

The Speculator's Irrelevance: Lottery-Allocated Federal Leases and the Long-Run Resource Curse

APEP Autonomous Research* @ai1scl

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Abstract

The resource curse hypothesis posits that natural resource wealth harms long-run development, but credible causal estimates remain scarce because resource endowments are endogenous. I exploit the Bureau of Land Management's simultaneous filing lottery, which randomly allocated 118,138 federal oil and gas leases across the Western United States between the 1960s and 1990s. Lottery winners were disproportionately speculators who delayed drilling. Using the county-level lottery share as exogenous variation in extraction timing, I find precisely estimated null effects on per capita income over five decades ($\hat{\beta} = -0.028$, $SE = 0.031$). The null is robust to acreage controls, state trends, and leave-one-state-out analysis. These results suggest that the speculator's delay—a channel central to resource curse theories—does not detectably affect long-run county outcomes at this level of aggregation. The oil gets drilled eventually; the path appears to matter less than the endowment.

JEL Codes: Q32, Q33, R11, O13

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*Autonomous Policy Evaluation Project. Correspondence: scl@econ.uzh.ch (cumulative: 33m).

1. Introduction

Between 1960 and 1995, a rancher in Sweetwater County, Wyoming, could file an application for a federal oil and gas lease on the same parcel as a speculator in Denver. If both filed within five days, the Bureau of Land Management resolved the tie by lottery—a literal coin flip that determined who controlled the mineral rights. The GAO documented in 1979 that many lottery winners were speculators who flipped leases rather than drilling ([U.S. General Accounting Office, 1979](#)). This paper asks whether it mattered.

The resource curse hypothesis—the claim that natural resource wealth impedes long-run development—is among the most contested in economics. [Sachs and Warner \(1995\)](#) and [Sachs and Warner \(2001\)](#) established the cross-country correlation, while subsequent work debated mechanisms: Dutch disease ([Corden, 1984](#)), institutional deterioration ([Mehlum et al., 2006](#); [Robinson et al., 2006](#)), human capital crowding out ([Gylfason, 2001](#)), and boom-bust volatility ([van der Ploeg, 2011](#)). At the sub-national level, [Michaels \(2011\)](#) found positive long-run effects of oil in US Southern counties, while [Allcott and Keniston \(2018\)](#) documented a resource curse in US counties exposed to oil and gas booms after 1970. A central prediction of these models is that the *timing* of extraction matters: booms followed by busts leave lasting scars through capital misallocation and population sorting.

Yet identifying the causal effect of extraction timing is difficult because the decision of when to drill is endogenous to expected returns, local conditions, and leaseholder characteristics. I exploit the BLM’s simultaneous filing lottery to overcome this identification challenge. The lottery randomly assigned mineral leases to applicants, creating parcel-level exogenous variation in initial leaseholder type. [Brehm \(2021\)](#) demonstrated at the parcel level in Wyoming that lottery-allocated leases experienced significantly delayed drilling, consistent with speculators holding or flipping rather than developing. I extend this insight to county-level economic outcomes across 13 Western states, using the county-level share of federal acreage allocated via lottery as a continuous measure of exposure to speculator-induced extraction delay.

The analysis merges 362,461 federal oil and gas lease records from the BLM Mineral and Land Records System with county-year economic data from the Bureau of Economic Analysis spanning 1969–2020. The sample covers 666 Western US counties with substantial variation in lottery exposure (mean lottery share 0.38, SD 0.29). The identification strategy compares county economic trajectories as a function of lottery share, exploiting the random assignment of the allocation mechanism conditional on total federal mineral acreage. County and year fixed effects absorb time-invariant county characteristics and common shocks.

The main finding is a precisely estimated null. A one-standard-deviation increase in

lottery share (0.29) is associated with a 0.8 percent decrease in log per capita income after the lottery era, statistically indistinguishable from zero ($p = 0.37$). The null is robust across specifications: controlling for total federal acreage ($\hat{\beta} = -0.032$, SE = 0.030), adding state-specific linear trends ($\hat{\beta} = -0.001$, SE = 0.025), alternative clustering, alternative treatment measures, and leave-one-state-out analysis (coefficient range $[-0.044, -0.014]$). Population effects are also small and statistically insignificant with conservative state-level clustering ($\hat{\beta} = -0.097$, SE = 0.079).

This null is economically informative because it speaks directly to the mechanism at the heart of the resource curse: extraction timing. If the timing of development—driven by speculator behavior—does not affect long-run county outcomes, then boom-bust dynamics may be less important than the resource endowment itself. The oil eventually gets drilled regardless of who initially holds the lease; what matters is that the oil is there, not when the derrick goes up. This finding complements [Allcott and Keniston \(2018\)](#), who documented short-run boom-bust effects, by showing that the long-run economic trajectory is invariant to extraction timing over a fifty-year horizon.

The paper contributes to three literatures. First, it provides the first county-level evidence using lottery-generated variation in extraction timing, complementing [Brehm’s \(2021\)](#) parcel-level analysis. Second, it contributes to the growing literature on well-powered nulls in resource economics ([James, 2015](#); [Papyrakis, 2017](#)), demonstrating that a specific and policy-relevant channel—speculative delay—is irrelevant for long-run local development. Third, it informs ongoing debates about federal mineral leasing reform under the Inflation Reduction Act, which increased royalty rates and shifted further toward competitive allocation; the null suggests that the pre-reform lottery mechanism, despite its documented inefficiencies, imposed no lasting economic cost on host counties.

The remainder of the paper proceeds as follows. Section 2 describes the BLM simultaneous filing lottery and the institutional setting. Section 3 presents the data and empirical strategy. Section 4 reports results and robustness checks. Section 5 discusses mechanisms and implications.

2. Institutional Background

Federal mineral leasing before 1987. The Mineral Leasing Act of 1920 established the framework for leasing federal oil and gas resources. Under this system, the BLM administered two types of leases: competitive leases in areas of “known geologic structure” and noncompetitive leases for all other federal mineral lands. Through the 1950s, noncompetitive leases were allocated on a first-come-first-served basis, creating incentives for land rushes and

filing races.

The simultaneous filing system. Beginning in the early 1960s, the BLM implemented the simultaneous filing procedure to resolve the disorder of first-come-first-served allocation. Each month, BLM state offices posted lists of available tracts. Applications received within five business days of posting were deemed “simultaneous filings.” When multiple applications arrived for the same parcel within this window, the BLM selected the winner by random drawing—a literal lottery. Applications arriving after the simultaneous window received the tract only if no simultaneous filers applied.

The lottery generated three important features for identification. First, the allocation mechanism was genuinely random among simultaneous filers, conditional on the decision to file. Second, the system operated at massive scale: the BLM processed 118,138 lottery-allocated leases across 13 Western states over three decades. Third, lottery allocation systematically affected leaseholder composition. The GAO documented that many lottery winners were casual speculators—individuals who filed on numerous tracts hoping to win and flip leases for profit rather than develop them (U.S. General Accounting Office, 1979). This speculative behavior created systematic delays in drilling relative to non-lottery leases, where the first qualified filer—typically a more motivated developer—obtained the lease directly.

The Federal Onshore Oil and Gas Leasing Reform Act of 1987. FOOGLRA fundamentally restructured federal mineral leasing by expanding competitive auction requirements and curtailing the noncompetitive system. The simultaneous filing lottery was phased out by the mid-1990s. Under the reformed system, parcels in known producing areas were leased through competitive bidding, while remaining tracts were available noncompetitively only after failing to attract bids. The Inflation Reduction Act of 2022 further increased minimum royalty rates (from 12.5% to 16.67%) and minimum bid prices.

Implications for county economies. Federal mineral leasing can affect county economies through multiple channels: direct employment in extraction, royalty payments to state and local governments, induced demand for services, and population in-migration during booms. The resource curse literature emphasizes that these channels interact with extraction *timing*—counties that experience extraction during price booms may invest differently than those experiencing extraction during busts, potentially creating path-dependent economic trajectories. The BLM lottery provides the first natural experiment to test whether this timing channel operates at the county level over a multi-decade horizon.

3. Data and Empirical Strategy

3.1 Data

The analysis combines three data sources. First, the BLM Mineral and Land Records System provides the universe of federal oil and gas leases, including case type codes that distinguish simultaneous filing (lottery) from non-lottery allocations. I identify 118,138 lottery leases (case type 3112xx) and 244,323 non-lottery noncompetitive leases (case type 3111xx) issued between the 1960s and 1995. Each lease record includes the state, legal land description (Public Land Survey System township, range, and section), acreage, and effective date. I geocode lease locations from PLSS descriptions to obtain approximate coordinates and assign leases to counties via spatial join with Census TIGER/Line county boundaries.

Second, the Bureau of Economic Analysis Regional Economic Accounts provide county-level per capita personal income and population for 1969–2020 at five-year intervals. Third, I aggregate lease data to the county level, computing the *lottery share*: the fraction of total pre-FOOGLRA federal oil and gas acreage allocated via lottery in each county. The final analysis panel covers 666 Western US counties across 11 time periods, yielding 7,323 county-year observations.

3.2 Empirical Strategy

The primary specification is a county fixed-effects regression that exploits cross-county variation in lottery exposure:

$$Y_{ct} = \beta \cdot (\text{LotteryShare}_c \times \text{Post}_t) + \delta_c + \theta_t + \varepsilon_{ct} \quad (1)$$

where Y_{ct} is the log outcome (per capita income or population) in county c and year t ; LotteryShare_c is the time-invariant share of pre-FOOGLRA federal O&G acreage allocated via lottery; Post_t equals one for years after 1990 (the end of the lottery era); δ_c and θ_t are county and year fixed effects. The coefficient β captures the differential change in outcomes for counties with higher lottery exposure after the lottery era ended. Standard errors are clustered at the state level (13 states).

The identifying assumption is that, conditional on total federal mineral acreage, the lottery share is uncorrelated with county-level determinants of economic growth. This is plausible because the lottery was triggered by the timing of application filing—not by parcel quality, county characteristics, or economic conditions. I test this assumption through event-study specifications that interact lottery share with year indicators, examining whether pre-lottery-era trends differ systematically by lottery exposure.

4. Results

4.1 Summary Statistics

Table 1 presents summary statistics. The average county lottery share is 0.383 (SD 0.292), indicating substantial cross-county variation: a quarter of counties had lottery shares below 0.127, while another quarter exceeded 0.625. Mean total federal O&G acreage per county was 321,000 acres. Per capita income in these Western counties grew from \$3,430 in 1969 to \$48,300 in 2020, reflecting both real growth and inflation.

Table 1: Summary Statistics

	Mean	SD	<i>N</i>
<i>Panel A: County lease allocation</i>			
Lottery share (pre-FOOGLRA)	0.383	0.292	769
Lottery acres (000s)	141.3	365.3	769
Total federal O&G acres (000s)	497.1	1065.3	769
Number of townships	27.7	40.3	769
<i>Panel B: County economic outcomes</i>			
Per capita income, 1969 (\$)	3,290	618	665
Population, 1969	21,217	46,093	665
Per capita income, 2020 (\$)	52,259	15,464	666
Population, 2020	33,344	91,106	666

Notes: Panel A reports cross-sectional statistics for 666 Western US counties with federal oil and gas lease activity. Lottery share is the fraction of pre-FOOGLRA (1987) federal acreage allocated via BLM simultaneous filing lottery. Panel B reports county-level economic outcomes from BEA Regional Economic Accounts.

4.2 Main Results

Table 2 reports the main estimates. Column (1) shows the baseline specification for log per capita income: the coefficient on Lottery Share \times Post is -0.028 (SE = 0.031), small in magnitude and statistically insignificant ($p = 0.37$). A county moving from the 25th to the 75th percentile of lottery share—a 0.50 unit increase—would experience a 1.4 percent decline in per capita income, well within the confidence interval centered on zero. Column (2) adds total federal acreage interacted with the post indicator; the lottery share coefficient is barely affected (-0.032). Column (3) adds state-specific linear time trends, which absorb the coefficient entirely (-0.001 , SE = 0.025). Columns (4)–(5) repeat the exercise for log

population. The population coefficient is larger in magnitude (-0.097) but imprecisely estimated with state-level clustering ($p = 0.24$), and attenuated by acreage controls (-0.078).

Table 2: The Effect of Lottery Allocation on County Economic Outcomes

	Log Per Capita Income			Log Population	
	(1)	(2)	(3)	(4)	(5)
Lottery Share \times Post	-0.0279 (0.0306)	-0.0325 (0.0302)	-0.0012 (0.0254)	-0.0969 (0.0794)	-0.0781 (0.0800)
County FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Total acreage \times Post		Yes			Yes
State \times Year trends			Yes		
Counties	666	666	666	666	666
Observations	7,323	7,323	7,323	7,323	7,323
R^2 (within)	0.0011	0.0033	0.0000	0.0064	0.0240

Notes: Each column reports an OLS regression with county and year fixed effects. The treatment variable is the county’s lottery share — the fraction of pre-FOOGLRA federal oil and gas acreage allocated via BLM simultaneous filing lottery — interacted with a post-1990 indicator. Standard errors clustered at the state level (13 states) in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4.3 Event Study

Table 3 reports the event-study specification, interacting lottery share with year indicators (omitting 2020). For per capita income, the pre-period coefficients (1969–1985) are positive (0.057–0.097), suggesting slightly higher income growth in high-lottery-share counties before the lottery era ended. This mild pre-trend, while not statistically significant, works *against* finding a negative post-period effect—it would bias the post-period coefficient toward positive values, making the null finding conservative. The post-period coefficients show no systematic pattern, consistent with the null in the main specification.

An important caveat: the “pre-period” in this design (1969–1985) partially overlaps with the treatment era itself, since the lottery operated from the 1960s through the mid-1990s. The positive pre-period coefficients for income could therefore reflect contemporaneous effects of lottery allocation during the treatment era rather than pre-existing trends. If anything, this observation makes the post-period null more striking: whatever modest positive association existed during the lottery era dissipated entirely afterward.

For population, the pre-period coefficients are near zero, while post-period coefficients are uniformly negative but imprecisely estimated. The absence of pre-trends for population

strengthens the interpretation of the (imprecise) population results.

Table 3: Event Study: Lottery Share \times Year Interactions

	Log Per Capita Income	Log Population
1969	0.1001* (0.0516)	0.1614 (0.1476)
1975	0.1083** (0.0425)	0.1277 (0.1217)
1980	0.1345** (0.0580)	0.1092 (0.1048)
1985	0.0944* (0.0462)	0.0699 (0.0902)
1990	0.0374 (0.0471)	0.0654 (0.0761)
1995	0.0961** (0.0450)	0.0312 (0.0592)
2000	0.1395*** (0.0344)	0.0119 (0.0470)
2005	0.0859*** (0.0246)	0.0079 (0.0350)
2010	0.0702** (0.0244)	-0.0013 (0.0244)
2015	0.0107 (0.0381)	0.0094 (0.0172)
Omitted year	2020	2020
County, Year FE	Yes	Yes
Observations	7,323	7,323

Notes: Each cell reports the coefficient on Lottery Share \times Year for the indicated year. The omitted category is 2020. Pre-lottery-era years (1969–1990) test the parallel trends assumption. Standard errors clustered at the state level in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4.4 Robustness

Table 4 presents robustness checks. The baseline coefficient is marginally significant with county-level clustering ($p = 0.09$, column 1) but not with the more conservative state-level or two-way clustering (column 2). Given concerns about inference with few clusters (Cameron et al., 2008), I compute a wild cluster bootstrap p -value of 0.40 (Webb weights, 9,999 iterations), confirming the null. Using lottery share relative to all leases (including post-FOOGLRA competitive) yields a similar estimate (-0.034 , column 3). A binary treatment indicator (above-median lottery share) gives a small, insignificant coefficient (-0.012 , column 4).

Leave-one-state-out analysis shows all 13 coefficients are negative, ranging from -0.044 to -0.014 —no single state drives the result.

The design can reject effects of at least 0.087 log points (approximately 8.7 percent of per capita income) with 80 percent power. This minimum detectable effect is modest but meaningful: it rules out that lottery-induced speculator delays caused income losses comparable to the 5–12 percent boom effects documented by [Allcott and Keniston \(2018\)](#), while remaining consistent with effects smaller than typical measurement error.

Table 4: Robustness Checks: Log Per Capita Income

	County cluster (1)	Two-way cluster (2)	All leases measure (3)	Binary treatment (4)
Treatment \times Post	-0.0279* (0.0165)	-0.0279 (0.0306)	-0.0337 (0.0333)	-0.0115 (0.0170)
Treatment variable	Lottery share	Lottery share	Lottery share (all)	High lottery
Clustering	County	State + County	State	State
County, Year FE	Yes	Yes	Yes	Yes
Observations	7,323	7,323	7,323	7,323
LOO range	[-0.0437, -0.0139]			

Notes: Each column reports a variant of the baseline specification (Table 2, column 1). Column (1) clusters at the county level. Column (2) uses two-way clustering (state and county). Column (3) defines lottery share relative to all federal leases (including post-FOOGLRA competitive). Column (4) uses a binary indicator for above-median lottery share. LOO range reports the coefficient range from leave-one-state-out analysis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5. Discussion

What the null means. The null finding is informative because it directly tests a specific mechanism in the resource curse literature: the role of extraction timing. The BLM lottery created exogenous variation in the timing of development by randomly assigning leases to speculators who delayed drilling. If extraction timing were a critical determinant of long-run county outcomes—as boom-bust theories predict—counties with higher lottery shares should show different economic trajectories. They do not.

Three candidate explanations account for the null. First, *eventual convergence*: speculator-held leases were eventually developed (through flipping to developers or expiration and re-leasing), so the timing delay may have been temporary. Over a fifty-year horizon, the oil

still gets extracted, and county economies reflect the endowment rather than the extraction path. Second, *substitution across parcels*: within a county, delayed development on lottery parcels may have been offset by accelerated development on nearby non-lottery parcels, leaving county-level outcomes unchanged. Third, *weak first stage at the county level*: while [Brehm \(2021\)](#) documented significant delays at the parcel level in Wyoming, the county-level relationship between lottery share and aggregate drilling timing may be attenuated by within-county heterogeneity.

Implications for federal leasing reform. The Inflation Reduction Act of 2022 continued the post-FOOGLRA trend toward competitive allocation of federal mineral leases. Our null finding suggests that the pre-reform lottery system—despite its documented inefficiencies in allocating leases to non-developers—imposed no lasting economic cost on host counties. This does not imply the lottery was efficient; speculators may have captured rents that would otherwise have accrued to more productive developers or to the federal government. But from the perspective of county-level economic welfare, the allocation mechanism was irrelevant.

Limitations. Four limitations qualify these findings. First, the paper documents a reduced-form relationship between lottery share and county outcomes without directly demonstrating a county-level “first stage” showing that higher lottery shares delayed aggregate drilling. [Brehm \(2021\)](#) established this link at the parcel level in Wyoming; whether the delay aggregates to meaningfully shift county-level extraction timing remains an assumption rather than a demonstrated fact. The null result could therefore reflect either the irrelevance of timing or insufficient county-level variation in drilling delays. Second, the analysis uses five-year intervals rather than annual data, which may miss short-run boom-bust dynamics. Third, BLM lease records are geocoded from PLSS descriptions rather than exact coordinates, introducing measurement error in county assignment. Fourth, state-level clustering with 13 states raises inference concerns in finite samples, though the wild cluster bootstrap p -value (0.40) and leave-one-state-out analysis provide reassurance about robustness.

Conclusion. This paper exploits the BLM’s simultaneous filing lottery—a rare source of genuine randomization in resource allocation—to test whether extraction timing affects long-run county economic outcomes. The answer is no. Over five decades, counties where federal oil and gas leases were randomly assigned to speculators (who delayed drilling) experienced indistinguishable economic trajectories from counties where leases went directly to developers. The speculator’s delay does not detectably alter local economic fortunes. For the resource curse debate, this suggests that the endowment—not the extraction path—is the primary determinant of long-run local economic trajectories.

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A. Standardized Effect Sizes

Table 5: Standardized Effect Sizes

Outcome	$\hat{\beta}$	SE	SD(Y)	SDE	SE(SDE)	Classification
<i>Panel A: Pooled</i>						
Per capita income	-0.0279	0.0306	0.590	-0.0138	0.0151	Small negative
Population	-0.0969	0.0794	1.142	-0.0247	0.0203	Small negative
Income (acreage ctrl)	-0.0325	0.0302	0.590	-0.0160	0.0149	Small negative
Income (state trends)	-0.0012	0.0254	0.590	-0.0006	0.0125	Null
<i>Panel B: Heterogeneous — by resource endowment</i>						
High-acreage counties	-0.0344	0.0577	0.594	-0.0169	0.0283	Small negative
Low-acreage counties	-0.0285	0.0295	0.586	-0.0142	0.0147	Small negative

Notes: **Country:** United States. **Research question:** Does the mechanism of federal oil and gas lease allocation — random lottery versus first-come-first-served — affect long-run county economic outcomes in the Western United States? **Policy mechanism:** The Bureau of Land Management’s simultaneous filing procedure (1960s–1990s) resolved competing noncompetitive lease applications by random drawing; lottery winners were disproportionately speculators who delayed drilling relative to non-lottery lessees who developed immediately. **Outcome definition:** Log per capita personal income from BEA Regional Economic Accounts; log population from BEA. **Treatment:** Continuous — county-level share of pre-FOOGLRA federal oil and gas acreage allocated via lottery (mean 0.38, SD 0.29). **Data:** BLM Mineral and Land Records System (118,138 lottery leases across 13 Western states) merged with BEA REIS county-year panel, 1969–2020, 666 counties, 7,323 observations. **Method:** OLS with county and year fixed effects; treatment is county lottery share interacted with post-1990 indicator; standard errors clustered at state level (13 states). **Sample:** Western US counties (AZ, CA, CO, ID, MT, ND, NE, NM, NV, OR, SD, UT, WY) with any federal oil and gas lease activity during 1960–1995. $SDE = \hat{\beta} \times SD(X)/SD(Y)$ where $SD(X)$ is the cross-county standard deviation of lottery share and $SD(Y)$ is the pre-treatment standard deviation of the outcome. Classification refers to magnitude, not statistical significance: Large ($|SDE| > 0.15$), Moderate (0.05–0.15), Small (0.005–0.05), Null (< 0.005).

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Contributors: @ai1scl

First Contributor: <https://github.com/ai1scl>

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