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Research Article

Race and agriculture during the assimilation era: Evidence from the Eastern Band of Cherokee Indians

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Research Article

Race and agriculture during the assimilation era: Evidence from the Eastern Band of Cherokee Indians[1]

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Abstract

BACKGROUND
The role of race within tribal communities is a contentious topic, and some of this acrimony emerged from 19th-century Indian policies rooted in scientific racism. There has been relatively little written on the role of intermarriage within indigenous communities.

METHODS
We link household data from the Eastern Band of Cherokee Indians in North Carolina at the turn of the 20th century to individual two-generational family trees located in legal documents to investigate the link between personal property and whether a household head had white ancestry.

RESULTS
We find that the racial gap in property does not follow simple racial hierarchies but rather depends on the gender of the household head. However, once selection into intermarriage is accounted for, the racial gap in property from intermarriage is eliminated. In fact, households containing a male head with close white ancestors held less property than households containing a male head without white ancestry.

CONTRIBUTION
Understanding who chose to intermarry and how intermarriages impacted the economic status of both families and their children as adults can provide key insights into understanding racial inequality today.

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[1] The analysis and conclusions set forth here do not reflect the opinions of the Federal Reserve Bank of Minneapolis or its board of governors.

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1. Introduction

Marriages between whites and American Indians, whether formally or informally recognized, have been contentious since the early stages of European colonization.[4] Beginning in the 17th century, these intermarriages occurred alongside a growing belief in the doctrine of scientific racism, which held that there were distinct races; that white biological characteristics were superior to those of other races, including American Indians; and that people of mixed white and American Indian ancestry were superior to those with solely American Indian ancestry (Horsman 1975). Federal Indian policy frequently exploited this latter dichotomy by treating American Indians with and without white ancestry as distinct groups with differing sets of rights. During the removal era, the federal government recruited tribal members with white ancestry to act as tribal representatives when signing treaties on behalf of the majority, who often opposed removal (Green 1982; Wallace 1993). During the allotment era, which began with passage of the Dawes Act in 1887, tribal members with white ancestry were often given private property while the federal government pursued a guardianship role for Indians without white ancestry, including holding their allotments in trust and managing the receipts from their land (Carlson 1981; 1983). Later, the federal government included blood quantum language in the Indian Reorganization Act of 1934 by defining an American Indian as an individual with "one-half or more Indian blood" (Spruhan 2006). The federal government also historically discredited the opinions of tribal members without white ancestry, characterizing them, for example, as "stationary and unbending" in the early 1800s and as "non-competent" in the early 1900s (Cass 1830; McDonnell 1980).[5]

Proponents of scientific racism argued that American Indians with white ancestry were more economically successful, although they provided little evidence of these claims. Modern papers that use quantitative data to consider how economic outcomes differ by race within indigenous communities are rare. Sandefur and McKinnell (1986), Sandefur and Sakamoto (1988), Kuhn and Sweetman (2002), and Pendakur and Pendakur (2011) all use contemporary data and find that indigenous people with white ancestry have better labor market outcomes than those without white ancestry. Gregg (2009) and Carlson (1981) also find a positive correlation between agricultural productivity and

[4] Throughout this paper, we use the terms "intermarried" and "mixed-race household" to describe households on Indian reservations that contained at least one spouse with white ancestry. This includes both white individuals and individuals with a parent or grandparent who was white.

[5] Today the criteria for tribal membership, which vary substantially across tribes, are often determined by blood quantum, which is the share of one's ancestors who were tribal members. This method has the unintended consequences of shrinking tribal populations over time as intermarriage between tribal and nontribal members increases.

mixed-race households in American Indian communities. However, the mechanisms that drive these racial gaps are largely unexplored. While making causal claims about race and economic outcomes is inherently problematic, documenting and exploring the causes of racial differences in outcomes can provide insight into the dynamics of inequality and suggest policies to ameliorate observed differences.

In this paper we combine two unique datasets from the Eastern Cherokee Indian Reservation in North Carolina at the turn of the 20th century to explore the relationship between agricultural outcomes, intermarriage, and white ancestry. We use newly digitized agricultural censuses collected annually by the Office of Indian Affairs (OIA) from 1893 to 1904 for households living on this reservation. We then create a two-generation family tree for each Cherokee household head, whether male or female, by linking their census data to 1906–1909 Eastern Cherokee applications to the US Court of Claims for payments in lieu of past treaty mismanagement. These applications, which were legal documents submitted to the federal government,[6] contain detailed information on each applicant's parents, grandparents, siblings, and cousins, along with information regarding the race of ancestors. Given that this reservation was mostly isolated from white contact until the mid-19th century, most Cherokee household heads with white ancestry in the OIA censuses had only close white ancestors (parents or grandparents). The applications were verified by fellow tribal members and approved by the OIA. The legitimacy of these records provides a solid foundation for studying the racial gap in property, since prior papers find that blood quantum was calculated based on physical appearance (Beaulieu 1984).

When we restrict our sample to married households with both spouses present, we find that Cherokee households with at least one close white ancestor held approximately 18%–20% more property, defined as either acres cultivated or the market value of livestock, than endogamous Cherokee households. However, this finding masks the heterogeneity within the distribution of intermarried households. We find that property accumulation was not proportional to blood quantum, defined as the share of close white ancestors within each household. Instead, within the Cherokee intermarried population, property accumulation was greater when household members had fewer white ancestors. This result is partially explained by the differential effects of white ancestry by gender. Male heads with white ancestry, whether married to a woman with only Cherokee ancestry or a woman with white ancestry, exhibited more personal property accumulation than endogamous households. Households with a female head with white ancestry and a male head without white ancestry held on average less property than comparable endogamous households.

[6] Historical census data isolate one adult, typically the male, as the head of household. Since we are interested in studying how the racial ancestry of both the husband and wife affects agricultural outcomes, when we restrict the sample to households containing a husband and a wife, we refer to both as household heads.

Previous literature on intermarriage was largely dominated by studies of marriages between immigrants and native-born people. The sizes and signs of intermarriage premiums have been found to vary by country of residence, individual endowments, and gender. For example, evidence that intermarriage improves the labor market outcomes of male immigrants exists in France (Meng and Meurs 2009), Australia (Meng and Gregory 2005), the United States in the 2000s (Furtado and Theodoropoulos 2009; Chi and Drewianka 2014), the Netherlands (Kalmijn and van Tubergen 2006), and other parts of Europe (Ponomareva, Chou, and Nikolsko-Rzhevskyy 2018). After accounting for selection, there is no causal evidence of a premium in Germany (Nottmeyer 2010), in the United States during the 1970s (Kantarevic 2004), and in Sweden (Dribe and Nystedt 2015).[7] Other research shows that the intermarriage premium exists only for high-skilled immigrants (Chi 2015) and is negative for intermarried Asian women in the United States (Basu 2015). In addition, recent research has found that children born in the host country from an intermarriage between an immigrant and a native-born person have more favorable socioeconomic outcomes than children born in the host country from a marriage between two immigrants (Kalmijn 2015; Tegunimataka 2020).

Scholars have identified three primary channels, independent of biological considerations, that explain the relationship between economic outcomes and intermarriage. First, the productivity hypothesis suggests that spouses who marry individuals from the majority culture assimilate faster than comparable individuals who participate in endogamy through improved local market knowledge, increased specialization of labor within the household, and increased access to social networks of the intermarried partner (Meng and Gregory 2005; Meng and Meurs 2009). Second, the ethnic identity hypothesis suggests that individuals choose not to marry into the majority culture to reduce the rate of ethnic attrition (Bisin and Verdier 2000). Under this hypothesis, the cost of intermarriage through the loss of cultural connections such as kinship networks – which can, among other things, provide insurance against economic shocks – outweighs the benefits (Ferrara 2003).[8] Third, the selection hypothesis suggests that the correlation between intermarriage and economic assimilation is spurious and disappears once selection is accounted for (Kantarevic 2004). In other words, intermarried members of the minority culture *would have* seen similar economic outcomes had they not intermarried.

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[7] In each of these papers, an immigrant is broadly defined as an individual born in a foreign country. Several papers have found country-of-origin differences in immigrant outcomes (see, e.g., Adsera and Chiswick 2007; Chiswick and Miller 2009).

[8] In addition, papers have shown that intermarriages experience a higher risk of divorce (Zhang and Van Hook 2009; Dribe and Lundh 2012), and lower family stability has been widely shown to affect the adult outcomes of children from intermarriages (Alesina and Giuliano 2010; Gahler and Palmtag 2015; Frimmel, Halla, and Winter-Ebmer 2016).

We explore mechanisms that explain the relationship between agricultural outcomes, intermarriage, and white ancestry by utilizing a unique feature of the Eastern Cherokee applications. Because we know the siblings of each Cherokee head of household, we can investigate whether time-invariant characteristics of Cherokee families may have played a role in the observed differences in property between male heads with and without white ancestry. For example, if males with white ancestry were more willing to marry into Cherokee families with preexisting wealth, then selection into intermarriage may have been a driving factor behind our results rather than productivity gains from improved market access. We test this theory by incorporating a sibling fixed effects framework that compares the property gap by exploiting within-family variation in intermarriage.

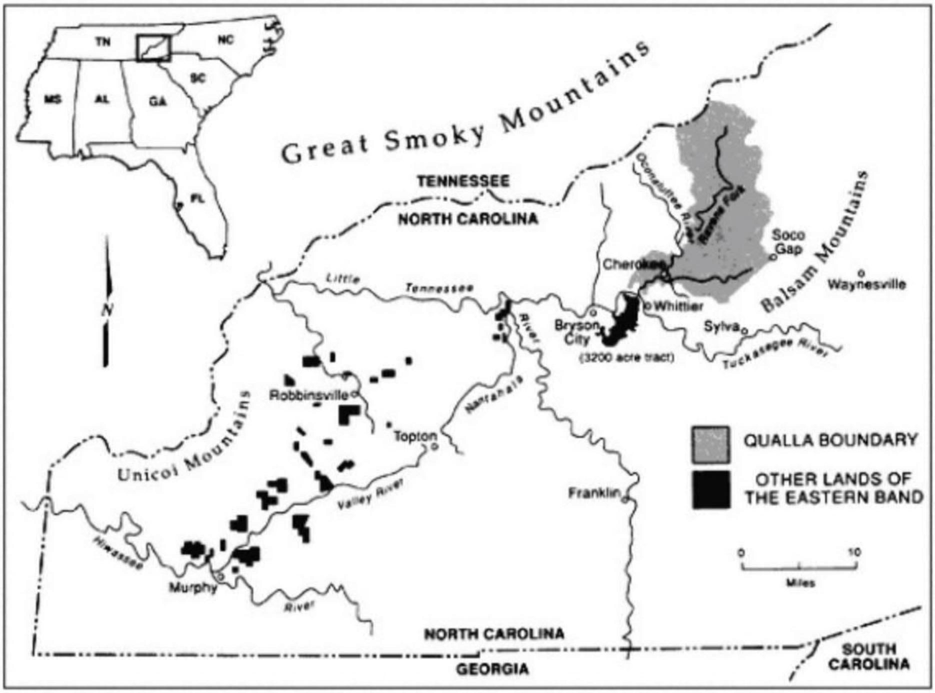
We find that the racial gap in property is eliminated when we compare intermarriage gains within families (rather than across families). In fact, we find that Cherokee women who married males with white ancestry held less property compared to their sisters who married males without white ancestry. One potential reason is that intermarried whites were selected from the lower end of the non-Indian distribution. Another potential reason is that Cherokee women may have traded off greater productivity gains for increased access to the English language by marrying males with close white ancestors. Our overall results are nuanced but are most in line with the work of Nottmeyer (2010), Kantarevic (2004), and Dribe and Nystedt (2015), who find evidence that the positive effect of intermarriage on economic outcomes is driven by selection on unobservables.

The rest of this paper is organized in the following manner: Section 2 provides a brief history of the Eastern Band of Cherokee Indians, with special emphasis on intermarriage and racial mixing within this community. Section 3 contains the discussion of our original dataset. Section 4 discusses the empirical methods used in the paper, and Section 5 contains the main results and potential mechanisms that drive these results. Conclusions are drawn in Section 6.

2. Historical background

The present-day Eastern Cherokee Reservation was initially created when a small number of Cherokees separated themselves from the larger Cherokee Nation and lived on individual reservations in western North Carolina under terms of the Treaty of 1819. By 1840, when roughly 1,000 Cherokees escaped the Trail of Tears and relocated to North Carolina, this community had grown exponentially. By 1900, as shown in Figure 1, the Eastern Cherokees held lands scattered in Graham and Cherokee Counties and a large contiguous tract called the Qualla Boundary.

Figure 1: The Eastern Cherokee Indian Reservation in 1900



Source: John Finger, *The Eastern Band of Cherokees, 1819–1900*.

Even though this enclave of Cherokees was formally recognized as a distinct tribe in 1868, the trust relationship between the federal government and the Eastern Cherokees remained uncertain (Finger 1984b: 104–107). Therefore, unlike other reservations at this time, all lands held by Eastern Cherokees were vested into a tribal corporation, which was chartered by the state of North Carolina in the mid-19th century (Finger 1991a: 10). Land was held in common, with Cherokee households owning individual user rights to as much land as they chose to improve. The land could not be transferred to non-Cherokees, although leasing to whites did occur. Arguably due to this unique legal arrangement, the Eastern Cherokee Reservation was never allotted (Finger 1991b).

Intermarriage and interracial cohabitation were not uncommon among the Eastern Cherokees. However, compared to the Cherokee Nation in Indian Territory, intermarriage was far less common among the North Carolina Cherokees. In the 1835 Cherokee census, 11.1% of Cherokees in North Carolina reported mixed-blood ancestry; this proportion gradually increased throughout the following decades (Finger 1991a: 68).

Interracial marriages most frequently occurred between Cherokee women and white men (Yarbrough 2004).[9] The reasons for a greater share of Cherokee women willing to marry outside of the tribe are somewhat under-researched. During the colonial period, intermarried white males gained access to tribal resources, such as land, since Cherokee women held those possessory rights (Perdue 2005). More broadly, exogamy between males and indigenous females was used to obtain alliances in the Canadian fur trade (Van Kirk 1983) and the deerskin trade in the US Southeast (Smith, Ethridge, and Hudson 2002).

However, the strategic pursuits of intermarriages during the period we analyze are less clear, since Eastern Cherokee land was available to whites through individual leases (Gilbert Jr. 1943). Since leasing agreements were temporary, access to land may still have been the sole strategic advantage behind intermarriages. In fact, the only documentation that refers to any strategic behavior by whites intermarrying during the late 19th century comes from ethnographer William Gilbert Jr., who wrote, "It is the land which attracts the whites into the tribe and the possibility of a future allotment of the land to individual owners in fee simple is very alluring" (Gilbert Jr 1943: 210). Other intermarriages involved returning Cherokee students who brought back white spouses (or spouses from other tribes) (Gilbert Jr 1943: 194). Cherokees who chose intermarriage received a limited amount of social ostracism. Firsthand accounts from the 1930s claimed that Cherokees who showed "no perceptible Indian characteristics" were described as "white Indians," some of whom illegally made claims to property within the reservation (Gilbert Jr 1943: 210). Traditional Cherokee social organizations such as matrilocal residences were mainly replaced by patrilocal residences by the turn of the 20th century.

Historical sources suggest that inequality was growing throughout the 19th century. Given that the main occupation was farming, some of the wealth inequality was generated by location advantages: "In the rich Soco [River] bottoms, an immense amount of white invasion has taken place and intermarriage with the Indians occurred" (Gilbert Jr 1943: 210). Once land was possessed, given the abundance of unimproved land within the Eastern Cherokee community, "there was nothing to prevent the buying up or inheriting of land beyond the 30-acre limit [the average holding of a Cherokee household]" (Gilbert Jr 1943: 210).

[9] While the Cherokees did own slaves, the number of people enslaved by the Eastern Cherokees was relatively small. Slavery was more common in the larger pre-removal Cherokee Nation and, later, in Cherokee Nation, Indian Territory. The 1835 Cherokee census recorded 3,644 Cherokees and 37 enslaved people in North Carolina. Finger (1984a: 68) noted, "An Indian lost status within the tribe for mixing with blacks," and "Cherokees who lived with blacks faced social ostracism" (143). While Cherokee–black intermarriages did occur, they were rare, and the inclusion of mixed-race children in the tribe was also rare. The 1851 Cherokee census included people of mixed Cherokee–black parentage only if they were acknowledged as Cherokees by the tribe itself. In the OIA Cherokee censuses, we found only one household head, a Cherokee female, who had any black ancestry.

These historical accounts from the turn of the 20th century depict the Eastern Cherokees as comprised of many self-sufficient farmers who could provide surpluses to local markets. Wealth accumulation, in the form of personal property and land improvements, protected against negative shocks and was seemingly achieved by a small number of intermarried whites and descendants of white–Cherokee unions. The extent to which the wealth gains by Cherokees with white ancestry were driven by skills introduced to the household via intermarriage or by selection into marriage by those with preexisting wealth is our main question of interest.

3. Data creation

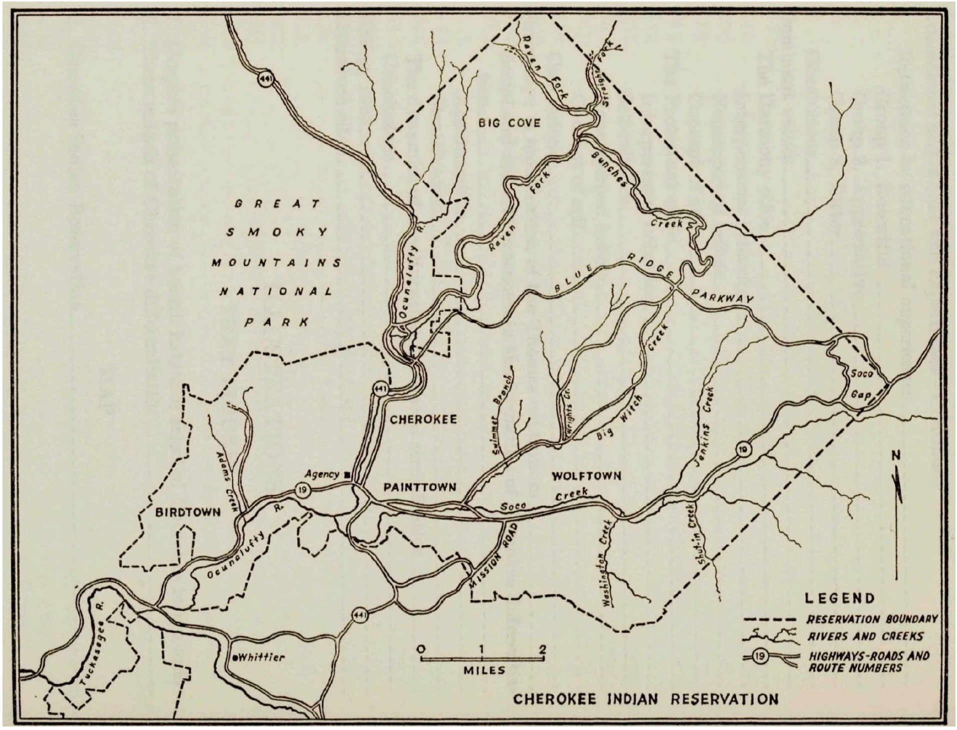
3.1 OIA Cherokee censuses

From 1893 to 1904, the Office of Indian Affairs enumerated each household on the reservation. To the best of our knowledge, the Eastern Cherokee microdata are the only household-level OIA agricultural censuses to have survived from this period.[10] The unit of observation is the household, which is defined as a group of individuals occupying the same dwelling. Typically, the male head was the first name listed in a household, followed by the female head and children (if any). Single men, single women, and widows (or widowers) were listed as the head of household when applicable. Other demographic information, such as the name, age, and gender of each household member, was listed. In the pre-1900 years, the data were aggregated at the household-head level.

Since the Eastern Cherokee Reservation contains several noncontiguous clusters across multiple counties, these data were organized into six townships. Figure 2 provides a rough sketch of the locations of each township within the Qualla Boundary, the main tract of the Eastern Cherokee Indian Reservation. Yellow Hill, Big Cove, and Birdtown (along with scattered tracts in Graham County; see Figure 1) are identified in the OIA censuses, whereas Cherokees located near Soco Creek were referred to as Soco Indians, and Cherokees located along the Nantahala River were referred to as Nantahala Indians.

[10] These censuses were recently uncovered when the Southeast regional branch of the National Archives moved from Atlanta to Morrow, Georgia. Prior to this discovery, these censuses were held in an unindexed archive box. The census scans are presently available on www.ancestry.com.

Figure 2: Townships within the Eastern Cherokee Indian Reservation, ca. 1900



Source: William Harlen Gilbert, "The Eastern Cherokees," *Bureau of American Ethnology Bulletin* 133, no. 23 (1943).

The censuses seem to have been collected with precision. Census enumerators were selected from among members of the tribe, who collected information on households living in the same townships as themselves. They often took multiple days to enumerate their townships. For example, in 1903, Sibbald Smith, a Cherokee aged 24, took four days to enumerate 259 individuals within 60 households in Big Cove, the same township in which Smith himself lived. In 1899 John Tahquette took eight days to collect information on 110 households in two neighboring townships, Big Cove and Yellow Hill. Some enumerators required less time. For example, Jeff Arneach took one and a half days to collect information; however, his particular township included only 74 individuals living in 15 separate households. Thus the effort by enumerators appears to have been uniform across censuses. In most census years, a second person signed off on the accuracy of the census information.

The OIA censuses provide information on animal husbandry for each household by listing head counts of six types of livestock: cattle, sheep, pigs, fowl, horses, and mules. The acres cultivated are also recorded in each census. Additional variables – such as the age of household members, numbers of literate household members under and above age 20, and church members – were also collected.

The two main outcomes of interest are the inflation-adjusted values of the heads of livestock and acres cultivated. Livestock prices are taken from Carter et al.'s *Historical Statistics* (2006: Tables Da969, Da971, Da973, Da984, Da986, Da1040) and are deflated using the historical Bureau of Labor Statistics (BLS) price index (Carter et al. 2006: Table Cc1).

3.2 Eastern Cherokee applications

Because of the sale of the Cherokee Outlet to the federal government, a congressional act in 1902 allowed the Cherokees to file suit against the federal government for violations of past treaty stipulations. Three suits, each regarding separate cases in which money was due to the Cherokees, were brought before the US Court of Claims, and in May 1905 the court ruled in favor of the Cherokees. In 1906 Congress finally appropriated more than $1 million plus interest, which was distributed to the North Carolina Cherokees on a per capita basis (Miller 1967).

Each Cherokee was required to fill out an application to receive the per capita payment. Each applicant furnished information, including his or her English and Indian names, residence, date and place of birth, marital status, name and age of wife or husband, English and Indian names of his or her parents and their birthplaces and dates of death, and the names of his or her children, siblings, cousins, and grandparents on both the mother's and father's side. To verify authenticity, all applications were made under oath and supported by two witnesses acquainted with the claimant.

We use two strategies to determine the race of each close ancestor, defined as the race of each parent and grandparent. First, if the spouse of an applicant did not have any Cherokee ancestors, then the enumerator listed this person by his or her race. Additionally, if a parent or grandparent of an applicant did not have any Cherokee ancestors, then the enumerator typically wrote "white" beneath the parent's or grandparent's name.[11] For example, Will West Arneach, a Cherokee (three-quarters Cherokee in blood quantum terms) born in 1849, was the son of Jenny Arneach (née Reed), whose father, Bill Reed, was white. Even though Bill Reed also had a Cherokee

[11] A small number of Catawba Indians intermarried with Cherokees, but most applicants who were biracial had white and Cherokee ancestors.

name, Wi-li S-ga-tsi, the notary added “white” below his name. So determining the racial identification of each family member is usually straightforward.

A second strategy is used when the name of an ancestor, commonly a grandparent, was omitted from an application. To find the race for each omitted relative, we locate the applicant in the 1900 or 1910 Indian schedules in the regular US census, which lists the degree of Cherokee blood for each individual. For example, if a Cherokee applicant had only one white grandparent, he or she would be considered three-quarters Cherokee in the regular census. Using this information, we can deduce the race of a grandparent whose name and race are missing in the applications. This strategy was necessary in only a few cases.[12]

3.3 Matched sample

The main dataset contains successful matches between the 1893–1904 censuses and the applications. In total, 2,565 household-by-year observations were contained in the censuses, and 2,070 were hand-matched to the applications data. The matched data contain 799 unique households and thus are highly unbalanced. The matching rate (80%) is noticeably high, since we are able to link across several variables: name of adult, name of spouse, name of children, and approximate birth year within a small geographic area. We restrict the sample to households with clearly identified male and female household heads. This restriction limits the sample to 1,893 household-by-year observations.

This sample is comprised solely of on-reservation Eastern Cherokee households. At this time, there was a limited degree of outmigration. According to the 1880 full-count US census, 91% of American Indians living in North Carolina were living in counties that contained the Eastern Cherokee Reservation. American Indians who lived off the Eastern Cherokee Reservation in North Carolina were not necessarily Cherokee, as Coharie, Lumbee, Catawba, Haliwa-Saponi, and Waccamaw Indians also lived in North Carolina at this time. Outside of North Carolina, the only other reserve for Cherokee Indians was located at a great distance in present-day Oklahoma. In addition, the OIA censuses from time to time listed the names of Eastern Cherokees who lived in Tennessee; at most, five individuals were listed. Thus statistical issues pertaining to sampling on an outcome, in this case sampling households within a reservation, are not a concern.

[12] This exercise was also used for a large sample of the applications to verify racial information in the applications. In the rare case where the blood quantum differed between applications and the Indian schedules, we queried additional genealogical websites such as familytreemaker.com and ancestry.com to determine the racial ancestry of a Cherokee head of household.

Three components of the distribution of households with close white ancestors are worth discussing. First, intermarriage was relatively rare: households with white ancestry comprise roughly 25% of the household-year observations. Second, males, either white males or descendants of Cherokee–white unions, were more commonly involved in intermarriage than females with white ancestry. Among intermarried households, 38% contain a male head with white ancestry (and a Cherokee female head without white ancestry), while 16% contain a female head with white ancestry (and a Cherokee male head without white ancestry). Third, the most common intermarriage (about 46% of all intermarriages) occurred between males and female heads with close white ancestors. Thus, in this community, positive assortative mating with respect to racial ancestry was common.

The mean difference in agricultural and demographic outcomes between households with and without close white ancestors is listed in Table 1. With respect to personal property, we see an unconditional gap in livestock accumulation and acres cultivated. In particular, the average gap in wealth is between 19 and 24 log points. By linking a small number of Cherokee household heads to their fathers' livestock wealth located in the 1850 US Census agricultural schedules, we find that households with Cherokee–white ancestry in the OIA censuses were also more likely to descend from wealthy parents. Demographic differences between households with and without white ancestry are also pronounced. While turn-of-the-twentieth-century American Indian child mortality was high (Hacker and Haines 2006), male heads in endogamous households (who survived adverse childhood conditions) were on average three years older than male heads with white ancestry. Male heads of endogamous households were also on average two years older at the time of marriage listed in the OIA censuses. The OIA censuses (and the US decennial census) did not ask about the number of times married. However, since the median age of males at first marriage in the United States was 26.1 years in 1890, male heads of endogamous households may have been more likely to be in a second marriage at the time of OIA census collection.[13] Alternatively, this could reflect changing propensity to intermarry over time: If newer generations were more likely to intermarry than older ones, then intermarried households would be younger on average than non-intermarried households

Not surprisingly, the share of Cherokee household members who could use the English language was close to 100% for households with white ancestry, compared to roughly half of all endogamous households. In addition, 74% of all Cherokee households with white ancestry had at least one church member, compared to close to 57% of all endogamous households. These large differences in economic and demographic

[13] Based on the authors' calculation using US Census Bureau decennial censuses, 1890 to 1940, available at https://www.census.gov/data/tables/time-series/demo/families/marital.html.

household characteristics mask the heterogeneity within these two race groups. Our empirical methods will allow for further decomposition.

Table 1: Observed differences by race

	Households with white ancestry			Households without white ancestry		
	N	Mean	S.D.	N	Mean	S.D.
Log (livestock)	429	4.527	1.033	1,277	4.312	1.020
Log (acres cultivated)	448	2.383	0.747	1,446	2.207	0.752
Log (father's livestock, 1850)	48	4.372	0.592	99	4.117	.555
Age of male head	506	41.974	14.408	1,562	45.787	16.555
Household size	506	4.650	2.517	1,559	4.320	2.066
Household members < age 20	506	1.715	1.811	1,558	1.411	1.503
Age at marriage, males	335	27.659	8.449	1,047	29.681	10.084
English-language users, share	508	0.919	0.272	1,562	0.564	0.495
Church membership indicator	494	0.740	1.013	1,513	0.567	.919

Notes: The main sample contains census households located in both the OIA censuses and the Eastern Cherokee applications. Livestock values are measured in constant 1900 dollars. Individual prices are taken from *Historical Statistics* and are deflated using the historical BLS price index.

4. Empirical methodology

We measure agricultural outcomes in terms of improved acres and livestock wealth. Our goal is to estimate the relationship between farm outcomes and the degree of white ancestry of each household head. To that end, one empirical approach would be to estimate a Mincer-style equation that relates wealth to observed, exogenous household characteristics and a household head's white ancestry indicator.

The full specification of this personal property function would have the form

$$y_{ict} = \beta W_i + \alpha_t + \alpha_c + X_{ict}\xi + \epsilon_{ict}, \tag{1}$$

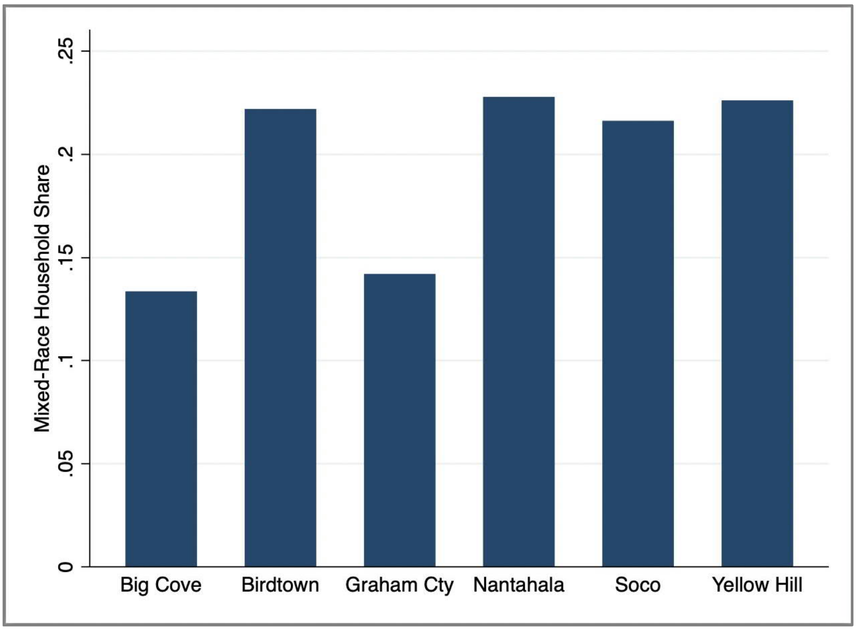
where the outcome of interest (log livestock wealth and log improved acres) is denoted as y_{ict}, where i stands for the i^{th} household in township c in year t.[14] We initially let W_i equal 1 if either household head has at least one close white relative; we define a close relative as a parent or grandparent. In other specifications, we split the white ancestry indicator into three mutually exclusive categories: households with a male head with close white relatives and a Cherokee female head without any white ancestry, households with a Cherokee male without any white ancestry and a female head with close white

[14] Though not shown, these results are relatively unchanged if we include the observations with zero counts into the analysis by adjusting the outcomes to log (livestock wealth + .01) and log (acres cultivated + .01).

relatives, and lastly households with both male and female heads with white ancestry. (The omitted category is endogamous households.)

In addition, α_t denotes year fixed effects, which would reflect changes in annual growing seasons shared by all households. The parameter α_c denotes township fixed effects, which will capture location advantages that differ across townships but are shared among households within townships. Township effects could have the unintended consequences of explaining away an important source of variation, but as shown in Figure 3, there was a limited degree of geographic clustering of households with close white ancestors.

Figure 3: Distribution of households with white ancestry by census townships



Notes: Calculations made by authors. Data taken from OIA census–Eastern Cherokee applications matched sample.

Last, the vector X contains household-level covariates, which are household size (and its square) and the age of the oldest adult male (and its square). In this specification, β captures the racial gap in property. If β is positive, then households with white ancestry possess more property than comparable households without white ancestry.

If unobserved household characteristics in ϵ_{ict} are directly related to the decision to marry an individual with white ancestry, then the OLS estimates of Equation (1) will be inconsistent. Given that we observe clustering of intermarriages within Cherokee families, we adopt a model that controls for time-invariant characteristics shared by siblings. This model accounts for a host of potential characteristics, such as possessory family tracts, premarriage family wealth accumulation, and shared preferences to assimilate. The sibling fixed model is specified as follows:

$$y_{iht} = \pi W_{ih} + \alpha_h + \tau_t + \xi X_{iht} + \epsilon_{iht}, \tag{2}$$

where y_{iht} is household i's wealth in year t from family group h, α_h is the family fixed effects, and W_{ih} is turned on if there is any variation in intermarriage among Cherokee sisters. The π coefficient will reveal the mean difference in personal property between Cherokee pairs, one of whom married a male with close white ancestors and one of whom did not. If π is less than β in Equation (1), this is evidence of positive selection into intermarriage.

5. Results

5.1 OLS estimation here

Table 2 presents the OLS estimates of Equation (1). The specification in column 1 uses log livestock wealth as the outcome, and year fixed effects are added as controls. Column 2 also uses log livestock wealth as the outcome, but the model now includes a full set of observed controls – household size (and its square) and age of male head (and its square). Column 3 contains the results from the full specification as shown in Equation (1). The same progression of model specifications is shown in columns 4–6, but the outcome is log acres cultivated. In each regression, the standard errors are clustered at the household head level.

Table 2, column 1 reveals that after controlling for year fixed effects, households with close white ancestors held approximately 25% more livestock wealth than households without close white ancestors. After controlling for differences in age of male head and household size, the gap is relatively unaffected. In fact, under the full specification, the gap remains at 25% (22 log points).

Table 2, column 4 reveals that after controlling for year fixed effects, households with white ancestry on average cultivated 19% more acres than households without white ancestry. Columns 5 and 6 also show that the conditional racial gap in property is largely unaffected by including demographic factors and township fixed effects.

These results are consistent with other studies that estimate a positive correlation between economic outcomes and tribal members with white ancestry. To explore the intensive margin of mixed-race ancestry – if the number of close white ancestors is correlated with property – we sum the male head's and female head's blood quantum to compute the household blood quantum. Thus if a white male is married to a Cherokee woman who descended from a Cherokee–white union, their household blood quantum would equal 1.5. Using this framework, we then estimate a regression of property on household blood quantum (and its square) using the same model specifications as Table 2.

Table 2: Racial gaps in private property accumulation

Dependent variable:	Log livestock wealth			Log acres		
Cultivated	(1)	(2)	(3)	(4)	(5)	(6)
Household contains white ancestors	0.2201	0.2235	0.2260	0.1788	0.1749	0.1669
	(0.1036)	(0.1049)	(0.1013)	(0.0724)	(0.0723)	(0.0717)
Household size		–0.0203	–0.0191		0.0444	0.0431
		(0.0588)	(0.0572)		(0.0462)	(0.0436)
Size squared		0.0072	0.0072		0.0012	0.0012
		(0.0049)	(0.0047)		(0.0042)	(0.0039)
Age of oldest male		0.0212	0.0230		0.0197	0.0169
		(0.0100)	(0.0100)		(0.0077)	(0.0073)
Age squared		–0.0001	–0.0001		–0.0001	–0.0001
		(0.0001)	(0.0001)		(0.0001)	(0.0001)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Township fixed effects			Yes			Yes
R-squared	0.0341	0.0782	0.1147	0.0262	0.0771	0.1108
Observations	1,705	1,705	1,705	1,893	1,893	1,893

Notes: The household with white ancestry indicator equals one when either the male (or female) head has at least one parent or grandparent who is white. Thus the indicator equals zero for all household heads without white ancestry or who are more than three-fourths Cherokee. The standard errors are clustered at the household head level. Livestock wealth is valued in 1900 prices.

The results are shown in Table 3. Column 1 reveals that there is a quadratic relationship between household blood quantum and property accumulation: The relationship between livestock wealth and household blood quantum peaks at 0.80 and falls thereafter. Thus intermarried households with one white head (which would have had a household blood quantum of at least one) did not hold as much livestock property as households whose heads were the children of white–Cherokee unions. Columns 2 and 3 in Table 3 reveal that the inverse-U relationship is robust to the inclusion of household factors and township fixed effects. In addition, columns 4 through 6 show the similar quadratic between the household blood quantum and farm size.

Table 3: Relationship between blood quantum and property

Dependent variable:	Log livestock wealth			Log acres cultivated		
	(1)	(2)	(3)	(4)	(5)	(6)
Household blood quantum	0.7276	0.7597	0.7034	0.6537	0.6856	0.6662
	(0.3902)	(0.4046)	(0.3832)	(0.2750)	(0.2677)	(0.2666)
Blood quantum squared	–0.4497	–0.4700	–0.4007	–0.3788	–0.4071	–0.4046
	(0.2573)	(0.2657)	(0.2492)	(0.1854)	(0.1792)	(0.1816)
Household size		–0.0140	–0.0144		0.0493	0.0478
		(0.0595)	(0.0581)		(0.0461)	(0.0435)
Size squared		0.0068	0.0070		0.0008	0.0009
		(0.0050)	(0.0048)		(0.0042)	(0.0039)
Age of male head		0.0216	0.0236		0.0202	0.0173
		(0.0100)	(0.0101)		(0.0077)	(0.0073)
Age squared		–0.0001	–0.0001		–0.0001	–0.0001
		(0.0001)	(0.0001)		(0.0001)	(0.0001)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Township fixed effects			Yes			Yes
R-squared	0.0338	0.0785	0.1150	0.0297	0.0815	0.1148
Observations	1,705	1,705	1,705	1,893	1,893	1,893

Notes: The household blood quantum is the sum of the male head's and female head's blood quantum (in terms of white ancestors). Greater values of household blood quantum imply a greater share of close white ancestors. The standard errors are clustered at the household head level. Livestock wealth is valued in 1900 prices.

Irrespective of the economic mechanisms underlying these findings, each specification rejects the simple racial hierarchy propagated by 19th-century proponents of scientific racism. The relationship between property and race is driven by nonbiological factors such as inheritance. To that end, we explore the relationship between property accumulation and whether white ancestry existed on the male's or female's side of the family (or both).

We split the simple racial ancestry variable in Table 2 into four categories, three that pertain to exogamous households and one that pertains to endogamous households. The three exogamous households are split into the following groups: (1) households with a male head with white ancestry and a wife without white ancestry, (2) households with a female head with white ancestry and a husband without white ancestry, and (3) households with white ancestry on both sides of the family. The last group consists of endogamous households, which will serve as the omitted category in our model specifications.

We report the results of adding three exogamous household categories into Equation (1) in Table 4. Column 1 shows that households with a male head with white ancestry, regardless of the spouse's racial heritage, held more property than endogamous households. For example, we estimate that households with a male head with white ancestry (and a female head without any white ancestry) held 35% (30 log points) more livestock wealth than endogamous households, while households with a male and female with white ancestry held 32% (28 log points) more livestock than endogamous households. These relationships hold when time-varying controls are added (column 2) and when the model includes township fixed effects (column 3).

Table 4: Property gaps across mixed-race household categories

Dependent variable:	Log livestock wealth			Log acres cultivated		
	(1)	(2)	(3)	(4)	(5)	(6)
Male head with white ancestry	0.3032	0.3427	0.3233	0.0975	0.1239	0.1045
	(0.1445)	(0.1496)	(0.1356)	(0.0964)	(0.0982)	(0.0993)
Female head with white ancestry	–0.1686	–0.1089	–0.1429	–0.0665	–0.0290	–0.0328
	(0.2747)	(0.2938)	(0.2773)	(0.1285)	(0.1391)	(0.1381)
Both sides with white ancestry	0.2800	0.2452	0.2758	0.3307	0.2924	0.2901
	(0.1322)	(0.1274)	(0.1271)	(0.1053)	(0.1071)	(0.1064)
Household size		–0.0172	–0.0158		0.0448	0.0426
		(0.0584)	(0.0565)		(0.0455)	(0.0427)
Size squared		0.0066	0.0065		0.0007	0.0009
		(0.0049)	(0.0047)		(0.0041)	(0.0039)
Age of male head		0.0226	0.0246		0.0207	0.0179
		(0.0099)	(0.0101)		(0.0078)	(0.0074)
Age squared		–0.0001	–0.0001		–0.0001	–0.0001
		(0.0001)	(0.0001)		(0.0001)	(0.0001)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time-varying controls		Yes	Yes		Yes	Yes
Township fixed effects			Yes			Yes
R-squared	0.0405	0.0834	0.1206	0.0358	0.0828	0.1169
Observations	1,705	1,705	1,705	1,893	1,893	1,893

Notes: Each regression contains a full set of year fixed effects. We split the “household with white ancestry” indicator into its four principal components: households where white ancestry enters only through the male head, households where white ancestry enters only through the female head, households where white ancestry enters through both the male and female household heads, and households without any white ancestry. The households without any white ancestry are the omitted category in each model. The standard errors are clustered at the household head level. Livestock wealth is valued in 1900 prices.

Columns 4–6 in Table 4 reveal that the same relationships hold when considering acres cultivated as the outcome. Namely, households with a male head with white ancestry, regardless of the spouse’s racial ancestry, held on average larger farms than endogamous households. Households with a female head with white ancestry and a male head without white ancestry held smaller farms compared to endogamous households. There are several potential explanations for this negative (or zero) correlation on property for households in the latter racial category. First, the imprecise measurement is a function of the relatively small number of households within this category. Among the exogamous households of any time (only 24% of the sample), only 17% are households of Cherokee males without close white ancestors and female heads with white ancestry. Second, given that farming is a male-dominant industry, if the gains from a Cherokee marrying someone with white ancestry were driven by inheritable skills or improved local market knowledge, then gains from intermarriage should be greater if intermarried males entered the household.

To better understand the mechanisms that might drive the observed gains in property accumulation from marrying a male with white ancestry, we incorporate two potential mechanisms into our model: Euro-American skills as measured by the household share of Cherokees who can use the English language, and the number of years married to a current spouse.[15] Our logic is that skills adopted from having a male household head with white ancestry may translate into greater economic assimilation. Marriage longevity may also influence wealth accumulation through the effect of household stability.

To test the potential mechanisms that drive the racial gap in property, we run "horse race" regressions by re-estimating Equation (1) along with these two potential mechanisms. We again split the "household with white ancestry" indicator into the three exogamous household categories used in Table 5. If English-language skills and marriage longevity explain the racial gap in property, then the coefficients on the exogamous household indicators will become statistically insignificant. Alternatively, if variables directly related to the racial ancestry of the household are responsible for the racial property gap, then those exogamous household indicators will remain significant.

Table 5 contains the results from these horse race regressions. Column 1 shows that the share of Cherokees who use the English language and the number of years married are both positively correlated to livestock wealth. Column 2, however, reveals that the coefficients of both variables decrease substantially when the white ancestry variables are included. The coefficients on the "male head with white ancestry" variable and the "both sides with white ancestry" variable are positive and precisely estimated. The coefficient on "female head with white ancestry" remains negative but is imprecisely measured. Adding township fixed effects in column 3 does not change the statistical significance of the "male head with white ancestry" variable, but the "English-language users" variable is of little significance in explaining livestock wealth. These results imply a direct effect of having a male head with white ancestry (along with a female head without white ancestry) on livestock wealth. English-language skills do not affect livestock once racial ancestry variables are included in the model, while marriage longevity remains a significant factor.

Columns 4–6 in Table 5 tell a different story. Both number of years married and the share of Cherokees who use English have a positive correlation with acres cultivated. When the household racial ancestry variables are added in column 5 (which includes time-varying controls) and in column 6 (which also includes township fixed effects), the

[15] Note that intermarried white males (or females) are not counted in the household share of Cherokees who are English-language users.

coefficients on each race variable become insignificant, while the coefficient on the English-language share variable remains positive and significant in each model. One potential explanation is that English-language acquisition likely occurred in schools, and language skills were more transferable to farming than to animal husbandry. Marriage longevity does not affect acres cultivated in any model.

Table 5: Potential mechanisms behind the racial gap in property

Dependent variable:	Log livestock wealth			Log acres cultivated		
	(1)	(2)	(3)	(4)	(5)	(6)
Male head with white ancestry		0.3425	0.4032		0.0137	0.0212
		(0.2041)	(0.1872)		(0.1301)	(0.1345)
Female head with white ancestry		–0.0643	–0.0800		–0.1884	–0.1503
		(0.3365)	(0.3281)		(0.1722)	(0.1788)
Both sides with white ancestry		0.0370	0.1072		–0.0129	–0.0287
		(0.1951)	(0.1920)		(0.1575)	(0.1540)
Share of Cherokees who use English	0.2831	0.1950	0.1395	0.3152	0.3314	0.2808
	(0.1251)	(0.1409)	(0.1364)	(0.0939)	(0.1002)	(0.0978)
Years married	0.0125	0.0107	0.0102	0.0081	–0.0010	–0.0007
	(0.0043)	(0.0069)	(0.0065)	(0.0031)	(0.0046)	(0.0045)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time-varying controls		Yes	Yes		Yes	Yes
Township fixed effects			Yes			Yes
R-squared	0.0601	0.0859	0.1271	0.0632	0.1075	0.1500
Observations	1,162	1,162	1,162	1,283	1,283	1,283

Notes: Each regression contains a full set of year fixed effects. We split the “household with white ancestry” indicator into its four principal components: households where white ancestry enters only through the male head, households where white ancestry enters only through the female head, households where white ancestry enters through both the male and female heads, and households without any white ancestry. Households without any white ancestry are the omitted category in each model. English-language users are household members who are at least 10 years old and can use and read English. Years married is the difference between the current year and the year a couple was married. Standard errors are clustered at the household head level. Livestock wealth is valued in 1900 prices.

5.2 Sibling fixed effects estimation

So far, we have established a direct relationship between property accumulation and the racial ancestry of the male household head. Regardless of marriage to a female with close white ancestors, households with a male head with close white ancestors held more property than comparable endogamous households, and the relationship is robust to the inclusion of controls. The relationship becomes more nuanced when we account for potential mechanisms – namely, households with a male head with close white ancestors (and a female head without close white ancestry) held livestock wealth above and beyond the impact of the household’s share of English-language adopters and current marriage longevity. English-language adoption by the household, however, seems to capture the entire racial gap in farm size.

In this section we attempt to address the role of unobservables in explaining the relationship between livestock wealth and the male head having white ancestry by accounting for sibling fixed effects. This method controls for permanent, unobserved characteristics shared by Cherokee family members. For example, if acculturated Cherokee families were more willing to support their daughters marrying men from outside of their tribe (or marrying mixed-raced men), then sibling fixed effects models take into account this unobserved trait shared by individuals from the same family. While we observe 281 instances (14% of the sample) where deviations in intermarriage occur between Cherokee sisters who are heads of households (wives), the amount of within-family variation is relatively low.[16] Thus we expect the estimates to be imprecisely measured.

Table 6 shows the results of the sibling fixed effects regressions. Columns 1 and 3 confirm that the coefficient on the male head with white ancestry is positive without sibling fixed effects. However, column 2 shows that the within-sibling coefficient on "male head with white ancestry" is negative (but insignificant) with respect to livestock wealth. Column 4 also shows that, with respect to acres cultivated, the within-sibling coefficient on the "male head with ancestry" indicator is close to zero. Given our earlier results on the role of English-language adoption on farm size, we expect that the effect of intermarriage on farm size would be close to zero. Thus the relationship between male head with white ancestry and property either changes signs or is close to zero, depending on the outcome.

The negative coefficient on the "male head with white ancestry" indicator suggests that a trade-off may have occurred. While we estimate that there were no advantageous effects of marrying a male with white ancestry on agricultural outcomes, Cherokee females may have preferred social assimilation over economic assimilation. Column 5 shows that after controlling for sibling fixed effects, a household with a male head with white ancestry contains a greater share of Cherokees within the household who can use English.

[16] Intermarried female heads are so rare than we cannot identify any within-brother variation in intermarriage.

Table 6: Controlling for unobservables: Sibling fixed effects framework

	Cherokee sisters				
	Log livestock		Log acres		English users, share
	OLS	Sibling FE	OLS	Sibling FE	Sibling FE
	(1)	(2)	(3)	(4)	(5)
Male head with white ancestry	0.4228	-0.3379	0.2483	0.0194	0.4029
	(0.1481)	(0.3170)	(0.0978)	(0.2830)	(0.2799)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Time-varying controls	Yes	Yes	Yes	Yes	Yes
R-squared	0.1144	0.6550	0.1305	0.5753	0.5480
Observations	1,114	1,114	1,231	1,231	1,231

Notes: The sibling fixed effect accounts for unobserved, time-invariant characteristics shared across siblings. Columns 1 and 2 exploit the variation in intermarriage among Cherokee sisters. Columns 3 and 4 exploit the variation in intermarriage among Cherokee brothers. All models contain the year fixed effects and time-varying controls used in Table 2. Standard errors are clustered at the household head level.

Additionally, one potential explanation for the negative within-sibling coefficient on the "male head with white ancestry" indicator may be the fact that white males were negatively selected from the *non-Cherokee* population. We were able to link 43 white males from the universe of 87 intermarried white males in the OIA censuses to their family characteristics listed in the 1880 US Census. Comparing these family characteristics to the mean characteristics of families living in counties that bordered the Eastern Cherokee Reservation, we find that intermarried males were more likely to grow up in larger families. In fact, on average, intermarried white males grew up in households with roughly two additional members compared to the average household size in neighboring counties.[17] This may imply that white males with limited opportunity to inherit land were more likely to engage in interethnic marriages and move to the Eastern Cherokee Reservation. If these individuals were located on the lower end of the skills distribution, then productivity gains from intermarriage would be limited.

Another explanation for the difference between the cross-sibling estimate of the "white head with white ancestry" coefficient and the "within-sibling" coefficient is that males with white ancestry were more likely to marry into Cherokee families with preexisting wealth. Although this community was highly rural and livestock accumulation was relatively low, there is evidence, albeit suggestive, that male heads with white ancestry married into households with more property (see Table 1). The degree of clustering of broadly defined intermarriages among a small number of Cherokee families (for example, while 25% of the sample are households with white ancestry, only 8% of all households in the sample have intermarried heads of household)

[17] This result comes from a simple regression of the household size on an "intermarried white male" indicator, which equals one if the household contained a male who eventually married a Cherokee and equals zero otherwise. The coefficient on the intermarried indicator was 1.92 (with a robust standard error of 0.374).

also suggests that family-specific factors may have played a large role in the degree of intermarriages with the community.

6. Conclusion

Compared to the immigration literature on intermarriage, there has been relatively little written on the role of intermarriage within indigenous communities. This oversight is due not to a lack of importance but rather a lack of suitable data. In this paper, we use a newly created dataset that follows Eastern Cherokee households over a 12-year period at the turn of the 20th century. The results show a positive correlation between property accumulation and whether a household had close white ancestry. However, as the share of household white ancestors increases, household wealth eventually falls. The results also suggest that any advantageous effect of marrying a male head with white ancestry on wealth, especially livestock wealth, was due to selection into intermarriage rather than productivity gains.

Intermarriages are highly common within the Native American population today. For example, while American Indians and Alaska Natives (AIAN) represent only 1.5% of the total US population, marriages between an AIAN person and a white individual are the second-most-common type of intermarriage among whites (authors' calculations using Ruggles et al. 2010). The long-run consequences of racial mixing within Native American communities are also evident: According to the 2015–2019 American Community Survey (ACS) sample, roughly 50% of the current American Indian population is either biracial or multiracial. Understanding who chose to intermarry and how intermarriages impacted the economic status of both families and their children as adults can provide key insights into understanding racial inequality today.

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