ECONOMICS

National monuments and economic growth in the American West

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National monuments in the United States are protected lands that contain historic landmarks, historic and prehistoric structures, or other objects of historic or scientific interest. Their designations are often contentious. Opponents argue that monuments hurt local economies by limiting uses of public lands, while supporters counter that monuments create a new amenity-driven economy. We use panel data on all business establishments in the eight-state Mountain West region to estimate economic impacts of 14 monument designations over a 25-year period. We find that monuments increased the average number of establishments and jobs in areas near monuments; increased the average establishment growth rate; had no effect, positive or negative, on the number of jobs in establishments that existed pre-designation; and had no effect on mining and other industries that use public lands. On net, protecting lands as national monuments has been more help than hindrance to local economies in the American West.

INTRODUCTION

The federal government in the United States owns and manages 640 million acres of land, 28% of the U.S. land area (*1*). In the 13 westernmost states, more than half of all land is federally owned. Most of these lands in the West are under the authority of two government agencies: The Bureau of Land Management and the Forest Service, which manage them, by law (*2, 3*), for multiple uses. How to balance these uses—how much of the land should be leased for energy production, where to allow livestock grazing, what areas are appropriate for recreation, and what lands are home to cultural and historic resources that should be protected—has long been a source of debate and conflict.

National monument designations on federal lands have often been particularly fraught. National monuments are areas set aside for protection because they contain historic landmarks, historic and prehistoric structures, or other objects of historic or scientific interest. They are typically created from existing federal lands by Presidential proclamation using authority granted in the 1906 Antiquities Act (*4*). Many national monuments offer spectacular scenery and protect some of the country's most important Native American artifacts and structures. Several national parks began as national monuments— Grand Canyon in Arizona, Zion and Bryce Canyon in Utah, Joshua Tree in California, and many more. But over the years, some monument designations have incited substantial local opposition (*5–7*). In December 2017, after a contentious U.S. Department of the Interior review of 26 large monuments, President Donald Trump issued proclamations reducing the size of two monuments in Utah, Grand Staircase-Escalante and Bears Ears, by over 2 million acres—reductions of 50 and 85%, respectively (*8, 9*), a legally questionable move currently tied up in the U.S court system (*10–12*).

Much of the debate over national monuments and other protected lands revolves around their impacts on local economies. Opponents argue that conferring protective status on the lands restricts economic opportunities, while advocates counter that protection creates a new amenity-driven economy (*13–15*). When a monument is designated, energy and mining leases that existed before designation are allowed

to continue, but future leasing is prohibited. Changes in livestock grazing allotments vary monument to monument but have been minimally affected in many cases. Monuments have very little developed visitor and recreation infrastructure, in contrast to national parks. Upon designation, a visitor center may be created in a nearby community but no new campgrounds, picnic areas, trails, or other facilities are added to the site. Thus, very little actually changes on the landscape when a monument is designated. The broader economic trends in the West show a general shift away from natural resource–based and extractive industries toward a variety of service sectors (*16*). In 2015, 36% of all jobs in rural areas of the eight-state Mountain West region were in services (Supplementary Materials). Given all of these factors, what can local communities expect the economic impact of monument designations to be? Will granting protective status to the public lands help or hurt local economies or leave them unaffected?

The extant literature on these issues is limited in two important ways: Empirical methods establish, at best, correlations and not causation, and the data used in the analyses are at a low spatial resolution, typically county level (*17–20*), where the link between economic outcomes and protected lands may be tenuous. Three exceptions to the correlation-only limitation are Chen *et al.* (*21*) and Jakus and Akhundjanov (*22, 23*), who use quasi-experimental econometric methods to analyze the effect of protected lands on economic outcomes. Chen *et al.* (*21*) use matching techniques and difference-in-differences (DID) regressions to estimate the impacts of the 1994 Pacific Northwest Forest Plan, which set aside over 11 million acres of publicly owned forestland in Oregon for conservation and habitat protection. They find positive impacts on population, income, and property values in small communities located close to the protected lands but no discernible effect for larger communities. Jakus and Akhundjanov (*22*) use DID regressions and synthetic control methods to analyze the effects of the Grand Staircase-Escalante National Monument designation on county per-capita income. Synthetic control methods are similar in concept to DID, but the researcher creates a "synthetic" control group to compare with a treatment group (*24, 25*). In (*23*), the authors extend their analysis to eight additional monuments. Both studies find no significant effect, positive or negative, on average per capita income from monument designations, and the

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authors conclude that monuments are "neither a boon nor bane" to local communities (22).

Here, we use similar econometric methods but apply them to a large panel dataset of geolocated individual business establishments. The data include the number of jobs in each establishment and a detailed representation of industry type. We estimate DID regressions that measure the causal impacts of monument designations on individual establishments that existed at the time of designation and on growth in establishments and jobs in areas near monuments. Because we know the locations of individual establishments, the latter analysis is not limited to a county level. Moreover, we can attribute net annual growth to changes on the extensive and intensive margins—i.e., from gains and losses in new businesses and expansions and contractions in existing businesses, providing a more nuanced assessment of monument treatment effects. Last, because we know the industry for each establishment, we can assess which industries may be helped or hurt by monument designations, another issue that is unexplored in the existing literature.

Our study region is the Mountain West, which includes eight states (Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming), and our data cover the period from 1990 to 2015, which allows us to analyze 14 monuments established between 1991 and 2014 (Table 1 and Fig. 1). We estimate DID regressions on the following economic outcome variables: (i) the number of jobs per establishment, (ii) the number of total establishments and jobs in areas near the monuments, and (iii) establishment and job growth rates in areas near the monuments, broken down into extensive and intensive margin effects. We also investigate changes across industry sectors, including mining, forestry, and livestock grazing, the industries that many have argued are negatively affected by monument desig-

nations as they often rely on access to federal lands. We combine the jobs data with information on wage income by industry and county from the U.S. Bureau of Labor Statistics (BLS) to look at wage income effects from monument designations.

Our empirical strategy relies on comparisons between geographic areas surrounding monuments and those in adjacent areas, before and after the designation dates of the monuments (Fig. 2). In this way, we select "control" areas that have economic trends similar to the "treatment" areas before treatment. We use fixed effects to control for establishment and local area unobservable characteristics, as well as state- and industry-specific time trends.

RESULTS

We focus on three sets of regressions to investigate different types of economic impacts from monument designations: (i) the average number of jobs per individual establishment; (ii) the average number of establishments, jobs, and wage income in U.S. Census–defined Zip Code Tabulation Areas (ZCTAs) within 25 km of a monument; and (iii) the annual growth rate of establishments and jobs in these ZCTAs; we also break down the growth rates into establishment and job "births" and "deaths," as well as job expansions and contractions at existing establishments.

The treatment area is ZCTAs within a 25-km buffer of the monument. Control ZCTAs are those adjacent to treated ZCTAs. For establishment-level regressions, treated establishments are those located in treated ZCTAs and control establishments are in control ZCTAs, to maintain consistency in the sample across the three sets of regressions. Figure 2 illustrates the treatment and control areas for two monuments in our sample (with the dots showing establishments

Table 1. National monuments in Mountain West region designated between 1991 and 2014. Pompey's Pillar National Monument, created in 2001, is excluded because it is only 51 acres. Craters of the Moon was created as a small site in 1962 but greatly expanded in 2000 and therefore is included. Visitor statistics are provided by BLM National Conservation Lands Division; Chimney Rock statistics are available in (40) and are for 2017; and NPS portions of Craters of the Moon are from annual visitation reports available from NPS Integrated Resource Management Applications (IRMA) Portal.

| National monument	State	Agency	Year created	Acres	Visits, 2018
Organ Mountains-Desert Peaks	New Mexico	BLM	2014	496,330	415,690
Rio Grande del Norte	New Mexico	BLM	2013	242,555	199,664
Chimney Rock	Colorado	USFS	2012	4,726	17,518
Prehistoric Trackways	New Mexico	BLM	2009	5,280	12,023
Kasha-Katuwe Tent Rocks	New Mexico	BLM	2001	4,148	301,238
Sonoran Desert	Arizona	BLM	2001	486,149	28,064
Upper Missouri River Breaks	Montana	BLM	2001	377,346	38,290
Craters of the Moon	Idaho	NPS, BLM	2000	661,287	267,660
Vermillion Cliffs	Arizona	BLM	2000	293,000	196,841
Canyon of the Ancients	Colorado	BLM	2000	164,000	130,113
Ironwood Forest	Arizona	BLM	2000	128,917	32,580
Agua Fria	Arizona	BLM	2000	71,100	43,729
Grand Canyon-Parashant	Arizona	BLM	2000	1,014,000	37,827
Grand Staircase-Escalante	Utah	BLM	1996	1,700,000	1,157,915
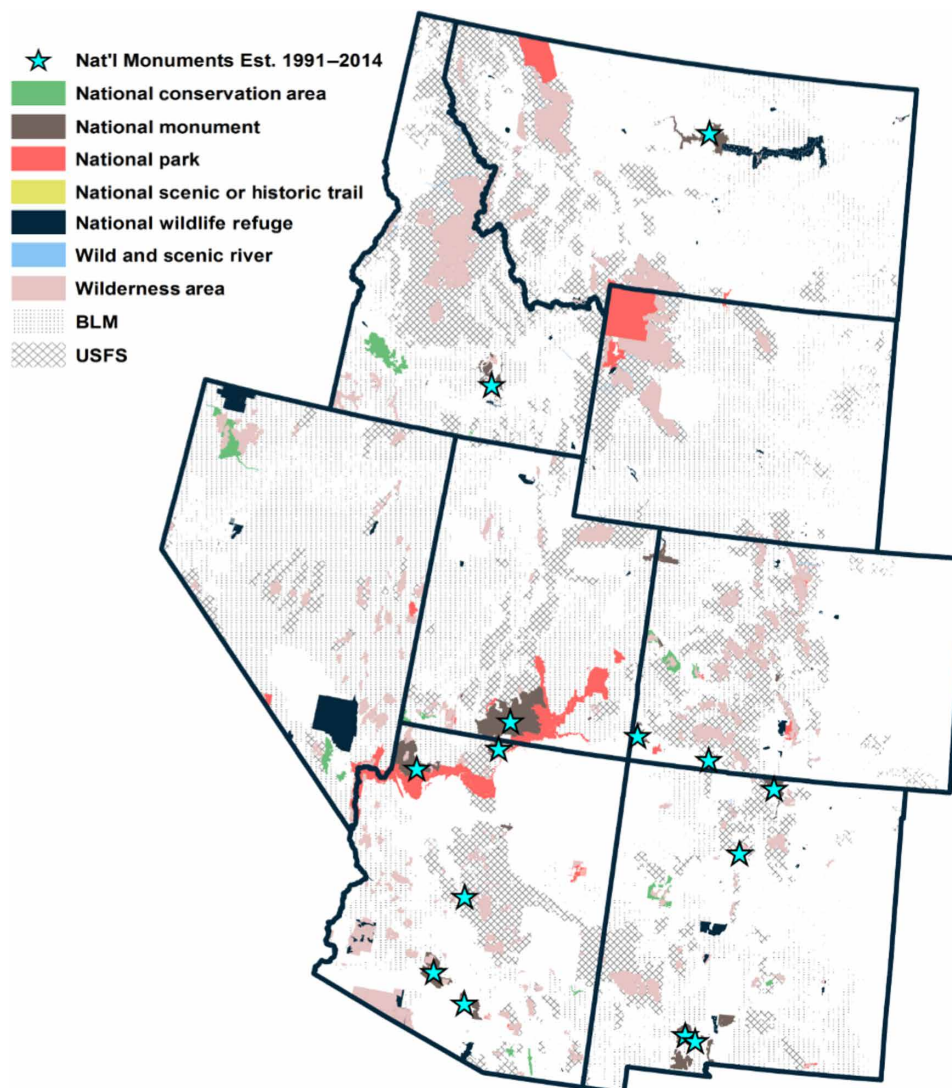
Fig. 1. Federal protected lands in eight-state Mountain West region.

in 2015). Our selection of 25 km is based on a conservative assumption of the geographic areas potentially affected by monument designations. It is possible that some parts of our neighboring control ZCTAs are affected by the monument; thus, in a robustness check, we use ZCTAs slightly farther away as controls (Supplementary Materials).

Our identification strategy relies on the plausibly exogenous shock of the monument designation at a particular point in time. While areas may be discussed as potential monuments for years, the timing of Presidential proclamations is often unexpected, and once the proclamation is made, monument status is immediately conferred on the lands (i.e., there is no concern about an announcement effect). The location of monuments is not random, however, as sites must contain historic, prehistoric, cultural, or geologic resources, and it is possible that local economic considerations factor into designations. Our selection of control areas assumes that, conditional on the fixed effects, ZCTAs bordering the treatment ZCTAs had similar economic trends to the treatment ZCTAs before monument designation. In the Supplementary Materials, we show the importance of the fixed effects to our final results, and we carry out event study regressions to investigate the pre-trends assumption.

The first regression measures the effect of monument designation on jobs in establishments that existed at the time of designation and is thus a purely intensive margin effect—i.e., it assesses whether and how much existing businesses are affected when nearby federal lands are protected. The second and third sets of regressions analyze growth in the areas around the monuments. In (iii), we use our micro-data to disentangle the separate extensive and intensive margin components of establishment and job growth rates.

Average number of jobs per establishment

Our first results reveal no statistically significant effect of monument designation on the average number of jobs per establishment for establishments that existed at the time of designation (Table 2, panel A). The sign on the estimated treatment effect is positive, but the magnitude is small (0.39%) and not statistically different from zero. Thus, monument designations have no discernible effect on the average
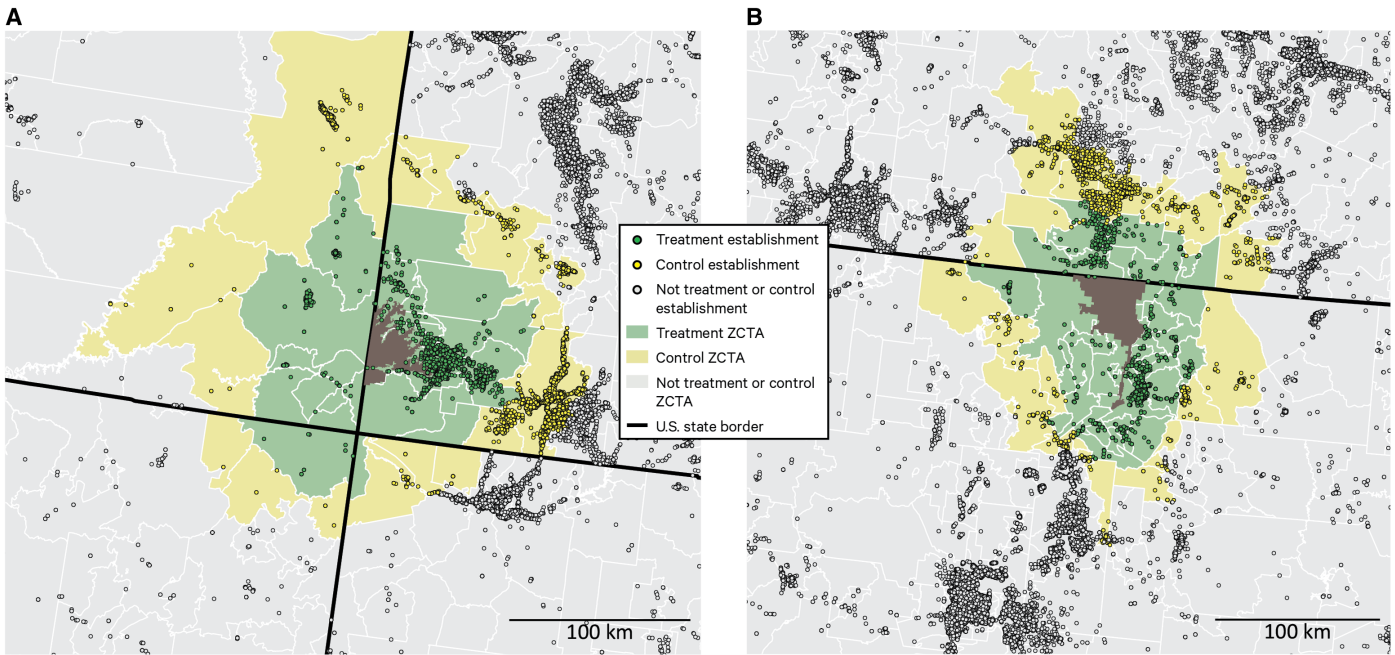
Fig. 2. Maps of treatment and control ZCTAs near two monuments, with 2015 establishments. ZCTAs with a boundary within 25 km of a national monument are considered treated; neighboring ZCTAs are controls. (**A**) Canyons of the Ancients in Colorado (established in 2000) and (**B**) Rio Grande del Norte in New Mexico (established in 2013).

Table 2. DID regression results: Monument designation impacts.
(**A** and **B**) Robust standard errors, two-way clustered at state and year level, in parentheses. (A) Regression includes individual establishment fixed effects, state by year fixed effects, and industry by year fixed effects (using two-digit SIC codes). (B) Regressions include individual ZCTA fixed effects and state by year fixed effects. *$P < 0.10$; **$P < 0.05$; ***$P < 0.01$.

A

	$ln(\text{jobs}_{jsjt})$
Treatment—establishments in ZCTAs within 25 km of monument	0.0039 (0.003)
No. of observations	3,077,838
No. of establishments	369,758
R^2	0.922

B

	$ln(\text{establishments}_{zjt})$	$ln(\text{jobs}_{zjt})$	$ln(\text{wage}_{zjt})$
Treatment— ZCTAs within 25 km of monument	0.099** (0.020)	0.085** (0.025)	−0.0014 (0.018)
No. of observations	10,892	10,892	10,885
No. of zip codes	435	435	435
R^2	0.974	0.958	0.638

number of workers used in existing establishments. This null result continues to hold in a robustness check in which we use controls in ZCTAs slightly farther away from the monuments (Supplementary Materials).

Average numbers of establishments, jobs, and average wage income in areas near monuments

Monument designation has a positive and statistically significant average treatment effect of approximately 10% on the total number of establishments and 8.5% on the total number of jobs in ZCTAs within 25 km of the monument (Table 2, panel B). The effects estimated in these regressions are averages comparing all years after designation to all years before. Thus, they indicate that monument designations are associated with an average increase in the number of establishments and jobs in areas around the monuments.

Monuments have no effect, positive or negative, on average wage incomes. Monument opponents often argue that low-wage service sector jobs replace relatively high-wage jobs in, for example, the mining industry when monuments are designated. We find no evidence of this; earnings appear to be unaffected, on average. We also find no statistically significant effect on the wage income growth rate (Supplementary Materials).

We estimate the total establishment and jobs regressions at the individual industry level to assess which industries are contributing to the estimated positive overall effects reported in Table 2. Several service industries show positive and significant effects. The estimated average jobs increases are 16% in hotels and lodging services, 24% in business services, 29% in health services, and 16% in finance, insurance, and real estate services. The construction industry shows a 17% increase in jobs. Mining, forestry, and livestock grazing industries, which often rely on public lands in the region, experience no

Table 3. DID regression results: Impact of monument designations on establishment and job growth rates in ZCTAs. Treated sample: ZCTAs within 25 km of monument, measured border to border. Control sample: ZCTAs bordering treatment ZCTAs. Births include new establishments and establishments that move from another ZCTA; deaths include establishments that cease operations and those that move to another ZCTA. Regressions are weighted by 1995 number of establishments or jobs and include state by year fixed effects and ZCTA fixed effects. Robust standard errors, two-way clustered at the state and year level, in parentheses. *$P < 0.10$; **$P < 0.05$; ***$P < 0.01$.

	Establishments	Jobs
Net growth	0.0092*** (0.0013)	−0.0050 (0.0172)
Births	−0.0006 (0.0030)	0.0099 (0.0063)
Deaths	−0.0098** (0.0038)	0.0100 (0.0163)
Expansions		0.0028* (0.0012)
Contractions		0.0076 (0.0044)
Net extensive		−0.0001 (0.0124)
Net intensive		−0.0048 (0.0056)
Job creation		0.0127* (0.0061)
Job destruction		0.0176 (0.0213)
No. of observations	10,456	10,456
No. of zip codes	435	435

statistically significant effect, positive or negative, from monument designations. (Results for individual industries are reported in the Supplementary Materials.)

The positive establishment and job treatment effects from monument designations continue to hold when we use a set of ZCTA controls that are farther away from the treatment areas, although they are smaller in magnitude (Supplementary Materials).

Our results for establishments should be viewed with some caution, as event study regression results indicate the possibility of pre-trends in the differences between treatment and control groups. The causal interpretation of the jobs estimates is stronger.

Establishment and job growth rates in areas near monuments

In addition to analyzing monument treatment effects on the average number of establishments and jobs in ZCTAs near the monuments, we also analyze the effect on the establishment and job growth rates. Many communities experience economic growth, or increases in the numbers of businesses and jobs over time; does monument designation increase or decrease the rate of this growth? Following methods used in the labor economics literature (26), we break down the growth rate effects into changes on the extensive and intensive margins. For establishments, the extensive margin tracks changes in "births" and "deaths" of new businesses. For jobs, we separate growth into job births and deaths—i.e., extensive margin effects—and changes from

expansions and contractions in existing businesses—i.e., on the intensive margin.

Monument designation is associated with an increase in the overall net establishment growth rate of 0.92 percentage points (Table 3). This increase in the growth rate comes from a statistically significant decrease in establishments deaths. Thus, monument designations appear to increase the staying power of new businesses.

We find no significant net effect of monument designation, positive or negative, on the annual average net job growth rate (Table 3). The individual components of net job growth suggest that monuments generated an expansion of jobs in existing businesses and increase in job creation, which is the sum of expansions and births. However, these positives did not lead to a statistically significant increase, on net, in the rate of job growth.

Studies by labor economists have shown that most of the ups and downs in job growth in the U.S. economy occur from changes on the extensive margin (27, 28). We find this result in our data: More than 62% of all job creation in the Mountain West region over the 1990 to 2015 period came from births (and a small number of establishments that move in to the region) and only 36% from expansions in existing businesses. Likewise, most job loss is from deaths (and move-outs), 67.2%, compared to 31.4% from losses in existing businesses. Our regression results here indicate that monument designations do little to affect these general job creation and destruction statistics in the region, even as they appear to increase the net establishment growth rate.

DISCUSSION

Protected public lands provide a wide array of benefits to society—wildlife habitat, watershed protection, carbon sequestration, and other ecosystem services, recreational amenities, and preservation of important cultural, scientific, and historic resources (29–31). However, debates over the opportunity costs of these protections, the potential lost values of development and extraction activities, are long-standing. This is particularly the case in the American West, where more than half the land is owned by the U.S. government, some of it protected and some used for a variety of extractive activities. When Presidents have used their authority under the 1906 Antiquities Act to create national monuments for protection of historic and prehistoric landmarks and areas of scientific interest, long-simmering conflicts often rise to the surface. Some residents and politicians in monument communities feel that their local economies are harmed by the designations. Supporters of protected sites claim that any negative impacts are small and offset by boosts in a tourism-related economy (32). Both sides typically offer anecdotal information, and the existing peer-reviewed literature is limited.

Our results using a rich longitudinal micro-dataset and quasi-experimental econometric methods suggest that national monuments provided a boost to local economies in some ways and in other ways had no effect at all. We estimated an increase in the average number of business establishments and jobs in areas around the monuments, an increase in the establishment growth rate and no effect, positive or negative, on the number of jobs in businesses in operation at the time of designation, average wage incomes, or the net job growth rate. We also found no effect on the natural resource industries that rely on public lands and that detractors claim are hurt by monuments—namely, mining, forestry, and livestock grazing. Several service industries and the construction industry exhibit positive

Table 4. Summary statistics for economic variables in treatment and control areas. Treated ZCTAs are within 25 km of monument, measured border to border. Control ZCTAs are adjacent to treated ZCTAs. SDs in parentheses.

	Treated ZCTAs		Control ZCTAs	
	Pretreatment mean (SD)	Posttreatment mean (SD)	Pretreatment mean (SD)	Posttreatment mean (SD)
Establishments	245 (615)	476 (1,106)	169 (363)	250 (618)
Jobs	2,193 (5,491)	3,275 (7,867)	1,345 (2,957)	1,587 (3,977)
Wage income (2015$)	33,464 (9,252)	36,667 (10,331)	33,113 (10,015)	35,860 (11,330)
Share of jobs in agriculture	0.14	0.12	0.18	0.15
Share of jobs in manufacturing	0.10	0.70	0.08	0.06
Share of jobs in mining	0.05	0.03	0.08	0.05
Share of jobs in services	0.51	0.54	0.49	0.52

effects from monument designations. An important previous study of monument designations found no change in per capita income at the county level after designations (*23*). Our findings for average wage income at the ZCTA level are consistent with these results. We build on this previous study by analyzing business activity and employment.

Our results concern average effects over a 25-year period, eight states, and 14 monument designations. They do not rule out the possibility that particular monuments had either larger or smaller effects than those we estimate or that future designations will have a different impact. This is an important caveat to keep in mind when applying lessons to policy.

One recent policy is the 2017 reduction in the sizes of two Utah national monuments. If we apply the estimated average job treatment effect in Table 2 to the ZCTAs that became "untreated"—i.e., those that are no longer within 25 km of the new monument boundary (which we calculate on the basis of a comparison of original map boundaries and new map boundaries)—we find that more than 700 jobs in the Bears Ears and Grand Staircase-Escalante regions could be lost as a result of the reductions. This is a reduction of approximately 2% of all jobs in the (pre-reductions) treatment areas. While we urge caution in applying our average results to specific monuments, the numbers are suggestive of the impacts.

Because our data begin in 1990, our DID regression analyses are limited to those monuments that were created since that year. This is a limitation of our study. Whether alternative quasi-experimental methods such as a regression discontinuity design (*33*) could be used in a way that allows analysis of older national monuments is a topic worth exploring in future research. Furthermore, survey-based and qualitative research methods applied across sites could yield additional insights into local economies beyond our data and econometric approach and help provide an understanding of what is driving the positive effects we found.

Carrying out the DID regression analyses on national monuments in other states—particularly the three states along the Pacific coast, Oregon, Washington, and California—would also be a useful research extension and lead to a more complete understanding of the economic impacts of monuments. Moreover, applying our data and methods to other types of protected sites could present an interesting comparison to the national monument results. Do national parks,

for example, which have more developed visitor infrastructure, generate a larger positive economic impact in nearby communities?

Rural communities in the United States are changing and their economies are transitioning away from a reliance on resource-dependent industries such as mining, forestry, and agriculture. This is especially true in the Mountain West, where the traditional reliance on public lands to drive extractive and agricultural industries seems to be waning. Our results suggest that protecting some of these public lands as national monuments does not exacerbate these trends but rather could even be reversing them and creating a new set of economic forces oriented around the historic, cultural, and scenic amenities these public lands provide.

MATERIALS AND METHODS
Data sources
The establishment data come from the National Establishment Time Series (NETS) Database. The proprietary NETS database is created, curated, and managed by a private company (Walls and Associates) from archival Dun and Bradstreet data on every establishment in the United States (*34*). Thus, we analyze the universe of all businesses in our study region from 1990 to 2015. The unit of observation in the NETS database is an establishment, which is a business or industrial unit, nonprofit organization, or government institution at a single physical location that produces or distributes goods or provides services. Establishment observations in each year include employment, an estimate of sales, and a detailed industry classification based on eight-digit Standard Industrial Classification (SIC) codes and six-digit North American Industrial Classification System (NAICS) codes. NETS has been used in many studies in the peer-reviewed literature. We provide examples in the Supplementary Materials, along with more detail about the NETS database.

We obtained county and industry wage income data from the BLS Quarterly Census of Employment and Wages (*35*). We combined the wage income data with number of jobs in each establishment from NETS to generate an estimate of annual average wage income for each establishment. County-level estimates are occasionally missing for some NAICS codes in some years. In these cases, we filled in the missing information by multiplying the state average (which is available for all NAICS codes and years) by a ratio of county-level

to state-level wages for the nearest available year. If no county-level information is ever available, which rarely occurs, then we use the state average. We created inflation-adjusted income measures using the BLS Consumer Price Index (all products group) (*36*) and averaged the data for each ZCTA. Using the NETS jobs data allows us to create the ZCTA averages, which are thus weighted averages based on the number of jobs in each industry in each ZCTA.

Physical addresses are provided for each establishment in the NETS Database. We developed a methodology for cleaning these addresses and matching them to a reference address database (*37*) to create latitude and longitude coordinates for each establishment. We use the coordinates to assign each establishment observation to its 2007 ZCTA, to use a consistent spatial aggregation across years for our ZCTA-level regression analyses (Tables 2 and 3). Each establishment is thus in a treated ZCTA (within 25 km of the monument), control ZCTA (nonurban outer neighbors to the treated ZCTAs), or other ZCTAs excluded from the regressions. The 25-km buffer is based on the distance between the monument border and the ZCTA border. The average establishment in the 25-km buffer is 36 km from the monument. As a few of the neighboring ZCTAs begin to approach urban areas, which are quite different from most monument surrounds, we use rural-urban commuting area codes (*38*) to exclude those urban ZCTAs. More information on our geocoding procedures are provided in the Supplementary Materials.

Polygon coordinate data for protected areas were collected from U.S. Geological Survey Gap Analysis Program, Protected Areas Database of the United States (PAD-US) version 2.0 (*39*). Original boundaries of Grand Staircase-Escalante were used in the analysis (before the 2017 reduction by the President); data were provided by the BLM. With each monument and proposed monument geocoded, we calculated distances between ZCTA boundaries and the monuments.

Summary statistics

Means and SDs of the key variables for our treated and control samples before and after treatment are provided in Table 4. There are noticeable differences between the two groups. The treated ZCTAs have more establishments and jobs, a smaller share of jobs in agriculture, and a slightly larger share of jobs in manufacturing and services (although it is worth noting that both areas have approximately half of all jobs in the services sector). The average number of jobs, establishments, and (inflation-adjusted) average wage income are higher in the post-treatment period for both treated and control ZCTAs. The raw differences in establishments, jobs, and income over time between the treatment and control groups must, of course, be interpreted with caution; our DID design controls for trends over time at the state level and time-invariant ZCTA unobservable factors that could affect our outcome variables through incorporation of fixed effects.

Econometric analyses

The first regression (Table 2) is estimated on the individual establishment data and measures the average intensive margin effect on jobs per establishment—i.e., how the average number of jobs in a given establishment that is operating before monument designation is affected by a designation

$$\ln y_{isjt} = \beta_0 + \beta_1 1[\text{monument} = 1]_{ijt} + \alpha_i + \gamma_{jt} + \delta_{st} + \varepsilon_{isjt} \quad (1)$$

where y_{isjt} is number of jobs in establishment i in industry s and state j in year t; $1[\text{monument} = 1]_{ijt}$ is an indicator equal to 1 once a monument is designated for ZCTAs that are within 25 km of establishment i; thus, β_1 is the coefficient of interest, measuring the treatment effect of monument designation; α_i is an establishment fixed effect; thus, we control for time-invariant unobservables at the individual establishment level; γ_{jt} is a state by year fixed effect, which controls for time trends that vary at the state level; δ_{st} is an industry (two-digit SIC code) by year fixed effect, which captures industry-specific time trends; and ε_{isjt} is an idiosyncratic error term.

The second set of regressions (Table 3) is focused on the impact of monument designations on the total number of establishments and jobs in areas near the monuments

$$\ln y_{zjt} = \beta_0 + \beta_1 1[\text{monument} = 1]_{zt} + \alpha_z + \gamma_{jt} + \varepsilon_{zjt} \quad (2)$$

where y_{zjt} is the number of establishments (or jobs) in ZCTA z in state j in year t, $1[\text{monument} = 1]_{zt}$ is an indicator equal to 1 once a monument is designated for ZCTAs that are within 25 km of the monument, α_z is an individual ZCTA fixed effect to control for time-invariant unobservables at the individual ZCTA level, γ_{jt} is a state by year fixed effect, and ε_{zjt} is an idiosyncratic error term.

We estimate a similar specification for the inflation-adjusted average wage income at the ZCTA level.

In the Supplementary Materials, we discuss results of event study regressions where dynamic treatment effects are measured relative to the year of designation, and the regressions include 6 years before and after designation.

The regressions for the net establishment growth rates (Table 4) are represented as

$$\Delta \ln y_{zjt} = \beta_0 + \beta_1 1[\text{monument} = 1]_{zt} + \alpha_z + \gamma_{jt} + \varepsilon_{zjt} \quad (3)$$

where $\Delta \ln y_{zjt}$ is the annual change in the log number of establishments in ZCTA z in state j in year t, $1[\text{monument} = 1]_{zt}$ is an indicator equal to 1 once a monument is designated in ZCTAs that are within 25 km of the monument, α_z is an individual ZCTA fixed effect, γ_{jt} is a state by year fixed effect, and ε_{zjt} is an idiosyncratic error term.

We separate the annual change in the log number of establishments in a given ZCTA into establishment birth and death components

$$\Delta \ln y_{zjt} = b_{zjt} - d_{zjt} \quad (4)$$

where b_{zjt} denotes the share that births contribute to the log change in establishments (including establishments that move in from other ZCTAs), and d_{zjt} denotes the contribution from deaths (including move-outs to other ZCTAs).

For each of these two components, we estimate the following regression

$$F_{zjt} = \beta_0^F + \beta_1^F 1[\text{monument} = 1]_{zt} + \alpha_z^F + \gamma_{jt}^F + \varepsilon_{zjt}^F \quad (5)$$

where $F_{zjt} \in \{b_{zjt}, d_{zjt}\}$ $F_{zjt} \in \{b_{zjt}, d_{zjt}\}$ and other variables are as defined above (although they are birth and death specific). By construction, the sum of the estimated treatment coefficients in Eq. 5 must equal the treatment coefficient from the regression of the

annual change in the log number of establishments, Eq. 3—i.e., the net change in the establishment growth rate due to monument designation must equal the sum of the portions attributable to each of the components of that growth rate, births, and deaths.

We estimate a similar regression for the job growth rate. In this case, though, job growth in the ZCTA is a result of births and deaths plus expansions and contractions in existing establishments

$$\Delta \ln y_{zjt} = b_{zjt} - d_{zjt} + e_{zjt} - c_{zjt} \tag{6}$$

where Δy_{zjt} is now the annual change in the log number of jobs in ZCTA z in state j and year t, b_{zjt} denotes the share of the log change in jobs attributable to births (including move-ins), d_{zjt} denotes the share attributable to deaths (including move-outs), e_{zjt} denotes the share from expansions, and c_{zjt} denotes the share from contractions.

We estimate a version of Eq. 5 for the job growth rate where $F_{zjt} \in \{b_{zjt}, d_{zjt}, e_{zjt}, c_{zjt}, b_{zjt} - d_{zjt}, e_{zjt} - c_{zjt}, b_{zjt} + e_{zjt}, d_{zjt} + c_{zjt}\}$. Thus, we analyze job growth from births, deaths, expansions, and contractions individually and also the net extensive margin, $b_{zjt} - d_{zjt}$, the net intensive margin, $e_{zjt} - c_{zjt}$, gross job creation from births and expansions, $b_{zjt} + e_{zjt}$, and gross job destruction from deaths and contractions, $d_{zjt} + c_{zjt}$.

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