Living in the Garden of Eden: Mineral Resources and Preferences for Redistribution

Online Appendix

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Early times of mining in the United States

Figure A1 presents the frontispiece of *A history of American mining* by Rickard in 1932. This picture illustrates the extent to which mining is associated with the concept of independence of individuals in American tradition. This book as been published under the auspices of the American Institute of Mining and Metallurgical Engineers. It aims to present the main steps of the development of mining industry in the United States. As acknowledged in the introduction, "[the book] is designed to give to those who have come late into the professions of mining engineering and metallurgy something of that background the older men built up as they went along". The introduction continues as follows:

> "The pioneers did not read history; they made it. We who come later, facing different and more complex situations, have much to learn from their experiences. In developing the mineral wealth of a continent and building a great industry things do not "just happen"; they are brought about by men who have the wit to see and the courage to do. Our predecessors were men with these qualities. They fought great battles against heavy odds and they have left us a great heritage."[1]

The first chapter of the book—*The gold discoveries*—emphasizes the social and technical conditions of mining activity at this time as well as characteristic traits of early diggers. About them, the author writes:

> "They had the machinery most used in mining: human muscle; they had the science most approved in that ancient art: organized common sense; they achieved the basic purpose of mining: to exploit mineral at a profit."[2]

Their greed is highlighted by the following words, attributed to a pioneer;

> "It was no uncommon event for a man alone to take out five hundred dollars in a day, or for two or three, if working together, to divide the dust at the end of the week by measuring it with tin cups. But we were never satisfied."[3]

Rickard also quote the following words of the general in command of Pacific division in 1949, who was clearly opposed to any governmental intervention in mining operations:

> "I do not conceive that it would be desirable to have the mines worked for the benefit of the public treasury. To do that would require an army of officers and inferior agents, all with high salaries, and with opportunities and temptations

[1] Rickard (1932), page ix.
[2] Ibid., page 29.
[3] Ibid.

for corruption too strong for ordinary human nature. The whole population would be put in opposition to the government array, and violent collisions would lead even to bloodshed."[4]

The author also draws a mixed picture of values that prevailed among diggers:

"The stories of the golden days leave contradictory impressions; on the one hand we read of order, generosity, honor, and high aim; on the other we see pictures of riot, bloodshed, fraud, and frenzy. Neither extreme is altogether true, but the facts are given more reliably in the chronicles of the time than in the later reminiscences of garrulous pioneers. The life of the mining-camp, as Royce says, was "the struggle of society to impress the true dignity and majesty of its claims on wayward and blind individuals, and the struggle of the individual man, meanwhile, to escape, like a fool, from his moral obligation to society". In such a frontier community, made up of men that had left their homes, their families, and their old vexations in an attempt to find a golden paradise, the social struggle came to the surface and was to be seen in its true light; for social duties of any sort are a nuisance amid the excited digging for gold [...]."[5]

These quotes from the book written by Rickard illustrate pretty well how individualistic values were associated with historical mining activities.

Natural resources and beliefs in Montana

As indicated by its title *Collapse : How societies choose to fail or to survive*, the book of Jared Diamond presents a large number of cases where societies face challenges at some point in their history. Some of them succeed, whereas others fail in doing so.

The first chapter of the book—*Under Montana's big sky*—is devoted to the American state of Montana. This state faces major challenges regarding the evolution of its economy and various natural disasters are threatening its survival. Indeed, the economy of Montana heavily relies on natural resources exploitation. According to Diamond, this economic organization has strong ties with inhabitants attitudes and political orientations. As a consequence, individual attitudes becomes in turn a barrier to solve new problems:

"Despite Montanans' longstanding embrace of mining as a traditional value defining their state's identity, they have recently become increasingly disillusioned with mining and have contributed to the industry's near-demise within Montana."[6]

[4]Ibid., page 33.
[5]Ibid., page 35.
[6]Diamond (2006), page 37.

> "In modern times a reason why Montanans have been so reluctant to solve their problems caused by mining, logging, and ranching is that those three industries used to be the pillars of the Montana economy, and that they became bound up with Montana's pioneer spirit and identity."[7]

Diamond points out the crucial role of natural resources in Montanan's values by describing "old timers" as

> "[...] people born in Montana, of families resident in the state for many generations, respecting a lifestyle and economy traditionally built on the three pillars of mining, logging, and agriculture [...]."[8]

These values are linked to right-wing orientations and have their roots in the deep history of American development:

> "[...] Montanans tend to be conservative, and suspicious of governmental regulation. That attitude arose historically because early settlers were living at low population density on a frontier far from government centers, had to be self-sufficient, and couldn't look to government to solve their problems."[9]

The work by Jared Diamond offers an rich an interesting case study of the link between natural resources and individual orientations. The book does not offer any support for the hypothesis that natural resources abundance *induces* selfish and anti-redistributive behaviors. However, it documents the interplay between natural resources and individualistic orientations. The latter have thus an impact both on general economic orientations and on the management of natural resources.

To sum up, Jared Diamond description of Montana's society illustrates the interplay between natural resources, values and economic organization.

Assessing the importance of the omitted variables bias

The introduction of additional explanatory variables changes the size of the coefficient of *mineral state*. The relative importance of such changes can be used to asses the potential omitted variable bias as suggested by Altonji et al. (2005). Here, we follow the method as implemented by Bellows and Miguel (2009) using ordinary least squares.

In Table A5, we present the estimated coefficient of the variable *mineral state* when different sets of covariates are introduced. No covariates are included in columns 0, but year of interview fixed effects. The set of individual characteristics is used in other columns. We add all state-level variables and origin and industry fixed effects in columns 2

[7] Ibid., page 432.
[8] Ibid., page 57.
[9] Ibid., page 63.

and 3 respectively. All covariates are included simultaneously in column 4. All in all, this table mirrors Table 2. The only difference is that the sample is restricted to individuals for which all individual as well as state-level variables are available. This ensure that coefficients are comparable across specifications.

The estimated coefficient of *mineral state* is equal to 0.068 without covariates, and to 0.078 when only individual covariates are included in the regressions. It is equal to 0.061 when all covariates are introduced simultaneously. It is thus decreasing as covariates are introduced. This decrease is obviously driven by the introduction of state-level covariates. Accordingly, this suggests that the further inclusion of that type of covariates would lower again the estimated coefficient of *mineral state*. The change of the coefficient between columns 0 and 4 amounts 0.007. Following Bellows and Miguel (2009), this implies that the explanatory power of further covariates should be more than $\frac{0.061}{0.007} \approx 9$ times larger than the one of observed characteristics to fully eradicate the estimated effect of our variable of interest. This makes us confident that our main result is not driven by omitted variables.

Spurious correlation

Two other falsification exercises can be proposed to check that the relationship we are presenting is not purely spurious. Both rely on random allocations of the mineral status.

First, we randomly assign each individual to a new state, leaving the mineral status of the state unchanged. We estimate $10,000$ times equation (1) with individual covariates (as in table 2, column 1) and present the distribution of estimated coefficients of *mineral state* in figure A2. None of the $10,000$ simulated coefficients are above the estimated coefficient of *mineral state* in table 2.

Second, we randomly assign the mineral status of each state, leaving unchanged the individual composition of each state. Again, we estimate $10,000$ times equation (1) with individual covariates and plot the distribution of estimated coefficients of *mineral state* in figure A2. Only 0.84% of simulated coefficients are above the estimated coefficient of *mineral state* in table 2. The outcome of this exercise is less favorable than the first one. This is not surprising since the procedure we implement is more likely to reproduce the original sample. However, there is still very little support for arguing that the correlation we uncover is spurious.

All in all, both falsification exercises make us confident that the relationship we document is not purely spurious.

References

Altonji, Joseph G., Todd E. Elder, and Christopher R. Taber. "Selection on Observed and Unobserved Variables: Assessing the Effectiveness of Catholic Schools." *Journal of Political Economy* 113, 1: (2005) 151–184.

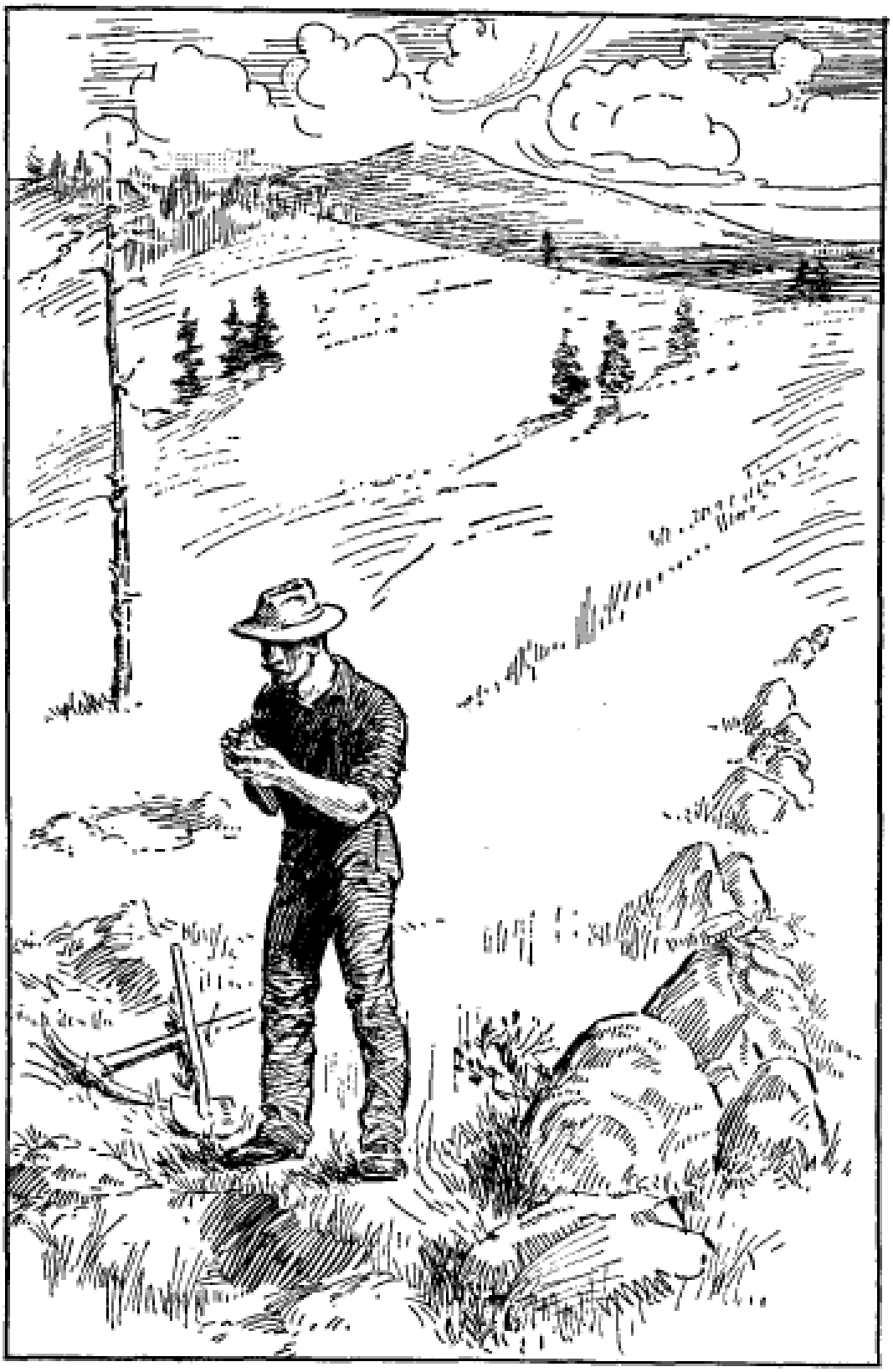
Bellows, John, and Edward Miguel. "War and local collective action in Sierra Leone." *Journal of Public Economics* 93, 11-12: (2009) 1144–1157.

Diamond, Jared. *Collapse: How Societies Choose to Fail or Succeed.* Penguin Books, 2006.

Frank, Mark W. "A New State-Level Panel of Annual Inequality Measures over the Period 1916-2005." *Journal of Business Strategies* 31, 1: (2014) 241.

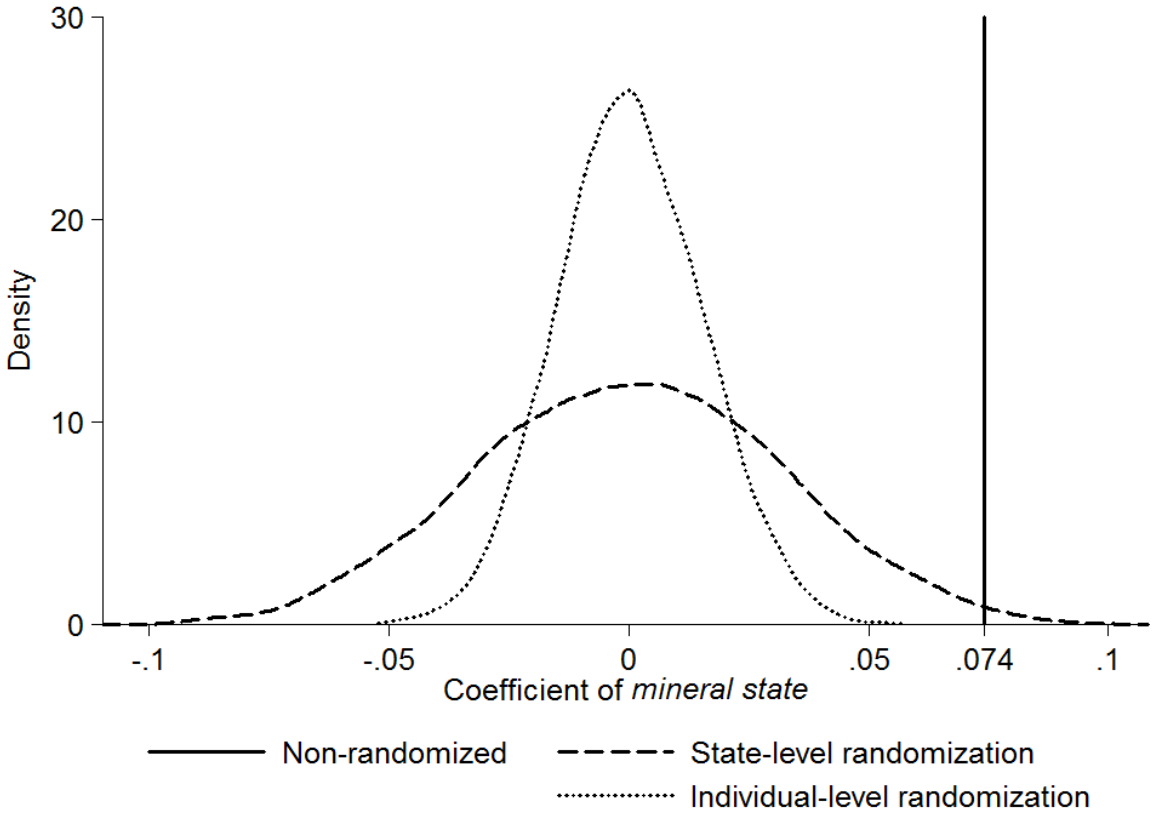
Rickard, T. A. *A history of American Mining.* McGraw-Hill Book Company, Inc., 1932.

Figure A1: Frontispiece of *A history of American mining* (Rickard 1932).



Stratton discovering the Independence.

Figure A2: Falsification tests.



Each density corresponds to the distribution of coefficients of *mineral state* from 10,000 estimations of equation (1) with individual covariates. Under "individual-level randomization", each simulation randomly assigns each individual to a new state, keeping the mineral status of the state unchanged. Under "state-level randomization", each simulation randomly assign the mineral status of each state, leaving unchanged the individual composition of each state. The *non-randomized* coefficient is the estimated coefficient of *mineral state* as in Table 2, column 1.

Table A1: Definitions of covariates used in regressions.

General Social Survey's covariates	
Male	Respondent's gender. Equals 1 for males, and 0 for females.
Age	Respondent's age in years. It corresponds to reported age divided by 10.
Age^2	Square of respondent's age divided by 10.
Married	Respondent's marital status. Equals 1 if married, and 0 if not.
Protestant and Catholic	Respondent's religious affiliation. The omitted category is "other" or "none".
Education	Completed years of formal education.
Employed	Respondent's employment status. Equals 1 for "full time", "part time" or "self employed". The omitted category is "retired", "housewife", "student", "unemployed" or "other".
White	Respondent's skin color. Equals 1 for "white". The omitted category is "black" or "other".
Income	Respondent's family income, corrected for family size. Our measure of income is slightly different from the one use in other analysis using the GSS. Usually, the GSS variable INCOME is used as a measure of income differences. This variable gives information about the respondent's total family income and is coded using 12 income brackets for the entire period covered by the survey. Using this variable without any transformation has two drawbacks. First, this does not take into account the size of the family. Second, the fact that the same coding is used for the whole period makes it an inappropriate measure because both of inflation and the increasing standard of living. Hence, we first create broad family income deciles using the income variables definer for shorter time periods (INCOME72, INCOME77, etc.). Then, we divide this new variable by the household's size using the HOMPOP variable.
Political orientation	Respondent's self positioning on a 7-item scale that goes from "extremely liberal" to "extremely conservative".
Trust	Respondent's trust in others. Equals 1 if the respondent answers "most people can be trusted" to the following question: "Generally speaking, would you say that most people can be trusted or that you can't be too careful in life?".
State-level covariates	
Longitude	Longitude of the capital of the state. Coefficients presented in tables correspond to the original longitude divided by 100.
Population density	State population in thousands at the time of interview, divided by the surface of the state in squared miles. Source: US Census Bureau.
Per capita income	Per capita income of the state at the time of interview, in thousands dollars. Source: Bureau of Economic Analysis.
Past per capita income	Per capita income of the state when respondent was 20 years old, in thousands dollars. Source: Bureau of Economic Analysis.
Gini coefficient	Gini coefficient of the state at the time of interview, between 0 and 1. Source: Frank (2014), updated until 2010.
Region fixed effects	Set of four fixed effects for the following regions: Midwest, Northeast, South, and West. Source: US Census Bureau.

Table A2: Summary statistics of individual-level variables.

Sample used to estimate expression (1): 20,193 observations

	Mean	Standard deviation	Min	Max
Opposition to redistribution	0.01	1.17	-2.12	2.44
Support for individual responsibility	2.91	1.16	1	5
Sympathy for income inequality	3.73	1.95	1	7
Mineral state	0.50	0.50	0	1
Male	0.46	0.50	0	1
Age	4.49	1.68	2	9
Married	0.51	0.50	0	1
Protestant	0.58	0.49	0	1
Catholic	0.24	0.43	0	1
Education	13.21	2.98	0	20
Employed	0.69	0.46	0	1
White	0.81	0.39	0	1
Income	2.86	2.00	0	10
Political orientation	4.12	1.37	1	7
Trust	0.38	0.49	0	1

Sample used to estimate expression (2): 13,182 observations

	Mean	Standard deviation	Min	Max
Opposition to redistribution	-0.02	1.16	-2.12	2.44
Support for individual responsibility	2.89	1.15	1	5
Sympathy for income inequality	3.69	1.93	1	7
Mineral state	0.46	0.50	0	1
Mineral discoveries observed	0.36	0.48	0	1
Male	0.46	0.50	0	1
Age	4.37	1.69	2	9
Married	0.50	0.50	0	1
Protestant	0.60	0.49	0	1
Catholic	0.24	0.43	0	1
Education	12.93	2.78	0	20
Employed	0.70	0.46	0	1
White	0.82	0.38	0	1
Income	2.74	1.93	0	10
Political orientation	4.14	1.34	1	7
Trust	0.36	0.48	0	1

Opposition to redistribution is the first principal component of two variables. The first is the answer, on a scale from 1 to 5, to the following question: "Some people think that the government in Washington should do everything possible to improve the standard of living of all poor Americans. Other people think it is not the government's responsibility, and that each person should take care of himself. Where would you place yourself on this scale?". This question is labeled *support for individual responsibility* in the table. The second is the answer, on scale from 1 to 7, to the following question: "Some people think that the government in Washington ought to reduce the income differences between the rich and the poor, perhaps by raising the taxes of wealthy families or by giving income assistance to the poor. Others think that the government should not concern itself with reducing this income difference between the rich and the poor. What score [. . .] comes closest to the way you feel?". This question is labeled *sympathy for income inequality* in the table. *Mineral state* is equal to 1 if the respondent lives in a state with more mineral resources than the median US state, 0 if not. *Mineral discoveries observed* equals 1 if there has been mineral discoveries in the state during the respondent's life. See Table A1 for the detailed definitions of other covariates.

Table A3: Distribution of mineral resources.

	Points	Mines		Points	Mines
Non-mineral states			South Carolina	1	1
Delaware	0	0	Vermont	1	1
District of Columbia	0	0	Virginia	1	1
Hawaii	1	0			
Illinois	9	0	*Mineral states*		
Indiana	0	0	New Hampshire	10	3
Iowa	0	0	New York	12	4
Kansas	0	0	Florida	28	5
Kentucky	0	0	Georgia	82	5
Maryland	4	0	Arkansas	14	6
Massachusetts	1	0	Oklahoma	144	47
Michigan	0	0	Wyoming	370	54
Minnesota	2	0	Idaho	237	67
Mississippi	0	0	North Carolina	134	77
Nebraska	0	0	New Jersey	238	224
North Dakota	0	0	South Dakota	395	272
Ohio	0	0	Washington	1598	298
Pennsylvania	8	0	Texas	629	427
Tennessee	5	0	Colorado	1411	546
West Virginia	3	0	New Mexico	947	588
Wisconsin	1	0	Montana	1382	663
Alabama	1	1	Alaska	2432	727
Connecticut	3	1	Arizona	2475	1358
Louisiana	1	1	Utah	2327	1377
Maine	15	1	Nevada	2648	1385
Missouri	1	1	California	4138	1493
Rhode Island	3	1	Oregon	4850	3840

Source: Mineral Resources Data System. *Points* is the number of entries in the data set. *Mines* is the number of places where mining has been operated. *Mineral states* are all states with a number of mines larger than the median.

Table A4: Major commodities, by type of observation.

	Occurrence %	Prospect %	Production %	Total %
Copper	14,6	30,9	9,5	12,6
Gold	31,3	48,2	30,8	31,6
Iron	2,5	1,3	1,8	2,1
Lead	8,1	18,5	10,0	9,4
Silver	13,8	28,8	18,2	16,6
Tungsten	3,7	3,1	3,0	3,3
Uranium	8,6	3,4	5,2	6,7
Zinc	4,2	12,7	3,4	4,1
Other	38,7	19,4	44,7	41,0

Source: Mineral Resources Data System. The sum of percentages is not equal to 100 because the same resource may contain several commodities. *Occurrence*: No production has taken place and there has been no or little activity since discovery. *Prospect*: Work such as surface trenching, adits, or shafts, drill holes, extensive geophysics, geochemistry, and/or geologic mapping has been carried out. *Production*: Mining has been operated. "Other" means none of the above commodities.

Table A5: Residence in a mineral state and opposition to redistribution: assessing the omitted variable bias.

Dependent variable: Opposition to redistribution					
	(0)	(1)	(2)	(3)	(4)
Mineral state	0.068***	0.078***	0.065***	0.077***	0.061**
	(0.021)	(0.017)	(0.024)	(0.017)	(0.024)
Individual covariates		Yes	Yes	Yes	Yes
State-level covariates			Yes		Yes
Origin and industry fixed effects				Yes	Yes
Observations	19,176	19,176	19,176	19,176	19,176

*** p<0.01, ** p<0.05, * p<0.1. White heteroskedastic standard errors in parentheses, clustered by state × year. OLS regressions. All regressions include a constant term and year of interview fixed effects. No other covariates are included in column 0. Each regression includes the same covariates as those used in the same-numbered column of Table 2. In columns 0–3, the sample is restricted to observations for which all covariates used in column 4 are available. *Opposition to redistribution*, the dependent variable, is the first principal component of two variables. The first is the answer, on a scale from 1 to 5, to the following question: "Some people think that the government in Washington should do everything possible to improve the standard of living of all poor Americans. Other people think it is not the government's responsibility, and that each person should take care of himself. Where would you place yourself on this scale?". The second is the answer, on scale from 1 to 7, to the following question: "Some people think that the government in Washington ought to reduce the income differences between the rich and the poor, perhaps by raising the taxes of wealthy families or by giving income assistance to the poor. Others think that the government should not concern itself with reducing this income difference between the rich and the poor. What score [...] comes closest to the way you feel?".