Economic Development, Unearned Income and Mortality: Evidence from Tribal Casinos

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Abstract

The relationship between income and health is not well understood. While descriptive studies have documented a strong positive gradient between income and health, research utilizing exogenous variations in income has found conflicting results. This work investigates the impact of economic expansions and unearned income transfers arising from tribal casino operations on the mortality of Native American and other residents of American Indian reservations. Using the universe of Native American records in Medicare for the period 1999-2018 and a random one-in-five selection of records from other races, we find that the casino operations reduce the probability of mortality for Native American men in our study by 7.4%. We also find that unearned cash transfers reduce overall mortality regardless of race or gender. However, there is an additional reduction in mortality for Native American women who receive the cash transfer that is not observed for Native American men. Opening a casino on tribal lands and disbursing unearned income to tribal members has positive effects on the longevity of Native Americans in Medicare residing on tribal lands.

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Introduction

American Indian and Alaska Natives have experienced some of the most dire health and mortality outcomes of any race or ethnic group in the U.S. (Barnes et al, 2010; Jones, 2006) for the past five centuries. New health challenges demonstrate equally stark differences in outcomes - during the recent COVID-19 pandemic, American Indians have, at least at the beginning, faced some of the highest death rates in the country (Akee and Reber, 2021).

The underlying causes have been known and of great concern for generations (IHS, 2019; Gracey and Kiing, 2009). Poverty is an important social determinant of health for many communities, but it has been a particularly persistent problem for the American Indian and Alaska Natives (Sequist 2017; Sarche and Spicer, 2008). It has often been quite difficult to identify and measure the health outcomes and even deaths of American Indians and Alaska Natives. These relatively small populations usually do not comprise a large enough group to be represented in many of the most well-known and utilized public panel data surveys. Thus, data limitations have severely limited research on this topic.

In order to conduct studies related to disparities in health and health outcomes across Native Americans and other racial and ethnic groups, researchers must identify and use restricted-access administrative records for this population. For example, Feir and Akee (2019) used Canadian Long-Form Census and the Indian Register data (which provides information on Canadian First Nations individuals). Using this data, the researchers were able to infer deaths of Canadian First Nations peoples given that other sources often mis-classify First Nations Peoples as "Other". The same issue presents itself in the U.S. where many American Indians and Alaska Natives tend to be categorized on death certificates as, "Other", "Mixed-Race", "Hispanic", and sometimes "White" (Small-Rodriguez and Akee, 2021). These data issues impede the ability to identify and address emerging public health emergencies and criminal activities; this is especially true with regard to missing and murdered Indigenous women and girls phenomenon that has gone unreported due to the lack of reliable data (Lucchesi and Echo-Hawk, 2018).

Large disparities in mortality and longevity persist across Native American and other populations, regardless of the main data source. In recent work, Gorzig et al (2022) examined the disparities between mortality rates for American Indians and whites in the U.S. American Indian women die on average 13 years earlier than their white counterparts and American Indian men die about 12 years earlier than their white counterparts. American Indian men also tend to die more from homicides than their white counterparts. The extent to which these disparities are explained by the chronic and persistent differences in economic conditions, especially on tribal lands, is not well understood.

In this paper we investigate how tribal gaming operations, and associated unearned cash transfers that were disbursed to tribal members, affected mortality in the population on Medicare residing on or neighboring a tribal reservation. The changes in income are directly related to the provisions of the Indian Gaming Regulatory Act (IGRA) taken up by various tribes.[2] Tribal casino operations might affect health and mortality in different ways. First, they create more economic opportunity in and around tribal areas.

[2] American Indian gaming was authorized via the passage of the Indian Gaming Regulatory Act (IGRA) of 1988. This law provided a standardized method for AI tribal governments to create casino operations on their federally-recognized tribal lands. The purpose of the IGRA was to provide AI tribal governments with a source of revenue in an era of declining federal support of tribal programs and services. The use of the profits from tribally owned and operated casinos are mandated to benefit tribal governments or operations.

This could lead to increased incomes, but it affects the intensity of different activities that could lead to accidents such as driving and construction. Further, although there is little evidence in favor of this hypothesis, casinos might increase the availability of alcohol and other harmful substances at or near tribal reservations. Thus, income gains from cash transfers may correspond with short-term increase in drug overdose, accidents and alcohol-related mortality. In the short-run, this phenomenon has been described by Evans and Moore (2011). Over decades, Ruhm's seminal work on recessions and mortality likely captured similar mechanisms (Ruhm, 2000). On the one hand, increased incomes may lead to improved health outcomes. In older populations, Evans and Snyder (2006) have shown that increased incomes may have the opposite effect, potentially through reducing the incentive to engage in economic activity. On the other hand, leisure and consumption choices associated with higher incomes might work in the opposite direction and increase the probability of mortality.

Second, casinos generate income for tribal governments, which is used to improve living conditions on the reservation and in some cases parts of the associated tribal income is disbursed to tribal citizens as unearned cash transfers. All tribal citizens receive the same transfers regardless of age, marital status, or household income. These unearned cash transfers can also have opposite effects on health and mortality. Casino openings would increase economic activity in the area, thus providing more economic and leisure opportunities. Cash transfers would increase the amount of disposable income, net of any labor market effects driven by the casino operations. Thus, it is an empirical question whether the net health and mortality effects of casino operations and associated cash transfers were positive or negative.

Several cross-sectional analyses have been conducted (Evans and Topoleski, 2002; Wolfe et al, 2014) and they generally show beneficial results on health from casino operations. However, a persistent concern is that the estimates from cross-sectional studies may be biased due to the changing composition of tribal reservation populations with the arrival (or departure) of reservation residents, potentially as a consequence of casino operations. Further, the impact of casino operations could be different from that of unearned cash transfers. Research based on panel data has been limited to individual tribes for whom such data are available, and focused on the combined effect of casinos and unearned cash transfers (e.g. Akee et al, 2013; 2018 and forthcoming).

This analysis uses a difference-in-differences framework comparing all-cause mortality for individuals from the same birth cohorts that could be affected by tribal gaming to those residing on reservations that opened a casino later or never opened one, controlling for unobserved differences across time and location. We find that casino operations reduced mortality for Native American men. Unearned cash transfers are present in about two thirds of casino operations and could be initiated at the time of casino opening or later. Unearned cash transfers are associated with a reduction in mortality for Native American women.

In prior research, we have found that the effect of cash transfers improves educational attainment of affected children, reduces criminality and improves economic outcomes (Akee et al, 2010; Akee et al, forthcoming). This research provides additional evidence that casino operations and associated income changes are associated with better health outcomes at the extensive margin – a reduction in mortality rates. Future research could investigate the specific mechanisms responsible for this observed mortality reduction and whether other intermediate health outcomes or diseases are also affected.

Previous Research on Income and Mortality

The literature studying the association between income and health is vast. In a review, Cutler, Lleras Muney and Vogl (2011) examine different dimensions of socio-economic-status – education, financial resources, and race and ethnicity – and conclude that the mechanisms that link health and economic success are complex and differ across the various factors affecting socio-economic standing. Income can play an important role in the health and wellbeing of individuals in a country where medical care and access are not provided for free. In the US, for individuals with little to no income, Medicaid provides basic services. For individuals over the age of 65, Medicare provides services after paying pre-set insurance premia.[3] However, for the working poor and younger citizens, there are fewer options and individuals may not have adequate preventative care or coverage. In this case, higher income is protective of health outcomes and provides means to obtain the necessary preventative care and health maintenance assessments that ensure healthier and longer lives.

Studies on the association between financial wellbeing and health in Native Americans are scarce. The well-established positive relationship between income and health may not adequately capture the experience of marginalized groups, and in particular of minority groups that have been subjected to centuries of discrimination and injurious government policies. As Aslan and Wannamaker (2018) convincingly show, health care utilization, and thus the benefits of regular preventative care, are affected by the collective historical experience of one's racial or ethnic group. Akee, Copeland, and Simeonova (forthcoming) have shown that additional unearned household income improves mental health in young Native American adults. Yet, recent work using Medicare data documents worse average experiences with the health care system reported by Native American Medicare beneficiaries relative to other races (Martino et al, 2020). It is an empirical question whether additional resources in the form of extra unearned income affect health care outcomes for tribal residents.

In addition to contributing to disparities due to the lack of health care access and utilization, poverty could contribute to excess mortality through other channels. In a series of recent papers, Case and Deaton (2015) have shown increased mortality due to deaths from accidents, suicides and drug and alcohol abuse for a substantial portion of otherwise healthy adults who are poor. This research documents that for non-Hispanic white males there is a strong relationship to unemployment and lower income and increased mortality. Case and Deaton term these "deaths of despair" as an emerging phenomenon related to a reduction in employment and income for the affected population. The excess mortality from "deaths of despair" also carries over to American Indian populations. In fact, Gorzig et al (2022) found that the rates for this population are significantly higher than for non-Hispanic white population.

Data

Individual data on demographics, health utilization and mortality for this study come from the Medicare Carrier file for the years 1999-2018. We requested data on 100% of individuals who were coded as Native American in the data and a random draw of 20% of all other individuals. Medicare sources race from the Social Security Administration. Information on dates of death is extracted from the National Death Index. We merged the Medicare data to data on casino openings and per capita cash transfer agreements. Only

[3] Different rates apply for Medicare Part A, B, C and D. For individuals who have not worked and paid Medicare tax for 10 years or more, the premia would be higher.

individuals who resided on zip codes that are either fully or partially on a tribal reservation are included in this analysis. Notably, the data identifying cash transfers are based on the year in which the tribal government applied for approval (from federal regulators at the National Indian Gaming Commission) to provide tribal citizens with cash transfers from tribal casino revenues. It is possible that the tribal government applied to provide these cash transfers and that the transfers started the subsequent year or even later or not at all. Casino openings are dated to the exact year of the start of gaming operations.

Table 1: Means and standard deviations of main variables for Medicare-Eligible Individuals Residing on Zipcodes covered by American Indian Reservation lands in 1999

	No casino		Casino	
Variable	Obs	Mean	Obs	Mean
Cash Transfer Provided	2,489,518	N/A.	3,720,409	0.649
				[0.478]
Age	2,489,518	72.797	3,720,409	71.828
		[11.577]		[11.56]
Age at death	1,910,542	84.007	2,692,916	84.295
		[10.38]		[10.29]
Died	2,489,518	0.767	3,720,409	0.724
		[0.422]		[0.447]
Male	2,489,518	0.443	3,720,409	0.447
		[0.497]		[0.5]
Native American	2,489,518	0.011	3,720,409	0.012
		[0.102]		[0.11]
Black	2,489,518	0.060	3,720,409	0.034
		[0.238]		[0.182]
Hispanic	2,489,518	0.053	3,720,409	0.027
		[0.224]		[0.163]

The sample is restricted to those who resided on or near tribal reservations in 1999. This is the first year of available data in our sample. Coincidentally, this is the year in which CMS started receiving data from the Indian Health Service and updating the race categories in their data accordingly (Filice and Joynt, 2017), which gives us more confidence in the quality of the racial identifiers in our sample. We fix the residential information (zip code of residence) to 1999 and do not consider individuals who join Medicare after that or who move onto the reservation after that time period. There is evidence of substantial migration on and off the reservation related to casino operations (Evans and Topoleski, 2002). We impose these restrictions in an attempt to limit bias arising from selective migration into (or out of) the reservation-based sample.

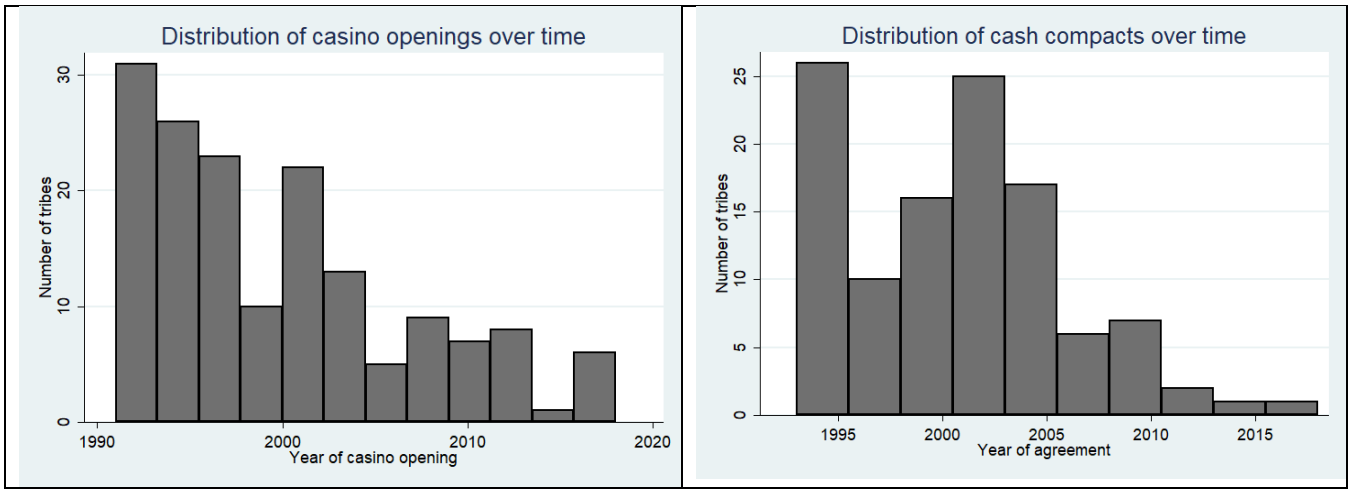
The match to reservations and casino openings was done on the zip code level. If a person's zip code was associated with a tribal reservation, that person was selected as part of the sample. Table 1 shows the total number of observations separated by those residing on reservations that never open a tribal casino and

those that reside on reservations that eventually open a casino. In total there are over 6 million observations across the two location types. Approximately 65% of the observations are located on reservation lands where cash transfers occur; not everyone will receive the cash transfer, as it is only provided to enrolled tribal citizens. People living on reservation lands with casinos were about a year younger in 1999 and were also about four months older at the time of death, if they died during the observation period. The probability of death during the sample window is 77 percent for those who did not have a casino, and 72 percent for those who did. Approximately 44% of the observations are male for both locations. Individuals residing in both locations are equally likely to be American Indian (around 1 %); however, reservations with casinos have about half the proportion of Black or Hispanic observations as those without casinos. The majority are non-Hispanic white in both locations.

Based on our sample, which includes all Native Americans and a one-in-five sample of all other individuals, the average age for Native Americans in Medicare in 1999 was 67.3 years. The rest of the sample were 72.4 years old on average in the same year. This large difference in mean age is likely the result of at least two factors. First, Native Americans are more likely to qualify for Medicare because of disability at a younger age. More than 2.5 percent of those younger than 65 who were on Medicare in 1999 were Native American. The corresponding share among those aged 65 and older is about one percent (0.98%). Second, conditional on qualifying for Medicare, Native American life expectancy is shorter.

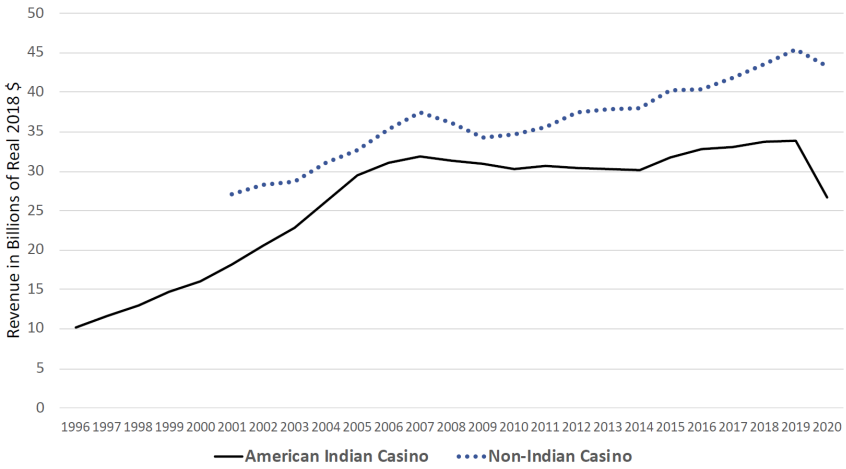
Figure 1 shows the distribution of casino openings and cash transfer agreements over the observation period. The distribution of casino openings by tribes is about evenly split between the decade of the 1990s and the years after 2000. The Indian Gaming Regulatory Act was signed in 1988 and resulted in a large number of tribes filing for gaming permits in the decade after that. The distribution of per capita transfer agreements is more skewed towards the years after 1995. A tribe must have a casino compact before it can disburse any cash transfers. It also must notify the Bureau of Indian Affairs if it intends to start a cash transfer program. Some, but not all, casino openings coincide with the beginning of cash transfers, as can be seen in the distribution plots below.

Figure 1 The evolution of Indian Gaming facilities and associated transfer agreements 1990-2018



The number and size of gaming operations on tribal lands increased steadily since the passage of IGRA. There was a corresponding increase in the total revenues generated by the tribal gaming industry. The gaming revenues that accrue to American Indian nations are sizeable. In Figure 2 we plot the revenues of the tribal and non-tribal gaming for the period 1996-2020. Revenues by tribal casinos increased substantially up until 2011 and remain of similar magnitude to the revenues generated by non-tribal gaming operations.

Figure 2 Tribal and Non-Tribal Casino Revenues



Source: National Indian Gaming Commission

Methods

We are interested in comparing mortality for American Indians and non-AIs across those who had a casino open on nearby tribal lands and those who did not. We compare the probability of death in any year before and after the casino opens to the probability of death in the same years for people from the same birth cohorts who resided in areas without casino openings. The regression model is a basic difference-in-differences setup, controlling for birth cohort, tribe, and year fixed effects. The coefficient of interest estimates the difference in the probability of death for individuals born in the same year across locations that opened and did not open a casino and time before and after the casino openings. The basic estimation model is as follows:

$$Y_{cgti} = \alpha + \beta * Casino_{gt} + \gamma * AI_i + \delta * Casino_{gt} * AI_i + \varphi * X_i + \mu_g + c + \tau + \varepsilon_{cgti}$$

Where Y is an indicator variable equal to one if person i from cohort c living in location g died in year t. Casino is equal to one in location g in years t after it opens, and zero in area g in years before it opens. It is universally equal to zero in locations that did not open a casino before or during the period of study. The coefficients of interest are β, which measures the change in the probability of death for individuals from a fixed birth cohort living in a given location after a casino opens, and γ, which measures the difference between American Indians (AI) and other residents of areas that are close to or on tribal lands. The difference in difference coefficient is given by δ and we report these estimates in the tables that follow. In all specifications we control flexibly for birth cohort unobservable common characteristics and

tribal area time-invariant unobservable characteristics. We also control for calendar-year specific fixed effects. Individual characteristics such as gender and race and included in X_i. All standard errors are clustered at the zipcode level. In total, there are over 3,000 of these zipcode regions in the data.

In related analysis, we also include a variable equal to one if the tribe signed an agreement that provided a proportion of tribal casino revenues as cash transfers to tribally enrolled citizens. We also include the interaction of that variable with the AI indicator, which captures the separate effect of casino transfers on American Indians, which may differ substantially from the average effect of casino cash transfers on the average person residing in the area. Only tribes that opened a casino could have cash transfer agreements. The combined effect of casinos and cash transfers can be calculated as the sum of the casino and the cash transfer coefficients from the equation above.

Results

We first investigate whether casino operations and associated cash transfers affected the probability of death in any year. Since there are differences in the determinants of mortality between men and women, we split the sample by gender. Further, mortality in those who are on Medicare before they reach age 65, who qualify because of disability, rather than age, is likely affected by different factors than in those aged 65 and above. That is why we further consider the subsample of individuals under the age of 65.

In Table 2 we provide the regression results for four different model specifications. The first column provides analysis for the total data set of individuals who were on Medicare in 1999 that resided on American Indian reservations regardless of their race (or age). The next column restricts the analysis just to men, the third column is restricted to women. Finally, the fourth column restricts analysis to individuals on Medicare below the age of 65 of all races and genders that resided on American Indian reservations.

The results indicate that individuals who identified as Native American and resided on reservations in 1999 had lower life expectancy by almost 2 months relative to non-Native Americans over all years in our data. The differences in mortality persist across genders and among Medicare recipients younger than 65. Additionally, across all races, men's longevity was almost 4 months shorter than women's.

We find no substantial differences in the probability of death in any year between those potentially affected by casino operations and the rest of the sample. Across all four sample specifications, the estimated coefficient on the casino operations dummy is small and does not reach statistical significance and we fail to reject the null hypothesis of no effect. For the interaction variable of casino and Native American, we find that the interaction is negative and statistically significant at the 10% level for men, which indicates a difference of about 7.4% of the mean of the dependent variable (or about 3 weeks difference) in the sample of men alone. There is no statistically significant difference for the sample restricted to women or those under age 65. This may mean that the economic opportunities due to the casino operations help to reduce the probability of death for Native American men enrolled in Medicare.

On the other hand, we find that the effect of the cash transfer reduces mortality across almost all of our samples. It reaches statistical significance at the 15% significance level for the total sample and 10% for men and women while it does not reach statistical significance at conventional levels for the under age 65 sample. This indicates that the increased incomes from the casino transfer payments are responsible for reduced mortality for all individuals residing on the Native American reservations that operate casinos

and disburse cash transfers. This points to potential spillover effects from unearned cash transfers to residents who are not tribally-enrolled members (recall that the majority of the reservation residents are white) These effects result in an almost 2% reduction in the mean of the dependent variable for the first three samples, which is a difference of about one week in mortality.

The estimated coefficient on the interaction variable between the cash transfer and Native American is negative for all specifications, however, it is only statistically significant for women. In fact, the estimated coefficient translates into a 9% reduction in the average mortality rate or about 5 weeks older at the age of death for American Indian women.

Overall, the results from this analysis indicate that in a sample of individuals who are covered by Medicare and reside on or near tribal lands, American Indians have higher mortality rates than other races. We also confirm a well-established fact that males have short life-spans relative to females. We find that American Indian men who reside on reservations with casino operations experiences a reduction in their probability of death that corresponds to about 3 extra weeks of life as compared to their non-American Indian counterparts. We do not find similar results for women. However, we do find that the effect of the cash transfers plays a large role in reducing the probability of death in a given year for Native American women. This suggests that lower incomes for this population likely plays an important role in contributing to overall mortality.

Table 2: Casino operations, cash transfers and mortality

	Sample Used in Analysis			
Variable	All	Males	Females	<65
Native American	0.00791	0.00887	0.00707	0.0039
	(0.001472)	(0.00145)	(0.0007)	(0.0007)
Casino	0.00007	0.00004	0.00013	-0.00012
	(0.0008)	(0.0008)	(0.0005)	(0.00045)
Casino*Native American	-0.0022	-0.004479	-0.00114	0.000254
	(0.002635)	(0.002630)	(0.001432)	(0.00159)
Cash transfer	-0.00124	-0.0012	-0.00136	-0.000727
	(0.000814)	(0.000721)	(0.000734)	(0.00056)
Cash transfer*Native	-0.00346	-0.0009086	-0.0051	-0.0019133
	(0.00286)	(0.00288)	(0.00228)	(0.00226)
Male	0.01548			0.00796
	(0.00038)			(0.00015)
Mean Dep Var	0.057	0.06	0.056	0.031
Zip FE	X	X	X	X
Cohort FE	X	X	X	X
year FE	X	X	X	X
Adj R2	0.0379	0.035	0.0408	0.0074
N obs	42,631,737	18,438,210	24,193,527	6,179,233

Note: Standard errors are clustered at the zipcode level. Linear probability regressions of mortality in any year

Limitations

There are several important limitations of this work. First, the racial designation is based on the race categories reported by Medicare. American Indian race is more likely to be mis-classified than most other racial categories in Medicare data (see Filice and Joynt (2017), for a review of the related literature). Second, we apply casino treatment based on zip codes of residence. Thus, our results are interpreted as intent-to-treat effects, and likely under-estimate the true effects of casino operations and unconditional cash transfers. Third, enrollment in Medicare, which is likely affected by the premia that individuals must pay, is affected by work and tax payment history. To the extent that financial wellbeing affects the probability of enrolling Medicare, American Indians are more likely to be under-represented in the data. Further, the selection of higher-income American Indians likely introduces downward bias in our estimates. On net, we believe that the reported coefficients are biased downward.

Conclusions

This is the first study to examine the effects of tribal casino operations on health and mortality using panel data. We find that there are differential effects for the effect of casino operations and cash transfers by gender and race on mortality for individuals who are enrolled in Medicare and residing on Native American reservation lands. Using a panel dataset of individuals from 1999 onward, we examine how the opening of casinos and the start of cash transfer programs (from casino revenues) affect the probability of death within a given year for this vulnerable population.

We find that the effect of tribal casinos and cash transfers do not have a large statistically significant effect on the Medicare population under age 65. The estimated coefficients in that analysis do not reach statistical significance for the cash transfers or casino operations. We find that the cash transfers have a negative effect on mortality for the total sample at the 15 % significance level. This result applies to all residents of Native American reservation lands with a cash transfer. This implies that there are positive externalities to these income augmentation programs; the cash transfer is only provided to tribally enrolled American Indian citizens of that tribe but the improvement in mortality accrues to all people.

Finally, we show that the largest benefit of the cash transfers occurs for Native American women. The presence of a cash transfer program reduces the probability of death by about nine percent in a particular year. This implies that lower incomes for this population may be related to mortality. For Native American men, the presence of the casino operations helps to reduce mortality risk; while we are uncertain of the mechanism responsible for this change it may be related to employment opportunities. We leave this analysis to future research.

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