$)
1945	10	$24,228
1969	14	$148,539
1979	9	$150,176
1989	9	$175,852
1999	16	$261,772
2010	10	$200,000

Notes: The table data from the 1970, 1980, 1990, 2000, and 2010 U.S. Census as well as data from 1943-1945 income reports from the U.S. Bureau of Indian Affairs, which are housed at the U.S. National Archives in Washington D.C.

The final step, after calculating the upper and lower bounds, is to assign weights to each in order to generate a point estimate of the Gini. In this paper we choose the midpoint between the upper and lower bounds (i.e., weights of 0.5) but our key results are invariant to small to moderate modifications in this choice of weights. We also find that optimized weights, using an approach developed by Wu and Perloff (2007), are very close, at 0.48. Part B of Appendix 1 provides a fuller description of the Wu and Perloff approach.

Although we have estimated a Gini coefficient for all reservations in all years for which income distribution data are reported, the focus here is on the 91 reservations for which there were data for at least 5 of the 6 years spanning 1945-2010.[26] These 91 reservations constitute the slightly unbalanced panel of data that we employ in most of the econometric analysis although we present some statistics for the 43 reservations for which data are available for all 6 time periods.[27] Table 4 summarizes the (midpoint) Gini coefficients (scaled from 0 to 100) and provides international comparisons for context.

[26] We also limit the reservations in our sample to those with measures of ethnicity developed in section 3.2.

[27] By using the unbalanced panel of reservations with at least 5 time periods of data, we more than double the number of reservations included in the analysis. Using a balanced panel for 1980 - 2010, we increase the number of reservations to 102.

In 1945, the San Pasqual reservation had the lowest inequality with a Gini of 10.20. For international context, this degree of inequality is close to Azerbaijan. The average Gini coefficient across all reservations in 1945 was 35.23, which was closest in magnitude to the Cheyenne River reservation's Gini in 1945. For international context, Romania's Gini coefficient was 35.2. The rest of statistics in Table 4 have similar interpretations.

Table 4

Summary Statistics of Gini Coefficients with International Comparisons

	Minimum	Mean	Maximum
1945	10.20 (San Pasqual, CA) [≅ Azerbaijan]	35.19 (Cheyenne River, SD) [≅ Romania]	57.93 (Southern Ute, CO) [≅ Brazil]
1970	27.42 (Menominee, WI) [≅ Finland]	40.34 (Turtle Mountain, ND) [≅ Georgia]	62.39 (Fort Belknap, MT) [≅ Kenya]
1980	12.54 (Fort Mojave, AZ) [≅ Azerbaijan]	38.38 (Jicarilla Apache, NM) [≅ Bulgaria]	51.63 (Hopi, AZ) [≅ Mexico]
1990	29.80 (Maricopa, AZ) [≅ Germany]	43.50 (Crow Creek, SD) [≅ Moldova]	53.67 (San Domingo Pueblo, NM) [≅ Peru]
2000	30.12 (Kickapoo, KS) [≅ Canada]	43.13 (Northern Cheyenne, MT) [≅ Ecuador]	55.52 (Crow Creek, SD) [≅ Panama]
2010	27.36 (Kickapoo, KS) [≅ Iceland]	42.72 (Santa Clara Pueblo, NM) [≅ Angola]	54.82 (Rosebud, SD) [≅ Guatemala]

Notes: In parenthesis is the name of the reservation having the minimum and maximum gini or having a gini coefficient closest to the mean value. In brackets is the name of the country having a gini coefficient close in value to a particular summary statistic. The country level gini coefficients come from World Bank Indicators at http://wdi.worldbank.org/table/2.9# and span 1994 to 2010. In all cases except for Azerbaijan, the international comparisons are approximately equal to associated reservation's gini. In some cases, the gini coefficients are significantly less than the gini for any other nation during 1994 to 2010. The lowest gini reported is 16.23; for Azerbaijan in 2004. The comparisons here are based on the slightly unbalanced panel of N= 91 reservations.

To highlight variation in whether growth has been inclusive or exclusive, and if these patterns are correlated with ethnicity, we being by condensing the income and inequality data for qualitative assessment.[28] We order each of the 91 reservation income and Gini coefficient observations by per capita income, from lowest to highest.[29] Next, we partition each of the observations into three groups (tritiles) that contain the lowest, middle, and highest third of that reservation's income observations for those reservations with 6 observations. For those reservations with 5 observations, the first "tritile" contains the lowest two income observations, the second contains the middle income observations, and the third contains the two highest income observations. We then compute the mean income and mean Gini coefficient for each tritile. This process generates three inequality-income points for each reservation. Appendix 3 shows the plots for each reservation.

Grouping the data into three categories suppresses some of the quantitative information in the original time series but there are advantages. A minimum of three points is required to trace out any single peaked curve, so a smaller number would not be sufficient. As shown in the appendix figures, only four shapes are possible with three points. They are: monotonically increasing, monotonically decreasing, single-peaked (inverted-U), and single-troughed (U-shaped).

The top row of Table 5 summarizes the occurrence of shapes. The increasing and single-peaked shapes are the most common, each occurring in 62 of 91 reservations. This pattern indicates that, at low levels of income, income growth has most commonly been exclusives. Moving from tritile 2 to 3, however, there is a less dominant relationship. Between these two points there are 40 of 91 reservations that exhibit a pattern of decreasing inequality, and 51 reservations exhibit a pattern of increasing inequality. This comparison of shapes suggests that any effect of ethnicity on exclusive vs. inclusive growth will more likely reveal itself at medium to high levels of income, where there has been more qualitative variation in the shape of growth-inequality relationships.

The bottom rows of Table 5 hint at the potential importance of ethnicity. Reservations with decreasing inequality were less ethnically assimilated and less polarized than reservations with the other shapes. Reservations with increasing inequality were the most ethnically assimilated, and the second most ethnically polarized.

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[28] Our method is inspired by time-series tests of the Environmental Kuznets Curve in Deacon and Norman (2006) and by the longitudinal analysis of income and inequality in Deininger and Squire (1998).

[29] Here we include reservations for which we have six data points (43 reservations) and those for which we have five data points (48 reservations). We include those reservations with only 5 data points because this significantly increases the sample size and makes the analysis more robust.

Table 5:

Mean Characteristics of Reservations, Based on Income-Inequality Shapes

	Decreasing	Increasing	Peak	Trough
Frequency of Shape	9	31	31	20
Gini				
Tritile 1	42.2	35.9	36.9	40.7
Tritile 2	40.0	41.4	44.8	34.7
Tritile 3	33.4	44.4	40.4	43.7
Per Capita Income (2010$s)				
Tritile 1	$8,083	$5,260	$6,289	$6,672
Tritile 2	$11,747	$8,989	$9,908	$9,369
Tritile 3	$14,642	$12,053	$13,433	$13,530
Blood Quantum Assimilation	$0.889^{*,+}$	0.693	0.749	0.761
Blood Quantum Polarization	0.163	0.224	0.274	0.213

Notes: The asterisk (*) indicates statistically significant differences ($p<0.05$) between the means across the Decreasing and Increasing categories, based on t-statistics calculated assuming both equal variance of means. The notation (+) indicates statistically significant differences based on t-statistics assuming unequal variation of means. There are a total of 91 reservations (N = 91) with Gini, income, and ethnicity data in this sample.

Although suggestive, the ethnicity relationships are confounded by many factors, and they are based on qualitative changes in inequality rather than quantitative changes. With respect to confounding factors, reservations with decreasing inequality also had the highest starting income, at $8,083. Reservations with increasing inequality had the lowest starting income, at $5,260. With respect to quantitative changes, reservations with decreasing and peak shapes both experienced declining Ginis from tritile 2 to 3, but of different magnitudes: -6.7 vs -4.4. Reservations with increasing and trough shapes both experienced increasing Ginis, but also of different magnitudes: +3.0 vs. +9.0. In the next section, we begin to isolate the role of ethnicity using a semi-parametric assessment of growth-income relationships across reservations. In addition to controlling for income levels, the semi-parametric analysis is based on quantitative, rather than qualitative, information on inclusive vs. exclusive growth.

5. Estimation of Growth-Inequality Relationships

To further motivate the potential relationships between growth, inequality, and ethnicity, we compare the growth-inequality across reservations, international countries, and U.S. states. The semi-parametric panel regression model is given in equation (3)

$$(3)\ gini_{it} = \varphi_i + f(y_{it}) + \varepsilon_{it}$$

where φ_i an economy-specific fixed effect and $f(y_{it})$ is an unknown smooth function of income y_{it} that we estimate with cubic regression splines. This method differs from much of the early cross-country research in that it identifies correlations from within-jurisdiction variation in income rather than across jurisdiction variation. This type of semi-parametric regression allows us to estimate how the variable y_{it} relates with the Gini within an economy while placing minimal assumptions on the functional form of the relationship.[30] We follow widely used methods (Wood 2006 and Takezawa 2006) by estimating the cubic regression splines through the minimization of penalized least squares and by selecting a smoothing parameter through generalized cross-validation (GCV) procedures.

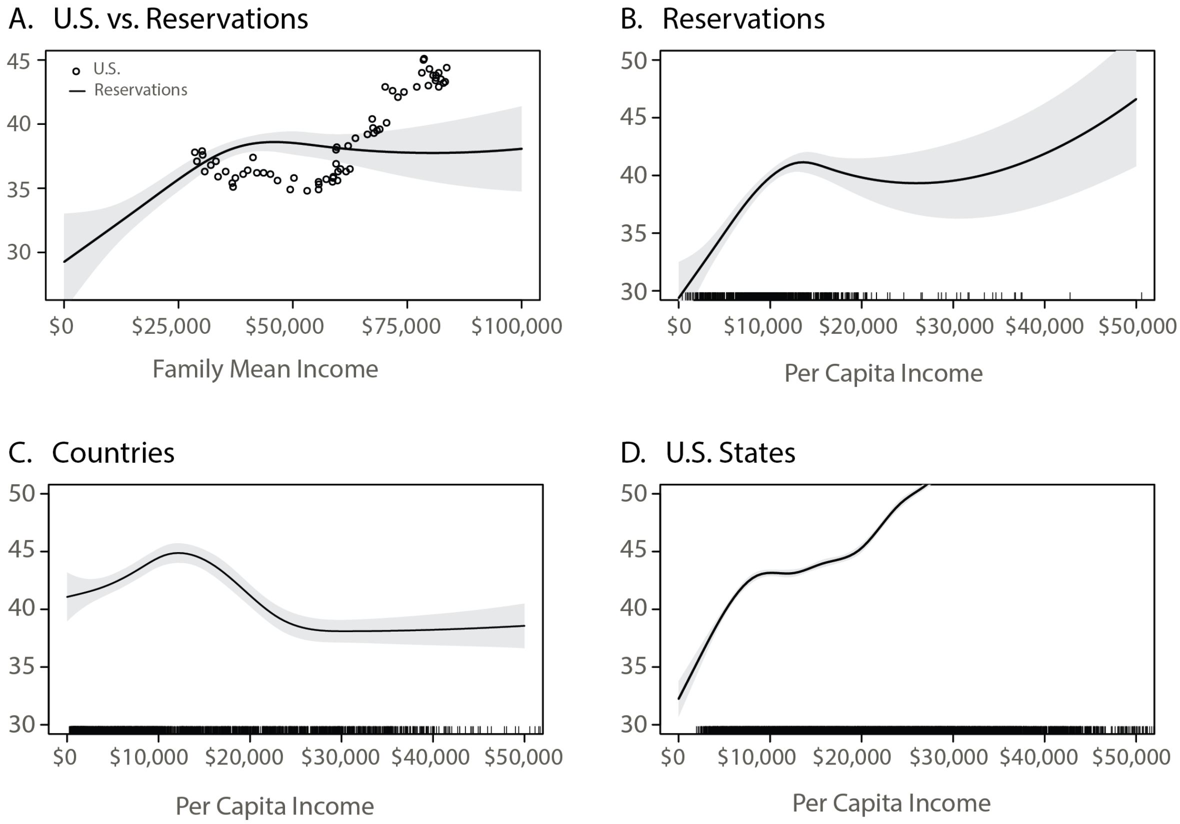
Figure 4 plots estimation results. Panel A plots family mean income against the function $f(y_{it})$ for the sample of Indian reservations, holding constant the reservation specific fixed effects. Changes along this curve describe how the Gini changes with increases in family mean income. To aid in the ease of interpreting the Y-axis, we have added the median fixed effect into regression equation (1) before plotting. The shaded area represents the 95 percent confidence region around the predicted values. For context, we have also plotted Gini-family income data points for the entire United States.

Panel A shows that inequality on reservations increased with income at low levels of income. Beginning with an income level of around \$45,000 per family, the relationship flattens out and inequality does not change in a precise way with income at higher levels. By contrast, the U.S. Gini-Income data points show that inequality was effectively flat for levels of income less than \$50,000, and then inequality began to increase with income at levels above \$50,000.

[30] Essentially, a cubic spline function is a piecewise function with various sections being comprised of cubic polynomials. The polynomials are joined together at the end points of each section (called knots) such that the first and second derivative of the spline function is continuous across its entire domain.

Figure 4

Income-Inequality Relationships for Reservations, Countries and U.S. States



Notes: U.S. Gini and family mean income data are from the U.S. Census Bureau and are for years 1947-2010. Country-level Gini data are from the UNU-WIDER World Income Inequality Database (WIID): http://www.wider.unu.edu/research/Database. The inequality data were collated with PPP-adjusted GDP per capita data from the Penn World Table (PWT) 8.0 which are adjusted and present in 2010 USD: https://pwt.sas.upenn.edu/. Gini data at the state-level comes from individual tax filing data available from the Internal Revenue Service (IRS) (see Frank 2009). State per capita personal income data are from the Bureau of Economic Analysis (BEA). Deininger and Squire (1996) find that Gini coefficients calculated from per capita measures are systematically higher than those from family or household measures.

Panel B shows the results for Indian reservations based on per capita income rather than family mean income. The growth-inequality pattern is similar to Panel A in that inequality increases with growth for low levels of income per capita. Inequality flattens and perhaps decreases in the range of $12,000 to $20,000. The relationship is indeterminate at levels of income exceeding $20,000. The X-axis shows the density of data points along the income distribution, indicating the majority of data points lie at income levels less than $20,000. This is one reason why the estimation error is greater at income levels exceeding $20,000. Despite the substantial number of observations between income levels $13,000 and $20,000, however, we also observe a widening of the confidence interval in this region. This result suggests that heterogeneity in income-inequality relationships, rather than estimation error, may explain the insignificance of the growth-inequality relationship at higher levels of income. We return to this issue of heterogeneity below.

For purposes of comparison, Panel C shows estimates of equation (1) for an unbalanced panel of 144 countries for years spanning 1950 to 2006. The graph shows that inequality rises until GDP per capita of about $12,000, and then inequality begins to fall. At higher levels of development - GDP per capita greater than $27,000 - the inequality-growth relationship is neither positive nor negative in general. The Panel C results are similar to those in Frazier (2006), who uses the same data sets (with GDP per capita logged) and a partially linear model, but does not control for country-specific fixed effects. The Panel C results are also similar to Barro (2000) and Barro (2008), who, after controlling for fixed country effects and conditioning on other demographic characteristics, finds the relationship between inequality and income level to have somewhat of an inverted-U shape.

Panel D shows the regression results for U.S. states and the District of Columbia for the years 1929 – 2011. The state level dataset is annual and has the most data points and the smallest estimation error of the four estimates. Similar to reservations and countries, we see that within U.S. states, inequality rose with income growth at low levels of income. At a per capita income level of around $9,000, the relationship becomes relatively flat until roughly $20,000. For incomes exceeding $20,000, there is a strong positive relationship between inequality and income growth. This positive relationship between inequality and income growth for U.S. states is consistent with much of the literature on state and U.S. inequality.[31] Comparing the results for U.S. states in Panel D with the data points for the U.S. as a whole in Panel A we see that they are largely consistent despite the fact that the data come from different sources and reflect different sources of income.

The comparisons in Figure 5 raise questions about why inequality on American Indian reservations has not risen as consistently as in the broader United States. Have differences in ethnicity helped guide more inclusive growth on Indian reservations? To shed light on this question, we begin by estimating the semi-parametric panel model above with subsamples segmented by the ethnic assimilation and polarization variables. The subsamples identify reservations as more assimilated if their *HBQA* variable is less than the mean (.746). Similarly, the

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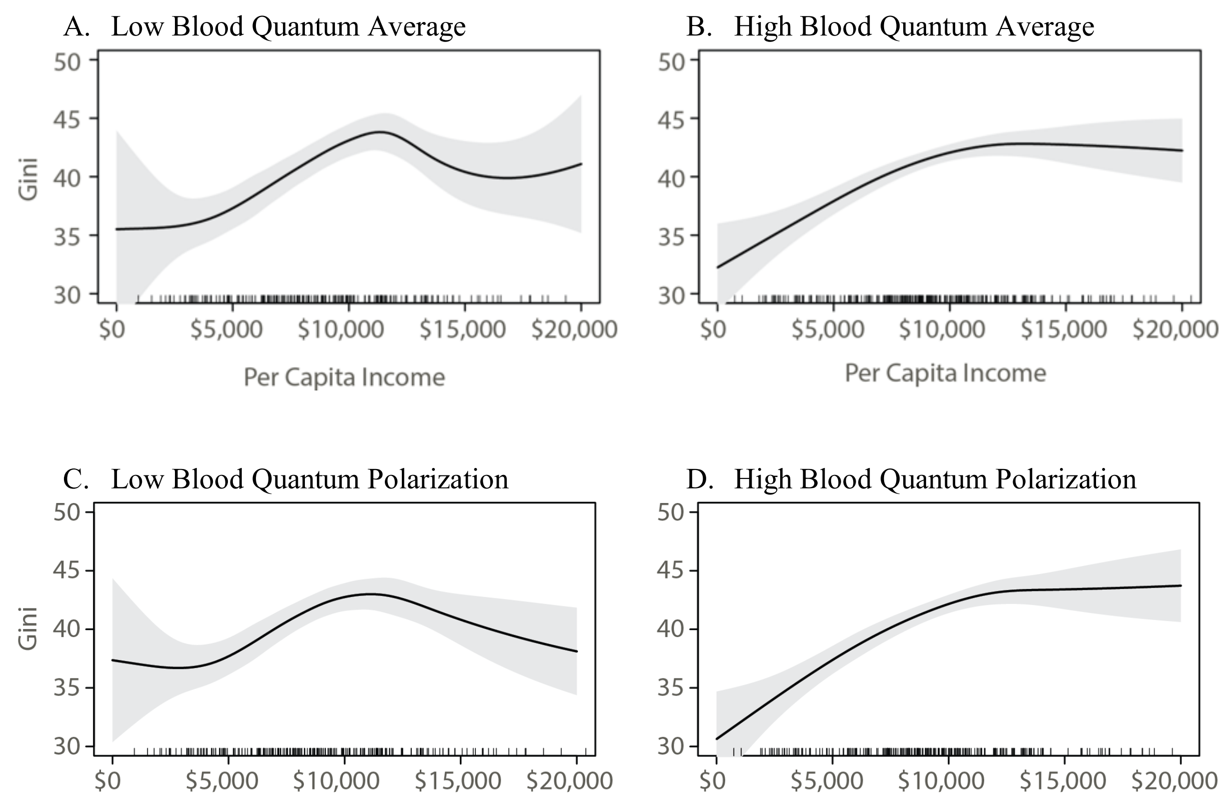
[31] Piketty and Saez (2003), Frank (2008), and Boustan et al. (2013) all find that inequality is generally increasing with income growth among U.S. states.

sub-samples identify a reservation as more ethnically fragmented if its *HBQP* is greater than the mean (0.233).

Figure 5 shows the semi-parametric panel regression results. Panels A and B demonstrate how the growth-inequality relationship differs between reservations which are more ethnically distinct from the U.S., and those that are ethnically more similar to the U.S. The results for both sub-samples show a positive relationship between income and inequality for lower levels of income, i.e., \$5,000 to \$12,000. At higher levels of income this relationship across the two subsamples appears to diverge; the relationship is flat among the reservations with a more ethnically assimilated Native American population during the 1930s and decreasing among the less assimilated reservations.

Figure 5

Income-Inequality Relationships for Sub-Samples of Reservations



Notes: The number of reservations for the sub-samples A, B, C and D are respectively 45, 46, 40 and 51.

Panels C and D of Figure 5 compare the growth-inequality relationships of less ethnically polarized reservations with those that are more ethnically polarized. The set of reservations with less ethnic polarization experienced decreasing inequality after reaching a peak at around $12,000. By contrast, the more ethnically fragmented reservations did not have a clear turning point.

To summarize the results in Figures 4 and 5, they provide initial evidence that growth has been more inclusive on reservations that were less ethnically assimilated and less ethnically polarized during the late 1930s. We examine these relationships in more detail in the sections that follow. Before proceeding, we note that the relationships are not simply explained by differences across geographical regions. As shown in Appendix 2, all three regions – the Midwest, Northwest, and Southwest – display overall growth-inequality relationships that resemble inverted U-shapes despite variation across those regions in terms of ethnic composition. These results suggest that income-inequality relationships are better explained by ethnic composition, which is an issue we examine in more depth in the following section.

6. Empirical Framework: Panel Estimation

To complete the analysis, we now focus on the growth-inequality relationship from decade to decade. Here we employ a panel model with reservation and time period fixed effects to examine how decade-to-decade changes in income relate to decade-to-decade changes in inequality. To test the extent to which blood quantum polarization affects inequality, we employ the following empirical model:

$$
\begin{aligned}
(4)\quad \log(gini_{it}) = {} & \alpha_i + \varphi_t + \theta_1 \log(per\ capita\ inc_{it}) \\
& + \theta_2 HBQA_i \times \log(per\ capita\ inc_{it}) \\
& + \theta_3 HBQP_i \times \log(per\ capita\ inc_{it}) \\
& + \theta_4 (HBQA_i \times HBQP_i) \times \log(per\ capita\ inc_{it}) \\
& + \textstyle\sum_{k=1}^{K} \beta_k\, x_k + \sum_{j=1}^{J} \delta_{jt}\, (x_j \times \varphi_t) + \epsilon_{it},
\end{aligned}
$$

where i is the reservation and t is the year for a balanced panel of 102 reservations covering each decade from 1980 to 2010.[32] Focusing on these time periods has three advantages. First, it increases the number of reservation usable in a panel because gaps in the data availability are concentrated in 1945 and 1970. Second, it allows us to focus on identifying the role of ethnicity on inclusive versus exclusive growth during the period in which most reservation economies had reached middle income status. Our analysis in Sections 3 and 4 showed that much of the heterogeneity in the growth-inequality relationship comes at higher levels of income, which were generally observed in these later years.[33] Third, a series of self-determination policies, beginning in the late 1970s, progressively gave elected tribal governments more control over reservation commerce. We explore these specific channels in more depth in Section 7.2.

The specification estimates the relationship between reservation inequality and per capita income, while allowing for differential effects by historic levels of blood quantum polarization. As discussed in Section 3, our measures of blood quantum average and polarization are negatively correlated but in a non-linear way: as average historic blood quantum approaches one, average historic blood polarization approaches zero. In order to disentangle the effect of polarization from the average historic blood quantum, we therefore interact per capita income with both measures of historic ethnicity. The coefficients of interest are the set of $\theta_i's$, where the interaction terms in the model allows the relationship between inequality and income to vary with historic blood quantum average and polarization. This allows us to isolate how historic blood quantum polarization has influenced the growth-inequality relationship on reservations while also accounting for its correlation with average blood quantum.

The parameters α_i and φ_t denote reservation fixed-effects and year fixed-effects, respectively. The year fixed-effects, which we did not include in the Section 5 descriptive analysis, helps to isolate relationships between income and inequality without confounding those relationships with time trends.[34] The set of x_k's contains time-varying covariates which may

[32] In column (1) of Appendix Table A.4.3, we run the main specification for our slightly unbalanced panel of 91 reservations, where inequality, income, and our ethnicity measures are available for 1980 to 2010. The results are very similar.
[33] In columns (2) and (3) of Appendix Table A.4.3, we run the main specification for the slightly unbalanced panel across the full set of years and a balanced panel across the full set of years. Both sets of results reveal no significant relationship between ethnicity and the growth-inequality relationship, which are driven by the early years in the sample.
[34] In column (4) of Appendix Table A.4.3, we allow each geographic region to have its own time effect. The results are similar in both cases.

impact inequality and are related to changes in per capita income, including state per capita income, adjacent county per capita income, and adjacent county population density. The set of x_j's contains time-invariant factors, including measures of land tenure, political and legal governance institutions, and distance to the nearest major metropolitan area. The literature on reservation development has established these as important characteristics for economic growth and industry development. [35] We include them here because the covariates may be correlated with inequality and the historic ethnic makeup of reservations. Land tenure, in particular, may be correlated with our ethnicity variables because reservations where land was allotted and privatized before and during the Dawes Era of 1887-1934 were more likely to have contact with white settlers prior to the 1930s (see Carlson 1981, Anderson 1995, Leonard et al. 2019). We interact these time-invariant controls with year fixed-effects to account for changes in their impact over time. Standard errors are clustered at the reservation level to account for serial correlation. Appendix 4 and Table A.4.1 provides definitions and summary statistics.

7. Main Results

7.1 Inequality and Per Capita Income

Table 6 show the results from estimation of the panel model spanning from 1980-2010, where the various columns correspond to different ways in which per capita income interacts with *HBQA* and *HBQP*. Column (1) describes the basic relationship between income and income inequality. The coefficient estimate is consistent with the findings in panel B of Figure 5, which shows a gradual positive relationship between income and income inequality on reservations.

The subsequent panels sequentially control for the ethnicity interactions. Column (2) adds the interaction term with historic blood quantum average (*HBQA*). The coefficient on the interaction term indicates that higher levels of income are associated with falling inequality for those reservations with higher levels of historic blood quantum. This result is consistent with the literature, discussed above, documenting that jurisdictions which are more ethnically homogenous, are more likely to lower levels of inequality.

[35] The covariates are used in studies of reservation-level income growth, including research by Anderson and Parker (2008), Dippel (2014), Akee et al. (2015a), Frye and Parker (2016), and Brown et al. (2016).

In column (3), income is interacted with historic blood quantum polarization (*HBQP*). The positive coefficient on the interaction term indicates that income gains are associated with rising inequality when the population is more ethnically polarized. Again, this is consistent with the implied hypotheses outlined in Section 2, and the literature on ethnic polarization.

Table 6:

Panel Model Estimates of Relationship between of Income and Inequality, 1980-2010

	(1)	(2)	(3)	(4)	(5)
	Ln(Gini)	Ln(Gini)	Ln(Gini)	Ln(Gini)	Ln(Gini)
Ln(Income Per Capita)	0.019	0.372^{**}	-0.169	0.004	-0.588^{**}
	(0.075)	(0.145)	(0.112)	(0.122)	(0.233)
Ln(Income Per Capita) × *HBQA*		-0.478^{**}		-0.178	0.499^{*}
		(0.201)		(0.136)	(0.296)
Ln(Income Per Capita) × *HBQP*			0.740^{**}	0.577^{**}	3.283^{***}
			(0.288)	(0.283)	(0.966)
Ln(Income Per Capita) × *HBQA* × *HBQP*					-3.679^{**}
					(1.445)
Number of Reservations	102	102	102	102	102
Number of Observations	408	408	408	408	408
R-Squared	0.370	0.387	0.394	0.394	0.404

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors, reported in parentheses, are clustered at the reservations level. All regressions include reservation fixed-effects, decade fixed-effects, time varying controls, and historic time trend controls. Time-Varying controls include state per capita income, adjacent county per capita income, and adjacent county population density. Historic Time-Trend controls include a dummy variable for whether the reservation adopted the IRA, a dummy variable for whether Public Law 280 applied to the reservation, log distance from the closest MSA, and controls for the share of reservation land held in tribal trust and individual trust. All of these variables are interacted with time period. The null hypothesis is that all the coefficients in the model are equal to zero.

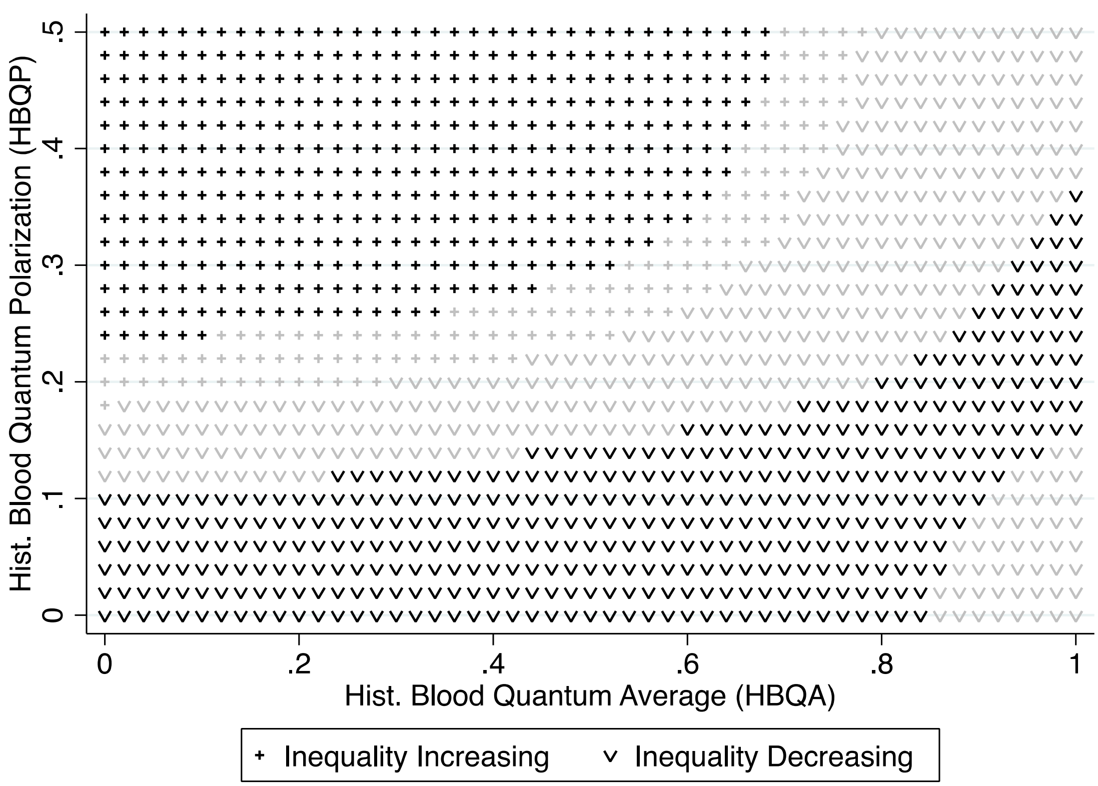
Columns (4) and (5) include both historic blood quantum average and polarization, allowing us to identify how inequality is affected by both measures simultaneously. Column (4) includes both of the previous ethnicity and income interactions, thereby isolating conditional correlations. Both ethnicity measures maintain their sign, but the magnitude and significance of the historic blood quantum average decreases. Column (5) introduces the fully interacted model with income and both ethnicity measures. This specification enables more flexibility in accounting for the correlation between the two ethnicity measures. The results suggest that the inclusion of the interaction term is important for understanding how the relationship between economic growth and inequality is conditioned by ethnic composition.

Figure 6 plots the marginal effects of income for different values of *HBQA* and *HBQP*. It shows the range of *HBQA* and *HBQP* values for which the model predicts inequality to be increasing or decreasing with income growth, based on our preferred model specification in Column (5).

Figure 6 indicates that reservations that were more ethnically polarized (*HBQP* above 0.2) have tended to experience exclusive growth on a decade-by-decade basis since 1980, especially at moderate to low levels of historic blood quantum average. Those reservations which have lower levels of polarization (*HBQP* below 0.15), in general, tend to have experienced inclusive growth. From the coefficient estimates in Table 6 and the illustrated marginal effects of Figure 6, historic blood quantum average appears to play a smaller role in determining inequality.

Figure 6:

Marginal Effect of Income Across Historic Blood Quantum Measures



Notes: Plus signs denote the combination of *HBQA* and *HBQP* predicts increasing inequality. Decreasing arrows denote the combination of *HBQA* and *HBQP* predicts decreasing inequality. Black symbols are statistically significant at a 90% confidence level.

Are the results illustrated in Figure 6 robust to alternative measures of polarization used in the literature? We first examine this question by applying two different measures (see Appendix Table A.4.4). The first, denoted MRQ, uses the ethnic polarization measure from Montalvo and Reynal-Querol (2005). The second, denoted ELF, uses the ethnic fractionalization measure used by Easterly and Levine (1997). Replacing our polarization measures with these and rerunning the empirical model produces very similar results. The findings here are generally consistent with Alesina and Glaeser (2004), which implies that ethnically homogenous societies prefer low inequality, and ethnically fragmented societies are more tolerant of high inequality.

7.2 Inequality and Casino Gaming

As described above, the 1980-2010 panel analysis just described is noteworthy because elected tribal governments were granted more control over economic development on reservations following a series of self-determination policies beginning in the late 1970s. As Kalt et al. (2008) note, "sovereignty and self-determination allow local desires, preferences, needs, and ways of doing things to be more accurately perceived and acted upon." Moreover, the Indian Gaming Regulatory Act (IGRA) of 1988 ushered in casino gaming on some reservations thereby creating a clear way for tribal governments to affect income distributions by directing casino jobs, profits, or public goods in progressive ways (Akee et al. 2015b). For both reasons, we have greater confidence that relationships between growth and inequality after 1980 reflect preferences and constraints at the tribal level.

Tribal casino revenues grew rapidly following IGRA and current estimates indicate that total tribal gaming revenues in 2017 exceeded $32 billion dollars (National Indian Gaming Commission 2018).[36] The same report indicated that tribal casinos are operating on over 490 reservations. Given the growth in gaming as a source of tribal income and the expanded mechanisms for redistribution possessed by tribal governments, a natural extension to our panel model explores the interaction between the rise in gaming, ethnicity, and inequality. Building on the previous framework from model (2), we replace income per capita with the number of slot machines per capita. This publicly available measure, used by Anderson and Parker (2008) and Cookson (2010), proxies for the (confidential) gaming income available to tribal governments.

[36] In the American Gaming Association's (AGA) annual survey report (2019), total commercial gaming revenues in the United States was $41.7 billion. The AGA estimates tribal gaming revenues will exceed total commercial gaming revenues by 2030.

Appendix Table A.4.1 gives summary statistics of the slot machines per capita variable. The mean increased from 0.007 in 1990, to 0.321 in 2000, to 0.814 in 2010 demonstrating growth in gaming across our sample reservations, over time. Additionally, over 85% of our sample has tribal gaming enterprises by 2010.

Table 7 presents the estimation results for various specifications where reservation gaming is interacted with *HBQA* and *HBQP*. The results convey a similar relationship between gaming, ethnicity, and inequality to the relationship identified with respect to overall income, in Table 6. When we include both ethnicity measures in the specification, as shown in column (5), the relationship between slot machines per capita, ethnicity, and inequality mirrors the relationship with income, ethnicity, and inequality. This result suggests that the way in which tribes distribute income to reservation Native Americans, in this case from casino earnings, is a key mechanism through which ethnicity leads to inclusive or exclusive income growth.

Table 7:

Panel Model Estimates of Relationship between Slot Machines and Inequality, 1980-2010

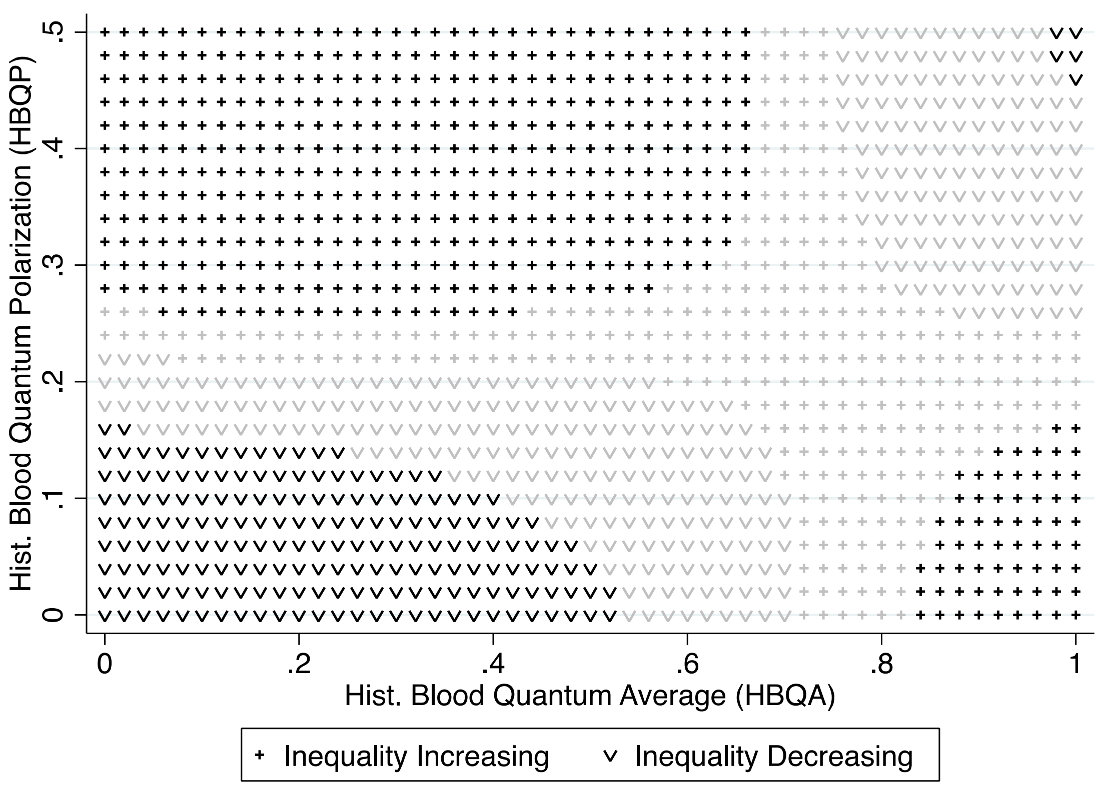
	(1)	(2)	(3)	(4)	(5)
	Ln(Gini)	Ln(Gini)	Ln(Gini)	Ln(Gini)	Ln(Gini)
Slots Per Capita	0.054***	0.014	0.072**	0.021	-0.340***
	(0.017)	(0.031)	(0.035)	(0.061)	(0.126)
Slots Per Capita × *HBQA*		0.059		0.054	0.472***
		(0.046)		(0.054)	(0.152)
Slots Per Capita × *HBQP*			-0.065	-0.013	1.540***
			(0.131)	(0.153)	(0.490)
Slots Per Capita × *HBQA* × *HBQP*					-2.089***
					(0.681)
Number of Reservations	102	102	102	102	102
Number of Observations	408	408	408	408	408
R-Squared	0.396	0.396	0.395	0.394	0.412

Notes: * p < 0.10, ** p < 0.05, *** p < 0.01. Standard errors, reported in parentheses, are clustered at the reservations level. All regressions include reservation fixed-effects, decade fixed-effects, time varying controls, and historic time trend controls. Time-Varying controls include state per capita income, adjacent county per capita income, and adjacent county population density. Historic Time-Trend controls include a dummy variable for whether the reservation adopted the IRA, a dummy variable for whether Public Law 280 applied to the reservation, log distance from the closest MSA, and controls for the share of reservation land held in tribal trust and individual trust. All of these variables are interacted with time period. The null hypothesis is that all the coefficients in the model are equal to zero.

Similar to equation (3) and Figure 6, we predict the marginal effect of inequality with respect to the number of slot machines per capita from our preferred specification in Column (5) for different values of our ethnicity measures. Figure 7 plots the marginal effect of adding an additional slot machine per capita for different values of *HBQA* and *HBQP* and shows the range of values for which the model predicts inequality to be increasing or decreasing with growth in tribally managed gaming enterprises, based on the model specification in Column (5). The figure shows a similar pattern where blood quantum polarization is associated with a strong divergence in the gaming-inequality relationship on reservations. We find that inequality increases with the addition of gaming machines for more ethnically polarized reservations. This finding is most pronounced among reservations that have low to moderate historic blood quantum averages.[37]

Figure 7:

Marginal Effect of Slot Machines Across Historic Blood Quantum Measures



Notes: Plus signs denote the combination of *HBQA* and *HBQP* predicts increasing inequality. Decreasing arrows denote the combination of *HBQA* and *HBQP* predicts decreasing inequality. Black symbols are statistically significant at a 90% confidence level.

[37] The lower right-hand corner of Figure 8 shows that reservations with historic blood quantum averages near one (and hence historic blood quantum polarization near zero) are predicted to have rising inequality with more casino investments. This finding does not contradict our conclusion that lower polarization is associated with inclusive growth because the nearly perfect correlations between blood quantum average and polarization for this set of reservation prevents us from separately identifying the contribution of polarization to inequality.

To summarize the findings in Table 6 and Table 7, income growth was more inclusive among less polarized reservations. This provides evidence that ethnic polarization plays an important role in guiding the growth-inequality relationships in recent years. Ethnic polarization has plausibly caused tribal membership polarization, and this would explain why casino activity has widened inequality. As the proportion of non-member Native Americans on reservations grows, which is more likely on ethnically polarized reservations, we expect payouts to tribal members from gaming to exacerbate inequality.

8. Auxiliary Evidence

8.1 Alternative Measures of Cultural Polarization

The findings in the previous section are consistent with tribal citizenship being an important mechanism through which ethnic polarization affects the growth-inequality relationship. As a check on this specific mechanism, we consider two alternative measures of polarization within reservations, which are related to cultural or social heterogeneity but are not determinants of citizenship eligibility.

First, we consider Dippel's (2014) measure of Forced Coexistence, which is an indicator for whether or not a reservation was created by combining historically distinct and autonomous bands. Forced coexistence is associated with persistent social distinctions within reservations and greater conflict and lower economic growth today; however, it is not associated with differences in citizenship eligibility which are based on ethnic distinctions from colonists rather than Native American kinship origin. Second, we consider heterogeneity in the share of the self-identified Native Ameircan population that speaks a native language at home. We define language use as polarized if between 40 and 60 percent of households on a reservation spoke a native language at home in 1980.[38] Language use is a marker of cultural connection and heritage but, unlike blood quantum, it is rarely used as criteria for citizenship.

We estimate the effect of these polarization measures on the growth-inequality relationship following a similar specification to equation (4):

$$(5)\ \log(gini_{it}) = \alpha_i + \varphi_t + \theta_1 \log(growth_{it})$$

[38] Our definition of language polarization is robust to alternative percentile groupings, including (25/75) and (35/65). We anchor our measure of language use to 1980 because that pre-dates the period we analyze.

$$+\theta_2 Polarize_i \times \log(growth_{it})$$
$$+\sum_{k=1}^{K} \beta_k x_k + \sum_{j=1}^{J} \delta_{jt} (x_j \times \varphi_t) + \epsilon_{it},$$

where we measure $growth_{it}$ using per-capita income or slot machines per capita defined in Section 7. The specification includes the full set of fixed-effects and controls used in the previous panel specifications and covers the period from 1980 to 2010. We replace our previous measure of blood quantum polarization with the binary measures of forced coexistence or language use polarization. The coefficient of interest, θ_2 , estimates the differential effect of the alternative measures of social and cultural polarization on the growth-inequality relationship. Table 8 presents the four alternative estimates from equation (5).

Table 8: Panel Model Estimates of Relationship between of Income and Inequality with Alternative Measures of Reservation Heterogeneity

	Forced Coexistence		Speaks Native Language (1979)	
	(1)	(2)	(3)	(4)
	Income	Slots	Income	Slots
Ln(Inc. Per Capita)	0.049		0.022	
	(0.107)		(0.080)	
Ln(Inc. Per Capita) × *FC*	-0.049			
	(0.101)			
Ln(Inc. Per Capita) × *Language*			0.004	
			(0.002)	
Slots per Capita		0.054**		0.055***
		(0.024)		(0.020)
Slots per Capita × *FC*		0.003		
		(0.028)		
Slots per Capita × *Language*				0.020
				(0.027)
Number of Reservations	376	376	400	400
Number of Observations	93	93	99	99
R-Squared	0.374	0.400	0.372	0.398

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors, reported in parentheses, are clustered at the reservations level. All regressions include reservation fixed-effects, decade fixed-effects, time varying controls, and historic time trend controls. Time-Varying controls include state per capita income, adjacent county per capita income, and adjacent county population density. Historic Time-Trend controls include a dummy variable for whether the reservation adopted the IRA, a dummy variable for whether Public Law 280 applied to the reservation, log distance from the closest MSA, and controls for the share of reservation land held in tribal trust and individual trust. All of these variables are interacted with time period. The null hypothesis is that all the coefficients in the model are equal to zero.

The results indicate that neither measure of polarization significantly impacts whether economic growth on reservations is inclusive or exclusive. The coefficient estimates on the interaction terms of interest are both economically and statistically insignificant. This suggests there is something specific about our measure of ethnic polarization that distinguishes it from these alternative forms of social and cultural polarization. The key distinguishing characteristic across the polarization measures is that only blood quantum polarization is connected to tribal citizenship through ethnic criterion.

8.2 Tribal Membership and Blood Quantum in the News

In 1978, the U.S. Supreme Court reinforced the rights of tribal governments to determine membership rules and define the conditions for citizenship. This can create a contentious environment between members and non-members within the reservation. Given the findings in Sections 7.1 and 7.2, we would expect membership and blood quantum related tension to be higher on more polarized reservations as income generation rises.

To determine whether membership and blood quantum related tension is associated with polarization, we employ an approach similar to Dippel (2014) and aggregate counts from keyword search queries using the *ProQuest* newspaper and historical newspaper databases from 1975 – 2015. For each reservation in our sample, we ran search queries related to blood quantum, membership, conflict, gaming, and payments, as well as different combinations of these queries, and counted the total number of article matches for each year.[39] To account for overall news coverage for a reservation, we normalized based on the total number of articles mentioning that reservation. We summed the counts to ten-year bins, where the mid-point corresponds to the year of our census data, i.e. counts from 1975 – 1984 are matched to the 1980 income data.

Correlations in the newspaper data indicate a clear connection between mentions of blood quantum and membership rules. When blood quantum is discussed, membership is almost always also discussed, which reinforces the importance of blood quantum for tribal membership.[40] We formally estimate whether newspaper mentions of blood quantum and membership rules are more prevalent on more ethnically polarized reservations using a specification similar to equation (4):

[39] Appendix 5 describes our search queries in more detail. Grouped queries were combined by adding the term "AND" between the individual query phrases.

[40] The correlation coefficient between the number of mentions featuring ("blood quantum") and ("blood quantum" AND "members*") exceeds 0.999.

$$
\begin{aligned}
(6)\quad Newspaper\ Count_{it} = {} & \alpha_i + \varphi_t + \theta_1 \log(per\ capita\ inc_{it}) \\
& +\theta_2 HBQA_i \times \log(per\ capita\ inc_{it}) \\
& +\theta_3 HBQP_i \times \log(per\ capita\ inc_{it}) \\
& +\theta_4 (HBQA_i \times HBQP_i) \times \log(per\ capita\ inc_{it}) \\
& +\gamma\ Total\ News\ Count_{it} \\
& + \sum_{k=1}^{K} \beta_k\, x_k + \sum_{j=1}^{J} \delta_{jt}\, (x_j \times \varphi_t) + \epsilon_{it}
\end{aligned}
$$

where $Newspaper\ Count_{it}$ is the number of newspaper articles pertaining to a specific query in period t mentioning reservation i and $Total\ New\ Count_{it}$ is the total number of news articles mentioning reservation i occurring during decade t. Our main coefficients of interest are the set of $\theta_i' s$. The specification also includes the full set of fixed-effects and controls included in equation (4). Our primary queries of interest focus on discussions including blood quantum accompanied by other key words related to conflict, gaming, and payments. Table 9 presents the fixed effects regression results for the fully interacted model, where table columns present separate queries.

The results across all blood quantum related queries reveal a similar pattern to the coefficients in Table 6 and 7. The coefficient pattern in column (1) indicates that as income increases in more historically polarized reservations, controlling for historic average blood quantum levels, the number of blood quantum related news articles increases. The coefficient pattern on the interaction terms remains unchanged following the addition of query terms related to conflict, gaming, and payments. This indicates that these topics are generally discussed jointly with blood quantum. In summary, these results reveal a strong connection between historic blood quantum polarization and contemporary conversations surrounding blood quantum, conflict, gaming, and payments.

Table 9:

Panel Model Estimates of Relationship between of Income and Blood Quantum Related Newspaper Mentions, 1980-2010

	(1)	(2)	(3)	(4)
	BQ	BQ + Conflict	BQ + Gaming	BQ + Payments
Ln(Income Per Capita)	-11.114	-12.681	-13.130	-10.280
	(49.529)	(44.919)	(32.976)	(46.575)
Ln(Income Per Capita) × *HBQA*	28.612	22.232	25.018	23.324
	(58.878)	(53.582)	(39.442)	(55.371)
Ln(Income Per Capita) × *HBQP*	385.281*	336.413*	274.059*	354.113*
	(210.627)	(191.675)	(140.503)	(197.424)
Ln(Income Per Capita) × *HBQA* × *HBQP*	-731.685**	-615.993**	-510.734**	-662.287**
	(320.066)	(283.585)	(218.000)	(299.191)
Total News Count	0.017***	0.015***	0.010***	0.015***
	(0.002)	(0.001)	(0.001)	(0.001)
Number of Reservations	102	102	102	102
Number of Observations	408	408	408	408
R-Squared	0.863	0.859	0.837	0.852

Notes: * p < 0.10, ** p < 0.05, *** p < 0.01. Standard errors, reported in parentheses, are clustered at the reservations level. All regressions include reservation fixed-effects, decade fixed-effects, time varying controls, and historic time trend controls. Time-varying controls include state per capita income, adjacent county per capita income, and adjacent county population density. Historic Time-Trend controls include a dummy variable for whether the reservation adopted the IRA, a dummy variable for whether Public Law 280 applied to the reservation, log distance from the closest MSA, and controls for the share of reservation land held in tribal trust and individual trust. All of these variables are interacted with time period. The null hypothesis is that all the coefficients in the model are equal to zero.

8.3 Poverty Rates, Labor Markets, and Adjacent County Income

To supplement the evidence based on gini coefficients, we also study poverty rates reported by the Census Bureau for 1990 – 2010.[41] Column (1) of Table A.4.5 presents the results from estimating equation (4), with the reservation poverty rate as the dependent variable. The pattern of coefficients resembles our prior findings, which suggests that exclusive growth on ethnically polarized reservations is being driven by the lower tail of the income distribution falling farther behind.

Reservation labor markets presumably also shape the distribution of income on reservations and may be a channel through which polarization hinders inclusive growth. We examine two general measures of labor markets, labor force participation and the unemployment

[41] These rates are calculated for the Native American population living on the reservation.

rate. Both measures are calculated for the Native American population on the reservation for 1990 – 2010. The results in column (2) of Table A.4.5 suggest that there are strong differences in labor force participation associated with income growth across more polarized and less polarized reservations. The coefficients indicate that labor force participation rates are lower on more polarized reservation. One potential channel is the preferential hiring of tribal members by tribal owned enterprises or government offices. This mechanism is consistent with our finding in Section 7.2, where tribal casinos provide employment opportunities that are funneled to tribal members. On ethnically polarized reservations, this leads to employment polarization between members and non-members, driving down labor force participation rates for non-members.[42]

We estimate the same specification, using the reported unemployment rate of Native Americans on the reservation by the Census Bureau as the outcome of interest. The results in column (3) of Table A.4.5 suggest a more muted connection between unemployment rates and income growth across more polarized reservations.

Labor markets and economic conditions off the reservation could also influence the distribution of income, especially if individuals have a different willingness to commute to employment opportunities off the reservation. To test whether adjacent county income shocks are responsible for the patterns we observe, we replace the per capita income interaction terms in equation (4) with adjacent county income per capita interactions. The final column of Table A.4.5 presents the results and reveals no significant relationship between inequality, adjacent county income, and ethnicity. This suggests the relationships we observe is driven by locally generated sources of income and not spillovers from neighboring regions.

8.4 Migration

Selective migration is another potential channel that could explain our main empirical findings. If increases in income or tribally owned enterprises draw Native Americans back to the reservation, we might expect increasing inequality if those workers are negatively selected and the migration patterns are correlated with historic blood quantum polarization. To understand the extent to which migration could partially explain the results we observe in Sections 7.1 and 7.2, we perform two additional tests.

[42] We are grateful to Joe Kalt for drawing our attention to preferential hiring as a potential mechanism.

First, we replicate equation (4) with additional covariates that account for changes in population and education levels. These models extend the main panel regression models presented in Table 6 by adding a set of potentially endogenous controls: American Indian population on the reservation and the Share of the Indian population that completed High School. We previously excluded both measures from our preferred specification because these characteristics could be changing as a result of changing growth and inequality on reservations. They are potentially important, however, because the two measures are correlated with migration and migration selection. Column (5) of Table A.4.3 in the Appendix shows that adding these two controls does not change the main findings in Table 6. We take this as evidence that neither total migration, nor selective migration as measured through the level of education, are driving our findings.

Second, we examine whether the growth-ethnicity interactions are associated with changes in migration behavior by replacing the dependent variable from equation (4) with three different migration related measures. First, we use the Log of the American Indian population. Second, we isolate the share of the American Indian population that moved from either out of the county, out of the state, or from abroad.[43] Third, we focus on long-distance migrations, and calculate the share of Native Americans that moved from out of the state or from out of the country. The results in Table A.4.6 indicate there was no correlation between total population changes, medium distance mobility, or long distance mobility and the set of income-ethnicity interactions. Considering both sets of migration results together, the results suggest that migration did not contribute to the patterns we observed in Sections 7.1 and 7.2.

9. Conclusions

Research suggests that increases in a nation's ethnic polarization will diminish its prospects for inclusive growth. Most studies do not consider the role of citizenship criteria, and a nation's economic reliance on government enterprise, in mitigating or exacerbating the effects of ethnic polarization. We study these issues in the context of Native American Nations. This setting is illuminating because i) ethnic criteria (blood quantum) has and continues to define Native American identity and citizenship and ii) government enterprise is an important source of income on many reservations and eligibility for government payments requires citizenship.

[43] These measures are available by race in the Census in 2000 and 2010. In 2000, the question asks where the respondent lived five years ago and in 2010, the question asks where the respondent lived one year ago.

We find that growth-inequality relationships across reservations do systematically relate to ethnic mix, based on historical blood quantum distributions. The strongest result is that Native American nations with lower levels of polarization have tended to experience more inclusive income growth, meaning Gini coefficients decreased as per-capita income expanded. We also find evidence that increases in casino gaming returns – measured by the number of slot machines per Native American – exacerbate inequality on polarized reservations but lower inequality on reservations lacking polarization. These results are consistent with recent findings by Fenske and Zurimendi (2017), who show that oil development has raised inequality across ethnic groups in Nigeria. On Native American reservations, casino gaming has raised the stakes of tribal membership, and ethnic polarization has, as a consequence, caused meaningful polarization in access to gaming proceeds, in-kind or monetary. This is reflected in auxiliary regression analysis of tribal newspaper stories which demonstrate that modern mentions of "blood quantum" and "gaming" and "payments" are more common on reservations that historically had higher blood quantum polarization. These findings imply that colonial rules of enumeration - the blood quantum system – has had a legacy of contributing to modern inequality and conflict.

The findings suggest that government enterprise and ethnic nationalism are barriers to inclusive growth in ethnically polarized societies. We hope the findings and limitations of this study will stimulate research on these factors across other settings and time periods. In terms of limitations, our study focuses on income inequality rather than consumption or wealth inequality, which may differ (see Norris and Pendakur 2015, Krueger and Perri 2005, Pendakur 2002). Our study also employs measures of ethnicity that are fixed at a point in time – prior to World War II – but research on how ethnicity (and ethnic composition) has evolved on Tribal nations could help improve understanding of the co-evolution of incomes, inequality, ethnicity, and citizenship rules. We leave these important issues for future research.

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