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Effects of per capita payments on governance: evidence from tribal casinos

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Abstract

Some governments distribute profits from state-owned enterprises to citizens on a per capita basis while others do not. Does the use of per capita payments affect how governments trade off pro-economy policies with other constituent interests such as environmental quality and public health? We study that question in the context of tribal government decisions to close or keep open casinos on American Indian reservations during the COVID-19 pandemic. Relying on per capita payment data and administrative information on the operational status of over 200 tribal casinos, we investigate how the distribution of per capita payments relates to the number of days casinos were closed from February 2020 through February 2022. After controlling for casino size at the onset of COVID-19, as well as demographic, economic, and geographic characteristics of the reservations on which the casinos operate, we find that casinos governed by per capita payments remained open about 17–29% longer than other reservation-based casinos. That finding suggests that per capita payments create a pro-economy constituency and implies that the decision to pay dividends directly to citizens affects the sizes of revenues from state-owned enterprises, such as tribal-government-owned casinos, rather than merely determining how they are distributed.

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1 Introduction

Development economists studying the "health–wealth gradient" have tried to understand the extent to which income-generating industrial development within a community must come at the expense of health, safety, and environmental quality (see Deaton, 2002). The short-run trade-off is fairly clear. Societies that embrace aggressive development earn more but put community health at risk. In the longer run, however, increases in overall income should lead to increases in health—improving public expenditures (Pritchett & Summers, 1996).

More importantly, the wealthier-is-healthier hypothesis requires "a thoroughgoing redistribution of income and wealth [that] is key to improving population health" (Deaton, 2002, p. 14). When governments control large portions of national income, citizens benefit from economic wealth only if governments provide public goods effectively. Otherwise, the link between economic development and health is broken by inefficiencies in converting government revenue into realized outcomes, because of corruption, informational deficiencies, institutional constraints, or targeted transfers that serve to exacerbate health inequities (Case & Deaton, 2005; Troesken, 2015). By contrast, when economic development translates directly into increases in household income—as is the case for direct dividends and other universal cash transfers—a clear pathway towards improved health becomes possible. Cash transfers improve a citizen's ability to purchase private goods such as food and healthcare and reduce the stress associated with paying for basic necessities (e.g., shelter, clothing, power, and potable water). In that way, transfers may foster economic freedom, providing individuals with greater ability to make private choices related to health outcomes (Geloso et al., 2021).

We study the governance of the health–wealth trade-off in the context of American Indian communities.[1] By "governance" here we refer specifically to decision-making by government leaders over the delivery of public and private goods and services, derived from Francis Fukuyama's (2013, p. 350) definition of governance as "a government's ability to make and enforce rules, and to deliver services." Tribal leaders often face a governing dilemma that pits their communities' short-run health and well-being against economic development priorities. Coal mining and oil production, for example, can bring substantial wealth to tribal communities to finance schools, citizen housing, health clinics, and drug rehabilitation centers but risks environmental damage to local watersheds and air quality.[2] Tribes considering casino enterprises face similar dilemmas. Gaming brings revenue and economic development that can fund healthcare and cultural centers, but it can also increase the risk of crime, addiction, and drug and alcohol abuse. While much of the literature on the health–wealth gradient describes trade-offs at the individual level, we follow in the footsteps of Black (1948) in applying individual choice theory as a basis for

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[1] When adopted herein, the term "Indian" connotes persons of both American Indian and Alaska Native ancestry. Indian is used in the present article instead of Native American because Indian is a legal term. See, e.g., 25 U.S.C. § 305e.

[2] For example, the roughly 16,000 Mandan, Hidatsa, and Arikara members of the Fort Berthold Indian Reservation living atop the Bakken basins of North Dakota have seen over $1.5 billion poured into the community as a result of the shale drilling rush since 2009. Those windfalls financed new schools, senior citizen housing, health clinics, drug rehab centers, and a new $30 million cultural center (Brown & Fonseca, 2021). Yet many oil- and coal-producing tribes like the Mandan, Hidatsa, and Arikara Nation fear that such wealth will not translate into health improvements, citing either direct environmental impacts of production or the inequities of how revenues are spent across the community (Clarren, 2018).
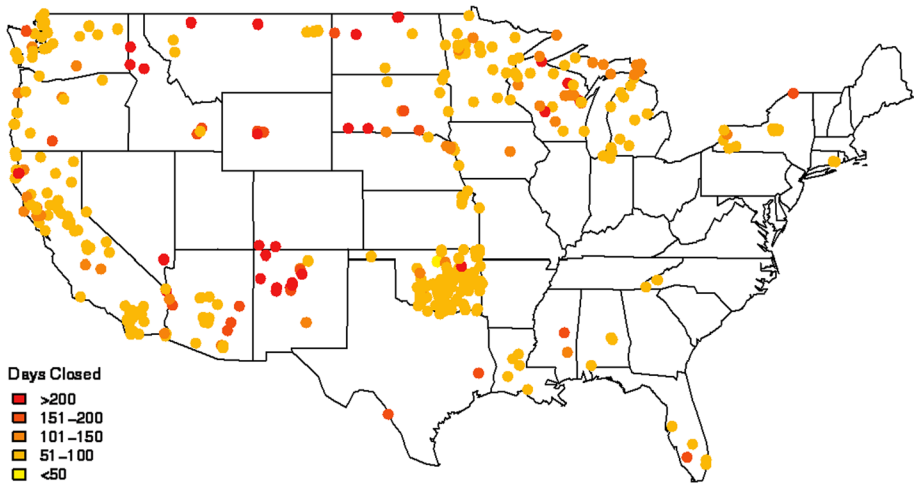
Fig. 1 Casino closures for tribal gaming facilities during the COVID-19 pandemic. Tribal casinos plotted as circles with increasing gradients of red for longer closures since February 20, 2020. Based on data from Casino City's Gaming Directory, last accessed on March 1, 2022. This map excludes properties labeled as Bingo Halls, Dog Tracks, and Race Tracks whether or not operated by tribes

government choices over public expenditure. In doing so, we consider tribal government decision-making as driven by the preferences of the median tribal voter, whether that person is a typical tribal citizen (Downs, 1957) or an individual within the tribal elite (the so-called selectorate assumption; see Bueno de Mesquita et al., 2005).

We hypothesize that governance of the health–wealth gradient differs when tribal governments distribute revenues to individual citizens to support their purchases of private goods rather than keeping revenues and using them to finance public goods. We test our hypothesis in the context of tribal casino gaming. Those facilities proliferated after the landmark US Supreme Court ruling in *California v. Cabazon Band of Mission Indians* (1987) and the ensuing Indian Gaming Regulatory Act of 1988. Both effectively paved the way for the widespread adoption of casinos as a tool for tribal economic autonomy and as sources of steady income for tribal governments to finance public expenditures and accumulate political expertise (Mason, 2000). Political scientists have largely focused on the latter, showing how tribal gaming revenues have been allocated for improving access to the federal government through lobbying (Mason, 2001; Boehmke & Witmer, 2012; Wilkins, 2002; Light & Rand, 2005; Bruyneel, 2006) or by strengthening bargaining power and interdependence (Evans, 2011; Evans, 2014; Kessler-Mata, 2017). Economists have examined how casinos with per capita payments have boosted tribal citizen incomes, which in turn has been linked to rising intergenerational political participation (Akee et al., 2020). Yet little is known about how casinos and their resulting per capita payments affect tribal governance and decision-making.

We investigate tribal governments' restrictions of economic activity during the COVID-19 pandemic in the particularly acute context of the health–wealth gradient. After adjusting for age, American Indians and Alaskan Natives experienced higher rates of COVID-19 cases, hospitalizations, and deaths than White, Black, Hispanic, and Asian populations

through January of 2022.[3] We assess the decision to keep tribal casinos closed or open—a decision tribes can make regardless of state-level lockdown policies—as a function of whether gaming revenues are distributed as per capita payments. As we detail below, our hypothesis is that tribal governments distributing casino revenues through per capita payments faced more pressure (or anticipated more pressure) from their constituents to reopen or keep casinos open to maintain steady revenue streams for private good consumption despite the public health risks posed by COVID-19. By contrast, governments without per capita payments faced more pressure (or anticipated more pressure) to keep casinos closed to minimize public health risks to the community; less pressure to reopen casinos likewise is observed given fewer direct benefits at the individual level for private good consumption and private health risk management. By that logic, we expect tribal casinos with per capita payments to have experienced fewer closed days during the pandemic than casinos without per capita payments.

We hypothesize that per capita payments—a service for which tribal citizens can hold governments accountable if not properly and consistently delivered—influence tribal leaders' economic decisions given constituent pressures to maintain the flow of income that would otherwise be lost if casinos remained closed. Absent such payments, less constituent pressure to reopen casinos was exerted, given the weaker link between casino profits and individual income.

Our empirical assessments evaluate the restriction of economic activity by all casino-operating tribal governments in the United States since the start of the COVID-19 pandemic in March 2020. To measure the effects of economic restrictions, we develop an original database comprising the operating statuses of 444 Indian casinos. To measure per capita payments, we rely on an existing database of per capita distributions of gaming revenues (Malinovskaya, 2020). Our causal identification strategy relies on the conditional exogeneity of a tribal government's decision to issue per -capita payments—a decision made at least 13 years prior to the onset of the pandemic—with respect to the operating status of casinos during the pandemic. We further assess the extent to which casino operating statuses are determined by a host of demographic, economic, and geographic characteristics of the Indian country in which the casinos operate.

The findings highlight the importance of per capita payments. Casinos governed by per capita payments were open 17–29% longer than casinos not allocating gaming revenues on a per capita basis. Our findings are robust to controlling for casino size, state fixed effects, and reservation population sizes and incomes, along with adjacent county incomes, all measured before the COVID-19 pandemic, as well as a sensitivity analysis for the impacts of other potentially omitted variables. We also find that larger casinos closed for fewer days, a result consistent with tribes favoring continuing revenue on reservations wherein the economic trade-off between health safety and revenue is most sharp.

In addition to contributing to the literature on the governance of health–wealth trade-offs, our research makes contributions to the literature on American Indian governance and to the study of governmental policy decisions during crises. First, we add new insights to the study of decision-making constraints facing tribal governments in the United States—or what Laura Evans refers to as the "dilemma of harnessing the potential of vulnerable government" (Evans, 2011, p. 663). Second, we illustrate the importance of per capita payments not only as a distributive policy tool but also as a fundamental linkage between

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[3] The data are taken from the CDC, Fig. 1, at https://www.kff.org/coronavirus-covid-19/issue-brief/covid-19-cases-and-deaths-by-race-ethnicity-current-data-and-changes-over-time/. See also Crepelle (2021).

tribal governments and their citizens. In doing so, we highlight the unique responsiveness of casino-operating tribal governments, which turned to gaming as one of the only viable options for generating revenue in the face of constrained sovereignty over taxation of property and citizen income (Fletcher, 2007; see also Feir et al., 2022 on tribal tax codes). Finally, we provide a new empirical assessment of local politics during the pandemic. Our analysis contributes to the literature on lockdown policies to find rich variation in local government responses in the context of existing state- and national-level laws (Hale et al., 2021).

2 Overview of per capita payments and the health–wealth gradient

Tribal per capita payments began during the 1880s as the result of the federal government liquidating tribal assets and disturbing them to tribal citizens. However, the origin of contemporary tribal per capita payments is the federal government's tribal self-determination policy (Crepelle, 2020). Inspired by that policy, tribes exercised their sovereignty to open casinos on their reservation land and to create other tribally owned enterprises. Revenues from tribal businesses were deployed to fund tribal government operations, but many tribes also started capturing tribal business profits to make direct per capita payments to the tribal citizens (see Crepelle, 2020).[4]

Per capita payments have become a complex issue for tribes (Crepelle, 2020). On one hand, tribal citizens usually welcome per capita payments, and tribal citizens can allocate per capita payments to address their own personal needs (i.e., by buying private goods such as food, shelter, education, and entertainment). Providing per capita payments to citizens also reduces opportunities for political cronyism because citizens receive equal shares of tribal profits, even if they no longer live on the reservation. Additionally, per capita payments give tribal citizens a direct stake in tribal economic welfare; per capita payments therefore may foster tribal citizen civic engagement. On the other hand, per capita payments reduce funds available for public goods such as cultural activities, law and order, and community infrastructure. If constituent demand for private goods is more immediate and pressing, or if constituent trust in tribal government is low, then politicians may be reluctant to propose reducing per capita payments and consider doing so detrimental to their political careers. Per capita payments likewise can create dependency among recipients and could contribute to reliance on such payments for repaying consumer debt and financing regular consumption patterns. Such reliance would make the population vulnerable to unexpected reductions in per capita payments such as those resulting from economic downturns.

Anecdotal evidence during the COVID-19 pandemic suggests that tribal governments were acutely aware of short-run trade-offs between tribal health and economic development in the context of per capita payments. For example, the pandemic abruptly shut down all six casinos operated by the Ho-Chunk Nation in Wisconsin in March 2020. With those casinos delivering more than three-quarters of tribal government revenue, their closure forced tribal leaders to stop distribution of per capita payments and to reduce funding for other public support programs for its citizens (Koran, 2022). While federal aid replaced a

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[4] A debate continues on whether per capita payments should be distributed on a performance basis as a percentage of profits or on a flat-rate basis. See Cornell et al. (2007).

small portion of lost casino revenue, intense pressure mounted between the tribe's president, Marlon WhiteEagle, and its legislature over the financial strains that tribal citizens attributed to the president's handling of the pandemic (Vaisvilas, 2021). The casinos began reopening in May 2020, just two months after closure.[5]

To fix attention on the possible importance of per capita payments in the context of the health–wealth gradient, we assume a short-run trade-off—or perceptions of a trade-off when decisions had to be made—between having more tribal casino profit on one hand, and less COVID-19 exposure risk on the other hand. Framing the issue in that way assumes that median voters care about casino profits because they are residual claimants to those profits. Residual claimancy obviously is true when the tribe distributes per capita payments. When the tribe does not, the median voter—who is a tribal citizen—nevertheless holds a claim on the public goods provided by tribal government (using casino profits) such as schools, parks, recreational centers, cultural facilities, and language classes.[6] In that framework, the tribal government chooses a set of casino policies (e.g., how long to stay open and at what capacity) to balance casino profits and health safety. Here, we assume that tribal leaders do so to best satisfy the median voter. Therefore, the median voter's preferences determine whether the casino will operate normally during the pandemic.[7]

Will the existence or lack of per capita payments affect the median voter's preference for keeping casinos open or closed? To answer that question, it is useful to consider what casino profits provide for tribal citizens. When the tribe distributes per capita payments, the profit is given to citizens in paychecks that citizens can use to purchase private goods such as food, clothing, transportation, shelter, and entertainment. When the tribe does not distribute per capita payments, casino profit is translated into the production of public goods such as those described above. We hypothesize that the median voter receiving per capita payments will be less willing to forego private goods in exchange for uncertain reductions in COVID-19 risk than the median voter not receiving per capita payments is to give up public goods. Fewer short-run substitutes are available for private goods such as food and shelter; income foregone from a reduction in per capita payments necessarily will constrain consumption when borrowing constraints exist as is common on reservations because individual access to credit is limited (Parker, 2012; Cattaneo & Feir, 2021; Dippel et al., 2021). Moreover, citizens can allocate per capita payments to finance private actions that reduce COVID-19 risks (e.g., improving ventilation, working remotely in locations where the exposure to risk is lower).

By contrast, the consumption of public goods likely was not as pressing or time sensitive as the consumption of private goods such as food and shelter. Moreover, the demand for

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[5] For additional media coverage alluding to the importance of per capita payments in the decision to reopen casinos, see Boomgaard (2020), Rhodes (2021), and Silverstein (2020).

[6] Casino profits must be allocated for financing public expenditures of some kind. The relevant law, 25 U.S.C. 2710(b)(2)(B), says that "net revenues from any tribal gaming are not to be used for purposes other than (1) to fund tribal government operations or programs; (2) to provide for the general welfare of the Indian tribe and its members; (3) to promote tribal economic development; (4) to donate to charitable organizations; or (5) to help fund operations of local government agencies".

[7] It is possible that factors other than the median voter will sway tribal decision-making, such as bureaucratic pressure and the structure of political institutions which can result in expenditure decisions that stray from the preferences of the median voter (Romer & Rosenthal, 1979). Tribes operate as democracies, however, and democracy does imply that governments ultimately will cater to the median voter's preferences, if the decision space is one-dimensional. As Randall Holcombe (1989, p. 115) has noted, "Just because the median voter model is not descriptive of every political market does not mean that it cannot provide a solid foundation for the analysis of public sector demand".

the use of some publicly provided goods such as recreational and cultural centers declined during the pandemic because of COVID-19 risk, meaning that the effect of casino closures likely was less salient on reservations where per capita payments were not distributed.[8]

A potentially important substitution effect in the consumption of public versus private goods likewise must be recognized (Mettler, 2018). Extra income from per capita payments can be used to cover expenses for services that otherwise would have been delivered by the government. Prior work on international remittances—income that is sent regularly to individuals from relatives living abroad—identifies a similar substitution effect on government provision of welfare goods (Bravo, 2009; Germano, 2013). Dionne et al. (2014, p. 5n1) find empirical support for the pattern that such transfers "are used to finance welfare goods privately," implying that remittances may increase the consumption of private goods to replace goods that had been provided by the state.

Relying less on the government for public services, individuals who receive per capita payments have less reason to hold governments accountable if the services are not delivered properly or cost-effectively. In its place, political discourse shifts from public service accountability to loss aversion and cultural dependence on formal institutions: maintaining the steady flow of cash transfers and its accompanying bureaucracy rather than ensuring adequate delivery of social services (Lofthouse, 2020; Mahdavi, 2020). That expectation is consistent with general accounts of the emergence of transfer-based societies, whereby individuals rely more heavily on the state primarily because of its (re-)distributive functions (Holcombe, 2020). Governance therefore becomes transactional, a pattern scholars have noted in the context of repeated cash transfers from Alaska Native Corporations (Anders & Anders, 1986; Hirschfield, 1991). Applying the same logic to gaming revenues, we might expect citizens primarily to hold tribal governments to account for continued delivery of per capita payments. With less accountability to their constituents—especially in matters not pertaining to the delivery of per capita payments—tribal governments will be less constrained on maximizing government income through unrestricted economic activity, even if such maximization poses risks for community health outcomes.

In summary, the tight linkages between per capita payments and private goods' consumption suggest that tribal citizens receiving per capita payments are likely to prefer a balance that leans more towards casino profits and less towards health and safety, especially in the context of uncertain COVID-19 risk. That conclusion ultimately is an empirical question, however, and we now turn to the data to assess how the actual decisions of tribal governments varied with the policy of per capita payments.

3 Data and methods

Our dependent variable is casino closure during the pandemic, measured as the number of days a given casino was closed between February 20, 2020, and February 20, 2022. Variation in this variable is driven by the earlier reopening of casinos after the initial pandemic wave during spring 2020, and also by differences in whether or not casinos closed a second or third time during the two-year period. We assembled information on casino openings and closures using a daily panel from Casino City's Gaming Directory, which tracked the

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[8] Our emphasis on the importance of private versus public goods is consistent with Besley and Coate (1991).
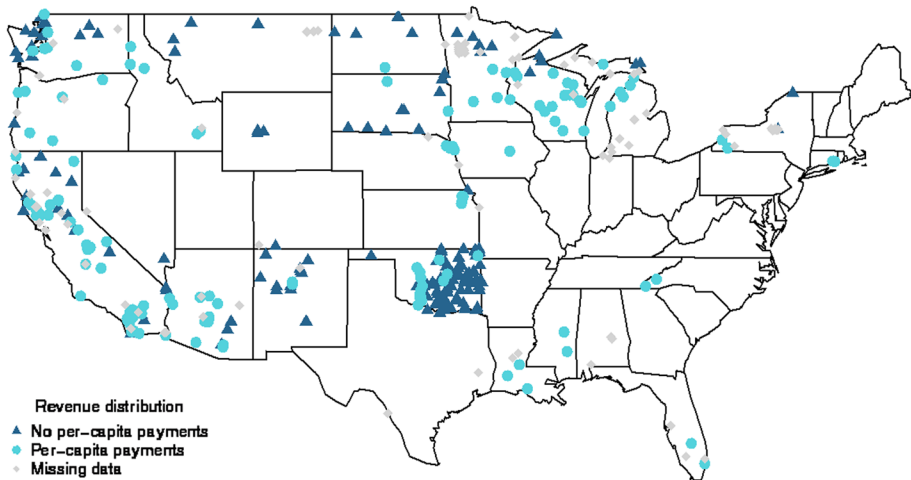
Fig. 2 Tribal gaming facilities in the contiguous United States. Dark blue triangles represent tribal casinos without per capita payments and light blue circles represent tribal casinos with per capita payments. Small grey diamonds show tribal casinos with missing data on revenue distribution systems. Based on data from Malinovskaya (2020) matched with the Casino City Gaming Directory full list of all operating casinos in the United States. See note in Table 1

operating status of 2225 gaming properties in the United States, including tribal casinos.[9] We then matched property locations with counties and tribal reservations based on geocoded addresses.

Figure 1 shows the geographic variation in tribal casino closures during the 24-month period of study. There is considerable variance across these facilities: some casinos, such as the Sandia Resort and Casino (Albuquerque, NM) and the Ho-Chunk (Tomah, WI), remained closed for over 470 days, in contrast to others like the Coushatta (Kinder, LA) and the Kickapoo (Shawnee, OK) that reopened after only being closed for two months.[10]

To measure per capita payments, our primary independent variable, we draw on a database compiled by Malinovskaya (2020) using information from the US Department of the Interior, scholarly reports, and local media sources.[11] Because data on per capita amounts are limited (often by design), we instead rely on a binary indicator for whether a tribe has ever distributed per capita payments from gaming revenues. This results in distributed per capita payments for 129 tribes, which we then match to the casino-level database described above. Figure 2 maps the distribution of all tribal casinos based on whether or not tribes

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[9] Data were scraped from the Casino City website (gamingdirectory.com) on February 20, 2021, and then again on February 20, 2022. We cross-validated several of these properties with their own casino websites to assess accuracy of closure information from Casino City. The dataset categorizes the following properties: Bingo Hall, Card Room, Casino Cruise, Commercial Casino, Dog Track, Dog Track Racino, Horse Track, Horse Track Racino, Indian Casino, and Off Track Betting Facility. Our analysis focuses on the property defined as "Indian Casino."

[10] A small number of casinos have censored closure ranges because they were built after the pandemic began, such as the Ponca Tribe of Oklahoma's Fancy Dance Casino in September 2020.

[11] A full list of sources used by Malinovskaya can be found here: https://drive.google.com/file/d/1R0zvteJoxRT2Erc2BWM7H0d9bg2-AR4u/view.
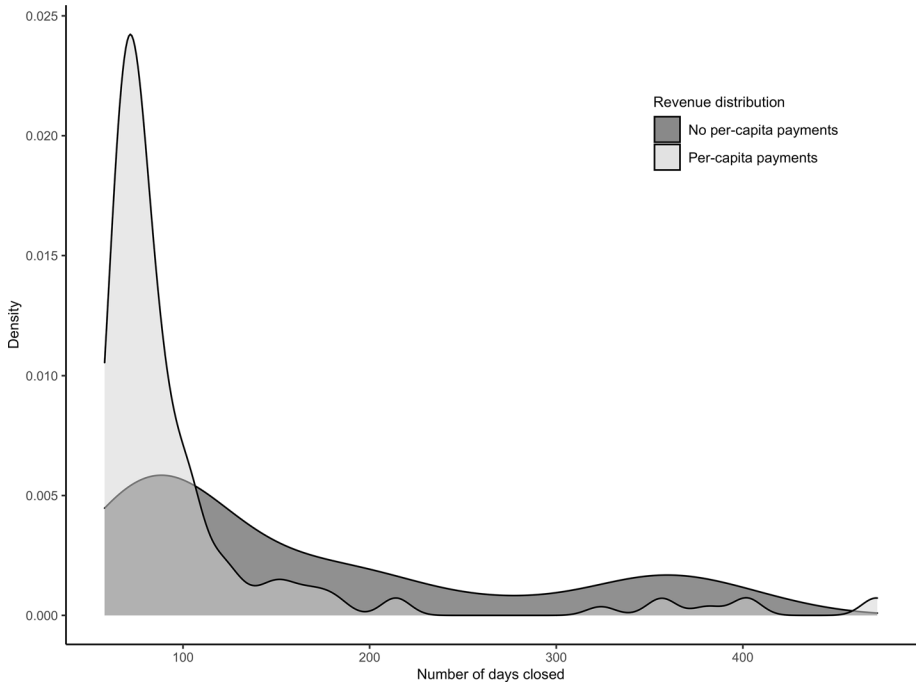
Fig. 3 Distribution of closure duration for tribal casinos with/without per capita payments. Kernel density of days closed for tribal casinos with (light grey) and without (dark grey) per capita payments. (Color figure online)

distribute per capita payments from these properties.[12] For example, the Santa Ynez Band of Chumash Indians operate the Chumash Casino in California, distributing monthly per capita payments based on gaming revenue from this facility.

3.1 Visualization of differences in days closed

To motivate the empirical analysis, we begin with a kernel density plot that compares the distribution of days closed for casinos with and without per capita payments. Figure 3 shows that casinos with per capita payments were closed for shorter periods on average. While casinos without per capita payments show a wide range of closure durations, casinos with per capita payments were predominantly closed for fewer than 100 days. Of course, these distributions do not account for potential confounders at the casino, community, or state levels, such as size, employment, income, and state opening regulations. We now turn to regression analysis in the following section to control for factors such as these.

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[12] Figure 3 in the Appendix shows this distribution alongside commercial casinos.

3.2 Regression model

We specify the following multivariate model to estimate the relationship between the existence of per capita payments and the decision to reopen tribal casinos after the onset of the pandemic:

$$y_{crs} = \alpha + \beta d_c + \gamma X_c + \delta Z_r + \theta_s + \epsilon_{crs}$$

where y is the number of days casinos remained closed (*AllDaysClosed*) for casino c on reservation r in state s; d is a binary indicator for per capita payments (*PerCapInd*); X is a matrix of casino-level covariates; Z is a matrix of reservation-level covariates; and θ represents state-level fixed effects. The latter captures a range of factors that vary at the state level that are difficult to measure reliably but change slowly (if at all) over the 24-month time period under study. One such factor is job insurance and state unemployment policies: tribes in states with minimal protection for unemployed workers would be under greater pressure from constituents to reopen casinos and other economic activities.

The casino level covariates include measures for the size of the casino on February 2, 2020 (square footage, number of gaming machines, and employment) to account for its economic importance prior to COVID-19. A larger casino means more profits are at stake and hence a sharper trade-off between profit and COVID-19 safety. The reservation covariates include the population and income per capita of the reservation, both measured before COVID-19 by the 2014–2018 American Community Survey (ACS) reports. We also add the population density of counties adjacent to reservations, also measured by the ACS reports. Standard errors are clustered at the reservation level to account for correlation in the timing of casino closures that are owned and operated by the same tribes.

Identifying the causal effect of per capita payments on casino reopenings with this design is hindered by the lack of random assignment. For example, the most populous tribes have historically opted against per capita revenue allocations. One justification for this choice among the Navajo Nation is that payments would be relatively small given so many tribal members, and that instead "the money would better be used in providing services or even put away in the bank where it could earn interest."[13] Indeed, as the summary statistics show (discussed below), reservations with the smaller American Indian populations were more likely to distribute per capita payments. Moreover, reservations making per capita payments also tended to have larger casinos and were closer to urban areas, as demonstrated by higher mean population densities in adjacent counties.

To account for these systematic and observable differences, our regression estimates controls directly for casino size, American Indian population, and the population density in adjacent counties. We also include state fixed effects to cover a wide range of plausible threats to exogeneity that may be clustered regional, in the same state.

The remaining threat to a causal interpretation is from any omitted variables that are correlated with both the historical decision to obtain federal approval of a tribal casino revenue allocation plan and the decision to restrict economic activity during the pandemic. We provide two types of sensitivity tests to address this threat, as discussed below.

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[13] Bill Donovan, "50 Years Ago: Navajo rejects idea of per-capita payments," *Navajo Times* (May 28, 2015), https://navajotimes.com/50years/50-years-ago-navajo-rejects-idea-of-per-capita-payments/.

Table 1 Sample summary statistics

Panel A: all tribal casinos	Obs.	Mean	SD	Min	Max
All days closed	444	110.39	78.75	17	472
Per capita payments	230	.62	.49	0	1
Gaming machines	439	774.9	948.17	5	8543
Am. Indian population on reservation	280	3518.09	14,135.43	0	166,395
Am. Indian per capita income on reservation	263	20,365.13	21,076.08	8321	246,692
Adjacent county population density	280	154.79	251.54	1.24	1708.97
Panel B: casinos included in regressions					
All days closed	210	128.74	96.57	58	472
Per capita payments	210	.63	.48	0	1
Gaming machines	210	833.89	821.26	5	5057
Am. Indian population on reservation	210	3929.24	16,254.37	20	166,395
Am. Indian per capita income on reservation	210	20,307.58	17,060.6	8321	155,913
Adjacent county population density	210	166.48	259.21	1.24	1708.97

The outcome variables and the information on casino size and employment were constructed from the Casino City's Gaming Directory. The per capita payment indicator comes from Malinovskaya (2020) and the information on American Indian reservation populations and incomes per capita come from the American Community Survey (ACS) records average over 2014–2018. Although there were 444 tribal casinos operating as of Feb. 2, 2020, we were unable to match every variable with every casino. The limitation on matching is due to some casinos operating in tribal areas that were either not federally recognized in Feb. 2020, or that were not listed in Malinovskaya (2020) and the ACS profiles

4 Summary statistics and results

Table 1 shows summary statistics for the full sample and for the smaller sample that we employ for regression estimation due to missing data for some covariates. There were 444 tribal casinos as of February 2, 2020. All tribal casinos closed for some duration during the pandemic, but all eventually reopened. The casinos were closed an average of 110 days, with a minimum of 17 and maximum of 472 days, between February 2, 2020, and February 20, 2022. Approximately 50% of the casinos offered payments per capita, based on Malinovskaya (2020). We log *all days closed* in some specifications to address the long right-side tail in the distribution and to minimize the influence of outliers.

In Table 3 in the Appendix, we compare means of the variables based on whether or not the casino was governed by per capita payments. On average, casinos with per capita payments were closed for 90 days compared to 120 days for casinos lacking per capita payments. Table 3 also shows that casinos governed by per capita payments are larger on average (i.e., they have more gaming machines) and are in more densely populated areas.

Table 2 Regression estimates

	Dependent variable is ln (all days closed)					
	(1)	(2)	(3)	(4)	(5)	(6)
Per capita payments	−0.28*** (0.10)	−0.17** (0.08)	−0.28** (0.11)	−0.21** (0.10)	−0.32*** (0.11)	−0.22** (0.10)
ln (gaming machines in Feb. 2020)	−0.10** (0.04)	−0.08** (0.03)	−0.10** (0.04)	−0.08** (0.03)	−0.10** (0.04)	−0.08** (0.03)
ln (adjacent county pop. density)	−0.05 (0.03)	−0.01 (0.03)	−0.02 (0.04)	0.00 (0.04)	−0.04 (0.03)	−0.01 (0.03)
ln (Am. Indian population, 2014–2018)			0.07*** (0.03)	0.01 (0.03)		
ln (Am. Ind. inc. per capita, 2014–2018)			−0.04 (0.09)	−0.08 (0.07)		
State fixed effects	No	Yes	No	Yes	No	Yes
Observations	226	226	210	210	210	210
R-squared	0.20	0.54	0.26	0.55	0.21	0.54

Standard errors, which are clustered at the reservation level, are shown in parentheses. $*p < 0.1$, $**p < 0.05$, $***p < 0.01$

4.1 Estimation results

Table 2 shows estimates of the regression model using the natural log of the number of days closed.[14] The even columns include state fixed effects and the odd columns do not. Columns 3 and 4 control for reservation level American Indian populations and incomes per capita, both measured as the average over 2014 and 2018. Column 5 controls for the average number of days closed for non-tribal casinos operating in the same state as discussed in more detail below. The standard errors are clustered at the reservation level to account for the few cases where multiple casinos operate on a single reservation and may be closed or open for reasons that are correlated within reservations.

The Table 2 estimates reveal a strong negative relationship between the number of days closed and the use of per capita payments. Casinos associated with per capita payments were open longer over Feb. 20 2020 through Feb. 20, 2022. The magnitude of the coefficients suggests the relationships are economically meaningful in terms of foregone casino revenue. Coefficients in column 1, for example, translate into a $e^{-0.338} - 1 = 29\%$ decrease whereas column 2 translates into a $e^{-0.188} - 1 = 17\%$ decrease in days closed.

Larger casinos, measured by the number of gaming machines, tended to be closed for shorter durations. Columns 1–2 indicate that a 10% increase in gaming machines is associated with about a 1% decrease in days closed. These results are consistent with tribes wanting to avoid the sharper economic loss that results from closing larger casinos.[15]

Columns 3–4 include two reservation-level covariates: the natural logs of the population of American Indians on reservations and the income per capita of the Indian population on these reservations, both estimated by the ACS over 2014–2018. Adding these variables decreases the number of observations but adds important controls for population size and income. The results indicate that adding the reservation-level controls has little effect on the relationship between per capita payments and casino closures. Here again, casinos on reservations with per capita payments were open between 19 and 28% longer than casinos on reservations lacking per capita payments. There is some evidence that reservations with larger American Indian populations—and hence more exposure to COVID-19—tended to stay closed longer but this finding is not robust to the inclusion of state fixed effects. Moreover, conditional on the use of per capita payments, the size of casinos, and the size of the reservation population, the per capita income of reservations is uncorrelated with closure policy. Columns 5–6 repeat the analysis shown in the first two columns but with the reduced sample size that results from adding the reservation-level covariates.

We also explore heterogeneity in the per capita payments results across two variables. First, we test whether the per capita effect is different across population density of counties adjacent to reservations, which we use to proxy for areas where COVID may have been more prevalent. We find a negative correlation between per capita payments and closure days in areas with lower population density (below 400 people per square kilometer), while the effect is effectively zero in places with very high population density. Figure 6 in the Appendix plots the marginal effect with an underlying histogram of adjacent county population density, showing that this negative marginal effect covers most of the data given how few reservations are near counties with a density above 400 people per square kilometer (above 6 on the logged scale). Second, we test whether the per capita effect is smaller

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[14] We log the dependent variable to reduce the effect of outlier observations but the results from specifications that are not logged are qualitatively similar.

[15] Here we measure casino size with the number of gaming machines to maximize the number of observations. The coefficients on per capita payments are similar if we add square footage and employment.

in places with higher income from outside earning opportunities, which we proxy using adjacent county income per capita. Here we find that the negative correlation persists in reservations adjacent to counties with low and middle income levels but is effectively zero in reservations near high-income counties (Appendix Fig. 7). This suggests that the per capita effect is smaller in places where alternative options exist for tribal members to earn additional income.

4.2 Sensitivity analysis

Is the per capita effect driven by omitted variables bias? It could be, for instance, that an unobserved confounder accounts for both variation in the origins of per capita payments and the decision to reopen tribal casinos, biasing the estimated relationship. While it is impossible to rule out such confounding factors with certainty with our research design, we can address the following question: how strong would these confounders have to be in order to change the conclusion that per capita payments affect casino closures during the pandemic?

Cinelli and Hazlett (2020) derive a sensitivity analysis framework that answers this question by simulating a hypothetical confounder that explains variation in both the treatment and outcome (conditional on observed covariates) and assessing the extent to which this confounding alters the estimated treatment effect.[16] We compare a hypothetical confounder to the strongest observed predictors (empirically and theoretically) of casino closures and per capita payments: casino size (gaming machines) and reservation size (American Indian population). This follows from the idea that larger tribes were less likely to adopt per capita payments (Crepelle, 2020), while larger casinos were less likely to remain closed during the pandemic. In other words, we estimate the confounding effect of a hypothetical omitted variable that would have the same impact or greater on casino closures as casino size or reservation population.[17]

Results from this sensitivity analysis indicate that any unobserved confounder would need to be more than three times as strongly associated with casino closures and per capita

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[16] This approach is similar to Oster (2019) and Altonji et al. (2005) in considering the omitted variable bias problem from the perspective of "bounding" the extent of confounding. Oster (2019), for example, details the use of a sensitivity parameter to estimate "proportional selection," which indicates the extent to which unobserved confounders drive treatment assignment relative to observed covariates. But as Cinelli and Hazlett (2020) explain, this parameter "does not correspond directly to… arguments about relative explanatory power of observables and unobservables in the treatment assignment process." Part of the inability to make such claims lies in the construction of the Oster and Altonji et al. sensitivity parameters which depend directly on—but do not estimate—the associations between the unobserved factors that drive treatment assignment and the unobserved factors that drive variance in the outcome (akin to a sort of "meta" confounding). The Cinelli-Hazlett sensitivity parameter, by contrast, is derived from a bounding procedure that "captures precisely this notion of the relative explanatory power of the unobservable and observable over treatment assignment, in terms of partial R^2 or total R^2, depending on the investigator's preference." In our sensitivity analysis, we choose the former, as the axes in Fig. 4 both illustrate the size of the partial R^2 of the confounder with the treatment (x-axis) and the outcome (y-axis).

[17] The Cinelli–Hazlett approach is agnostic on the number of confounders and the functional form of confounding. The "robustness value" which is used to generate the estimates in Fig. 4 provides an upper bound on changes to the effect size and significance in the face of "multiple unobserved confounders, possibly acting non-linearly—this includes the explanatory power of all left-out factors, even misspecification of the functional form of observed covariates" (Cinelli & Hazlett, 2020, p. 56). In our case, if there were multiple confounders and/or interactions between confounders, our estimate would still remain robust if the combined explanatory power of these confounders is three times as large as the explanatory power of casino size or reservation size in predicting both the decision to issue per capita payments and the decision to reopen casinos during the pandemic.
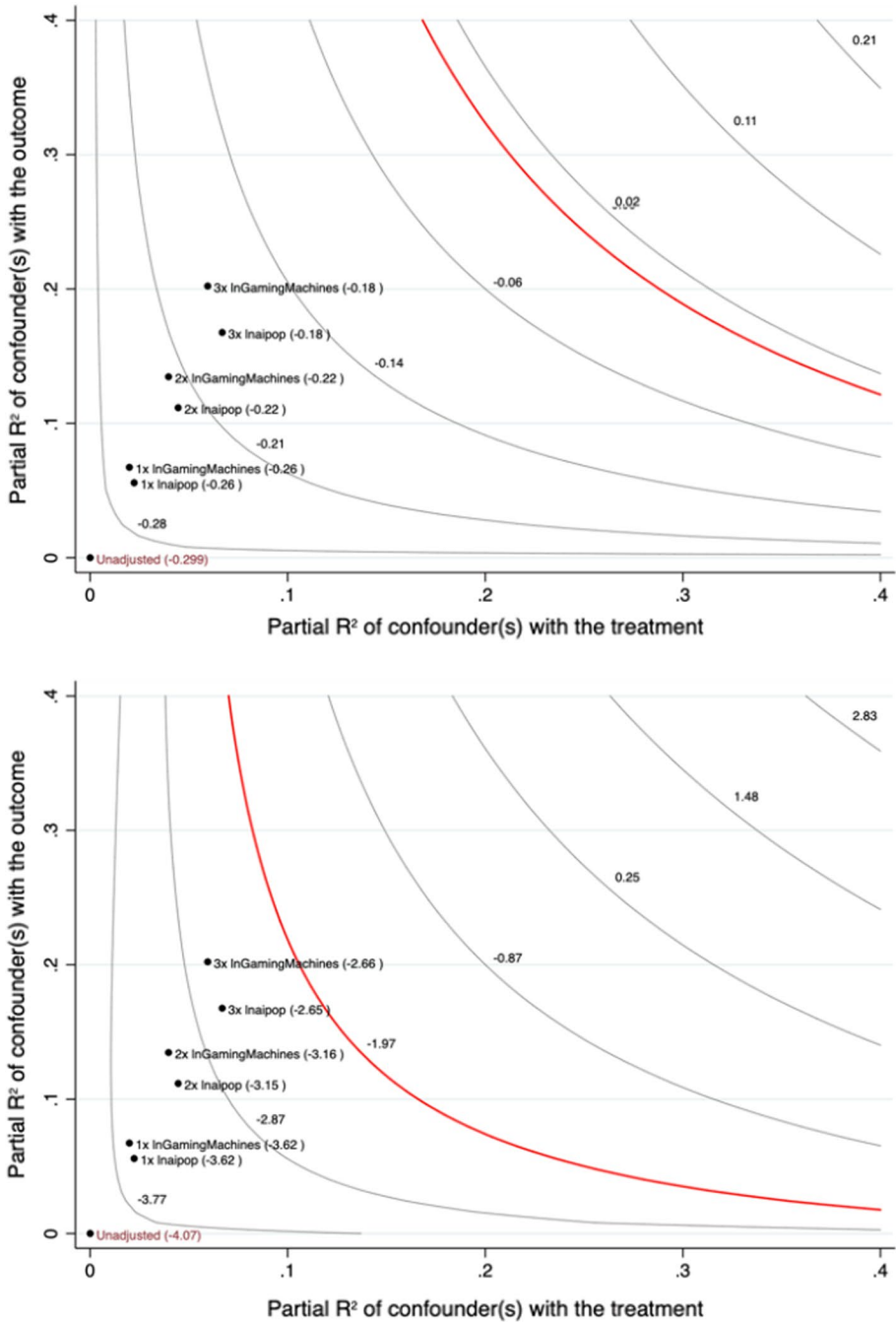
Fig. 4 Sensitivity of results to potential omitted variables. Sensitivity contour plots of point estimate (top) and *t* value (bottom) of the coefficient on per capita payments in Model 3 of Table 2. Each black dot indicates the expected change to the estimated value from the addition to the model of an unobserved confounder with three times (3×) the explanatory power of logged gaming machines and reservation population, the two strongest predictors of per capita payments and casino closures that we can observe

payments as casino size or reservation size to fully explain away the point estimate and cross the threshold of statistical significance. Figure 4 shows the change in effects from adding such unobserved confounders to the model: a confounder with three times the predictive power of casino size (gaming machines), for instance, changes the coefficient estimate of per capita payments on number of days closed from −0.299 to −0.180 (left panel), which remains significant at the 5% level with a *t*-value of −2.66 (right panel).[18]

As a second robustness check on omitted variable bias, we control directly for a historically determined factor that correlates with per capita payments: an indicator variable for whether or not a reservation contained extensive energy resources (e.g., coal and oil) prior to opening a casino, as assessed by Ambler (1990). As Table 4 in the Appendix shows, casinos on these reservations are more likely to allocate per capita payments after controlling for the size of the American Indian population, adjacent county population density, and state fixed effects. One interpretation is that energy endowments familiarized tribes with the distribution of collective revenues prior to the casino era, and this familiarity made the citizens more likely to favor per capita payments.

Table 5 in the Appendix shows the main regression results with the inclusion of the energy tribe indicator variable. The coefficients on the per capita payment indicator are somewhat larger in absolute magnitude with the inclusion of this control, suggesting that the omission of historical determinants from our main specification may be biasing the coefficient estimates towards zero. Moreover, the coefficient on the energy tribe indicator is large, positive, and highly statistically significant. This may suggest that alternative revenues sources—such as money from mining and drilling—made tribes more willing to keep casinos closed during the COVID-19 pandemic.

5 Conclusion

Our study of tribal casino governance during the COVID-19 health crisis brings new evidence to the literature on factors affecting the governance of health–wealth trade-offs. The results here are consistent with the theory that per capita payments from gaming revenues play an influential role in how tribal governments balance economic interests with community health priorities. Across tribal casinos in the United States in operation prior to the onset of the COVID-19 pandemic in March 2020, we find that casinos that distribute per capita payments were open between 17 and 29% longer during the pandemic than casinos without per capita payments. These results are robust to the inclusion of various factors at the casino, reservation, and state levels, as well

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[18] Specifically, the partial R2 of the treatment with the outcome indicates an extreme confounder (orthogonal to the covariates) that explains 100% of the residual variance of the outcome, would need to explain at least 7.49% of the residual variance of the treatment to fully account for the observed estimated effect. The so-called robustness value, here set to $q = 1$, indicates that unobserved confounders (orthogonal to the covariates) that explain more than 24.69% of the residual variance of both the treatment and the outcome are strong enough to bring the point estimate to 0 (a bias of 100% of the original estimate). Conversely, unobserved confounders that do not explain more than 24.69% of the residual variance of both the treatment and the outcome are not strong enough to bring the point estimate to 0. Furthermore, unobserved confounders (orthogonal to the covariates) that explain more than 13.61% of the residual variance of both the treatment and the outcome are strong enough to bring the estimate to a range where it is no longer "statistically different" from 0 (a bias of 100% of the original estimate), at the significance level of alpha = 0.05. Conversely, unobserved confounders that do not explain more than 13.61% of the residual variance of both the treatment and the outcome are not strong enough to bring the estimate to a range where it is no longer "statistically different" from 0, at the significance level of alpha = 0.05.

as potentially omitted but unobserved confounders via a simulation-based sensitivity analysis. Most fundamentally, the findings imply that tribal governments on reservations with per capita payments were more likely to govern casino closures in ways that exchanged larger revenues for more risk to tribal members of catching COVID-19.

These findings imply that a number of other health–wealth trade-offs may also be impacted by the existence of per capita payments. In the tribal casino context, the decision to allow smoking and/or to serve alcohol in casinos may drive increased traffic to gaming facilities but bears public health consequences for both casino employees and the broader tribal community. The existence of gaming facilities in general has been linked to increased alcohol and drug usage on reservations, and it is unclear whether distributional choices surrounding per capita payments play a role in exacerbating these outcomes.

More generally, the findings suggest that per capita payments will sharply change government priorities to lean more towards economic activity. The implication is that per capita payments do not only affect the distribution of revenues from state-owned enterprises, they fundamentally affect the size of revenue flows from those enterprises. This may have implications for how much communities—such as American Indian Nations—want to pursue disruptive energy development such as that for oil, gas, wind, and solar. Our findings support the intuition that communities will be most aggressive when natural resource dividends are paid directly to constituents (Hammond, 2012), suggesting that prospects for energy development are very much linked to distributional choices. We leave these important issues for future research.

Appendix

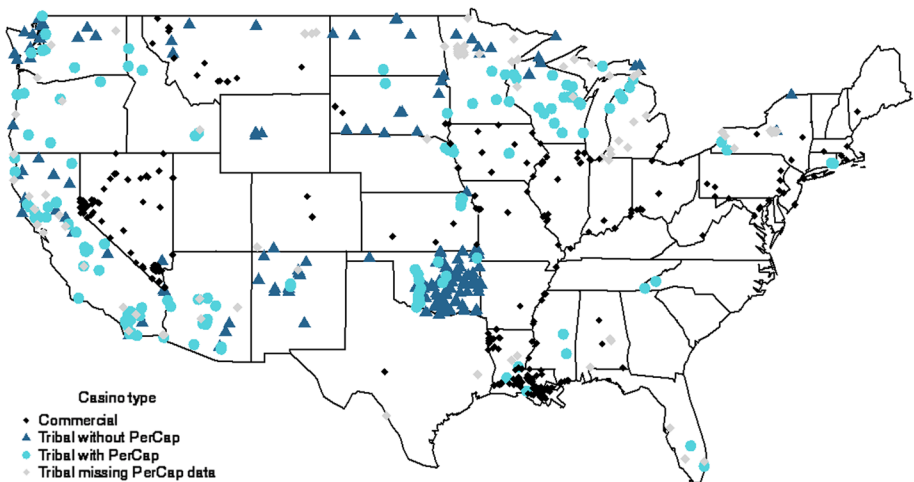See Figs. 5, 6, 7 and Tables 3, 4, 5.

Fig. 5 Commercial and tribal casinos in the contiguous United States. Small grey diamonds represent non-tribal casinos; dark blue triangles represent tribal casinos without per capita payments; light blue circles represent tribal casinos with per capita payments; small grey diamonds show tribal casinos with missing data on revenue distribution systems. Based on data from Malinovskaya (2020) matched with the Casino City Gaming Directory full list of all operating casinos and other gaming facilities in the USA. See note in Table 1

Fig. 6 Heterogeneity of the per capita payment correlation with closure days, by population density in counties adjacent to reservations. Each point estimate is the estimated marginal effect of the per capita variable in a regression of closure days (logged) on per capita payments interacted with adjacent county population density (logged), controlling for casino size. The overlaid histogram shows the distribution of logged population density
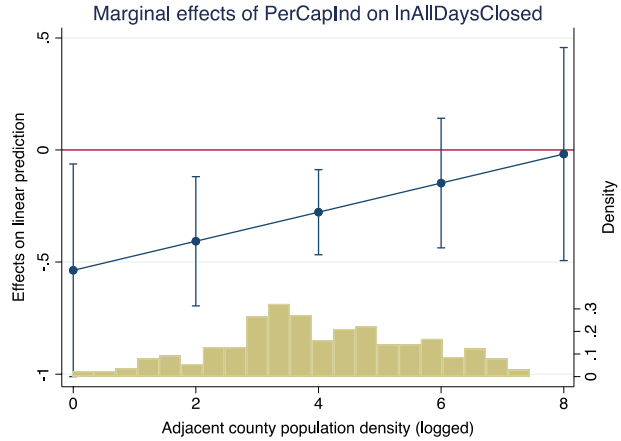

Marginal effects of PerCapInd on lnAllDaysClosed

Fig. 7 Heterogeneity of the per capita payment correlation with closure days, by average income in counties adjacent to reservations. Each point estimate is the estimated marginal effect of the per capita variable in a regression of closure days (logged) on per capita payments interacted with adjacent county income per capita (logged), controlling for casino size. The overlaid histogram shows the distribution of logged adjacent county income
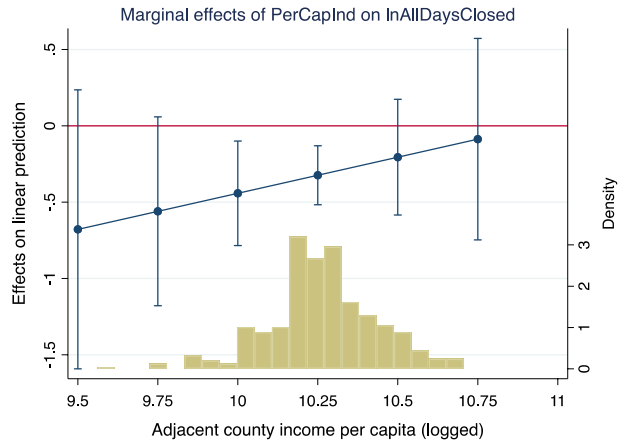

Marginal effects of PerCapInd on lnAllDaysClosed

Table 3 Cross-tabulated summary statistics, by per capita status

Summary statistics

	Observations	Mean	SD
Tribes not making per cap payments (PerCap = 0)			
All days closed	158	120.29	120.59
Gaming machines	122	495.29	460.58
Am. Ind. pop., 2014–2018	145	6346.86	23,617.98
Am. Ind. per capita income, 2014–2018	132	15,404.12	4586.44
Adjacent county pop. density	145	97.73	174.62
Tribes making per cap payments (PerCap = 1)			
All days closed	177	90.67	76.78
Gaming machines	165	977.03	907.65
Am. Ind. pop., 2014–2018	173	1524.29	2341.81
Am. Ind. per capita income, 2014–2018	160	22,985.28	19,676.95
Adjacent county pop. density	173	228.36	309.01

The top panel shows summary statistics for all variables included in regressions for tribes not making per capita payments from casino revenues; the bottom panel shows these statistics for tribes making per capita payments. Note the considerable loss of data for the historical energy resources indicator and the percentage of reservations that are under tribal ownership, as these data are only available for less than half of the full sample

Table 4 Historical determinants of per capita payments

	Dependent variable is per capita payments (binary)	
	(1)	(2)
ln (Am. Ind. pop.)	−0.042** (0.020)	−0.039* (0.022)
ln (adj. county pop. density)	0.17*** (0.02)	0.19*** (0.03)
Energy resources indicator	0.13 (0.11)	0.25** (0.12)
State fixed effects	No	Yes
Observations	120	120
R-squared	0.47	0.68

Standard errors, which are clustered at the reservation level, are shown in parentheses. $*p < 0.1$, $**p < 0.05$, $***p < 0.01$. The "energy resources indicator" comes from Ambler (1990) and equals 1 if the reservation had significant and valuable energy endowments (e.g., coal, oil) prior to opening a casino

Table 5 Regression estimates of all days closed with controls for energy resources

	Dependent variable is ln (all days closed)					
	(1)	(2)	(3)	(4)	(5)	(6)
Per capita payments	−0.30* (0.10)	−0.21** (0.09)	−0.31*** (0.11)	−0.26** (0.11)	−0.35*** (0.11)	−0.26 (0.10)
ln (gaming machines)	−0.09** (0.03)	−0.09** (0.03)	−0.09** (0.04)	−0.08** (0.03)	−0.09** (0.04)	−0.08* (0.034)
ln (adj. county pop. density)	−0.02 (0.03)	0.01 (0.03)	0.00 (0.04)	0.01 (0.04)	−0.01 (0.03)	−0.00 (0.03)
Energy resources indicator	0.45*** (0.15)	0.41** (0.17)	0.37*** (0.16)	0.41** (0.18)	0.44** (0.15)	0.41** (0.17)
ln (Am. Ind. pop.)			0.05 (0.03)	−0.00 (0.03)		
ln (Am. Ind. inc. per cap.)			−0.05 (0.08)	−0.07 (0.07)		
State fixed effects	No	Yes	No	Yes	No	Yes
Observations	226	226	210	210	210	210
R-squared	0.28	0.57	0.31	0.57	0.29	0.57

Standard errors, which are clustered at the reservation level, are shown in parentheses. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$. The "energy resources indicator" comes from Ambler (1990) and equals 1 if the reservation had significant and valuable energy endowments (e.g., coal, oil) prior to opening a casino

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