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Resource Location Patterns and State Severance Taxes: Some Empirical Evidence**

I. INTRODUCTION

State severance tax rates and collections from mineral resources are related, among other things, to the industrial structure of the extractive industry and geographic resource location patterns.¹ The generally accepted theoretical conclusions are summarized in Table 1. The *industrial structure* of the extracting industry is critical in determining how much revenue a state can collect from any specific severance tax. A state, if it is the sole state in which a resource is located, can collect more revenues if there are many extractive firms within the state as opposed to if there is only one such firm. Basically, this result follows because the monopolist tends to restrict output—and thus the tax base—to levels lower than in the competitive market structure.²

TABLE 1
State's Severance Tax Potential for Specific Resource

Number of Firms in Industry	Number of States In Which Resource Is Located		
	Many	Few	One
Many	Poor	Fair	Excellent
Few	Poor	Fair	Good
One	Poor	Fair	Good

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1. See Gillis, *Severance Taxes on North American Energy Resources: A Tale of Two Minerals*, 10 GROWTH AND CHANGE 55 (1979); McLure, *Economic Constraints on State and Local Taxation of Energy Resources*, 31 NAT'L TAX J. 257 (1978); and J. RICHARDSON & L. SCOTT, THE TAXATION OF NATURAL RESOURCES BY STATES (Study prepared for the Office of Surface Mining, Department of the Interior, 1981).

2. See J. RICHARDSON & L. SCOTT, *supra* note 1, at 43 for a rigorous theoretical proof of this assertion.

On the other hand, one would expect *geographic resource location patterns* to be related to the state's power to tax. The generally accepted hypothesis is that the more dispersed the resource across states the less likely that a state can effectively tax the resource. Or, alternatively, the more concentrated the resource is geographically the more likely that a state can effectively tax the resource.³ This paper examines empirically this geographic location hypothesis by focusing on five resources severed in the United States—sand/gravel, sawtimber, coal, oil, and natural gas. We will also briefly discuss the case of nickel, which does not fit the concentration patterns of the other minerals. The methodology entails comparing the differences in resource location patterns of these minerals to differences in severance tax rates across the minerals as a means of testing whether resource dispersion and severance tax rates are inversely related.

II. RESOURCE PATTERNS AND SEVERANCE TAX RATES

The geographic location patterns across states of sand/gravel, sawtimber, coal, oil, and natural gas are summarized in Table 2. Sand/gravel and sawtimber are produced in all 50 states while coal, oil, and natural gas are produced in 50 to 60 percent of the states. Information on four-state concentration ratios, which constitute the measure of resource concentration for this study, and state severance tax rates are included in Table 3.⁴

The four-state concentration ratio rises from 28.6 percent for sand/gravel to 85.3 percent for natural gas. Oil has a four-state concentration

TABLE 2
Percent of Total U.S. Oil, Natural Gas, Coal, Sawtimber, and
Sand/Gravel Production by States for Selected Years

State	Oil ^a	Natural Gas ^a	Coal ^b	Saw-Timber ^c	Sand/Gravel ^d
Ala.	0.6	0.4	3.1	2.7	1.2
Alaska	16.4	1.1	0.1	7.3	6.1
Ariz.	N	—	1.5	0.9	2.2
Ark.	0.6	0.5	N	1.9	1.6
Calif.	11.3	1.2	—	10.2	11.2
Colo.	1.0	0.9	2.4	2.1	2.5
Conn.	—	—	—	0.2	0.6

3. See *id.* for a rigorous theoretical proof of this assertion.

4. A "four-state concentration ratio" is defined as the resource production occurring in the top four producing states relative to the resource production in all 50 states.

Del.	—	—	—	0.1	0.1
Fla.	1.5	0.2	—	1.2	1.7
Ga.	—	—	N	3.1	0.6
Hawaii	—	—	—	N	0.1
Idaho	—	—	—	5.4	0.9
Ill.	0.7	N	7.7	0.3	4.9
Ind.	0.2	N	3.5	0.4	2.7
Iowa	—	—	0.1	0.1	2.0
Kans.	1.8	3.9	0.1	0.1	1.4
Ky.	0.2	0.3	18.8	1.1	1.1
La.	15.7	35.5	—	2.5	1.8
Maine	—	—	—	1.4	1.3
Md.	—	N	0.3	0.3	1.5
Mass.	—	—	—	0.3	1.7
Mich.	1.1	0.8	—	1.6	6.0
Minn.	—	—	—	1.0	4.2
Miss.	1.2	0.7	—	2.6	1.8
Mo.	N	—	0.8	0.6	1.2
Mont.	1.0	0.3	4.2	3.8	0.5
Neb.	0.2	N	—	0.1	1.5
Nev.	N	—	—	0.1	1.0
N.H.	—	—	—	0.6	0.7
N.J.	—	—	—	0.1	1.6
N. Mex.	2.6	5.8	2.0	1.0	0.8
N.Y.	N	0.1	—	1.0	2.8
N.C.	—	—	—	3.0	1.0
N. Dak.	1.0	0.1	1.9	N	0.7
Ohio	0.4	0.6	5.6	0.6	4.7
Okla.	4.6	9.0	0.6	0.2	1.2
Oreg.	—	N	—	16.7	2.1
Pa.	0.1	0.5	12.0	1.3	2.2
R.I.	—	—	—	N	0.4
S.C.	—	—	—	1.6	0.9
S. Dak.	N	N	—	0.2	0.8
Tenn.	N	N	1.1	1.3	1.4
Tex.	32.6	35.0	3.5	1.9	4.9
Utah	0.9	0.3	1.5	0.6	1.3
Vt.	—	—	—	0.4	0.3
Va.	N	N	4.7	2.1	1.3
Wash.	—	—	0.7	12.8	2.4
W. Va.	0.1	0.7	14.4	1.1	0.6
Wis.	—	—	—	1.2	3.8
Wyo.	4.2	2.0	9.2	1.1	0.5

N = less than 0.1 percent

— = no measurable output reported

*AMERICAN PETROLEUM INSTITUTE, I BASIC PETROLEUM DATA BOOK, PETROLEUM INDUSTRY STATISTICS No. 1, Sec. IV, Table 5, and Sec. XIII, Table 9b (May 1981). Data are for 1979.

^bU.S. DEP'T OF ENERGY INFORMATION ADMINISTRATION, ENERGY DATA REPORT, Table 4 (May 22, 1980).

^cBUREAU OF THE CENSUS, U.S. DEP'T OF COMMERCE, STATISTICAL ABSTRACT OF THE UNITED STATES—1980, at 732. Data are for 1977.

^dBUREAU OF MINES, U.S. DEP'T OF INTERIOR, AREA REPORTS: DOMESTIC, 2 MINERALS YEARBOOK 9–29. Data are for 1975.

TABLE 3
Summary of Geographical Dispersion and Severance Taxation

	Sand/ Gravel	Saw- Timber	Coal	Oil	Natural Gas
No. of states with measurable production	50	50	26	31	30
Four-state concentration ratio	28.2	47.0	54.4	76.2	85.3
No. of states with severance tax	6	8	14	27	27
No. of states with percent of value tax	3	3	5	20	18
Range of percent of value tax	.75%–5%	.375%–12.5%	2%–30%	1%–15%	1%–10%
States with 5% +	1	1	2	11	8

Source: Table 2.

ratio of 76.2 percent. Only six states have severance taxes on sand/gravel while 27 states tax oil and natural gas. One state has a severance tax rate of more than 5 percent of value on sand/gravel and sawtimber, while 11 states have tax rates of more than 5 percent of value on oil. Eight states have such a tax rate on natural gas. The power of a state to tax, indeed the likelihood that a state will tax, does appear to rise with the four-state concentration ratio. To examine this conclusion more thoroughly we investigate each of the minerals separately.

Sand and Gravel

Sand and gravel are severed from the land of all 50 states in the United States. No one state or group of states dominates the production of these products. Instead, each state's proportion of the total U.S. production is generally in line with the state's geographic size and population. The four-state concentration ratio for sand and gravel output is 28.2 percent, which is low compared to the other severed products in Table 3. From an industrial structure standpoint, evidence available suggests that the sand and gravel industry is purely or monopolistically competitive. In

TABLE 4

State Severance Taxes on Sand and Gravel as of May, 1981^a

State	Severance Tax
Arkansas	1¢ per ton
Florida	5% of value, unless a Florida sales tax is ultimately paid on the mineral ^b
Kentucky	4.5% of value, less transportation expenses
Louisiana	3¢ per ton
New Mexico	.75 of 1% of value
Ohio	1¢ per ton

Source: 2 ST. TAX GUIDE (CCH) ¶¶45-000 to 45-955 (1981).

^aBoth Alabama and Minnesota have statutes permitting localities to levy severance taxes on sand and gravel. In Alabama these rates are 1¢ and 5¢ per ton in Bibb and Elmore Counties, respectively, and the rate is 10¢ per cubic yard in certain Minnesota localities.

^bAccording to a Florida Department of Revenue official, the majority of the sand and gravel severed in that state is ultimately subject to the state sales tax. Hence, the severance tax on sand and gravel is rarely assessed.

1979, there were 6,836 "operations" in this industry, and just over 81 percent of these operations had annual sales of \$200,000 or less.⁵

These characteristics of the sand and gravel industry place it in the first column and first row of Table 1, which means there should be little or no severance tax possibilities for this product. As it turns out, Table 4 shows this to be a reasonably accurate description of sand and gravel severance taxation. Despite or perhaps because of the fact that this product is produced in all 50 states, only six states have a sand and gravel severance tax. In four of these states, the tax is a negligible part of the total value of the product. Florida has a 5 percent severance tax on this product, but due to a broad exemption for sales tax paid, very little severance tax is actually paid on sand and gravel in Florida.⁶

Only Kentucky has what might be called a significant severance tax on sand and gravel, with an assessment of 4.5 percent of value less transportation expenses. This relatively new law (1980) is a part of that state's Natural Resource Severance Tax which applies generally to all natural resources except oil and coal.⁷ A tax of this magnitude on a product like sand and gravel cannot be sustained for a long period of time without driving a significant proportion of Kentucky's sand and gravel industry

5. BUREAU OF MINES, U.S. DEP'T OF THE INTERIOR, 1 MINERALS YEARBOOK 773 (1978-79).

6. See note b, Table 4.

7. 2 ST. TAX GUIDE (CCH) ¶¶45-465 (1980).

into surrounding states. Indeed, the generally accepted conclusions in Table 1 suggest that a flat rate severance tax applied to all natural resources severed in a state can be very harmful to certain of that state's extractive industries, given that resources have different industrial and locational properties.

Sawtimber

Sawtimber represents a case only slightly different from sand and gravel. Measurable amounts of sawtimber are severed in all 50 states, but the distribution of production is more skewed than in the case of sand and gravel. The four-state concentration ratio is noticeably higher at 47 percent. There are 22 states which sever less than 1.0 percent of the total U.S. sawtimber (versus only 15 states in the case of sand and gravel). Sawtimber's industrial structure tends toward the competitive extreme with 15,569 establishments classified as Logging Camps or Logging Contractors in 1977 in the United States.⁸ These characteristics suggest that severance tax activity in this industry should be similar to taxation in the sand and gravel industry.

Table 5 indicates that eight states have imposed a severance tax on sawtimber and associated lumber products—slightly more than for sand and gravel. However, those five states imposing per unit taxes on sawtimber—Alabama, Arkansas, Mississippi, North Carolina, and Virginia—have used rates which are very comparable, on a percent of value basis, to the per unit rates imposed on sand and gravel.⁹ Louisiana and Oregon have imposed a percent of value tax which is noticeably higher than on sand and gravel. Louisiana's 2.25 percent rate has been in effect since at least 1950 with no apparent effect on its timber industry.

Oregon, on the other hand, presents a slightly different case. The per unit component of Oregon's timber tax is not onerous by any means and has been in effect since 1947. Oregon's percent of value taxes, however, may appear at first glance to be noticeably high. For example, if one severed timber from reforested land in eastern or western Oregon, the tax rate would be 12.5 percent of stumpage value. In reality, individuals owning and severing timber from reforested lands in Oregon receive a significant reduction in property taxes which is designed to offset the extra severance tax on reforested products. Oregon's laws are designed

8. BUREAU OF THE CENSUS, U.S. DEP'T OF COMMERCE, 1977 CENSUS OF MANUFACTURERS—INDUSTRY SERIES, LOGGING CAMPS, SAWMILLS, & PLANING MILLS, at 24A-13.

9. It may appear that the per unit lumber severance taxes are noticeably higher. However, in 1978 lumber was selling at prices ranging from \$41.10 per mbf for eastern hardwood to \$134.50 per mbf for southern pine. In comparison, sand and gravel was selling for an average price of \$2.29 per ton. BUREAU OF THE CENSUS, U.S. DEP'T OF COMMERCE, STATISTICAL ABSTRACT OF THE UNITED STATES—1980, at 735, 771.

TABLE 5
State Severance Tax on Forest Products As of May, 1981^a

Alabama	Pine—20¢ per mbf; hardwood and others—12¢ per mbf; pulpwood—10¢ per cord.
Arkansas	Pine—\$1.25 per mbf; others—63¢ per mbf; pine pulpwood—63¢ per cord; hardwood pulp—50¢ per cord.
Louisiana	2.25% of stumpage value on all, except 5% for pulpwood. On timber grown on reforestation land—6% of stumpage value.
Mississippi	Saw logs, pine, and softwoods—\$1.00 per mbf; hardwoods—75¢ per mbf; lumber including cross ties—60¢ per mbf; pulpwood except pine—22.5¢ per cord; pine pulpwood—30¢ per cord.
North Carolina	Softwood—50¢ per mbf; hardwood and cypress—40¢ per mbf; softwood pulp—20¢ per cord; hardwood pulp—12¢ per cord.
New Mexico	$\frac{3}{8}$ th of 1% of value.
Oregon	Timber tax—29¢ per mbf; privilege tax—6¢ per mbf on products harvested on protected east side forest lands; Eastern Oregon Severance Tax—5% of harvest value plus 7.5% of harvestable value if on reforestation lands (this latter tax is reduced by $\frac{1}{4}$ % per year after 1978 and ends in 2007); Western Oregon Timber Tax—6.5% of stumpage value plus 6% if harvested from reforestation lands. (This latter tax falls by $\frac{1}{4}$ % per year after 1978 until 2001).
Virginia	Pine—\$1.15 per mbf; cedar—15¢ per mbf; pine pulpwood—47.5¢ per cord; cedar pulpwood—7.5¢ per cord; manufacturers of rough lumber may alternatively elect to pay a flat fee of \$258 per year if producing 300 to 500 mbf or \$129 per year for 300 mbf or less.

^aOnly severance taxes are included. Some states charge a property tax which is levied when timber is severed and that tax is typically based on the stumpage value. This is true in California, Idaho, Massachusetts, Michigan, Minnesota, and Wisconsin.

mbf = 1000 board feet

Source: 2 ST. TAX GUIDE (CCH) ¶¶45-000 to 45-955 (1981).

so that the additional severance tax on reforested lands will gradually fall over time and property taxes will gradually rise. By approximately the turn of the century, timber owners on all lands will be paying severance tax rates of 5 to 6.5 percent of stumpage value.¹⁰

Oregon is presently the country's largest producer of timber, generating 431,172 million board feet of sawtimber in 1977 or 16.7 percent of the national volume.¹¹ Given this degree of geographic concentration of sawtimber, Oregon's power to assess a slightly higher timber severance tax than other states is not surprising.

Coal

As is apparent from Table 3, coal falls in a category between the sand/gravel and oil/gas cases. Just over half of the states in the United States sever measurable amounts of coal from their lands. The four-state concentration ratio for coal of 54.4 percent is noticeably higher than for sand and gravel, but this ratio still suggests considerable dispersion among the producing states.

With one exception severance tax behavior for coal conforms to our general hypothesis. Because of the greater geographical concentration of coal, states with coal resources have enhanced power to tax this product. As indicated in Table 6, 14 states have severance tax on coal as compared to only six for sand and gravel and eight for sawtimber. Table 3 shows that there are also more states with percentage of value taxes on coal (five) than for sand/gravel and sawtimber (three states each). Three other states with per unit taxes on coal—Colorado, New Mexico, and North Dakota—have escalator clauses which enable their rates to change with the general price level.

Montana (and to some extent Wyoming), of course, has gained national recognition as an extreme rebel in coal severance taxation. In response to its citizens' perception of the social costs associated with surface strip mining, Montana has levied the largest severance tax on any product in the United States—a 30 percent-of-value tax on surface mined coal that has BTU's per pound in excess of 7,000. This rate was passed by the Montana legislature in 1974 and was contested in the courts until a final Supreme Court ruling in 1981 upheld Montana's right to assess rates of this magnitude.¹²

10. See OREGON STATE UNIVERSITY—FORESTRY EXTENSION, *THE FOREST PROPERTY TAX LAWS IN WESTERN OREGON*, EXTENSION CIRCULAR NO. 888 (1980); and OREGON STATE UNIVERSITY—FORESTRY EXTENSION, *FORESTRY PROPERTY TAXATION IN EASTERN OREGON*, EXTENSION CIRCULAR NO. 898 (1980).

11. STATISTICAL ABSTRACT OF THE UNITED STATES—1980, *supra* note 9, at 732.

12. *Commonwealth Edison Co. v. Montana*, 453 U.S. 609 (1981).

TABLE 6
State Severance Taxes on Coal as of May, 1981

State	Severance Tax		
Alabama	33.5¢ per ton		
Arkansas	2¢ per ton		
Colorado	60¢ per ton. Every 3% charge in producer price index rate will be increased or decreased 1%. No tax on first 8,000 tons each quarter. Credit of 50% of tax for coal mined underground and lignite coal production.		
Idaho	2% of net value. Net value = gross value minus all costs of mining and processing the ore minus federal depletion deduction.		
Kentucky	4½% of gross value		
Louisiana	10¢ per ton		
Montana	BTU Per Lb. of Coal	Surface Mines	Underground Mines
	Under 7,000	12¢ or 20% of val.	5¢ or 3% of val.
	7,000 to 8,000	22¢ or 30% of val.	8¢ or 4% of val.
	8,000 to 9,000	34¢ or 30% of val.	10¢ or 4% of val.
	over 9,000	40¢ or 30% of val.	12¢ or 4% of val.
	The first 20,000 tons each calendar year are exempt.		
New Mexico	82.6¢ per ton. Each July 1 this rate is adjusted upward/downward by the percentage rise in the CPI for the previous calendar year.		
North Dakota	85¢ per ton and 1¢ per ton for every four-point increase in the Wholesale Price Index.		
Ohio	5¢ per ton		
Oklahoma	5¢ per ton		
South Dakota	4½% of value in lieu of all occupational, excise, income, privilege, and franchise taxes levied by the state.		
Tennessee	29¢ per ton		
Wyoming	8½% of value		

Source: 2 ST. TAX GUIDE (CCH) ¶¶45-000 to 45-955 (1981).

Given the number of states in which coal is produced and the fact that Montana generates less than 5 percent of total U.S. production, this tax rate might be expected to seriously retard surface mining operations in that state. Other considerations are pertinent, such as the fact that Montana coal has a low sulphur content which facilitates compliance with national air standards. Only a detailed longitudinal study can determine the impact this tax has had on surface mining in Montana.

Oil and Gas

When one considers the severance taxes on oil and gas, the case is distinctively different from the previously discussed products. Table 3 shows that there is a great deal more geographic concentration of production in the oil and gas industries. The four-state concentration ratios are 76.2 and 85.3 percent for oil and gas, respectively, and two to three states tend to dominate the production of these products. For example, Table 2 shows that Texas produces 35 percent and Louisiana 35.5 percent of the country's natural gas. Texas is responsible for one-third of the country's oil production, while Louisiana and Alaska combine for another one-third of the nation's output. Twenty states produced no measurable amounts of natural gas in 1979 while 19 states produced no measurable amounts of oil. Thus, oil and gas output is much more geographically concentrated than sand/gravel, sawtimber, or coal.

While the geographical spread of oil and gas in the United States is relatively concentrated, the oil and gas market structure is not. Precise data on market structure are somewhat difficult to find; however, in 1977 there were 17,192 establishments engaged in just the oil and gas extraction end of the petroleum industry. Of these, 12,790 were single unit companies and the remaining 4,402 were part of multi-unit companies.¹³ Professor Jesse Markham has calculated the four-firm concentration ratio for oil and gas production companies to be 25.1 percent.¹⁴ Such a concentration ratio is typically associated with a low probability of interdependence among the firms.¹⁵

These characteristics place the oil and gas industries in approximately the middle cell of the top row in Table 1. Hence, when examining oil and gas severance tax rates across states one would expect to find: (a) rates higher than those on sand/gravel and sawtimber; (b) differential rates across states; and (c) a large proportion of the producing states levying the tax.

13. BUREAU OF THE CENSUS, U.S. DEP'T OF COMMERCE, 1977 CENSUS OF MINERAL INDUSTRIES—SUBJECT SERIES, TYPE OF ORGANIZATION, at 3-6.

14. Markham, *Market Structure and Horizontal Divestiture in the Oil Industry*, in *HORIZONTAL DIVESTITURE IN THE OIL INDUSTRY* (E. J. Mitchell ed. 1978).

15. J. BAIN, *INDUSTRIAL ORGANIZATION* 136 (3d ed. 1972).

Indeed, just such a pattern is reflected in Tables 7 and 8. An examination of these tables in conjunction with Table 3 reveals that:

- (1) many more states impose a severance tax on oil and gas than is the case with sand/gravel, sawtimber, or coal;
- (2) the tax rates vary substantially across the states (in the case of oil, for example, the rates range from a low 2 mills per barrel in Utah to 15 percent of value in Alaska); and
- (3) the rates are clearly higher than on those minerals discussed earlier.

The top three oil producing states have taken advantage of their economic power in this area by imposing significant percent of value taxes: Texas—4.6 percent; Louisiana—12.5 percent; Alaska—15 percent. Most of the states levying very low taxes use these receipts to finance the activities of their conservation departments which regulate the oil industry in their states.¹⁶ This same pattern of rate variation, with high rates imposed by the top three producers, exists for gas also. The only glaring exception is Louisiana's low per unit tax of 7¢ per mcf despite that state's number one rank as a natural gas producer. The state presumably kept its rate on a per unit basis because of the price differential between intrastate and interstate gas.¹⁷ A percent-of-value tax would place Louisiana's industries—which are heavy users of the higher priced intrastate gas—at a competitive disadvantage with out-of-state industries using the cheaper interstate gas. One other peculiarity regarding oil and gas severance taxes is the lack of a severance tax on oil in the nation's fourth largest producing state, California, which generates 11.5 percent of the country's oil production. California oil is typically classified as heavier oil which makes it more expensive to recover and refine, thus explaining at least a part of the lower tax.¹⁸

III. THE SPECIAL CASE OF NICKEL

While the resources considered above fit rather neatly into the columns labeled "many" and "few" in Table 1, finding a natural resource that is severed in only one state—that is, a product that fits in the last column of that table—is much more difficult. Nickel represents this extreme case.

16. See 2 ST. TAX GUIDE (CCH) ¶¶ 45-000 to 45-955 (1980) for various state severance tax and production tax laws.

17. Legislative arguments focused on the differential impacts of a value tax on low price interstate gas going out of state and high price intrastate gas consumed within the state. Although such testimony is not permanently retained, the content of the legislative arguments can be found in newspaper reports of the session.

18. Richardson & Scott, *Domestic and International Implications of Federal and State Policies Toward Heavy Oil*, in PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON HEAVY VS. LIGHT OIL, INTERNATIONAL RESEARCH CENTER FOR ENERGY AND ECONOMIC DEVELOPMENT (forthcoming).

TABLE 7
State Severance Taxes on Oil as of May, 1981^a

State	Severance Tax
Alabama	Production tax—2% of gross value; severance tax—6% of gross value or 4% of gross value for wells producing less than 40 bbls per day; new wells after 9/01/79—4% of gross value for first 10 years—6% thereafter.
Alaska	15% of value or 60¢ per bbl, whichever is greater times an economic limit factor.
Arkansas	5% of value if 10 bbls or more per day; 4½% otherwise.
California	\$.016 per barrel
Colorado	Oil shale—4% of value; graduated rate on petroleum going from 2% on \$25,000 income from crude to 5% on \$300,000 plus.
Florida	8% of value unless producing less than 400 bbls per day or using tertiary recurring methods which is taxed at 5%.
Georgia	5 mills per barrel
Idaho	5 mills per barrel + 2% of value
Indiana	1% of value
Kansas	\$.004 per barrel
Kentucky	4.5% of value
Louisiana	12.5% of value
Michigan	6.6% of value; 4% on stripper wells; 0.2% conservation tax.
Mississippi	6% of value plus 8 mills per barrel.
Montana	5% of value plus .02% conservation tax.
Nebraska	3% of value; stripper wells—2%; 4 mills per barrel conservation tax.
Nevada	5 mills per barrel
New Mexico	6.3% of value
North Carolina	5 mills per barrel
North Dakota	11.5% of value
Ohio	3¢ per barrel
Oklahoma	7.00085% of value
Oregon	6% of value
South Dakota	4.5% of value
Tennessee	1.5% of value
Texas	4.6% of value plus 3/16 of one cent per barrel.
Utah	2% of value plus 15 mills per barrel.
Wyoming	.8 mills per dollar plus 6% of value.

Source: 2 ST. TAX GUIDE (CCH) ¶¶45-000 to 45-955 (1981).

TABLE 8
State Severance Taxes on Natural Gas as of May, 1981^a

State	Severance Tax
Alabama	8% of given value
Alaska	10% of gross value or 6.4¢ per mcf, whichever is greater times economic limit factor
Arkansas	0.3¢ per mcf plus 5 mills per mcf
California	1.6¢ per mcf
Colorado	Graduated rate on income from gas going from 2% on \$25,000 to 5% on \$300,000 plus
Florida	5% of value
Georgia	0.5 mills per mcf
Idaho	5 mills per 50 mcf plus 2% of value
Indiana	1% of value
Kansas	\$.00085 per mcf
Kentucky	4.5% of value
Louisiana	7¢ per mcf
Michigan	5% of value
Mississippi	6% of value or 3 mills per mcf, whichever is greater
Montana	2.65% of gross value plus .02% conservation tax
Nebraska	3% of value plus 4 mills per mcf
Nevada	5 mills per 50 mcf
New Mexico	.0274% of value plus 5¢ per mcf
North Carolina	0.5 mills per mcf
North Dakota	5% of value
Ohio	1¢ per mcf
Oklahoma	7.085% of value
Oregon	6% of value
South Dakota	4.5% of value
Tennessee	1.5% of value
Texas	7.5% of value
Utah	2 mills per dollar
Wyoming	.8 mills per dollar plus 6% of value

mcf = thousand cubic feet

Source: 2 ST. TAX GUIDE (CCH) ¶¶45-000 to 45-955 (1981).

Nickel is severed from the land in only one state, Oregon, and is mined by only one firm, The Hanna Mining Company in Riddle, Oregon.¹⁹ These characteristics place nickel in column 3, row 3 of Table 1, and suggest that Oregon should be able to levy a severance tax on this product, with the tax rate being limited by the extent of the firm's monopoly power.

The Hanna Mining Company's monopoly power is negligible. Although Hanna has the only nickel mine in the United States (and consequently, the only location where the mineral is severed), nickel is produced elsewhere in the United States as a by-product in other production processes. Moreover, a very efficient international market for this product exists which restricts Hanna Mining Company's monopoly power. For example, consider the U.S. nickel market in 1979. In that year the output of the Hanna Mining Company mine was 15,065 short tons. Elsewhere in the United States plant by-products generated another 57,392 short tons, and 183,742 short tons were imported.²⁰ The mining company's output was a relatively minor component of the total U.S. nickel market. Thus, Oregon's incentive to levy a severance tax on nickel is negligible, and the state levies no such tax on the mineral.

IV. SUMMARY AND CONCLUSIONS

The empirical evidence supports the general hypothesis that the more concentrated the geographical location of a natural resource, the greater a state's power to levy a tax on the resource and the more likely a state will have such a tax. The documented patterns of resource taxation reflect basic revenue maximizing principles embraced by state governments in establishing their tax structure, especially when the perception is that the tax can be exported. The analysis does not enable us to establish the upper limit on state severance tax power, that is, the maximum severance tax which could be levied before the severing industries would leave a state. A corollary to our general conclusion is that states levying a flat severance tax rate on all natural resources run the serious risk of impeding the extraction of resources which are also produced in many other states.

19. MINERALS YEARBOOK, *supra* note 5, at 630.

20. *Id.* at 629.