INFORMATION TO USERS

The most advanced technology has been used to photograph and reproduce this manuscript from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

U·M·I

University Microfilms International
A Bell & Howell Information Company
300 North Zeeb Road, Ann Arbor, MI 48106-1346 USA
313.761-4700 800.521-0600

Order Number 9023338

An analysis of the effect of the proposed *ad valorem* property taxation of unmined coal property in Kentucky

Frazier, Jessica Johnson, D.B.A.

University of Kentucky, 1990

U·M·I
300 N. Zeeb Rd.
Ann Arbor, MI 48106

DISSERTATION

Jessica Johnson Frazier

The Graduate School

University of Kentucky

1990

AN ANALYSIS OF THE EFFECT OF THE PROPOSED AD VALOREM PROPERTY TAXATION OF UNMINED COAL PROPERTY IN KENTUCKY

DISSERTATION

A dissertation submitted
in partial fulfillment of the requirements for the
degree of Doctor of Business Administration
at the University of Kentucky

By

Jessica Johnson Frazier

Richmond, Kentucky

Director: Dr. Daniel L. Fulks, Professor of Accounting

Lexington, Kentucky

1990

AN ANALYSIS OF THE EFFECT OF THE PROPOSED AD VALOREM PROPERTY TAXATION OF UNMINED COAL PROPERTY IN KENTUCKY

By

Jessica Johnson Frazier

David L. Fuller
(Director of Dissertation)

W. W. Ecton
(Director of Graduate Studies)

March 20, 1990
(Date)

ACKNOWLEDGEMENTS

I wish to express my appreciation to my dissertation committee members, Dr. Edward W. Kifer, Dr. Curtis E. Harvey, Dr. James A. Knoblett, and Dr. Thomas R. Pope for their valuable advice and encouragement given during my dissertation research. I would like to offer a special thanks to Dr. Daniel L. Fulks, my dissertation director, for the encouragement, assistance, and time given. I am especially grateful to my friend Dr. Stephen M. Courtenay for his continued guidance, insight, and suggestions not only during the writing of this dissertation, but throughout the doctoral program.

I would also like to thank my parents, Mr. and Mrs. J. W. Johnson, who have supported me whole-heartedly during my doctoral program. Above of all others, I would like to thank my son, Forrest, without whose support and understanding completion of this program would not have been possible.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES - Continued

LIST OF FIGURES

CHAPTER I

Introduction

On March 3, 1988 the Kentucky Supreme Court ruled that a state law allowing unmined coal to be taxed differently from other property was unconstitutional.[1] The decision was a victory for groups such as "Kentuckians for the Commonwealth" who have long advocated taxing unmined coal at the same rate at which other real property is taxed. The ruling left many serious issues unresolved, however. For example, as the law now stands farmers who own both surface and mineral rights will be required to pay tax on unmined coal at the same rate as coal producing companies, although they have no intentions of mining the coal. In addition, the Court did not address the ruling of a lower court which said

---

[1] Gary Gillis, Secretary of the Revenue Cabinet v. William D. Yount, Scott Barbour, et al. No. 87-SC-286-DG and The Kentucky Coal Association, Inc. v. Alison Moore, J. D. Miller, et al. No. 87-SC-288-DG. (March 3, 1988).

that taxing unmined coal at a minuscule tax rate amounted to a tax exemption and was also unconstitutional. Since the Supreme Court did not address the tax rate, the coal industry could seek legislation that would group coal and other unrecovered minerals (such as natural gas and oil) into a new tax classification.[2] The $.001 tax rate, now applicable to unmined coal, could then be adopted to the new classification by the legislature.

On March 25, 1988, the House of Representatives defeated an amendment, backed by Kentuckians for the Commonwealth, which would have taxed unmined coal at the same rate as other "real property".[3] Similar bills, introduced during the last three legislative sessions, have also failed to become law. The House did, however, during the current legislative session, pass an amendment, backed by representatives of the coal industry.[4] Although the amendment called for the taxation of unmined coal and other minerals, it included a provision limiting local taxes at $.10 per $100

---

[2]Tom Daykin, "Court Bars Tax Break for Unmined Coal Lexington Herald-Leader, March 4, 1988, at A1, col. 5.

[3]Tom Daykin, "Unmined-Minerals Tax Passed By House," Lexington Herald-Leader, March 26, 1988, at A1, col. 1.

[4]Id.

valuation.[5] In addition, eighty-five percent of the ad valorem tax on unmined minerals would be used to offset severance taxes.[6] This amendment was later attached to Senate Bill 329. The Senate adjourned without considering the bill, thus killing the legislation.[7]

The level of concern that has been generated is not surprising considering the fact that coal is Kentucky's most valuable resource.[8] Despite the significance of this issue, the question of whether coal in place should be taxed as other real property has yet to be resolved. Proponents of legislative attempts to tax coal in situ contend that the basic issue involved with the tax is one of fairness.[9] They argue that since mineral lands are property it is unfair to tax other forms of property, such as surface land and houses, and not tax mineral property.

---

[5]Kentucky Coal Association, Legislative Bulletin, March 28, 1988, LB-88-12.

[6]Id.

[7]Kentuckians For The Commonwealth, "Unmined Coal Tax To Be Collected," Balancing the Scales, Vol. 7, No. 6, March 31, 1988, at 4, col. 3.

[8]Kentucky Department of Economic Development, "Energy and Natural Resources in Kentucky," (1984), at iv.

[9]Kentucky Fair Tax Coalition "Position Paper on the Taxation of Unmined Coal and Other Minerals in Kentucky" (1983) (position paper presented to the Kentucky Unmined Minerals Tax Advisory Commission).

Those who oppose the tax contend that the coal severance tax, which is 4.5 percent of the gross value of coal after it is mined, is a much more accurate method of taxing coal.[10] They point out that if the proposed legislation becomes law, coal will be taxed twice, first by the tax on unmined coal while it is still in the ground and later by the severance tax when it is produced. Industry representatives allege that a tax on unmined coal would increase the price of coal, thereby, decreasing the competitiveness of Kentucky coal in a highly competitive market.[11]

The purpose of this study is to determine whether a tax on unmined coal would increase the cost of producing Kentucky coal and thereby render it noncompetitive with coal produced in other states. The study utilized two models, Resource Allocation and Mine Cost (RAMC) and Coal Supply and Transportation Model (CSTM), developed by the Energy Information Administration(EIA), the independent statistical and analytical agency within the Department of Energy. The EIA utilizes the RAMC model as a general analytical tool in developing long-term coal supply

---

[10]Tom Daykin and Catherine Chriss, "Studies Say Tax Will Mean Millions for Coal-Rich Pike," Lexington Herald-Leader, March 9, 1988, at A16, col. 2.

[11]Bruce Stephens, Jr., "Taxation of Coal Land in Kentucky" (1983) (position paper presented to the Kentucky Unmined Minerals Tax Advisory Commission), (October 1983).

curves for use in coal market modeling.[12] The primary model using the RAMC supply curves is the National Coal Model, but the RAMC supply curves are also used in the International Coal Trade Model (ICTM), the CSTM, the Midterm Energy Forecasting System (MEFS), and Long-term Energy Analysis Program (LEAP) and the Intermediate Future Forecasting System (IFFS).[13] The projections made using these models are incorporated in various reports prepared by the EIA. For example, EIA's Annual Prospects for World Coal Trade 1987[14] was based on projections made using the ICTM, while their publication, Outlook for U.S. Coal Imports[15], contained analytical results obtained using the CSTM.

In addition to providing the EIA with information concerning coal supply, demand, and transportation, the models have been used in academic research. James A. Crenshaw, George D. Parker, and David G. Arey, mathematics professors at Southern Illinois University at

---

[12]Synergic Resources Corporation, Documentation of the Resource Allocation and Mine Costing (RAMC) Model, Report for the U.S. Department of Energy, September 1982 (DOE/NBB-0020).

[13]Id.

[14]Energy Information Administration, Annual Prospects for World Coal Trade 1987, May 6, 1987 (DOE/EIA-0363(87).

[15]Energy Information Administration, Outlook for U.S. Coal Imports, March 19, 1986 (DOE/EIA-0483).

Carbondale have used the models in a number of articles and presentations which attempt to determine how changes in sulfur dioxide emission regulations and the cost of technology to deal with sulfur dioxide emission would affect the coal market.

Heretofore, the models have not been used in a study such as the one reported on here. Utilizing them here was most appropriate, however, as the RAMC was designed to ". . . analyze the impact of changes in coal supply or costs due to changes in taxes, . . ."[16] The analysis of a complex issue, such as the affect of the proposed ad valorem property tax, can be much more exhaustive if sophisticated models are utilized.

Statement of the Problem

Estimates of the total revenue which could be generated by a tax on unmined coal range from a low of $25.6 million per year to a high of $136.2 million per year.[17] Considering the Commonwealth's recent fiscal problems as well as the increased need for revenue for

---

[16]Energy Information Administration, Documentation of the Resource Allocation and Mine Costing (RAMC) Model, Report for the U. S. Department of Energy, May 1987 (DOE/EIA-M021).

[17]Stephen James Vasek Jr., "Impact and Desirability of Taxing Unmined Coal Interest In the Same Manner as Other Property," 1 Journal of Mineral Law and Policy 221 (1985), at 259-260.

local schools, roads and other public facilities, it is only natural that the property tax on unmined minerals is once again being considered as one of many potential remedies for the state's financial woes. However, before looking to the Kentucky coal industry for increased revenue, it is important to recognize that the present tax burden makes Kentucky coal less competitive than that of neighboring states.[18] Industry representatives believe that taxing unmined coal could be detrimental to the Kentucky coal industry.[19]

Research Questions

This study will analyze how a tax on unmined coal would affect the competitiveness of Kentucky coal. The research originally proposed would have attempted to determine which method of taxation would produce the greatest amount of revenue while encouraging orderly exploration, development, and mining. This would have entailed determining which of the two primary methods of taxing minerals - severance taxation or property taxation - would, relative to the amount of revenue generated, be less detrimental to the coal

---

[18]Testimony of William Bowker, Department of Energy, before the Unmined Mineral Commission (1983) at 3.

[19]Stephens, supra note 11, at 8.

industry. This issue is, however, rendered meaningless by the nature of the tax. As explained in greater detail in Chapter III, the ad valorem property tax which has been proposed would classify coal property into four categories "active mining property," "active reserves," "inactive reserves," and "barren or unminable property," in order to determine the "actual value of mineral properties" for tax purposes. Because the majority of the tax would be imposed on coal properties currently being mined, the tax is clearly an additional severance tax as opposed to a property tax.

The following research questions will be addressed:

Research Question #1. To what extent would a tax on unmined coal be passed on to consumers through a price increase?

Research Question #2. How would a resulting price change affect the quantities of coal demanded?

Research Question #3. If taxed at the same rate as "other real property" and the price of coal is held constant, by how much will the producer's rate of return on investment decrease?

Scope of the Study

The study focused on the possible effect a tax on unmined coal would have on the Kentucky Bituminous coal industry in Eastern and Western Kentucky. The study made no attempt to determine the "fairness" or the "equity" of

such a tax. In studying the effect of the tax, the research utilized two models, the Resource Allocation and Mine Costing Model (RAMC) and the Coal Supply and Transportation Model (CSTM). These models were developed by the Energy Information Administration (EIA), Washington, D.C. to aid in the analysis of, and provide insight into, regional coal supply-demand interactions.[20]

The net income approach to valuation of coal reserves is used in determining the amount of tax a coal firm would pay on unmined coal. Using this method, a variation of Hoskold's formula, the discounted net present value of the income stream generated by mining operations is used to calculate the value of the mineral property. The following example shows how the net income approach is used in estimating the value of coal in place.

Annual sales price of severed coal	$100,000
-Cost of production (operating expenses)	60,000
-Rate of return required on assets invested (Total assets $200,000 x ROI of 12 percent	24,000
Value of coal at extraction	$ 16,000

The value of the coal extracted may be extended to the coal in reserve by discounting the value at extraction by the prevailing interest rate for the period of time estimated to elapse before remaining coal will be

---

[20]Synergic Resources Corporation, Documentation of the Reserve-Related Data Inputs to the Resource Allocation and Mine Costing Model, Report for the U.S. Department of Energy, September 1982 (DOE/NBB-0026).

the prevailing interest rate for the period of time estimated to elapse before remaining coal will be extracted. In determining the present value factor to be used in this example, it is assumed that the period of time remaining in the life of the mine is fifteen years and the prevailing interest rate is twelve percent. Thus, the value of the unmined reserves would be $108,976 (value of coal at extraction $16,000 x present value of an annuity factor 6.811).

In determining the value of the unmined reserves for this study, the annual sales price of severed coal and the cost of production, including a rate of return required on assets invested, will be generated by the CSTM. The average mine life years, published by the EIA and used in the RAMC model, were used in computing the period of time remaining in the life of the mine. The average mine life years are dependent on both supply region, Eastern Kentucky or Western Kentucky, and mining method, surface or underground.

As shown in Table 1 on pages 13 and 14, the average live of an underground mine in Western Kentucky is 18.12 years while the average life of an underground mine in Eastern Kentucky is 14.32 years. The average life of a surface mine is much shorter. A surface mine in Western Kentucky has an average life of 8.22 years and a surface

mine in Eastern Kentucky has an average life of 4.50 years.[21]

An eight percent rate of return is used as this is the rate used by the RAMC model. The EIA justifies using an eight percent rate of return as it is higher than the average rate of return for all industries of six percent.[22] Investors in the coal industry demand a higher rate of return as an investment in that industry is considered to be riskier due to the large capital investment required. In addition, the existence of coal reserves and the ease of their extraction is difficult to determine without extensive exploration.

Assumptions and Limitations

This study makes the assumption that when the mineral owner and producing company are not one and the same, a tax on unmined coal would be passed from the owner of the mineral rights to the coal producer, a position supported by the coal industry.[23] This is not, however, the position taken by some advocates of the tax

---

[21]Synergic Resources Corporation, supra note 20, at 22.

[22]Energy Information Administration, Documentation of the Inputs to the Resource Allocation and Mine Costing (RAMC) Model, Report for the U. S. Department of Energy, June 1987 (DOE/EIA-M024).

[23]Stephens, supra note 11, at 8.

on unmined coal, who cite the decision in the case of Head v. Little.[24] In this case the Court held that a coal producing company, or lessee, is responsible only for property taxes on the coal after it is mined. Representatives of the coal industry, however, contend that a tax on unmined coal would be passed through to producers via higher royalties.

The RAMC uses five model mines to represent the major surface mining methods, and four model mines to represent underground mines with different depth, seam thickness, or annual production. No two mines are alike, however, and this variety is not represented by the model mines. The approach used here is a vast improvement over previous studies which have simply compared the tax burdens a single hypothetical mine would encounter in neighboring coal producing states. These earlier studies ignored differing geologic conditions as well as the cost of transporting the coal to the market.

The potential for substitution effects for coal is not captured by the CSTM. In the short-run, it is not economically feasible to use substitute fuels when the price of coal increases.[25] In the long-run this phenomenon can be expected to occur, however, and the

---

[24]226 S.W. 2d 322 (Ky.1924).

[25]Curtis E. Harvey, Coal in Appalachia, at 7, (University Press of Kentucky, 1986).

Table 1. Mine Life Distributions

Region	Fraction of Production Remaining in Year 1985	1990	1995	2000	Avg. Mine Life (Years)
	Underground Mines				
PA	0.93	0.80	0.75	0.65	24.55
OH	0.96	0.80	0.67	0.57	25.70
MD	0.75	0.75	0.75	0.57	16.74
NV	0.93	0.88	0.83	0.65	24.68
SV	0.81	0.69	0.59	0.45	19.10
VA	0.62	0.49	0.37	0.31	15.16
WK	0.77	0.68	0.45	0.45	18.12
EK	0.60	0.51	0.42	0.28	14.43
TN	0.78	0.39	0.27	0.19	13.30
AL	0.89	0.83	0.66	0.55	19.31
IL	0.99	0.99	0.80	0.68	26.98
IN	0.52	0.34	0.34	0.34	18.22
IA	1.00	1.00	1.00	1.00	30.00
SW	1.00	0.50	0.50	0.0	14.54
CS	0.97	0.74	0.51	0.51	19.36
UT	0.89	0.81	0.71	0.70	21.77
NM	1.00	1.00	0.0	0.0	11.05
	Surface Mines				
PA	0.30	0.14	0.0	0.0	4.45
OH	0.41	0.26	0.0	0.0	5.40
MD	0.51	0.20	0.0	0.0	5.61
NV	0.20	0.09	0.0	0.0	4.06
SV	0.62	0.24	0.0	0.0	6.95
VA	0.27	0.03	0.0	0.0	3.04
WK	0.65	0.38	0.07	0.02	8.22
EK	0.43	0.03	0.0	0.0	4.50
TN	0.11	0.03	0.0	0.0	2.55
AL	0.53	0.36	0.0	0.0	6.78
IL	0.98	0.54	0.26	0.15	11.86
IN	0.77	0.47	0.42	0.28	13.27
IA	0.17	0.17	0.06	0.06	6.10
MO	0.95	0.93	0.79	0.79	25.30
KS	0.58	0.29	0.24	0.0	7.45
AR	0.55	0.0	0.0	0.0	4.88
OK	0.60	0.52	0.49	0.42	16.87
TX	0.99	0.00	0.99	0.99	27.14
ND	0.98	0.95	0.78	0.70	34.36
EM	1.00	1.00	1.00	1.00	20.00

Table 1. Mine Life Distributions (Continued)

Region	Fraction of Production Remaining in Year 1985	1990	1995	2000	Ave. Mine Life (Years)
	Surface Mines				
WM	1.00	1.00	1.00	0.74	30.50
NW	1.00	1.00	1.00	0.71	25.67
SW	0.86	0.72	0.67	0.61	23.17
CN	0.94	0.94	0.94	0.94	28.44
CS	0.69	0.68	0.55	0.55	21.88
AZ	1.00	1.00	0.0	0.0	12.63
NM	1.00	1.00	1.00	0.97	29.04
WA	1.00	1.00	0.0	0.0	10.72
AK	1.00	1.00	1.00	1.00	29.17

Source: Synergic Resources Corporation: Documentation of the Reserve-Related Date Inputs to the Resource Allocation and Mine Costing Model, September 1982, pages 22 and 23.

fact that it is not accounted for is a limitation of the study.

The study assumes that the net income approach would be used by the state in valuing unmined coal reserves as this is the valuation method which has been proposed.[26] This approach is advocated by Robert H. Paschall, senior petroleum and mining appraisal engineer, California State Board of Equalization, Sacramento; Albert M. Church, the author of numerous books and articles concerning the taxation of minerals; and C. Gilmore Dutton, Staff Administrator, Appropriations and Revenue Committee, Legislative Research Commission. In addition, very similar methods are used to determine the tax liability of unmined coal in two of our neighboring states, Illinois and West Virginia.

Although the net income approach is the method preferred by many experts for valuing unmined coal, the method depends on a number of estimates. For instance, estimates must be used concerning: the number of years remaining in the life of the mine, the future selling price of the coal, and the number of tons of coal to be extracted yearly. Valuing the unmined coal based on these estimates poses somewhat of a limitation to the study proposed here.

---

[26]Vasek, supra note 17, at 243.

Contributions

The research reported on here will make a significant contribution to the literature in this area. The work done heretofore has been done either by those advocating an ad valorem tax on unmined minerals or by those opposing such a tax. This research reported here, however, was an academic pursuit and a conscious attempt was made to conduct the study in an unbiased manner.

While earlier studies have simply compared the tax burdens a single hypothetical mine would encounter in neighboring coal producing states, this research utilizes models which incorporate differing geologic conditions as well as the cost of transporting the coal to the market. In addition, the scope of the study is larger, allowing the price of and demand for Kentucky coal to be compared with the price of and demand for coal from all coal producing states, rather than just neighboring states.

Currently, various members of the Kentucky Legislature and representatives of the coal industry are asking that research be undertaken concerning the taxation of coal. Hopefully, this research will be useful in the development of a policy for the taxation of coal.

Chapter Development

As previously mentioned the objective of this dissertation is to determine whether the proposed ad valorem property tax on unmined coal would affect the price of and demand for coal produced in Kentucky. Chapter II shows how various sections of the Kentucky Constitution and the Kentucky Revised Statutes influence the decision of whether to tax unmined coal, and provide a historical perspective of the tax.

Chapter III focuses on recent legislative and judicial attempts to tax coal in place, in addition to providing a review of the two articles concerning the tax on unmined coal in Kentucky. The literature review is included in this chapter as both articles include a discussion of the implementation issues surrounding the recent legislative proposals.

An analysis of the two primary methods of taxing coal - severance taxation and property taxation - is provided in Chapter IV. The study reveals that while the proposed tax is commonly referred to as a property tax, it would have the effect of an increased severance tax and must be evaluated as such.

In Chapter V, a comprehensive description of the methodology used in the study is provided. The chapter includes a description of the two models utilized as well

as a discussion of the statistical procedures. Chapter VI provides an analysis of the results of the research. Chapter VII contains a summary of the study and a discussion of the conclusions drawn from the study.

CHAPTER II

Historical Development of the Taxation of Unmined Coal in Kentucky

The taxation of property in Kentucky is provided for in sections 170 through 174 of the Kentucky Constitution. Since these sections serve as the basis for many of the issues concerning the taxation of unmined coal, they are examined in detail.

Kentucky's Ad Valorem Property Tax

The Kentucky Constitution establishes the property tax and gives the General Assembly the authority to levy the tax to meet state expenses in section 171, where it states:

> The General Assembly shall provide by law an annual tax, which with other resources, shall be sufficient to defray the estimated expenses of the Commonwealth for each fiscal year.[27]

---

[27]Ky. Const. § 171.

Section 171 was later amended giving the General Assembly the power ". . . to divide property into classes and to determine what class or classes of property shall be subject to local taxation."[28]

Section 172 of the Constitution specifies what property shall be taxed and how that property shall be assessed:

> All property, not exempted from taxation by this Constitution, shall be assessed for taxation at its fair cash value, estimated at the price it would bring at a fair voluntary sale . . .[29]

An exemption to the "fair cash value rule" is provided for in section 172A.[30] This section states that agricultural and horticultural land is to be assessed according to its value for agricultural or horticultural use rather than its fair cash value.[31] Section 172A further states:

> The General Assembly may provide for reasonable differences in the rate of valorem taxation within different areas of the same taxing districts on that class of property which includes the surface of the land.[32]

---

[28]Id.

[29]Ky. Const. § 172.

[30]Ky. Const. § 172A.

[31]Id.

[32]Id.

Thus, the General Assembly has the power to provide for reasonable differences in the tax rate within different areas of the same taxing districts. Concerning this, the Kentucky Supreme Court held:

> The clear purpose of Section 172A is to permit a lack of uniformity in taxation, both as to rate and valuation, for the land affected.[33]

Furthermore, the Court said that the section was not limited to agricultural land but that it applied to urban land as well:

> There are no words or phrases here which restrict this section of the amendment to farm land. Different rates are specifically contemplated when the land affected is given a "urban character" by the different governmental services which are furnished.[34]

Certain real property is exempted from taxation by section 170 of the Constitution which says in part:

> There shall be exempt from taxation public property . . . places actually used for religious worship . . . places of burial not held for profit . . . institutions of education not used or employed for gain . . . all parsonages or residences owned by any religious society . . . and all laws exempting or omitting property from taxation other than the property above-mentioned shall be void.[35]

---

[33]City of Louisville v. Fiscal Court, 623 S.W. 2d 219, 223. (Ky. 1981).

[34]Id.

[35]Ky. Const. § 170.

In addition, real property used as a permanent residence of an owner who is sixty-five years of age or totally disabled is exempt from taxation.[36] Furthermore, the General Assembly may authorize any city or town to exempt manufacturing establishments from local taxation for a maximum of five years as an incentive to locate there.[37]

All real property not specifically exempt in section 170 is subject to the ad valorem property tax.[38] Section 174 requires that all property, not exempted by the Constitution, be taxed in proportion to its value regardless of whether it is owned by an individual or a corporation.[39]

In addition to the guidance provided in the State Constitution, a comprehensive plan for the levy, assessment, and implementation of an ad valorem tax on nonexempt property is provided in Title XI of the Kentucky Revised Statutes. Section 132.020 of the statutes prescribe that real property be taxed at a rate of $.315 per $100 of assessed value and that unmined coal be taxed at a rate of $.001 per $100 of assessed value.[40]

---

[36]Id.

[37]Id.

[38]Ky. Rev. Stat. § 132.190(1)(a) (Cum. Supp. 1984) (hereinafter cited as KRS).

[39]Ky. Const. § 174.

[40]KRS § 132.020(1).

Although the statutes call for a $.315 rate, the rate is generally rolled back pursuant to the 1984 property tax bill which places a four percent limitation on the increase in state property taxes. The four percent limitation, however, does not apply to increases due to the addition of new property to the tax rolls.[41]

The General Assembly has, through KRS 132.200 said that certain classes of property shall be subject to taxation for state purposes only.[42] Among the property listed in the statutes as being taxable only at the state level is ". . . unmined coal and any interest therein, in whatever form held".[43] All types of property not specifically mentioned in KRS section 132.200 are subject to taxation by the state, county, city, school or other taxing district in which the property is located.[44] Local taxing districts may, however, tax coal in place in a specially voted levy, provided the purpose of the tax is to retire bonds outstanding prior to January 1, 1977.[45] Local taxation of property is conducted in a manner almost identical to the state taxation of real

---

[41]KRS § 132.020(7) (Cum. Supp. 1986).

[42]KRS § 132.200.

[43]KRS § 132.200(11).

[44]KRS § 132.200 (Cum. Supp. 1984).

[45]KRS § 132.203 (Cum. Supp. 1984).

property. However, section 157 of the Kentucky Constitution sets a limit on the tax rates of county, city, and local taxing districts.[46]

When interpreting sections 170 and 171 of the Kentucky Constitution, the court made it clear that while the legislature had the power to restrict the taxation of certain classes of property to the state level, thus exempting it from local taxation, it had no power to exempt property from state taxation.[47]

Administration of the Ad Valorem Tax

In Kentucky, the property tax is administered under a two tier system with the Kentucky Revenue Cabinet[48] at the state level and the property valuation administrators (PVAs) at the county level. The Department of Revenue has the power to " . . . make rules and regulations, and direct proceedings and actions, for the administration and enforcement of all tax laws of this state."[49] Although the Revenue Cabinet has the power to assess the

---

[46]Ky. Const. § 157.

[47]Martin v. High Splint Coal Co., 163 S.W. 2d 711, 714-716 (Ky. 1937).

[48]KRS § 12.250 (1985) (prior to July 13, 1984, the Kentucky Department of Revenue).

[49]KRS § 131.130(1).

value of distilled spirits,[50] property of public service corporations,[51] capital stocks of domestic savings and loans,[52] and taxable capital,[53] and reserves of domestic life insurance companies,[54] it must rely on the assessments of local PVAs with respect to the value of all other property subject to state ad valorem property tax.[55]

Each county in the state must have a property valuation administrator whose major duties are as follows:

> " . . . subject to the direction, instruction and supervision of the department of revenue, make the assessment of all property in his county except as otherwise provided, prepare property assessment records, and have such other powers and duties relating to assessments as may be prescribed by law of by the department.[56]

Thus, the Revenue Cabinet has supervisory authority over local property valuation administrators who have the responsibility for the actual assessment of properties.

---

[50]KRS § 132.160 (Cum. Supp. 1984).

[51]KRS § 136.120(3) (Cum. Supp. 1984).

[52]KRS § 136.290 (1982).

[53]KRS § 136.320(a) (1982).

[54]KRS § 136.320(c) (1982).

[55]KRS § 132.420(1) (1982).

[56]KRS § 132.420 (1982).

Assessing property fairly has been a constant problem for local PVAs. The statutes addressed this problem saying:

> The property of one (1) person shall not be assessed wilfully or intentionally at a lower or higher relative value than the same class of property of another, and any grossly discriminatory valuation shall be construed as an intentional discrimination. The property valuation administrator shall make every effort, through visits with the taxpayer, personal inspection of the property, from records, from his own knowledge, from information in property schedules, and from such other evidence as he may be able to obtain, to locate, identify, and assess property.[57]

The statutes also prescribe how often property shall be assessed and physically examined:

> Each parcel of taxable real property or interest therein subject to assessment by the property valuation administrator shall be revalued during each year of each term of office by the property valuation administrator . . . and shall be physically examined no less than once every two (2) years by the property valuation administrator or his assessing personnel.[58]

In Dolan v. Land,[59] the property owners brought an action challenging the assessments of their agricultural and horticultural land by the county property valuation

---

[57]KRS § 132.450(1) (Cum. Supp. 1984).

[58]KRS § 132.690(1) (1982).

[59]667 S.W. 2d 684 (Ky. 1984).

administrator.[60] The Kentucky Supreme Court held that the valuation method used by the deputy valuator was not constitutionally sound. The Court held that although the deputy valuator had visited the land he " . . . did not physically inspect land but merely looked at farm for comparison with contour maps".[61] The Court added that the formula method used by the PVA " . . . made no effort to identify the different types of land or soil comprised in each individual farm".[62] Thus, it may be concluded that although the degree of physical inspection needed may vary, some physical inspection is a must.

Section 172 of the Kentucky Constitution, requiring that all property shall " . . . be assessed for taxation at its fair cash value, estimated at the price it would bring at a fair voluntary sale",[63] was enacted in 1891 along with the rest of the present Constitution. The "fair cash value" rule was not followed until almost eighty years later, however. Eminence Distillery Co. v. Henry County Board of Sup'rs[64] was the first in a series

---

[60]Id. at 684.

[61]Id. at 685.

[62]Id. at 687.

[63]Ky. Const. § 172.

[64]200 S.W. 347 (Ky. 1918).

of cases concerning equitable assessments.[65] In this case the Court of Appeals found that assessing distillery property at its fair cash value when other property in the county was assessed at sixty percent of cash value violated sections 171, 172, and 174 of the Kentucky Constitution and the Fourteenth Amendment to the United States Constitution.[66] The Court, however, pointed out that it lacked the necessary powers to remedy the inequality by increasing the assessment of other taxpayers to their property's fair cash value.[67] Rather, it said that the "practical remedy" was to reduce the plaintiff's assessment.[68] In 1965 the Kentucky Court of Appeals (now Kentucky Supreme Court), ruling in Russman v. Luckett[69] and its sister cases,[70] went against the ruling in Eminence and said that all property must be assessed at its fair cash value.[71]

The matter of uniformity of assessment was in the

---

[65]Id. at 347.

[66]Id. at 350.

[67]Id. at 351.

[68]Id.

[69]391 S.W. 2d 694 (Ky. 1965).

[70]McDevitt v. Luckett, 391 S.W. 2d 700 (Ky. 1965); Miller v. Layne, 391 S.W. 2d 701 (Ky. 1965).

[71]391 S.W. 2d 694 (Ky. 1965), at 699-700.

judicial setting again in 1981. In Parrent v. Fannin,[72] the Supreme Court found that the uniformity insured in Section 172 of the Kentucky Constitution is not uniformity of value but uniformity of standard of assessment.[73]

Overview of the Ad Valorem Property Taxation Of Unmined Coal

Property taxation of coal in Kentucky has varied substantially in recent years. Prior to 1976, coal deposits were a factor taken into consideration, along with many others, in determining the value of real estate.[74] The ultimate valuation for tax purposes was often the product of negotiation between taxpayer and county PVAs.[75] In 1976, the Kentucky General Assembly, with the passage of House Bill 667 (HB 667), established a separate property tax for unmined minerals.[76] The tax rate on unmined coal was set at $.315 per $100 of assessed value, the same rate at which other real

---

[72]616 S.W. 2d 501 (Ky. 1981).

[73]Id., at 501, 503.

[74]C. Gilmore Dutton and Calvert R. Bratton, "The Feasibility and Revenue Effects of an Ad Valorem Tax on Unmined Coal," (October 31, 1983) (unpublished report to the Kentucky Legislative Research Commission).

[75]Stephens, supra note 11, at 1.

[76]H.B. 667, Ky. Gen. Assembly, Reg. Sess. (1976).

property was taxed.[77] The responsibility for the assessment of coal in place was shifted to the Revenue Cabinet which certified the values to the county PVA.[78] In 1978, the General Assembly approved Senate Bill 309 (SB 309) which returned the responsibility for valuation of coal in place to the county PVAs.[79] In addition, the bill reduced the state tax rate on unmined coal from $.315 to $.001 per $100 valuation and exempted unmined coal from local taxation.[80] In practical terms, this implicitly exempted coal in place from taxation, the situation which exists today.

A thorough understanding of the historical background of the taxation of unmined coal in Kentucky is necessary in order to fully comprehend the issues considered in this study. Thus, the following sections provide a detailed analysis of the history of the tax on unmined coal in this state.

Early Historical Development of the Tax on Unmined Coal

Ad valorem property taxation is the oldest form of taxation used by states and localities for collecting

---

[77]Dutton, supra note 74, at 1.

[78]Id.

[79]Id. at 2

[80]Id.

revenue.[81] From 1792, when Kentucky's first property tax was levied until recent years, coal in place was considered just another feature of the total real estate package, and was given special attention only to the extent of its contribution to the value of the surface real estate.[82] A review of the history of property taxation reveals two reasons why states and local taxing units did not differentiate natural resources from real property until the last half of the nineteenth century. First, there was a movement in America toward the adoption of a general property tax.[83] This movement has been described by Professor Ely in his classic study, Taxation in American States and Cities as follows:

> . . . the period from 1796 to the beginning of our Civil War . . . witnessed the complete establishment of the American system of state and local taxation. The distinguishing feature of the system may be described in a single sentence. It is the taxation of all property movable and immovable, visible and invisible, or real and personal . . . at one uniform rate.[84]

The second factor contributing to the common treatment of natural resources and other taxable property

---

[81]Robert G. Conrad and R Bryce Hool, Taxation of Mineral Resources, at 40, (D. C. Heath and Company, 1980).

[82]Dutton, supra note 74, at 1.

[83]R. Ely, Taxation in American States and Cities, at 131 (Thomas Y. Crowell and Company, 1888).

[84]Id.

during the first half of the nineteenth century was the state of the resources themselves. Many of the natural resources had yet to be discovered and exploited.[85] Hence, no one knew of their existence and actual value, and therefore they were not taxed.

In the 1920s County Judge Noah Bentley of Letcher County developed a system of taxation that was approved by the Letcher Fiscal Court and served as a mode of taxing unmined coal for about fifty years.[86] Under the "Letcher County System", all known veins of coal were inventoried, the amount of coal they contained per acre was calculated, a market value was computed, and rates of taxation were then imposed.[87] Using this system, assessed value of coal in the seams increased during the years of mining. As a tract of coal was mined out, the exhausted seams were dropped from the tax rolls.[88]

In the early 1950s the United States Bureau of Mines engaged in an extensive exploration and mapping program

---

[85]Walter Hellerstein, State and Local Taxation of Natural Resources in the Federal System, Legal Economic and Political Perspectives, at 5-6 (American Bar Association, 1986).

[86]Harry M. Caudill, "Taxation of Unmined Coal Reserves in Kentucky" (1983), (position paper presented to the Kentucky Unmined Minerals Tax Advisory Commission).

[87]Id. at 1-2.

[88]Id. at 2.

in Letcher County.[89] Using this additional information, county officials, with the aid and assistance of the Department of Revenue and industry experts, updated and revised the zone maps.[90] This revision also resulted in the development of a formula to take into account coal currently being produced, which obviously had more present value than undeveloped or outlying coal. Using the formula, the number of acres of coal mined in each zone during the preceding year was multiplied by ten times the zone rate.[91] This may be better explained by an example. Assuming a zone rate of $50.00 per acre, and that the taxpayer owned one hundred acres, ten of which had been mined the prior year. His total assessment for tax purposes would be $9,500, or ninety acres at $50.00 per acre and ten acres at $500.00 per acre.[92] This illustration demonstrates that a significant portion of the assessment was based on production during the prior year. Thus, the formula represents a combination ad valorem and severance tax.

---

[89]H. Clyde Reeves and Harry Spalding, "Assessment of Coal Producing Properties in Kentucky," 3 National Tax Journal, June, 1950, at 177.

[90]Stephens, supra note 11, at 5.

[91]Id.

[92]Id.

Effect of the Russman Ruling

The 1965 Kentucky Court of Appeals' ruling in Russman[93] to assess all taxable property at one hundred percent of fair cash value, beginning January 1, 1966 presented the Kentucky Department of Revenue and County Tax Commissioners with a most formidable task.[94] The valuation of mineral properties offered complex technical difficulties. Since coal was the principal mineral product, and in view of the fact that workable valuation formulas existed for oil and gas, it was decided to concentrate the available technical assistance on coal.[95] At the time, Letcher county had the only systematic approach to the coal land valuation problem.[96] After numerous appraisal methods were considered, the zone system being used in Letcher County was found to be the most satisfactory by both the industry and tax officials. Thus the zone approach, originating in Letcher County was adopted in Perry, Leslie, Knott, Floyd, and Pike Counties.[97] This method was approved and supported at

---

[93]Russman, 391 S.W. 2d 594.

[94]Phil M. Miles, "Kentucky Coal Land Valuation December 1965-June 1966," at 1 (unpublished report prepared for Kentucky Department of Revenue).

[95]Id. at 1.

[96]Id.

[97]Stephens, supra note 11, at 6.

all times by the Department of Revenue as being the most feasible method yet devised for the assessment of coal lands.[98]

1972: First Severance Tax

In 1972, during the term of Governor Wendell Ford, the legislature imposed a four percent severance tax on coal.[99] At that time, the tax was the highest tax of this type levied by any major coal-producing state. A study of the tax structures of various coal producing states conducted at the time described the effect of the tax:

> Imposed like most such taxes as an additional tax, it had the effect of converting Kentucky from a low-tax to a high-tax state--quite possibly the very highest--insofar as the coal industry is concerned.[100]

Industry officials responded to the enactment of the severance tax by saying that coal was being taxed twice, first by the ad valorem tax, which taxed the value of the mineral in the ground, and second by the severance tax when the coal was mined. They contended that it was of little significance that the ad valorem tax was assessed

---

[98]Miles, supra note 92, at 4.

[99]Stephens, supra note 11, at 6.

[100]James H. Thompson, "State and Local Taxation of the Bituminous Coal Industry," 76 West Virginia Law Review, (1973-74), at 307.

against the mineral owner since the tax was passed on to the operating company.[101]

1976: House Bill 667

In 1976, the Kentucky General Assembly passed HB 667, establishing, for the first time in Kentucky, a separate property tax for unmined minerals.[102] The tax rate on coal was set at $.315 per $100 of assessed value.[103] At the time, this was the rate that was being applied to real property. The tax was a state tax, and no local tax could be levied under this bill unless such a levy was already in effect.[104] All field assessments of coal deposits were to be made by the State Department of Revenue rather than by the local PVA.[105] This allowed for greater uniformity and consistency in the valuation process since the Department of Revenue was not subject to local political pressures. In addition, the Revenue Cabinet had access to individuals who possessed the expertise to effectively assess unmined coal.[106] The tax

---

[101]Stephens, supra note 11, at 6.

[102]Id.

[103]Dutton, supra note 74, at 1.

[104]Id.

[105]Id.

[106]Vasek, supra note 17, at 230.

revenue went to the state general fund, and found its way back to the county of origin by use of the Power Equalization Program or one of the other state-local sharing programs. Traditionally, property taxes in Kentucky have been the domain of the county, but this bill specified that unmined coal would only be subject to taxation by the state, and counties could not levy a tax on coal in place.

At this time, the severance tax was increased to four and one half percent of the ultimate sales price less transportation costs, a higher price than the mine mouth price used when the severance tax was first enacted.[107] In addition, the new legislation boosted the minimum tax on coal severed during the reporting period from thirty cents per ton to fifty cents per ton.[108] There is evidence that coal industry representatives were led to understand that in two years, the tax on unmined coal would be removed.[109] This would indicate that there was an off the record compromise between legislators and coal industry representatives.

---

[107]J. E. Clark, "Taxation of Unmined Minerals: Is It Inevitable, or Is It Unconstitutional?" 1 Journal of Mineral Law and Policy 97 (1985) Note 17 at 100.

[108]Fredrick W. Whiteside, Jr. and Edward J. Buechel, "Kentucky Taxation," 65 Kentucky Law Journal (1976), at 425.

[109]Stephens, supra note 11, at 6.

In 1977, the first year of the state controlled assessment program, the Revenue Cabinet, using severance tax records, forms from lessees showing the name of the landowner from whom they were leasing the coal, and the 1976 tax rolls in existence, developed a list of 8,300 potential coal property owners.[110] Forms, requesting basic information, were sent to these potential owners.[111] From the 8,300 forms mailed in 1977, 750 were returned undelivered and only 2,600 were returned in a usable form.[112] Using this information, along with information supplied by local PVAs, the cabinet was able to assess 4,400 of the potential owners in the first year.[113] In 1976, one year prior to the state assessment, the assessment for unmined coal totaled $109 million.[114] During 1977, the first year of state control, the assessment almost doubled, increasing to $209 million.[115]

---

[110]Testimony of Virgil O. Barnard III, Kentucky Revenue Cabinet, before the Unmined Mineral Commission (1983) at 2.

[111]Id. at 2-3.

[112]Id. at 3.

[113]Id. at 4.

[114]Id. at 5.

[115]Id.

Perhaps the most serious flaw in the 1977 assessment procedure was that the entire acreage of unmined coal was assessed as though none of the coal had been mined previously.[116] There was an appeals procedure to deal with overassessments, and if a mineral owner could show that acreage had been mined previously, the assessment was adjusted accordingly.[117] However, many mineral owners may not have known about this procedure or they may have perceived this course of action as unduly burdensome. Therefore, the 1977 assessment data may not be accurate.[118]

In 1978, assessors from the Department of Revenue visited every coal producing county in Kentucky in an attempt to identify primary and secondary seams of coal that were actively mined or minable.[119] Using this information in conjunction with the United States Geological Survey maps, new coal area maps were developed.[120]

In this same year, state assessors searched courthouse records in an attempt to identify additional

---

[116]Id. at 6.

[117]Id.

[118]Vasek, supra note 17, at 231.

[119]Barnard, supra note 110, at 7.

[120]Id.

potential owners. The list of potential owners increased from 8,300 in 1977 to 9,300 in 1978, while the number of coal land holdings that were assessed increased from 4,400 to 6,000.[121] During this time, the total assessed values increased from $209 million in 1977 to $278 million in 1978 while tax revenues from unmined minerals increased from $650,000 to $880,000.[122] Despite these facts, the measure was considered deficient for several reasons: first, it did not provide relief for landowners with small deposits of coal; second, enforcement efforts were hampered by a lack of accurate information on which to base assessments; and third, there was a lack of sufficient funding and staffing to implement the program at the state level.[123]

1978: Senate Bill 309

In 1978, a bill was passed which completely gutted the tax on unmined coal. SB 309 returned the responsibility of assessing unmined coal to the local PVA and at the same time reduced the rate at which coal was

---

[121] Id. at 9.

[122] Id.

[123] Lee Muellier, "Push Resumes for Higher Tax on Unmined Coal," Lexington Herald-Leader, February 27, 1983, at D2, col. 1.

taxed from $.315 per $100 of assessed value to $.001 per $100 of assessed value.[124]

In practical terms, SB 309 exempted coal in place from taxation.[125] Although assessments of unmined coal increased from $209 million in 1977 tc $318 million in 1982, the revenue from unmined minerals tax declined from $673,000 to approximately $3,000 in the same period.[126] PVAs in many coal counties choose not to prepare tax bills for the owners of unmined minerals since the cost of collecting the tax would exceed the revenues derived. Hopkins County, which has the second largest estimated coal reserves in the state, reported no unmined coal assessment for 1982.[127]

---

[124]Dutton, supra note 74, at 2.

[125]Id.

[126]Id. at 3.

[127]Id. at 2.

CHAPTER III

Legislative Attempts, Judicial Attempts and Literature Review

The purpose of this chapter is to summarize the recent legislative and judicial attempts to tax unmined coal at the same rate as other real property. In addition, a review of the current literature is offered. The literature focus primarily on implementation problems surrounding the taxation of unmined coal.

Legislative Attempts

There have been four legislative attempts to tax unmined coal in the last eight years. The first attempt was with House Bill 549 (HB 549), which was introduced during the 1982 session of the General Assembly.[128] HB

---

[128]H.B. 549, Ky. Gen. Assembly, Reg. Sess. (1982) (Although H.B. 549 was originally introduced Feb. 18, 1982 by Representatives Little and Donnermeyer, the cites herein refer to the March 15, 1982 version substituted by the House Committee on Appropriations and Revenue Ed.)

549 would have taxed coal in place at the same rate as other real property[129] and returned the responsibility for assessing unmined minerals to the Revenue Cabinet.[130] After much debate the bill failed to pass the House.

House Bill 92 (HB 92), introduced on the first day of the 1984 legislative session, also called for the taxation of coal in place at the same rate as other real property.[131] Under HB 92 coal property would have been divided into four classes: active mining property, active reserves, inactive reserves, and barren or mined out property.[132] The bill was sent to the House Appropriations and Revenue Committee out of which it was not reported.[133]

House Bill 503 (HB 503), introduced in 1986, was very similar to HB 92.[134] Unlike its predecessor, however, the later bill would have allowed the ad valorem

---

[129]Id. § 2.

[130]Id. § 6(2).

[131]H.B. 92, Ky. Gen. Assembly, Reg. Sess. § 1(3) (1984).

[132]Id. § 1(19)-(22).

[133]Vasek, supra, note 17, at 235.

[134]H.B. 503, Ky. Gen. Assembly, Reg. Sess. (1986).

tax levy to be deducted from the severance taxes.[135] A combination of factors led to the demise of the bill.[136]

During the recent 1988 legislative session House Bill 305 (HB 305), calling for the taxation of coal in place at the same rate as other real property, was introduced.[137] An amendment was attached to the bill which would have limited local taxes on unmined coal and allowed the property tax to offset payments made to the state for severance taxes.[138] After the bill passed the House, the amendment was attached to Senate Bill 329 (SB 329), which was never considered by the Senate.[139] The following section provides a more comprehensive discussion of each of these attempts.

---

[135]"Sidetracked, Unmined Coal Tax Detoured," Kentucky Coal Journal, Vol. 12, No. 4, April 1986, at 1, col. 1.

[136]Id. at 14.

[137]Tom Daykin, "Lawmakers to Look at Bill for Taxing Unmined Coal," Lexington Herald-Leader, March 9, 1988, at A1, col. 1.

[138]Tom Daykin, "Unmined-Minerals Tax Faces Long Fight," Lexington Herald-Leader, March 27, 1988, at E1, col. 1.

[139]Kentuckians For The Commonwealth, supra note 7, at 1 col. 2.

1982: House Bill 549

The first legislative attempt to tax unmined minerals was HB 549.[140] Officially titled "An act relating to the levy and assessment of property taxes on unmined minerals", HB 549 was introduced during the 1982 session of the General Assembly.[141] The bill proposed changes to Title XI of the Kentucky Revised Statutes which would have created an ad valorem tax on all unmined minerals in excess of one hundred acres at the same rate as that applied to other real property.[142] In addition, unmined minerals would have been subject to taxation in the county, city, school or other taxing district in which it has a taxable situs.[143] HB 549 would have amended the definition of real property to read: ". . . all lands, unmined minerals, oil, natural gas and natural gas liquids within this state and improvements thereon".[144] The current definition reads ". . .all lands within this state and improvements thereon".[145] Unmined minerals were defined in the bill as:

---

[140]Vasek, supra note 17, at 232.

[141]H.B. 549.

[142]Id. § 2.

[143]H.B. 549 § 3.

[144]Id. § 1(3).

[145]KRS § 132.010(3)(1984).

> . . . all forms of minerals which have not yet been mined or removed from the earth including, but not limited to, coal, rock, stone, limestone, shale, gravel, sand, clay, fluorspar, and zinc but excluding oil, natural gas, and natural gas liquids which are contained in or on the soils or waters of this state.[146]

The bill would have avoided possible limitations resulting from the four percent inflationary limit placed on the increase to the aggregate assessed value of all property already on the tax rolls under KRS section 132.020(7) by amending that section to read:

> The value of all unmined minerals appearing on the tax rolls on or before December 31, 1986, shall be considered "real property additions" for each year such value appears on the tax rolls prior to that date. Beginning January 1, 1987, "real property additions" shall include the value of all unmined minerals added to the tax rolls on or after that date for the year in which such value is added to the tax rolls.[147]

Thus, unmined minerals would have been treated as new property, and taxes derived from the assessment of unmined minerals would not have been subject to the four percent increase limitation.

HB 549 would have returned the responsibility for assessing unmined minerals from the local PVA to the

---

[146]H.B. 549, § 1(16) (1982).

[147]Id. § 1(7)(i).

Revenue Cabinet.[148] The bill provided explicit guidelines, to be used by the Revenue Cabinet in assessing the value of the unmined minerals.[149]

The proposed legislation would have set different tax rates for "non-extractable unmined mineral interest" and for "extractable unmined mineral interest".[150] These differing tax rates were necessary to provide relief for small landowners and farmers since the Kentucky Constitution forbids exemption of property from the property tax base. Non-extractable unmined mineral interest was defined as:

> . . . any fee simple interest in unmined minerals of less than one hundred (100) contiguous acres owned by a taxpayer not engaged in the business of extracting or leasing for extraction unmined minerals.[151]

An extractable unmined mineral interest, on the other hand, was defined as ". . . all other interest in unmined minerals".[152] Non-extractable unmined minerals would have been subject to tax at the rate of $.001 per $100 of assessed value,[153] while extractable unmined minerals

---

[148]Id. § 6(2).

[149]Id. § 6(2).

[150]Id. § 2(5).

[151]Id. § 1(17).

[152]Id.

[153]Id. § 2(5).

would have been taxed at $.315 per $100 of assessed value,[154] the state ad valorem tax rate applicable to other real property.

HB 549 specifically exempted certain tracts from property tax assessment. A tract of unmined minerals was presumed to have no value if any one of the following factors existed: (1) the owner of the surface estate is also the owner of the unmined minerals; the surface estate is used for agricultural, horticultural, residential purposes, or other uses inconsistent with the extraction of unmined minerals; and the owner has not leased any portion of the tract of unmined minerals for extraction; (2) the land has been depleted or is barren; (3) the minerals cannot be extracted due to geologic, economic, or legal reasons.[155] Despite the long list of exemptions the bill failed to pass the House.

1984: House Bill 92

The second attempt to pass an unmined minerals tax was HB 92 which was introduced in the House on the first day of the 1984 General Assembly.[156] The bill would have

---

[154]Id.

[155]Id. § 7(1).

[156]Vasek, supra note 17, at 234.

taxed unmined minerals at the same rate as other real property by redefining real property to include " . . . all lands, unmined minerals, oil, natural gas, and natural gas liquids within this state and any improvements thereon."[157] This action would have required unmined minerals to be included on the tax rolls as real property.

The legislation proposed in 1984 introduced a new method of classification of mineral interests. Rather than merely being classified as either extractable or non-extractable, HB 92 would have divided mineral interest into four classes: active mining property, active reserves, inactive reserves, and barren or mined-out properties.[158] When valuing mineral properties, the Revenue Department was to take these classifications into consideration.[159]

Unlike its predecessor, HB 549, the bill proposed in 1984 did not provide for exclusion from the unmined minerals act. However, mineral property underlying farmland and property of less than one hundred acres

---

[157]H.B. 92, Ky. Gen. Assembly, Reg. Sess., § 1(3) (1984).

[158]Id. § 1(19)-(22).

[159]Id. § 6(2).

would have been classified as "inactive reserve property" and subject to taxation at a much lower rate.[160]

The bill would have removed the exemption from local taxation which the legislature had established in 1976 through HB 667.[161] The removal of this exemption would have allowed county, city school and other taxing districts in which the unmined coal property was located to levy additional ad valorem taxes.

HB 92 tended to be broader in its reach and more flexible than HB 549. Like its predecessor, HB 92 mandated that the Revenue Cabinet be responsible for assessing the value of unmined minerals.[162] The guidelines required for accomplishing this goal were, however, far less explicit in the bill introduced in 1984.[163] The proposed legislation did, however, require taxpayers to file with their local PVA information concerning "any interest in unmined minerals, oil, natural gas, or natural gas liquids" when listing real property for tax purposes.[164]

---

[160]Vasek, supra note 17, at 235.

[161]Id.

[162]H.B. 92, § 6.

[163]Id. § 6(2).

[164]Id. § 6(1)(a).

HB 92 was not as successful as its predecessor. After it was introduced, HB 92 was sent to the Appropriations and Revenue Committee, out of which it was not reported.[165]

1986: House Bill 503

HB 503 was introduced during the 1986 session of the General Assembly.[166] The bill was very much like HB 92 which had been introduced two years before. HB 503, however, would have allowed coal operators to deduct the ad valorem tax levy from their severance taxes.[167]

Lobbyists for the coal industry and others who followed the bill cite several reasons for its demise. First, a clerical error allowed the bill to pass from the House Appropriations and Revenue Committee without the required twelve signatures to the committee vote. Second, floor amendments were attached to the bill which would have taxed distilleries, newspapers, printers, and publishers. Third, House Majority Leader Greg Stumbo suggested that a commission be created to study the problem of coal taxation. Finally, it was argued that an upcoming decision of the Kentucky Supreme Court would

---

[165]Vasek, supra note 17, at 235.

[166]H.B. 503, Ky. Gen. Assembly, Reg. Sess. (1986).

[167]"Sidetracked", supra note 135, at 1, col. 1.

answer constitutional questions about the tax, making proposed legislative action moot.[168]

1988: Current Legislative Attempt

During the 1988 legislative session the House considered a bill sponsored by Rep. Clayton Little. As originally introduced, the bill was very much like HBs 92 and 503 in that it would have: taxed coal at the same rate as "other real property", required the Revenue Cabinet to determine the fair cash value of unmined minerals and provide the valuation data to local PVAs, and created four different classifications for unmined coal with different tax rates for each category.[169]

Before HB 305 came before the House for a vote, there were reports that coal industry representatives and legislators had reached a compromise on how to assess property taxes on unmined coal.[170] The compromise was contained in an amendment to the bill which would have allowed the property tax payments to be used to offset 85 percent of the payments made to the state for the coal severance tax.[171] The compromise was, however, short-

---

[168]Id. at 14.

[169]Daykin, supra note 137, at A1, col. 1.

[170]"Compromise Reached on Unmined Coal Tax," Lexington Herald-Leader, March 22, 1988, at B2, col. 5.

[171]Id.

lived and coal lobbyists asked that an amendment be drafted which would limit local taxes on unmined coal to a rate of $.10 per $100 of assessed value. In addition, the bill would have provided for the 85 percent offset to the severance tax.[172] The bill was approved by the House, in a vote of 55 to 37, after a bitter debate.[173] The amendment was attached to Senate Bill 329 (SB 329), an unrelated bill concerning savings and loan institutions, which was posted for passage on the House Floor. SB 329 was returned to the Senate for concurrence with the House amendment on March 25. The Senate, however, adjourned on March 31, without considering SB 329, thus, killing the proposed legislation.[174]

Recent Judicial Attempts

Three recent court cases have questioned the legality of the present system of taxation.[175] Nowak v. Foster raised the issue of whether the tax was being

---

[172]Daykin, supra note 138, at E1, col.1.

[173]Daykin, supra note 3, at A1, col. 1.

[174]Kentuckians For The Commonwealth, supra note 7, at 1 col. 2.

[175]Nowak v. Foster, No. C84-0057 P(J) (W.D. Ky. filed Feb. 17, 1984); Yount v. Gillis, No. 84-CI-0815, slip op. (Franklin Cir. Ct., July 10, 1985); Moore v. Gillis, No. 84-CI-0867, slip op. (Franklin Cir. Ct., July 10, 1985). Yount and Moore were consolidated by the Supreme Court.

properly administered.[176] Yount v. Gillis questioned whether the low tax rate of $.001 was in violation of the section of the Constitution of Kentucky which provides that taxation shall be uniform upon property of the same class.[177] In Moore v. Gillis the plaintiffs argued that the $.001 tax rate on unmined coal constituted a de facto exemption from property tax.[178] Yount and Moore were combined by the Kentucky Supreme Court, which ruled that the state law allowing unmined coal to be taxed differently from other property was unconstitutional.[179] The following sections provides an in-depth discussion of each of these cases.

Nowak v. Foster

The first in the series of cases, Nowak v. Foster, raised the question of whether the present law was being properly administered.[180] The plaintiffs alleged that local PVAs were not administering the statutes properly as they did not ". . . engage in any significant efforts

---

[176]See Nowak No. C84-0057 P(J), at 10.

[177]No. 84-CI-0815 at 2, slip op. (Franklin Cir. Ct. July 10, 1984).

[178]Moore No. 84-CI-0867, at 2.

[179]Gary Gillis, supra note 1, at 2.

[180]See Nowak No. C84-0057 P(J), at 10.

to ensure that unmined coal is on the tax rolls and that it is properly assessed."[181]

The position of the defendants was that the Kentucky General Assembly allows a favorable property tax treatment to owners of coal interest in order to avoid some of the inequities in administering the tax and to prevent excessive taxation of the industry. The defendants expressed this opinion saying:

> By imposing a severance tax on mined coal and other minerals, and lowering the tax on unmined coal reserves in 1978, the Kentucky legislature clearly expressed its intention coal and other minerals should be primarily taxed in this state through the severance tax rather than through the ad valorem property tax. This determination was made in large part because of inherent difficulties in measuring and valuing unmined mineral reserves.[182]

Yount v. Gillis

The second question to come before the bar was whether the tax rate of $.001 per $100 of assessed value on unmined coal was in violation of the constitutional requirements of uniformity.[183] In Yount v. Gillis, the plaintiffs argue that KRS section 132.020(5) which

---

[181]Id. at 11-12.

[182]Id. at 3-4.

[183]No. 84-CI-0815 at 2, slip op. (Franklin Cir. Ct. July 10, 1984).

imposes a low tax rate on unmined coal violates section 171 of the Kentucky Constitution which provides that taxation shall be uniform upon property of the same class.[184] The plaintiffs contend that since coal is real estate,

> . . . taxation thereof at a rate which amounts to a de facto exemption is contrary and offensive to Section 171 and other sections of the Constitution of Kentucky which, inter alia, provides that taxation shall be uniform upon property of the same class.[185]

Moore v. Gillis

In Moore v. Gillis, the plaintiffs allege that KRS section 132.020(5) violates the equal protection provisions in the Kentucky Constitution.[186] These provisions require that persons in similar circumstances be treated similarly in the exercise of state powers which affect the individual or his property, including the power of taxation.[187] Plaintiffs contend that there is no reasonable basis for the legislative classification of unmined coal at a tax rate of $.001 per $100 in value

---

[184]Id.

[185]Id. at 5.

[186]Moore, No. 84-CI-0867 at 3.

[187]Clark, supra note 107, at 108-109.

while oil and gas are taxed at the same rate as other real property. [188]

The contention of the defendants is that unmined coal is not like other real property and legislative classification of unmined coal separate from other real property is not only constitutional but appropriate. Unmined coal has "only future potential beneficial use" while realty, can be rented or used by the owner presently. In addition, unmined coal is stationary, whereas oil and gas deposits can flow from beneath one property and be pumped from wells on neighboring properties. Oil and gas deposits are found in pockets or pools. There is little probability of a property tax being assessed for oil and gas deposits simply because it exists on neighboring property. Rather, oil and gas assessments are based on operating wells on the property being assessed.[189]

In addition to the uniformity issue, Moore also addressed the question of whether the statute limiting the tax rate on unmined coal to $.001 constitutes a de facto exemption from property tax, thus violating the Kentucky Constitution.[190] The Moore plaintiffs claimed

---

[188]Moore No. 84-CI-0867, at 3.

[189]Vasek, supra note 17, at 237.

[190]Moore No. 84-CI-0867, at 2, 3.

the statute offends section 174 of the Constitution, which requires that "All property . . . shall be taxed in proportion to its value unless exempted by this Constitution . . . "[191] Plaintiffs contend that the levy upon unmined coal was so low, especially in relation to the cost of its administration and collection that it would not be fairly called a tax."[192]

In addition, the plaintiffs in Moore claimed that KRS 132.020(5) violates section 3 of the Kentucky Constitution which prohibits the legislature from exempting property from ad valorem taxation since it bestows a de facto exemption from taxation upon unmined coal.[193] The plaintiffs went on to say that by placing so insignificant a levy on unmined coal, the legislature had accomplished indirectly what the Constitution expressly forbids, namely, the exemption of unmined coal from property taxation.[194]

Defendants in Moore deny that KRS 132.020(5) violates sections 3 and 174 on the Kentucky Constitution, contending that the requirements of these sections are met as long as the legislature imposes an ad valorem levy

---

[191]Ky. Const. § 174.

[192]Moore No. 84-CI-0867, at 2.

[193]Id. at 2.

[194]Id. at 3.

on unmined coal, regardless of how nominal or insignificant.[195] The defendants allege, that this is true even if the legislature's intent in enacting the tax was to exempt property from taxation.[196] The defendants further contend that unique economic circumstances justify the legislature's effectively exempting unmined coal from property taxation while levying a significant ad valorem taxation on oil and gas reserves.[197]

Yount and Moore were consolidated by the Kentucky Supreme court which decided on March 3, 1988, in a five to two decision, that the separate classification for unmined coal was an arbitrary classification and thus, unconstitutional.[198] The court, however, decided not to consider whether the $.001 ad valorem levy upon unmined coal was an unconstitutional tax rate.[199]

---

[195]Id. at 3-4.

[196]Id. at 4.

[197]Id.

[198]Gary Gillis, supra note 1, at 2.

[199]Id.

Literature Review

Two recent articles by Stephen James Vasek, Jr.[200] and J. E. Clark[201] provide a comprehensive discussion of the implementation problems surrounding the taxation of unmined coal. Both of these articles appear in the Journal of Mineral Law and Policy.

Vasek

In the article, "The Impact and Desirability of Taxing Unmined Coal Interests in the Same Manner As Other Real Property",[202] Vasek discusses several implementation issues which are often overlooked by proponents and opponents of the tax.[203]

The first of these implementation issues concerns the speculative valuation of unmined coal. Vasek contends that it is difficult to value unmined minerals because of two factors: (1) the scarcity of objective data on the location, quantity, and quality of unmined minerals under a parcel of land, and (2) the lack of comparable sales.[204] The absence of this data forces the

---

[200]Vasek, supra note 17, at 221.

[201]Clark, supra note 107, at 97.

[202]Vasek, supra note, 17, at 221.

[203]Id. at 239-265.

[204]Id. at 239.

valuator to use a present value method which requires a number of estimates including: future prices for coal, future costs of coal production, number of years in the future when the deposit will be depleted, and a fair discount rate.[205]

HB 92 offered a solution to the valuation problem by creating a classification system in which only active mining property and active reserves would be valued at or near the going price for unmined minerals. Vasek points out that this valuation system would be very much like an increase in the severance tax since the greatest tax burden falls primarily on current and near future production.[206]

Vasek calls attention to the problem of assessing unmined coal located beneath farm land. Assume the owner of the land also owns the mineral rights but makes his living by farming the land and has no intentions of mining the coal or letting any one else mine the coal. Should this farmer be required to pay tax on the unmined coal? If agricultural and horticultural land is exempt from taxation, the exemption could be used by every owner of a mineral estate who also owns the surface estate to escape mineral taxation. On the other hand, if farm land

---

[205]Id. at 242.

[206]Id. at 243.

is not exempt from the unmined minerals tax, the consequences could be disastrous for the farm industry.[207]

In situations where the mineral estate has been leased to an operator, the question of who pays the tax on unmined coal arises. Kentucky courts have ruled that both the reserve royalty and the leasehold estate are "properties" for tax purposes.[208] In Head v. Little the lessee was able to avoid the tax on unmined minerals since his lease provided that he would pay taxes only on any coal that was produced on the leased premises.[209]

When a lease is executed the reserved royalty should be equal to the value of the unmined minerals and the leasehold estate should be equal to zero, assuming that the lease is fair.[210] In such a situation, the owner of the reserved royalty would be subject to the tax. However, if the price of coal increases, the value of the leasehold estate would also increase. In situations such as this, the economic burden of the unmined minerals tax would be shared by the leaser and the lessee.[211]

---

[207]Id. at 246-249.

[208]Id. at 252.

[209]Id. at 253.

[210]Id. at 254.

[211]Id.

Vasek offers an in-depth discussion of the economic incidence of the tax on unmined coal.[212] Assuming, as economists theorize, the unmined minerals tax cannot be shifted, the owner of the unmined minerals would assume the tax burden. In such a scenario, the present value of the future property tax payments would have to be subtracted from the before-tax value of the unmined coal in order to determine the present value of the coal deposit. Thus, the tax would cause an immediate decline in the value of the mineral interest.[213]

In situations where the lessee/operator is required to pay the property tax, it is doubtful that the tax burden could be shifted to consumers.[214] Because of the elastic demand for coal, any price increase would result in a proportional decrease in the demand for coal. It is possible, however, that the operator could shift the additional tax burden to labor and the lessor.[215]

Vasek estimated that a tax on unmined coal would generate total tax revenues of $25.6 million per year.[216] In computing this estimate, the author began with the

---

[212] Id. at 255.

[213] Id. at 255.

[214] Id. at 254.

[215] Id.

[216] Id. at 259.

Kentucky Geological Survey's "total measured, indicated and estimated coal reserves" of 64 billion tons. The author estimated that fifty percent of the estimated coal reserves would be exempt from taxation leaving thirty-two billion tons subject to the tax. Of this thirty two billion tons subject to tax, only fifty percent of it would be recoverable. Thus, sixteen billion tons of recoverable, taxable coal would be assessed at $4 billion, assuming the average value per ton was $.25. Applying the state property tax of $.22 per $100 in value and a local rate of $.42 per $100 in value, the tax is expected to produce $9 million in state revenues and $16.8 in local revenues.[217]

The author notes that the estimate of $16 billion for the fair cash value of unmined coal in Kentucky varies greatly from estimates used in other studies. Previous studies have used estimates ranging from $8.2 billion to $22.4 billion.[218]

Vasek warns that the imposition of a property tax on unmined coal, increasing or decreasing the level of coal production, would have significant secondary revenue effects.[219] An increase in coal production would cause a

---

[217] Id.

[218] Id. at 260.

[219] Id.

subsequent increase in severance tax collections, employment, sales tax revenues, and income tax revenues. Conversely, a decrease in coal production would cause a decrease in severance tax collections, employment, sales tax revenues, and income tax revenues.

Whether the enactment of a tax on unmined coal would cause an increase or decrease in the level of coal produced depends upon the incidence of the tax.[220] If owners are ultimately burdened with the tax they will, in the short run, attempt to "mine out from under the tax" by severing coal from the earth as quickly as possible, thereby reducing the amount of taxable property owned and thus the tax liability.

There are arguments that the property tax burden would cause coal production to decrease in the long run. Owners, trying to avoid an increase in tax liability would delay exploration since exploration could lead to an increase in owner's coal reserves and consequently an increase in the tax liability.[221] There might also be a tendency for owners to delay the opening of new mines in order to avoid reclassification of reserves from inactive to active reserves.[222] Additionally, overproduction in

---

[220]Id. at 261.

[221]Id. at 262.

[222]Id.

the short-run would cause coal prices to decline because of the elasticity of demand for coal.[223]

A portion of the tax burden can be expected to rest with operators for one of two reasons.[224] First, the coal lease may provide that the operator is responsible for all taxes. Secondly, if coal prices increase while royalties remain fixed, the value of the leasehold estate would increase, thereby increasing the property tax liability.[225]

If the operator were saddled with the tax burden, the operator might accelerate production on existing leases to reduce the tax burden and plan to shift future production to other states in which the tax burden was lower. For the operator, an unmined minerals tax would be much like an additional severance tax.[226]

Clark

Clark, in another article appearing in the Journal of Mineral Law and Policy,[227] focuses on issues related to House Bill 92. While House Bill 92 did not pass the

---

[223]Id.

[224]Id. at 263.

[225]Id.

[226]Id.

[227]Clark, supra note 107, at 97.

legislature, interest in the passage of such a bill has not vanished. The issues considered here were present in the 1986 legislative proposal as well as in the proposal presented during the 1988 legislative session.

The first issue discussed is the "property" issue which is of vital importance since the Kentucky Constitution mandates that all interests in property, unless exempted, must be taxed by the state. Clark notes that case law has held that unmined minerals represent an interest in real property.[228] Much of the resistance to the imposition of a property tax on unmined minerals stems from the notion that ownership of mineral rights does not represent ownership of real property. Rather, ownership of mineral rights is viewed by many as the right to go on to land and produce the underlying minerals. Those who hold this view feel that the severance tax is a more appropriate way to tax minerals since only severed coal has a use.[229]

Clark noted that the court in Raydure v. Board of Supervisors, said that "under our constitutional and statutory provisions the word 'property' may be said to only embrace that character or species of property that has a cash value and may be subject to barter or

---

[228]Id. at 117.

[229]Id.

sale".[230] Drawing on the language in Raydure, it could be argued that the actual cash value of minerals cannot be determined until the mineral is mined and sold. Thus, a severance tax would be a more appropriate method of taxation. However, it would be difficult to argue that the cash value of unmined coal was worthless.[231]

HB 92 defined "unmined minerals" as those minerals "for which there exists a method of extraction . . . in common usage in the industry and a commercial use for which the mined mineral could be devoted . . ."[232] Clark notes that this definition would exclude from property tax Kentucky's vast reserves of oil shale and tar sands since the mining and utilization of these resources is not a method of extraction in common usage in the industry.[233] However, the Kentucky Constitution requires that all property not specifically exempt by the constitution be taxed.

The property classification scheme outlined in HB 92 would have placed mineral property into one of four categories: "active mining property," "active reserves," "inactive reserves," and "barren or mined out" property.

---

[230]Id. at 118.

[231]Id. at 119-120.

[232]Id. at 120.

[233]Id.

The category into which a property fell would be considered when determining the "actual value of the mineral properties" for taxation purposes. There are those who argue that such a classification scheme would allow classification based on type of ownership and on owners' intentions regarding the property.[234] Opponents of the proposed tax measure argue that the classification system proposed is used to disguise the fact that drafters of the proposal intended to tax large corporate mineral owners and exempt small landowners from the tax.[235] In McHenry v. Alford, the United States Supreme Court held that property classifications based on the ownership of the property would not be tolerated.[236]

Clark pointed out that another weakness in the legislation was that it did not specify the type of valuation methods to be utilized to "fairly establish the actual value" of these properties.[237] A failure to specify the valuation methods to be employed would result in different methods of valuation which in turn would lead to different assessments.

---

[234]Id. at 121.

[235]Id. at 122.

[236]Id.

[237]Id. at 122-123.

Under the plan proposed in HB 92 a taxpayer trying to prove that a parcel, which is being assessed, is barren could provide results of core drillings as evidence that minerals do not exist. Further, the legislation would have required that the results of the core drilling be verified by a geographical gamma-ray density log test performed at the expense of the taxpayer. If results of the core drilling were verified, it would be used as evidence of the value of the unmined minerals only for the area bounded by a one-quarter mile radius of the core drillings. This section would make it cost prohibitive to obtain verification of barren or mined-out property for many property owners. Even those property owners who could afford the testing might find that the cost of testing outweighed the tax liability.[238]

---

[238]Id. at 123-124.

CHAPTER IV

An Evaluation of Mineral Taxes

The purpose of this chapter is to evaluate the relative merits of the two primary methods of mineral taxation: property taxation and severance taxation. Property taxes may be defined as taxes which use wealth as the base on which the tax is levied.[239] The term severance tax refers exclusively to an excise tax that is based on the production of solid minerals.[240]

Mineral firms are subject to income taxation as well as property taxation and severance taxation. Income taxation of minerals refers to the use of the incomes of mining firms as a basis for taxation.[241] The principal

---

[239]G.H.K. Schenck, Handbook of State and Local Taxation of Solid Minerals, second edition, at 72, (The Department of Mineral Economics The Pennsylvania State University, 1984).

[240]Id. at 50.

[241]Id. at 68.

type of taxation of mineral income is the corporate income tax. In addition to the federal income taxes assessed on mining companies, approximately seventy-five percent of the states apply a state corporation income tax to mining corporation as well as other types of corporations.[242] Although corporate tax rates vary among states, the average rate is five to six percent after deducting the federal income tax.[243] Since this study focuses on forms of state and local taxation, especially those forms which can discriminate between the minerals industry and other industries, the discussion here will be limited to severance taxation and property taxation.

Criteria for the Wise Taxation of Minerals

In analyzing the three types of mineral taxation, a criteria first set forth by Adam Smith in 1776 in his book The Wealth of Nations[244] are utilized. These criteria, included in John Stuart Mill's treatise Principles of Political Economy[245], and representative of

---

[242]Karl E. Starch, Taxation, mining, and the Severance Tax, Information Circular 8788, at 15, (United States Department of the Interior, Bureau of Mines, 1979).

[243]Id.

[244]Adam Smith, The Wealth of Nations, vol. 2, edited by E. Cannan (Putnam, 1904).

[245]John Stuart Mill, Principles of Political Economy, at 802, (Augustus M. Kelley, 1965).

criteria generally found in the literature of public finance are:

1. taxes should be equitable;
2. taxes should interfere as little as possible with the ideal of economic efficiency;
3. taxes should be administratively efficient;
4. taxes should not interfere with economic growth and stability; and
5. taxes should provide adequate revenues.[246]

A brief description of each of these criteria is provided in the following section.

Equity

It is widely agreed that taxes should be equitable. An equitable tax is one in which everyone pays their "fair share" of the tax burden. There is little agreement, however, in what constitutes an equitable tax or what everyone's fair share would be. Economic thought has evolved into what can be distinguished as two different principles, which seek to answer this question, the "benefits-received" principle and the "ability to pay" principle.

Intuitively, the "benefits-received" principle is appealing. In order for taxes to be politically viable

---

[246]Richard R. Musgrave and Peggy B. Musgrave, Public Finance in Theory and Practice, at 193, (McGraw-Hill Book Company, 1973).

taxpayers must be able to perceive some degree of correspondence between the level of taxation and the benefits in return.[247] There are two major difficulties to be overcome in applying the "benefits-received" principle. First, the people who benefit from the government services must be identified and secondly, the value of the benefits received must be measured.[248] Application of this principle is most feasible in instances where the benefits received from the government are easily traced to the beneficiary. The most widely cited example of the successful application of the "benefits-received" principle is the tax on gasoline consumption. Gasoline consumption is perceived as an adequate measure of the benefits received by each taxpayer from the public highway system.[249]

The "ability-to-pay" principle requires that taxpayers pay taxes in relation to their relative ability to do so. Taxpayers are said to be treated equally if tax payments involve an equal sacrifice or loss of welfare.[250] The notion that taxes should require equal

---

[247]Harold M. Groves, Financing Government, sixth edition, at 18, (Holt, Rinehart and Winston, 1964).

[248]Werner Z. Hirsch, The Economics of State and Local Government, at 50, (McGraw-Hill Book Company, 1970).

[249]Schenck, supra note 239, at 64.

[250]Musgrave, supra note 246, at 198.

sacrifice on the part of taxpayers requires both "horizontal" equity and "vertical" equity. "Horizontal" equity requires that taxpayers of equal ability be taxed equally while "vertical" equity requires that taxes be levied according to relative ability to pay.[251]

There are two conceptual problems to be addressed when considering "vertical" equity. First, in order for the principle to be operative, agreement must be reached on what measure of ability to pay will be used for tax liability assessment.[252] Three measures of ability to pay have been identified: (1) income, (2) total wealth, and (3) consumption.[253] The second problem focuses on the difficulty in ascertaining what relationship should exist between ability to pay and the amount of tax burden. The concept of "vertical" equity does not specify whether taxes should be increased on an absolute or on a proportional basis as ability to pay increases.[254]

In discussing equity as a criteria for optimal taxation, a distinction must be made between the normative question of who should pay the tax and the

---

[251]Id. at 199.

[252]Hirsch, supra note 248, at 50.

[253]Musgrave, supra note 246. at 204-205.

[254]Hirsch, supra note 248, at 50.

positive question of who in fact pays the tax. The concepts of tax incidence provides the answers to these questions. Tax incidence is of much interest to analysts of tax policy as there is often a profound difference between the statutory incidence of a tax and its subsequent economic incidence. Statutory incidence refers to the taxpayer on whom a tax is directly levied, while economic incidence refers to the taxpayer who will ultimately pay the tax.[255]

The phenomenon of tax shifting determines the economic incidence of a tax. Tax shifting is the process of tax avoidance by individuals who pass all or part of the burden of a tax to others.

Economic Efficiency

Central to a discussion of economic efficiency is the concept of Pareto optimality, a condition in which no one can be made better off without at least one person being made worse off.[256] It has been demonstrated, under very restrictive assumptions, that a Pareto optimal situation is obtained in a perfectly competitive market. In this situation, society's total utility is being maximized by each individual's economic decisions in the

---

[255]Musgrave, supra note 354, at 354.

[256]Id. at 444.

private sector. Thus, the goal of public policy concerning taxation is allocational neutrality. An economically efficient tax is one that does not alter the otherwise economically efficient decisions made in the private sector, ceteris paribus.[257]

Two primary sources of economic inefficiency resulting from the imposition of taxes are the problems of excessive burden and the distortion of production decisions.

In an ideal situation, the benefits arising from services provided for society by government should equal the cost to society of those benefits. Such a situation would be consistent with the goal of Pareto optimality. One measure of the costs of a tax to society are the revenues collected from the tax. Revenues collected, however, do not usually represent the entire cost that society bears from a particular tax. This situation gives rise to the concept of excessive burden. Excessive burden exists when a tax interferes with an individual's economic decisions such that the result is a lowering of the individual's total utility, ceteris paribus. Musgrave cites the example of an individual who forgoes the purchase of an automobile because of a sales tax on the automobile. The individual suffers a loss of utility

---

[257]Id.

that is not reflected in the revenues collected form the automobile tax.[258]

Distortion of production decisions may arise when a tax changes the relative costs involved in production. The resultant decisions are, therefore, not based on the least cost criteria that lead to optimal resource allocation in otherwise efficient markets. A tax on income from capital, for example, tends to induce industry to become less capital intensive than would be found in a Pareto optimal situation.[259]

Administrative Efficiency

Administrative costs is a relative efficiency criterion for evaluating taxation policy. Administrative costs may be measured on grounds such as: the ratio between cost of tax collection and revenues produced; the difficulty of avoiding a tax; timing between the collection of revenues and provisions of government services; and the fairness of tax assessments.[260] The criterion of administrative efficiency may seem insignificant when compared to ideals such as equity and economic efficiency, but is a very practical

---

[258]Id. at 356.

[259]Id. at 453.

[260]Hirsch, supra note 248, at 69-70.

consideration in determining the fate of a particular tax. In addition, equity and economic efficiency are hard to quantify, whereas ratios between estimated costs of collection and revenues produced, tax assessments and delinquent taxes, can be quantified relatively easy. Furthermore, ratios such as these are of real concern to tax policy makers, particularly those at the state and local levels of government where administrative costs tend to be a large percent of total tax revenues.

Economic Growth and Stability

The primary concern of this discussion of the theory of taxation is with state taxation rather than taxation at the Federal level. Thus, the criterion that taxes should prevent adverse results on economic growth and stability is of limited value because the size of state taxes, relative to Federal fiscal and monetary policies, limits their impact on such macroeconomic concerns.[261] Policy makers should, however, strive to adopt tax policies that are predictable and not subject to arbitrary or frequent changes. Policies that are more predictable with respect to economic fluctuations provide

---

[261]Id. at 71.

stability as private investment decisions can be made with greater confidence in such an environment.[262]

Revenue Adequacy

The criterion of revenue adequacy is somewhat self explanatory. In order for a tax to be feasible it must generate sufficient revenue, from the perspective of the taxing authority. In addition, revenues should be relatively stable or have steady growth so as not disrupt the ability of a government to provide services.[263]

Property Taxation of Minerals

In order to evaluate the relative merits of property taxation, a knowledge of its definition and nature is essential. "In its broadest meaning the general property tax is a tax upon all wealth, tangible and intangible, that possess exchange value."[264] There are several categories of property that are commonly used for tax purposes. The more common categories of property classifications are shown in Figure 2 on page eighty. Although mineral deposits are included in the subcategory of land, the entry is marked with an asterisk. While

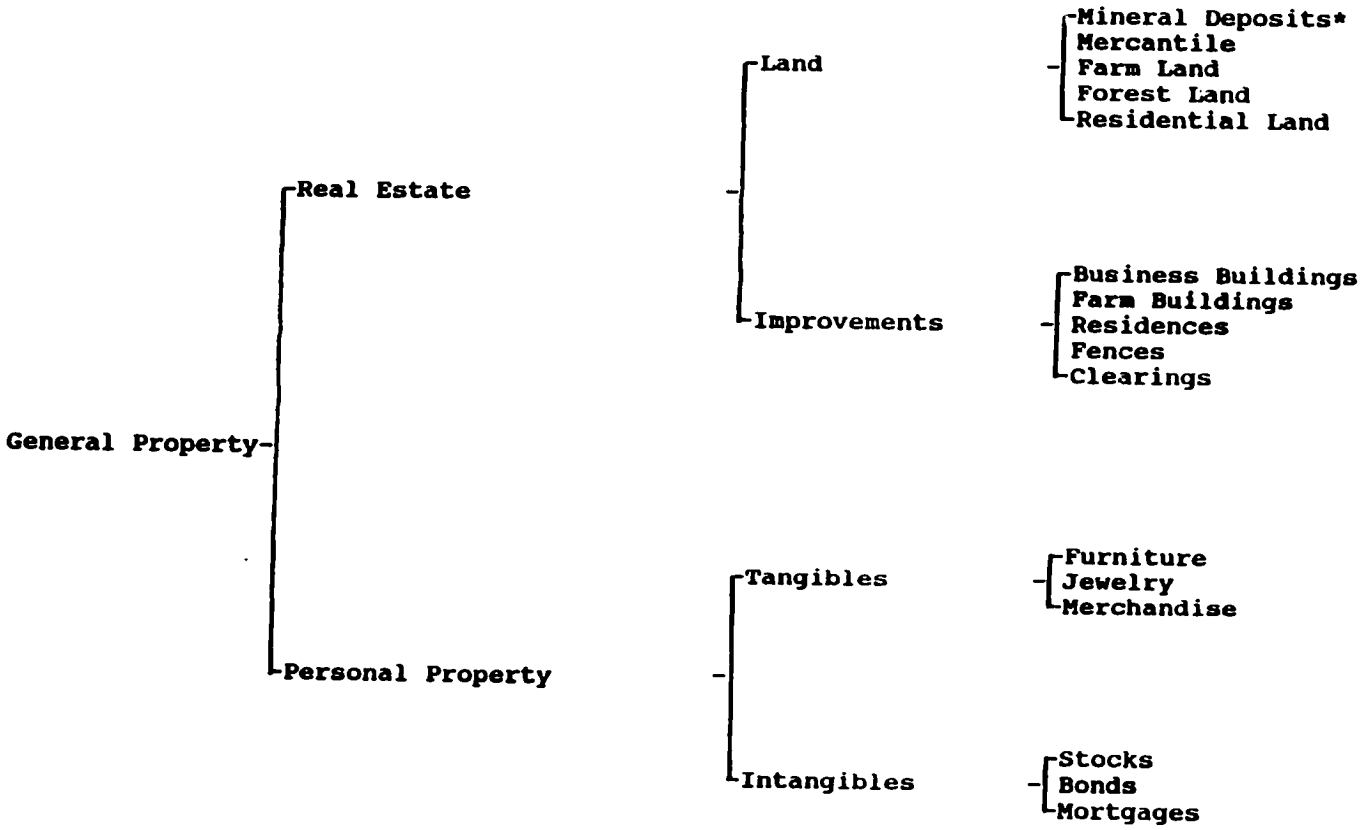
---

[262]Id. at 72.

[263]Id.

[264]Groves, supra note 247, at 44.

Figure 1. Categories of Property as Classified for Tax Purposes



Source: Harold M. Groves, Financing Government.

mineral deposits share many of the same attributes as land, such as being immobile, there are characteristics, such as exhaustibility and the need for exploration, that make it inappropriate to classify mineral deposits under the subcategory of land without qualification.

A distinction between mineral deposits and capital improvements on these mineral deposits is critical when analyzing the merits of property taxation on minerals as the effect of taxes on these items is very different. The discussion provided here will focus on the mineral deposits only.

Equity

The property tax does not satisfy the taxation objections of either the benefits-received principle or the ability-to-pay principle. A theoretical justification of the property taxes has been that the net wealth of a taxpayer is generally proportional to the benefits received from the government. Government benefits, however, are rarely administered in proportion to the net wealth of the mining operation.

When the nation was primarily agrarian, the size of one's land holdings was, perhaps, a legitimate measure of income, and hence ability to pay. This is no longer the case in modern society. An asset may have value because

of its ability to produce income, however, the asset may not produce income for many years.

Another equity problem with property taxation is that at times it is not "horizontally equitable". Often taxpayers of equal wealth are not taxed equally since assessment techniques and procedures vary widely between local taxing jurisdictions. "Interregional inequity" may also come about because of a mine's relative importance to the local tax base. For example, a mine located in an area with little industry may be expected to provide more of the local tax base than a mine located in a more industrialized region.[265]

Tax capitalization is an important concept to remember when analyzing the incidence of property taxation. Tax capitalization occurs when the value of the taxed land is reduced by an amount equal to the capitalized value of the tax.

Economic Efficiency

The property taxation of mineral properties has often been criticized on the grounds that it induces the mining firm to "mine out" from under the tax. Since property taxes are levied on a yearly basis, a mining

---

[265]T.F. Stinson, State Taxation of Mineral Deposits and Production, at page 63, (U.S. Environmental Protection Agency, Office of Research and Development, 1977).

firm might increase production in order to shorten the life of the mine and thereby avoid further property taxes.[266] The result of this "mining out" allegedly brought on by property taxation:

> . . . may be to shorten adversely the period of mine operation; discourage orderly exploration, development, and mining; cause overdevelopment of mine capacity by forcing mineral property owners to open mines to produce income to pay the tax; encourage selective mining with the accompanying loss of lower grade mineral.[267]

Arguments have been presented, however, which lead to the conclusion that the impact of "mining out" is quite small. The first contention focuses on the phenomenon of tax capitalization that "virtually eliminates any net influence of taxes on output," where the life of the deposits is considerable.[268] The second contention is that the increased costs required to obtain an increase in production would outweigh the benefits of a reduced property tax.[269]

---

[266]Henry Steele, "Natural Resource Taxation: Resource Allocation and Distributional Implications,", at 245, Extractive Resources and Taxation, edited by Mason Gaffney, (University of Wisconsin Press, 1967).

[267]Starch, supra note 242, at 14.

[268]Mason Gaffney, Extractive Resources and Taxation, at 369, (The University of Wisconsin Press, 1967).

[269]Steele, supra note 266, at 245.

Property taxes have also been criticized on the ground that it tends to discourage exploration activity. This comes about as the result of the tax lowering the value of any potential discovery which, in turn, acts to discourage investment in exploration.

Property taxation has been advanced as a means to solve certain production decision distortions. One such problem occurs when a few large companies buy up most of the existing known reserves of a mineral to limit competition in the industry or to insure a steady supply of the mineral for future years. The imposition of significant levels of property tax would provide incentives for companies holding the inactive reserves to develop or sell the reserves.

Administrative Efficiency

There are a number of administrative problems unique to taxation of mineral property. First, is the problem of inconsistency between valuations, resulting from the uncertainty and subjectivity associated with estimating mineral reserves. The second problem is the recognition that a trade-off exists between the cost of obtaining fair and reasonable assessments and the benefits received from the tax. Another problem to be discussed is that of

determining which valuation method or combination of methods should be used in making the assessment.[270]

Economic Growth and Stability

If property tax assessments accurately reflect the current value of a mineral property or are relatively stable over time, the tax will tend to have a stabilizing effect on the business environment. Arbitrary and random assessments will tend to increase uncertainty.[271]

Revenue Adequacy

One of the property tax's greatest strengths is its ability to raise large amounts of money in a short period of time. It is this virtue of the tax that promotes its continued use in the face of serious theoretical difficulties. Since property taxes are being collected throughout the exploration and development stages, the tax avoids the front end load problem associated with income and severance taxes.

---

[270]Schenck, supra note 239, at 76.

[271]Georgia Tax Reform Commission, 1980, Mineral Resources Taxation in Georgia, at 17, Atlanta, Georgia.

Severance Taxation of Minerals

The severance tax is an excise tax based on the production of natural resources.[272] A severance tax that is levied as a set amount per physical unit of production is known as a specific severance tax[273] while one levied as a fixed percentage of the market value of the mineral being produced is known as an ad valorem severance tax.[274] Over fifty percent of the states use severance taxes.[275] Five states raise over twenty five percent of their tax revenue from severance taxes and seven states raise substantial amounts from taxes on solid mineral production.[276] The gross proceeds or ad valorem severance tax is the most popular form of severance taxation.

A review of the legislative proposals to tax unmined coal indicates that recent proposals have called for the classification of coal property into four categories: "active mining property," "active reserves," "inactive reserves," and "barren or unminable property."[277] These

---

[272]Starch, supra note 242, at 16.

[273]Id. at 78.

[274]Id.

[275]Schenck, supra note 239, at 50.

[276]id.

[277]H.B. 503, §1(19-22)(1986).

classifications were to be taken into consideration in the determination of the "actual value of mineral properties" for taxation purposes.[278] The consequence of the four tier valuation system would be much like an increase in the severance tax, with the burden of the tax dependent on the value of current and near future production.[279] The property tax base would, therefore, depend on the value of the coal produced. Thus, the proposed tax is more properly analyzed from an economic standpoint as a production tax, rather than a property tax.[280]

Equity

Severance taxes have been praised with respect to the benefits-received principle as it can provide statewide benefits from a localized industry. The tax has also been criticized for this very same reason. There are those who argue that mining is a localized industry, therefore, areas in which mining is most predominant should receive the bulk of the tax revenues. It is administratively difficult to allocate the proceeds

---

[278]H.B. 503, §6(2)(1986).

[279]Vasek, supra note 17, at 243.

[280]Hellerstein, supra note 85, at 109.

of a severance tax on a statewide basis in such a way that mining areas receive a fair 'share' of the benefits.

The severance tax, unlike the property tax, rates favorably on the ability-to-pay principle. Proponents of the tax contend that since the tax is not levied until the mineral is severed and presumably sold, the tax insures the mining firm's ability to pay the tax.

A per unit severance tax is often criticized as discriminating against low-grade minerals as it would represent a higher percentage of value than an identical tax imposed on the same unit of higher grade minerals.[281] The burden of a per unit tax will decrease if market prices increase and increase if prices decrease.[282] This is contrary to the idea of vertical equity requiring that taxes be levied according to relative ability to pay.[283] Ad valorem severance taxes, based on the market value of the mineral being produced, do not discriminate between high and low grade mineral producers and are considered more equitable than specific severance taxes.[284]

The natural heritage argument has been advanced to support the equity of the ad valorem severance tax. This

---

[281]Starch, supra note 242, at 26.

[282]Id.

[283]Musgrave, supra note 246, at 198.

[284]Stinson, supra note 265, at 10.

argument recognizes that mineral deposits are a bounty of nature and they are, therefore, the natural heritage of all the people of the nation. According to this theory, the tax is simply a way of compensating society for the private exploitation of this mineral wealth.[285] The natural heritage argument has been challenged by the assertion that rents which accrue to fertile land or superior individual talents are not taxed as "gifts of nature" and therefore mineral deposits should not be treated any differently. The ad valorem severance tax has also been advocated as a means for society to insure that an appropriate amount of tax is collected for the removal of a nonrenewable tax base.[286] Minerals, most often found in isolated and undeveloped areas, are often developed by nonresident individuals and corporations. Thus, much of the profit from the enterprise flows outside the area leaving little or no permanent wealth in the state or area in which the minerals are located. Advocates of the tax maintain that it protects the public from absentee owners of mineral deposits who, it is feared, escape from paying their fair share of taxes and

---

[285]Starch, supra note 242, at 21.

[286]Id.

who exploit the natural wealth of an area without just compensation to the local government.[287]

Incidence

A discussion of the equity of the proposed ad valorem tax on unmined coal would not be complete without considering the incidence of the tax. The actual shifting and incidence of a particular tax is uncertain, depending upon a number of criteria: the base upon which the tax is levied, elasticity of supply and demand, the market structure, and taxes elsewhere.[288] Each of these criteria will be considered in analyzing the incidence of an ad valorem property tax on unmined coal.

Tax base. As stated earlier recent proposals to tax unmined coal would have classified coal property into four categories that were to be taken into consideration in determining the value of the mineral properties for tax purposes. The tax base of the proposed tax would, therefore, depend on the quantity of coal produced.

Elasticity of supply and demand. Central to the discussion of the incidence of state's production tax is the consideration of the elasticity of supply and demand.

---

[287]Id. at 22.

[288]Id.

The general rule is that a production tax will be "shifted forward onto the consumer when demand is very inelastic. It is shifted onto the producers when supply is relatively the more inelastic" of the two.[289]

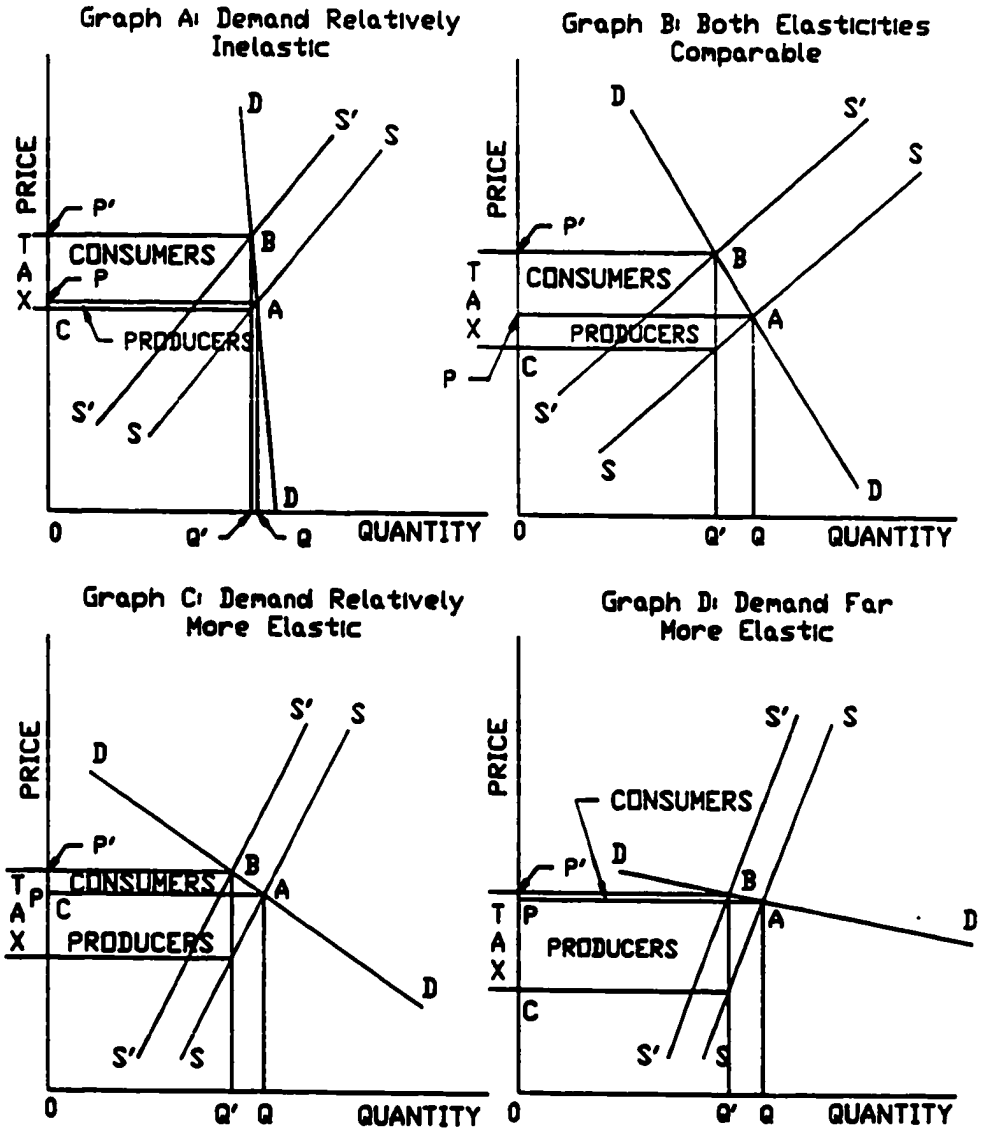
A number of variables influence the quantity of coal purchases, including: the price of coal; reliability of supply; desire to diversify supply sources; and the cost of transportation not included in the negotiated price. The analysis offered here, however, refers only to price as a decision variable in the purchase of coal.

Graphs A through D in Figure 2 on page ninety-three depict the effect of price elasticity on tax incidence. In Graph A, quantity demanded does not change much with a change in price. Demand is, therefore, said to be almost perfectly inelastic. Since mining firms view the enactment of a production tax as an increase in unit costs of production, the imposition of such a tax will move the supply curve upward by the amount of the tax, from SS to S'S'. Prior to the enactment of the tax, the industry produces OQ and receives a price of OP. The quantity demanded remains relatively constant after taxation although the price increases by the amount of

---

[289]Paul A. Samuelson, Economics, ninth edition, at 388 (McGraw-Hill Book Company, 1973).

Figure 2. -- Theoretical Effect of Price Elasticity On Incidence of a State Tax



Assumptions: (1) Firms are price takers and
(2) Competitive industry

Source: C.H.J. Schenck, Handbook of State and Local Taxation of Solid Minerals.

the tax, PP'. Producers receive the price OP' and most of the tax, PP', is passed on to the consumers.[290]

Graph B shows the incidence of the tax assuming both supply and demand are relatively elastic. Prior to taxation, at the equilibrium point A, the mining industry produces an amount OQ and receives a price OP. When a production tax is introduced, the state's supply curve moves upward by the amount of the tax, from SS to S'S'. The new equilibrium point is at B. Price has increased from OP to OP' and output is reduced from OQ to OQ'. The increase in price, PP' is less than the amount of the tax, CP'. Thus, about two-thirds of the tax, PP' is shifted to the consumers who will now buy less and the mining firms absorb the remainder of the tax, CP.[291]

Graph C illustrates a scenario where demand is relatively more elastic than supply. The price increases from OP to OP' with the implementation of a severance tax. The increase in price causes a reduction in quantity demanded from OQ to OQ'. Approximately two-thirds of the tax, CP, is absorbed by producers while the remainder, PP' is passed on to consumers in the form of higher prices.[292]

---

[290]Schenck, supra note 239, at 59.

[291]Id.

[292]Id.

In Graph D demand is even more elastic causing producers to have to absorb even more of the tax than in Graph C. The price to the consumer increases by PP' which is the amount of the tax passed on in form of higher prices. The producer, however, absorbs CP, which constitutes a majority of the tax.[293]

Although it is not shown on the graphs, the producer may shift some of the tax burden backward onto the factors of production and the owners of mineral rights. This situation arises because a reduction in the quantity of coal demanded may result in a reduced demand for the inputs of production (labor, services, machinery, etc.) as well as a reduced demand for mineral rights.[294]

In addition, some of the burden of a state production tax will fall on the Federal and State governments. A reduction in the income tax base caused by the deduction of production tax payments from taxable income will cause the producing firms to pay less Federal and State tax.[295]

In determining the graph most representative of the Kentucky coal industry, one must consider the relative elasticity of supply and demand in that industry. In

---

[293]Id.

[294]Albert M. Church, Taxation of Nonrenewable Resources, at 94, (Lexington Books, 1981).

[295]Schenck, supra note 239, at page 79-80.

analyzing the elasticity of supply, a recent study that provides data on coal production at various costs is used. The study reveals that although coal produced in the Eastern portion of the United States is high in Btu content, the quantity is somewhat limited. Thus, the supply of Eastern coal is somewhat inelastic.[296]

There are four factors that influence the price elasticity or inelasticity of demand. The first factor is the availability of substitutes.[297] Generally speaking, the greater the number of substitutes available for a product, the greater the price elasticity of that product. Coal is used in two ways: to generate steam and as a raw material in the making of coke.[298] While steam coal is used to generate steam, metallurgical coal is used in making coke.[299] Since the electric utility industry, burning more than four-fifths of the coal consumed in the United States is the major consumer of U.S. coal,[300] the analysis presented here will focus on that market. As an energy source coal competes with oil,

---

[296]Michael P. Ward, Coal Severance Taxes: The effect of Western States' Tax Policy on the U.S. Coal Market, at 26, (The Rand Corporation, 1982).

[297]Curtis E. Harvey, The Economics of Kentucky Coal, at 3, (University Press of Kentucky, 1977).

[298]Harvey, supra note 25, at 18.

[299]Id.

[300]Id.at 9.

natural gas, and uranium.[301] The welfare of the coal industry has traditionally paralleled fluctuations in the price of oil.[302] The future of natural gas as a source of energy appears limited due to the maze of regulations regarding production, transportation, and distribution of this resource.[303] The American public's concern about safety and environmental factors coupled with the high price of constructing nuclear power plants have curtailed plans for additional nuclear power in the future.[304] In the short run it is not feasible to substitute other fuels when the price of one increases. The cost of abandoning equipment is far too great and the construction of new plant and equipment takes a long time.[305]

The second factor that influences the elasticity of demand for a commodity is time.[306] Generally speaking, the demand for a product tends to be more elastic the longer the time period under consideration.[307] In the

---

[301]Id. at 134.

[302]Id. at 133.

[303]Hellerstein, supra note 85, at 126.

[304]Id.

[305]Id. at 7.

[306]Id.

[307]Campbell R. McConnell, Economics, ninth edition, at 414, (McGraw-Hill Book Company, 1984).

long run customers have time to make adjustments. Many long term contracts between coal producers and utility customers contain "pass through" clauses that call for production taxes to be allocated to the utility companies. The utility companies in turn pass the tax on to their consumers. When these contracts expire, the tax burden is less likely to be passed on to the utility companies.[308] The existence of "pass through" clauses have been cited as increasing the short-run inelasticity of demand.[309]

The third factor influencing the price elasticity of the demand for coal is the elasticity of the product or services it is used to produce.[310] In the short run, the demand for energy is inelastic as there is little that can be substituted for energy resources. In the long run, however, increases in the price of energy resources can bring significant changes in the quantity demanded.[311]

The cost of coal as a percentage of the total cost of the final product it is used to produce is the fourth

---

[308]Hellerstein, supra note 85, at 125.

[309]Schenck, supra note 239, at 105.

[310]Harvey, supra note 25, at 3.

[311]Harvey, supra note 297, at 16.

factor influencing the price elasticity of coal.[312] In the past coal prices have been very low, contributing to the relative inelasticity in the demand for coal.[313] According to financial statements of utility companies for the year 1987, coal represents approximately forty percent of the total cost of electricity.[314] Thus, it is reasonable to assume that the demand for coal is more sensitive to prices today than it was only a short time ago.[315]

Market structure. The structure of the market may also determine the extent to which a state production tax may be shifted forward to consumers. The Kentucky coal industry is generally regarded as competitive because there are many independent producers and output is not concentrated.[316] Therefore, the more concentrated the industry, the more likely firms will use their market power and shift forward a tax on the resource produced to customers. Economists, however, generally agree that a

---

[312]Harvey, supra note 25, at 3.

[313]Id.

[314]1987 Published Financial Statements of Kentucky Utilities, East Kentucky Power Company, Louisville Gas and Electric, and Cincinnati Gas and Electric.

[315]Harvey, supra note 25, at 3.

[316]Harvey, supra note 25, at 24 and Hellerstein, supra note 85, at 125.

monopolist will shift to consumers only about one-half as much of a tax as would be shifted to consumers by a competitive industry.[317] Since firms in a competitive industry are presumed to be earning no more than a normal rate of return, they are under greater pressure to shift the tax forward or to reduce output than is the monopolist, who has a cushion of monopoly profits to absorb the tax.[318]

Transportation costs can account for twenty to eighty percent of the delivered price of coal. Because transportation costs are so high, three basic regional geographic markets for coal have emerged in the United States: the eastern, the midwestern, and the western.[319] Thus the high cost of transportation tends to segment the national market and lessens the degree of regional competition. Consequently, the elasticity of demand for coal produced in a particular state decreases.

Taxes elsewhere. It was noted above that high transportation costs segment the market for coal. This fact is considered in discussing taxes elsewhere. Coal produced in Eastern Kentucky competes primarily with coal

---

[317]Charles E. McLure, Jr., "Economic Constraints on State and Local Taxation of Energy Resources", National Tax Journal, Vol. XXXI, No. 3, 1978, pp. 257-258.

[318]Hellerstein, supra note 85, at 125-126.

[319]Harvey, supra note 297, at 19.

produced in other Central Appalachian states, namely West Virginia, Virginia, and Tennessee; while coal produced in Western Kentucky, competes with coal produced in other Midwest states, particularly Illinois and Indiana. State and local taxation of coal in Kentucky and competing coal producing states is summarized in Table 2 on pages 102 and 103. While rates per ton and per dollar value were included in the table in many instances, it was impossible to include all rates as they vary by locality.

Studies comparing the tax burdens a single hypothetical mine would encounter in neighboring coal producing states have been conducted. These studies concluded that the amount of tax Kentucky imposes on members of the coal industry exceeds that imposed by all other states, with the possible exception of West Virginia.[320] Tables from these studies are included here as Table 3 found on page 105 and Table 4 found on pages 106, 107, and 108. It should be noted that Kentucky's workmen's compensation costs have increased significantly since these studies were completed.

---

[320]West Virginia Research League, Inc., A Comparison of State Tax Burdens Imposed Upon the Coal Industry West Virginia and Selected States, A Report Prepared for the Taxation Subcommittee of the Legislature's Joint Committee on Government and Finance, May 28, 1975 and Kentucky Department of Energy, Economic Impact of Taxes on Selected Eastern Coal States, 1983.

Table 2. -- Taxation of Coal Property in Kentucky and Neighboring Coal Producing Counties

State	Production Tax	Property Tax
Kentucky	State severance tax equal to 4.5 percent of gross value	State ad valorem property tax at rate of $.001 per $100 value No local taxation
West Virginia	State severance tax equal to 3.5 percent of gross sales proceeds Counties and municipalities levy an additional .35 percent	State ad valorem property tax at same rate as other real property Producing interests valued using income capitalization approach
Virginia	Any municipality or county may impose severance tax at a rate not to exceed one percent of gross receipts as an alternative to the property tax	Local taxation only
Tennessee	State severance tax of $.20 per ton	State ad valorem property tax at same rate as other real property Producing interests valued using income capitalization approach Nonproducing interest valued using arbitrary and nonuniform value per acre, if valued at all

Table 2.--Taxation of Coal Property in Kentucky and Neighboring Coal Producing Counties (Continued)

State	Production Tax	Property Tax
Illinois	None	State ad valorem property tax at same rate as other real property Mineral interests are assessed at 33 1/3 percent of fair cash value Nonproducing property assigned a nominal value
Indiana	None	State ad valorem property taxation Undivided or surface interests in coal land, producing or nonproducing, valued as agricultural land Mineral ownership only is valued at $60 per acre

Source: Walter Hellerstein, State and local Taxation of Natural Resources in the Federal System.

Table 3. Tax Burdens of Top 6 Coal Producing States

State	Percent of West Virginia Total	
	Total Tax Burden[a]	Total Tax Burden[b]
Kentucky	108%	79%
West Virginia	100%	100%
Pennsylvania	79%	29%
Illinois	85%	40%
Ohio	80%	28%
Virginia	81%	46%

[a]Includes workmen's compensation and unemployment compensation costs.

[b]Excludes workmen's compensation and unemployment compensation costs.

Source: West Virginia Research League, Inc., A Comparison of State Tax Burdens Imposed Upon the Coal Industry West Virginia and Selected States, 1975.

Table 4. Tax and Insurance Obligations of Hypothetical Companies in Kentucky and Surrounding Coal-Producing States: Cost Per Ton and Percent of Selling Price

	Severance Tax		Property Tax	
	Cost per ton	% of Price	Cost per ton	% of Price
Appalachian				
East Kentucky	$1.48	4.2	$.09	0.3
West Virginia	-0-	-0-	.24	0.7
Ohio	.06	0.2	.56	1.6
Tennessee	.20	0.6	.41	1.2
Virginia	.18	0.5	.27	0.8
Interior Basin				
West Kentucky	$1.17	4.2	$.07	0.3
Illinois	-0-	-0-	.59	2.1
Indiana	-0-	-0-	.75	2.7

Table 4. Tax and Insurance Obligations of Hypothetical Companies in Kentucky and Surrounding Coal-Producing States: Cost Per Ton and Percent of Selling Price (continued)

	Other Taxes[a]		Total Taxes[b]	
	Cost per ton	% of Price	Cost per ton	% of Price
Appalachian				
East Kentucky	$ .25	0.7	$1.82	5.2
West Virginia	1.52	4.3	1.76	5.0
Ohio	.34	1.0	.96	2.7
Tennessee	.25	0.7	.86	2.5
Virginia	.25	0.7	.70	2.0
Interior Basin				
West Kentucky	$ .20	0.7	$1.44	5.1
Illinois	.22	0.8	.81	2.9
Indiana	.20	0.7	.95	3.4

[a]Includes corporate income tax and business and occupational taxes.

[b]Total of severance tax, property tax, and other taxes columns.

Table 4. Tax and Insurance Obligations of Hypothetical Companies in Kentucky and Surrounding Coal-Producing States: Cost Per Ton and Percent of Selling Price (Continued)

	Insurance[a] Cost per ton	Insurance[a] % of Price	Total Tax and Insurance Cost per ton	Total Tax and Insurance % of Price
Appalachian				
East Kentucky	$2.99	8.5	$4.82	13.8
West Virginia	2.95	8.4	4.71	13.5
Ohio	2.65	7.6	3.61	10.3
Tennessee	3.20	9.1	4.06	11.6
Virginia	2.91	8.3	3.61	10.3
Interior Basin				
West Kentucky	$ .46	1.6	$1.90	6.8
Illinois	1.20	4.3	2.01	7.2
Indiana	.57	2.0	1.52	5.4

[a]Includes unemployment insurance and workmen's compensation insurance.

Source: Kentucky Department of Energy, Economic Impact of Taxes on Selected Eastern Coal States, 1983.

Economic Efficiency

In the discussion on the equity criterion of the severance tax, it was stated that in a competitive economy all or a part of a severance tax on minerals will be passed on to the consumer. When taxes are shifted, it not only redistributes the burden of the tax, but affects the efficient allocation of resources as well.[321] As was illustrated in Figure 2, producing firms view the imposition of a severance tax as an increase in unit costs of production. This results in higher prices paid by consumers and a reduction in the quantity of the mineral supplied. The effect of lowering the rate of production will be to lengthen the life of the mine thereby reducing the exploitation of the mineral deposit. The lower rate of production is less than the socially optimal rate of production, however, if society's rate of discount is equal to the private rate of discount. The delayed exploitation of the mineral is not in society's best interest if the value of the delayed mineralproduction is worth less to society in the future than it is presently.

Severance taxes may cause distortion in the production decisions of mining firms. As stated previously the severance tax is an addition to cost.

---

[321]Musgrave, supra note 246, at 443.

With a given market price, and a higher production cost, the mining firm will have to mine higher grade coal to remain profitable. Thus, the effect of the tax is to raise the cutoff grade of the coal mined. Marginal grades of coal formerly recovered will become waste with a consequent reduction in reserves. Therefore, an amount of lower grade mineral is irretrievably lost as the result of the severance tax.[322] Mining firms may alter the technology they employ as the higher production costs make different technologies more economical.[323] In addition, firms may choose not to replace capital as it becomes worn out because of the lowered profits brought about by a severance tax.[324] Lower profits would also discourage new investment in the industry.

Administrative Efficiency

Relative to other forms of taxation, the severance tax is easy to administer. This aspect has great appeal to state and local taxing authorities. All that is needed to calculate the severance tax liability of a given firm is the amount of mineral produced by the firm. The tax liability may be a bit more difficult to

---

[322]Starch, supra note 242, at 26.

[323]Church, supra note 294, at 56.

[324]Id.

determine if the severance tax is levied on an ad valorem basis. Quite often there are no open market transactions involving the mineral being taxed, therefore, prices are hard to determine. This is the case with coal mines that are wholly owned by utilities or steel manufacturers, as there are no arms' length sale of similar coals to nearby customers.[325] This is insignificant, however, compared to the difficulties associated with income and property taxation.

Economic Growth and Stability

One argument advanced in favor of the severance tax is that it fosters an environment of certainty concerning the amount of taxes owed. This condition may not be present with property taxes as they may be prone to rather severe changes in assessments.[326] Income taxes, subject to numerous changes and interpretations regarding allowable deductions from gross income, may be even less certain.

One of the most serious criticisms made against the severance tax is that it has an unfavorable impact upon resource development. The tax discourages investment in mineral production and consumption of mineral products by

---

[325]Stinson, supra note 265, at 10.

[326]Georgia Tax Reform Commission, supra note, 271 at 17.

raising production costs.[327] An additional detrimental aspect of severance taxation is the possible inflationary effect it may have if the increased production cost is passed forward to the consumer.[328]

Revenue Adequacy

Because the severance tax is based on the amount of mineral production, revenue collected from the tax will vary in direct proportion with levels of production.[329] Fluctuations in mineral production are often directly correlated to the business cycle. This is of particular concern to taxing jurisdictions as decreasing production rates may often be the result of a slowdown in the economy, a time when the need for tax support for governmental services may be crucial.[330] Additionally, a severance tax does not provide revenue until a mine is producing and selling a mineral, although the venture may require many years of development. During the developmental years the project may be severely burdening local government services. The problem is particularly

---

[327]Starch, supra note 242, at 25.

[328]Georgia Tax Reform Commission, supra note 271, at 17.

[329]Starch, supra note 242, at 25.

[330]Id.

acute for jurisdictions in which the minerals industry is significant relative to other industries.[331]

The ad valorem severance tax is superior to the specific severance tax during periods of inflation as the tax revenue will keep pace with inflation. On the other hand, if mineral prices fall, tax revenues fall.[332]

---

[331]Stinson, supra note 265, at 10.

[332]Id.

CHAPTER V

Methodology

The purpose of this study is to analyze the effect the proposed ad valorem property tax on unmined coal may have on the coal industry in the state of Kentucky. This chapter will provide a discussion of the methodology to be used in making this analysis.

Two models developed by the Energy Information Administration (EIA), Resource Allocation and Mine Costing (RAMC) Model and the Coal Supply and Transportation Model (CSTM), are used in the study. A discussion of these models is fundamental in describing the methodology.

Resource Allocation and Mine Costing (RAMC) Model

The principle function of the RAMC is to provide intermediate and long term coal supply curves for EIA's coal supply models. It can be used to analyze the impact of changes in coal supply or costs due to changes in any

one of a number of variables including: taxes, production and preparation costs, productivity and other supply-related costs.[333] In modeling coal supply, there are three primary considerations. First, coal is not a homogeneous commodity as Btu and sulfur content may vary significantly. These two characteristics affect demand considerably. Second, the occurrence of coal is distributed widely geographically. Coal is often found a great distance from where it is consumed. Thus, there is great variation in the cost of transporting coal from the areas where it is produced to the areas where it is consumed. Third, the cost of extracting coal depends on how it is deposited as well as on the methods that can be used to extract it. These three considerations may interact. For example, a type of coal that is in demand may be found in a region where the cost of extraction is low but the cost of transportation is high. Thus, it is important that the potential for interaction among the three considerations be represented in a model of coal supply.

When comparing the price of coal with various levels of the proposed tax added as a cost parameter to the price of coal without such a tax, the mine mouth price

---

[333]Energy Information Administration, Documentation of the Resource Allocation and Mine Costing (RAMC) Model, Report for the U.S. Department of Energy, May 1987 (DOE/EIA-M021).

(MMPR) is used rather than the delivered price (DLDPR). Transportation costs, which tend to be relatively constant given a particular supply region and a specific demand, can represent a large percentage of the delivered price of coal. Thus, the MMPR would appear to be the variable to use as a dependent variable in that it is more robust in differentiating changes in cost at different levels of tax. The model, however, has the capacity to include transportation cost.

The heterogenous nature of coal is captured by classifying coal along two dimensions: the rank of the coal and the sulfur content.[334] The rank of the coal is distinguished by its heat content, which is measured in British thermal units (Btu) per pound.[335] The heat content of the coal is of primary importance because the principal use of coal is to produce heat. The cost of coal extraction depends on the weight of the coal. Thus, the heat content is crucial in relating the cost of producing the coal to the market value of the coal. Sulfur content, measured in pounds of sulfur per million Btu, is particularly important in determining the value of coal because it is released as sulfur dioxide when

---

[334] Id. at 1.

[335] Id.

coal is burned.[336] Sulfur is the major pollutant in coal.

Consideration is given to the geographic range of occurrence of coal by incorporating thirty-two coal supply regions.[337] Regions are defined so that they do not cross state boundaries, permitting the RAMC to incorporate differences in state taxation laws.[338] If there are significant differences in the methods of mining within a given state or if there are significant differences in transportation distances to principal markets, sub-state regions are used. This is the case in Kentucky. Eastern Kentucky and Western Kentucky are two separate regions.

Different mining methods are recognized by separately representing coal that can be mined by underground methods and coal that can be mined by surface methods.[339]

To represent the coal rank, geographic, and mining differences in coal supply, coal reserves for each possible category are treated separately.[340] For

---

[336]Id. at 2.

[337]Id.

[338]Id.

[339]Id.

[340]Id.

example, within each geographic supply region, quantities of coal reserves available for mining are classified according to; type of coal, demand region, heat content, sulfur category, and method of mining.

The starting point for the model is the quantity of coal reserves of a particular type of coal, within a particular geographic region, that can be mined by a particular method of mining. The principle output of the RAMC consists of coal supply curves for each region and type of coal.[341] Each curve is developed as a sequence of steps with the horizontal axis representing the annual coal production, and the vertical axis representing the price of coal at the annual production level on the horizontal axis.

There are two essential steps in developing the supply curves: (1) classification of available coal reserves by resource parameters that affect m_ning cost and (2) calculation of the selling price for coal in each reserve classification block.[342]

The primary purpose of the reserve classification is to categorize the reserves available to new or future mines according to various geological and operating parameters that are major determinants of the cost of

---

[341] Id.

[342] Id.

mining.[343] A flow-chart of the RAMC reserve classification procedure is included as Appendix A. Once the reserves have been categorized, the reserve classification component estimates the future annual production that will be mined from each category of reserves. The principal steps in the reserve classification component are: determination of the quantity of available reserves; classification of the available reserves according to geological parameters; classification of available reserves according to operating parameters; and estimation of the future annual production from each block of reserves.[344]

Before reserves can be classified, the quantity of available reserves must first be determined. Then, estimates are made of the total reserves for each coal type/region combination.[345] Only a portion of this total is actually available to future mining, however. In order to determine the amount of available reserves, the reserves committed to current mining operations are subtracted from the total demonstrated reserves for the coal type.[346] Then, a percentage of reserves is removed

---

[343]Id. at 8.

[344]Id.

[345]Id.

[346]Id.

to represent reserves that are not available to future mining because they are either inaccessible or they are illegal.[347] Within each region and coal type, separate estimates of the available surface reserves, the available underground thick (greater than forty-two inch) seam reserves, the available underground thin (less than forty-two inch) seam reserves, are calculated.[348]

Once available reserves have been calculated, they are classified according to geological parameters that affect mining cost.[349] For reserves that are recoverable by surface mining, there is a single parameter: overburden ratio.[350] Overburden ratio is the quantity of material lying between the coal seam and the surface (measured in cubic yards) per ton of coal contained in the seam. It is a crucial determinant of the economics of surface mining, because it represents the quantity of rock that must be removed or stripped from above the seam to enable extraction of each ton of coal.[351] There are seven overburden ratio categories.

---

[347] Id.

[348] Id. at 37.

[349] Id. at 9.

[350] Id.

[351] Id. at 23.

For underground reserves, there are two parameters: seam thickness and seam depth. Coal in the United States is almost always flat-lying or horizontal. Seam thickness is the distance from the top to the bottom of the seam while seam depth is the vertical distance from the surface to the top of the seam, measured at the point of access to the mine.[352]

After the available reserves have been classified according to the geological parameters, they are further categorized according to a single operating parameter: mine size. There are six separate categories of mine size for surface reserves, and five separate categories for underground reserves.[353]

Once the available reserves have been divided and subdivided into separate reserve blocks corresponding to unique combinations of mine size, overburden ratio, seam depth, and seam thickness, the total annual tonnage of coal that will be produced by all new mines in each block is estimated.[354] Three main steps are involved in developing the annual future production estimate for each reserve block. First, the quantity of reserves to support a single mine operating in the block is

---

[352]Id. at 22.

[353]Id.

[354]Id. at 45.

determined. This quantity is then divided into the total quantity of reserves contained in the block to determine the number of mines that can be supported by the block. The total annual tonnage produced by all of these mines is determined.[355] Once the annual future production for each reserve block is then determined, the allocation of reserves is completed, and the model is used to develop mining costs.

The mine costing component of the RAMC is used in determining a price to be associated with each block of reserves calculated in the reserve classification component.[356] A flow-chart of the RAMC mine costing procedure is included as Appendix B. To calculate this price, a generalized discounted cash flow is calculated for each year in the life of the mine defined by the geological, resource, and operating parameters that determine the reserve block. Essentially, this procedure involves calculations of the costs of mining plus a rate of return on capital investment for each year in the life of the mine. The steps in this procedure are: determination of model mine costs; adjustment for productivity, inflation and mine life; calculation of capital costs; calculation of year-by-year costs and

---

[355] Id.

[356] Id. at 11.

nominal selling price; and determination of minimum acceptable selling price (MASP).[357]

The first step in developing the MASP is to calculate the initial capital, deferred capital, direct labor, parts and supplies, and utilities (power and water) costs associated with mining using the model mine cost estimating equations.[358] These equations relate the above-mentioned costs to the various geological and operating parameters by which the model classifies reserves and annual production (overburden ratio, mine size, etc.).[359] There is a separate set of five equations, one for each of the five cost components listed, corresponding to each of the RAMC model mines. The equations differ for the different model mines. Thus, the costs of mining a particular block of reserves, as calculated using the equations, are dependent on which of the model mines is chosen to mine the reserve block, as well as the seam depth, seam thickness, overburden ratio, and mine size categories to which the reserve block has been assigned.[360] The selection of a particular model mine depends on the reserve block's

---

[357]Id. at 12.

[358]Id.

[359]Id. at 72.

[360]Id.

classification with respect to mining method (surface or underground), the region in which the reserve block is located, the block's classification with regard to mine size and, in the case of underground mining, seam depth or thickness.[361] Once the appropriate model mine has been chosen to develop a particular block of reserves, the set of cost equations corresponding to that mine is used to determine the five components of mine costs listed at the beginning of this paragraph.[362] Again, the independent variables in the cost equations correspond to the various geological and operating parameters by which each reserve block is classified.

After calculating the five model mine cost components, the calculated costs for productivity, inflation, and mine life are adjusted.[363] The productivity adjustment, performed first, is designed to update costs to reflect changes in mining productivity as well as to capture variations in productivity across regions. After adjusting for productivity, the five cost components: total initial capital, total deferred capital, direct labor costs, parts and supplies costs, and utilities costs, are adjusted for the expected impact

---

[361] Id.

[362] Id.

[363] Id.

of inflation.[364] In addition, the initial and deferred capital costs are adjusted to reflect the mine life specified by the user.[365]

The MASP is determined on the basis of the year-by-year calculations of the mining costs and nominal selling price for each year of the mine life. Before making the year-by-year calculations, it is necessary to determine the present value of all capital investment, using an assumed distribution of the total deferred capital over the life of the mine. The coal industry nominal rate of return is applied to this total to calculate an annualized cash flow requirement that will recover the capital investment and earn the assumed rate of return.[366]

An income statement, including all cost components, is prepared for each year in the life of the mine. The calculation is performed in nominal dollars. Operating costs are inflated to the appropriate year and a selling price in nominal dollars is calculated for each year in the mine operation.[367]

---

[364]Id. at 73.

[365]Id.

[366]Id.

[367]Id. at 12.

Once the nominal price series is calculated for each year of mine operation, the price series is discounted using a nominal utility discount rate. Then a levelized real price, having the same present value to a utility as the nominal price series, is calculated. The user may choose either this levelized price or the first-year nominal price for the MASP.[368] The levelized price treats the MASP as if it were a long-term utility decision regarding the present value of all future purchases from the mine. The use of the first-year mine price, however, treats the MASP as if it were determined by the ability to obtain the first-year price alone.[369]

The EIA uses a number of data sources in developing the inputs for the RAMC. The primary inputs are discussed in Appendix C.

Coal Supply and Transportation Model

The EIA utilizes the CSTM to forecast coal production and transportation flows using data on coal supply, demand, and transportation.[370] The coal supply

---

[368] Id.

[369] Id.

[370] Science Applications, Inc, Coal Supply and Transportation Model Description and Data Documentation, Report for the U.S. Department of Energy, August 1983 (DOE/EIA-0401).

component of the CSTM is derived from coal supply curves produced by the RAMC model.[371]

The demand component of the CSTM contains forty-four domestic demand regions and four overseas demand regions in Europe and the Orient.[372] The major demand sectors considered in the CSTM are: electric utility, industrial, metallurgical, synthetic fuel, residential/ commercial, and export. The six major demand sectors are further differentiated into a total of thirty sectors within the CSTM.[373]

Demands in the CSTM are specified by giving the total heat content in Btu, the different types of coal that can be used to satisfy the demand, and the type of scrubbing technology required to reduce sulfur emissions. The demand for a specific Btu amount from a range of coal types, within a demand region and demand sector, is referred to as a "job" in the CSTM.[374]

The transportation network imbedded in the CSTM consists of: thirty-one coal supply regions, forty-eight coal demand centers, 181 rail nodes, forty-seven water nodes, 532 rail links, 187 water links, and forty-six

---

[371] Id. at 3.

[372] Id. at 7.

[373] Id.

[374] Id.

transshipment links.[375] The transportation network is connected to supply regions at specific points, or centroids, corresponding to the thirty one coal supply origins and the forty-eight coal demand centers.[376] In the CSTM, several alternative paths into the main rail and water network are provided for each supply origin and demand center.

The CSTM algorithm is an iterative procedure that generates a series of solutions to the coal supply and transportation problem until criteria for completion are met. The algorithm is composed of three main parts: costing computations, shortest-path algorithm, and participation-shifting calculations.[377]

First, mine mouth prices for each coal supply region and coal type are computed at the prevailing production levels. Transportation link and route rates are computed at the prevailing coal transportation volumes.[378] The shortest-path algorithm determines the coal source and transportation route that results in the lowest delivered cost for each demand job, given prevailing minemouth

---

[375] Id. at 9.

[376] Id.

[377] Supra note 241, at 15.

[378] Id.

prices and transportation volumes.[379] It is essentially a shortest-path algorithm with prevailing link rates and minemouth prices in place of distances. New routes for a demand job are established if the least-cost source is better than any current source. Each distinct coal type/source/route on a demand job is referred to as a "participant" in the job.[380] Then, for each job, the lowest- and the highest-cost active participants are identified. Delivered costs are shifted toward equilibrium by transferring a fraction of the demand from the high-cost to the low-cost participant.[381] The fraction transferred is determined by a set of heuristic rules. Each time participation-shifting calculations are performed, the maximum "shift ratio," the ratio of the highest-cost to the lowest-cost coal participants in each job, is retained.[382] These steps are repeated until the criteria for completion are met.

In the development of the CSTM, the EIA uses demand data as well as transportation data. The sources of these data are included in Appendix D.

---

[379] Id.

[380] Id.

[381] Id.

[382] Id.

Research Questions Addressed

In addressing the research questions, a tax on unmined coal in Kentucky will be included as a mine costing parameter in the RAMC model. The tax will be computed using the net income approach which was mentioned previously. When using this method to value unmined coal, one begins with the sale price of the severed mineral and subtracts the cost of production, sales costs, and a reasonable profit margin, to arrive at the value of the coal extracted. These amounts were generated by the models. The value of the coal extracted is extended to the coal in reserve by discounting the value at extraction by the prevailing rate of return necessary to attract the investment of money into a mining operation for the life of the mine.[383] Eight percent was used as the rate of return as that is the rate used by RAMC to develop coal supply curves. Mine Life Distributions[384], published in Documentation of the Reserve-Related Data Inputs to the Resource Allocation and Mine Costing Model and reproduced in Table 1 on pages eleven and twelve of Chapter I of this study, was the

---

[383]Dutton, supra note 64, at 14.

[384]Synergic Resources Corporation: Documentation of the Reserve-Related Data Inputs to the Resource Allocation and Mine Costing Model, September 1982, pages 22 and 23.

source for the average life of a mine. Once the value of the coal in situ has been determined, the tax liability will be computed by applying the applicable state rate, and a county and school district rate. The computation of these taxes is included as Appendix E.

In answering each of the research questions various rates of the proposed ad valorem property tax will be included as input in separate computer runs. The study will analyze the affect of a high tax, low tax, and average tax. In making this analysis the tax is computed and then added as a regional cost parameter to the RAMC model. The annual dollar amount of coal sales from a region (Eastern Kentucky or Western Kentucky), identified by method of mining (deep or surface) is the starting point for computing the tax. The annual production cost, including a return on capital, for the particular region and method is subtracted from annual sales to arrive at an annual net income. The present value of the remaining coal reserves is determined by discounting the annual net income using a present value factor based on an eight percent rate of return and an average mine life, both of which are used by RAMC. Various tax rates, average tax, high tax, and low tax, will be applied to the present value of the remaining reserves in order to determine total tax as well as a tax per ton. The average, high, and low tax rates are equal to the state property tax

rate of $.207 plus an average of the county property tax rates for all coal producing counties, the highest county property tax rate for all coal producing counties, and the lowest county property tax rate for all coal producing counties, respectively. The computation of the foregoing taxes is presented as Appendix E.

The hypothesis to be tested is:

$$H_o: \quad \beta < 1$$

where

β is the elasticity coefficient of coal produced in Kentucky

In order to test the hypothesis and address the first two research questions, concerning the change in price and the change in quantity of coal demanded, the price elasticity of coal produced in Kentucky will be computed. Economists use the elasticity coefficient to measure how responsive consumers are to a change in the price of a product. The formula for β is:

$$\beta = \frac{\% \text{ change in } Q}{\% \text{ change in } P}^{385} \approx \frac{d \ln Q}{d \ln P}$$

Thus, if a one percent increase in price (P) causes a .5 percent decrease in demand (Q), the elasticity coefficient is said to be -.5. If, on the other hand, a

---

[385]McConnell, supra note 222, at 409.

one percent increase in price causes a 1.5 percent decrease in demand, the elasticity coefficient is -1.5.

Demand is elastic if a given percentage change in price results in a larger percentage change in quantity demanded. Conversely, if a given percentage change in price is accompanied by a relatively smaller change in the quantity demanded, demand is said to be inelastic.[386]

In this study, the elasticity coefficient of coal will be estimated in regression of the general form:

$$\ln Q = b_0 + \Sigma\, b_i \text{ Coal Type } i + \beta \ln P + e$$[387]

in which

Q is quantity demanded.

P is the price.

b_0 is the intercept.

b_i ($i = 1, \ldots 17$) represents the coefficients of binary or quantity variables, coal type 1 through coal type 16, classified according to Btu and Sulfur content. This variable allows the equation to reflect how coal quality impacts the level of demand. Since b_i is a binary variable $b_i = 1$ if coal type is i, 0 if not i.

e is the error term, assumed to be normally and independently distributed with a mean of zero and constant variance.

While a linear demand equation is a convenient way to express quantified relationships, linear approximations are satisfactory only over a limited range of

---

[386] Id.

[387] John Neter and William Wasserman, Applied Linear Statistical Models, at 299.

available data and expected future experience.[388] A curvilinear model of demand, on the other hand, assumes that the marginal effects of each variable are not constant but rather are dependent upon the value of that variable and of all other influences represented in the demand equation.[389] Curvilinearity can be introduced into multiple regression analysis, as was done here, by transforming the values of one or more of the variables by converting them to logarithms. The transformed values are then used in the regression equation.[390] When transformations are made the equation is said to be linear in logarithms.[391] This study uses logarithms as it is the only functional form that allows a test of the hypothesis regarding elasticities, and is widely used to estimate elasticities in economic analysis.[392]

Information regarding quantity and price used in the equation will come from the CSTM Coal Demand Report. A sample of this report is shown on page 134.

---

[388]William R. Henry and W. Warren Haynes, Managerial Economics, Fourth Edition, at 58, Business Publications, Inc. (Dallas, Texas, 1978).

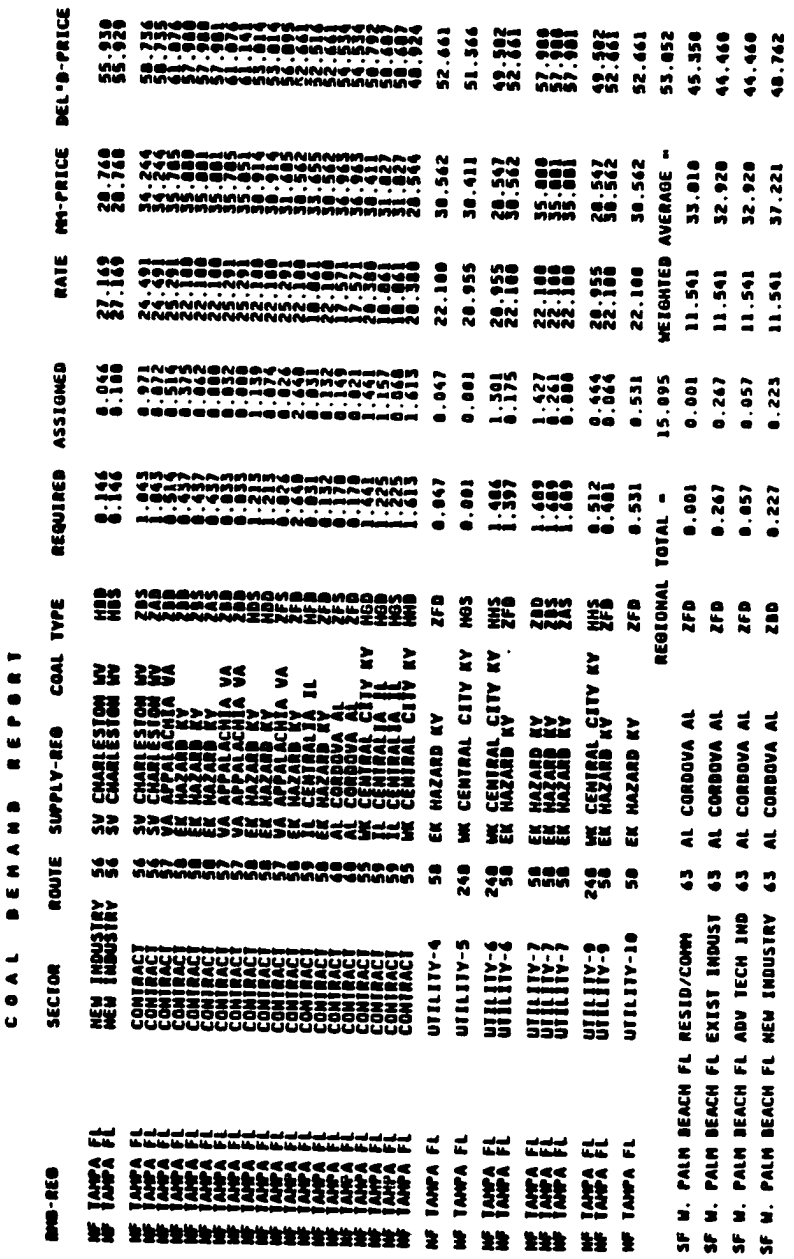
[389]Id.

[390]Vincent E. Cangelosi, Phillip H. Taylor, and Philip F. Rice, Basic Statistics A Real World Approach, Second Edition, at 324, West Publishing Company (St. Paul, 1979).

[391]Henry, supra note 388, at 58.

[392]Id. at 58.

Table 5. Coal Demand Report



C O A L D E M A N D R E P O R T

DMD-REG	SECTOR	ROUTE	SUPPLY-REG	COAL TYPE	REQUIRED	ASSIGNED	RATE	MM-PRICE	DEL'D-PRICE
NF TAMPA FL	NEW INDUSTRY	56	SV CHARLESTON WV	HBB	0.146	0.046	27.169	28.748	55.930
NF TAMPA FL	NEW INDUSTRY	56	SV CHARLESTON WV	HBS	0.146	0.100	27.169	28.748	55.929
NF TAMPA FL	CONTRACT	56	SV CHARLESTON WV	ZBS	1.043	0.071	24.491	34.244	58.736
NF TAMPA FL	CONTRACT	56	SV CHARLESTON WV	ZBB	1.043	0.072	24.491	34.244	58.735
TAMPA FL	CONTRACT	57	VA APPALACHIA VA	ZBB	0.433	0.375	22.100	33.785	55.885
TAMPA FL	CONTRACT	57	VA APPALACHIA VA	ZBS	0.433	0.082	22.100	33.785	55.885
TAMPA FL	CONTRACT	57	VA APPALACHIA VA	HBB	0.433	0.052	22.100	33.785	55.885
TAMPA FL	CONTRACT	57	VA APPALACHIA VA	HBS	0.433	0.080	22.100	33.785	55.885
TAMPA FL	CONTRACT	58	EK HAZARD KY	ZBB	1.213	1.039	22.100	33.914	56.014
TAMPA FL	CONTRACT	58	EK HAZARD KY	ZBS	1.213	0.174	22.100	33.914	56.014
TAMPA FL	CONTRACT	58	VA APPALACHIA VA	HBB	0.268	0.026	22.291	33.914	56.205
TAMPA FL	CONTRACT	58	VA APPALACHIA VA	HBS	0.268	0.242	22.291	33.914	56.205
TAMPA FL	CONTRACT	58	EK HAZARD KY	ZBB	0.831	0.831	22.861	33.914	56.775
TAMPA FL	CONTRACT	58	EK CENTRAL CITY KY	ZBB	0.831	0.132	22.861	33.914	56.775
TAMPA FL	CONTRACT	58	EK CENTRAL IL	ZBB	0.831	0.149	22.861	33.914	56.775
TAMPA FL	CONTRACT	59	AL CORDOVA AL	ZBB	0.128	0.021	11.541	33.914	45.455
TAMPA FL	CONTRACT	240	WK CENTRAL CITY KY	HBB	1.441	1.441	28.388	30.411	58.799
TAMPA FL	CONTRACT	240	WK CENTRAL IL	HBS	1.441	1.157	28.388	30.411	58.799
TAMPA FL	CONTRACT	55	WK CENTRAL CITY KY	HBB	1.225	0.040	28.044	31.027	58.607
TAMPA FL	CONTRACT	55	WK CENTRAL CITY KY	HBS	1.225	1.613	28.388	30.544	58.924
NF TAMPA FL	UTILITY-4	58	EK HAZARD KY	ZFB	0.047	0.047	22.100	30.562	52.661
NF TAMPA FL	UTILITY-5	240	WK CENTRAL CITY KY	HBS	0.001	0.001	28.955	30.411	51.366
NF TAMPA FL	UTILITY-6	240	WK CENTRAL CITY KY	HHS	1.486	1.301	28.955	28.547	49.502
NF TAMPA FL	UTILITY-6	58	EK HAZARD KY	ZFB	1.397	0.175	22.100	30.562	52.661
NF TAMPA FL	UTILITY-7	58	EK HAZARD KY	ZBB	1.488	1.427	22.100	35.088	57.188
NF TAMPA FL	UTILITY-7	58	EK HAZARD KY	ZBS	1.488	0.241	22.100	35.088	57.188
NF TAMPA FL	UTILITY-7	58	EK HAZARD KY	ZFB	1.488	0.888	22.100	35.088	57.188
NF TAMPA FL	UTILITY-9	240	WK CENTRAL CITY KY	HHS	0.512	0.444	28.955	28.547	49.502
NF TAMPA FL	UTILITY-9	58	EK HAZARD KY	ZFB	0.481	0.044	22.100	30.562	52.661
NF TAMPA FL	UTILITY-10	58	EK HAZARD KY	ZFB	0.531	0.531	22.100	30.562	52.661
						REGIONAL TOTAL -	15.095	WEIGHTED AVERAGE -	53.052
SF M. PALM BEACH FL	RESID/COMM	63	AL CORDOVA AL	ZFB	0.001	0.001	11.541	33.810	45.350
SF M. PALM BEACH FL	EXIST INDUST	63	AL CORDOVA AL	ZFB	0.267	0.267	11.541	32.920	44.460
SF M. PALM BEACH FL	ADV TECH IND	63	AL CORDOVA AL	ZFB	0.057	0.057	11.541	32.920	44.460
SF M. PALM BEACH FL	NEW INDUSTRY	63	AL CORDOVA AL	ZBB	0.227	0.223	11.541	37.221	48.762

Source: Science Applications, Inc., Coal Supply and Transportation Model, Model Description and Data Documentation.

Using the RAMC model, coal can be classified according to Btu and sulfur content. Tables 6 and 7 on page 136 show the Btu and sulfur content categories utilized by the model.

In addition to estimating elasticity coefficients, the statistical significance of various levels of taxation on the amount of Kentucky coal demanded was tested utilizing an analysis of variance (ANOVA). ANOVA is the test of choice in this situation because of the many potentially interacting variables. In addition, ANOVA is robust to departures from normality. Due to the unbalanced nature of the data, ANOVA will be effected through ordinary least squares (OLS) regression.

With multiple regression analysis there is more than one independent variable. Each of which is assumed to be related to the single dependent variable.[393] In the study the dependent variable is "REQ" or the amount of The variable "taxtype" indicates the level of tax added as a cost parameter to coal production costs - low, average, or high tax. "Region" denotes Eastern Kentucky or Western Kentucky. "Year" is used to represent the years covered in the study, 1985 through 1995 and year 2000. The variable "mine" indicates the method of mining used, deep or surface. "Typ" refers to the quality of

---

[393]Cangelosi, supra note 389, at 324.

Table 6. Rank/Btu Content Categories

Rank/ Btu Code	Rank of Coal[a]	Million Btu Per Ton[b]
Z	Bituminous	≥26
H	Bituminous	≥23 but <26
M	Bituminous	<23
S	Subbituminous	NA[c]
L	Lignite	NA[c]

[a]Anthracite (i.e., "hard") coal is not included among the RAMC Coal types. Although significant reserves of anthracite exist (in eastern Pennsylvania), the production of this coal is relatively insignificant at present and is assumed to remain so for the foreseeable future. Hence, the RAMC does not consider anthracite.

[b]As received basis.

[c]Not applicable; the S and L Rank/Btu codes are defined by coal rank alone.

Table 7. Sulfur Content Categories

Sulfur Code Btu[a]	Pounds of Sulfur per Million
A	0.00-0.40
B	0.41-0.60
D	0.61-0.83
F	0.84-1.67
G	1.68-2.50
H	>2.50

[a]As received basis after customary cleaning.

Source: Department of Energy, Energy Information Administration, Documentation of the Resource Allocation and Mine Costing (RAMC) Model.

coal estimated to be mined in Kentucky during the period of time covered in the study. Quality is determined by Btu and sulfur content classifications shown in Tables 6 and 7 on page 136.

The third research question is concerned with the decrease in the producers' rate of return on investment, assuming the price of coal remains constant after the enactment of a tax on unmined coal. Responding to this research question will require the rate of return to be adjusted to the level where the price of coal, after the tax on unmined coal is added, is equal to the current price.

CHAPTER VI

Results of the Analysis

Chapter V provided a detailed discussion of the methodology used in analyzing the effect an *ad valorem* property tax on unmined coal would have on Kentucky's coal industry. In this chapter, the results of that analysis are presented.

Responding to Research Questions 1 and 2, required that the elasticity coefficient of Kentucky coal be computed. The elasticity coefficient estimates how much the quantity demanded will change given a change in price.

There were a total of sixteen different coal quality classifications or types, determined by Btu and sulfur content, estimated to be mined in Kentucky during the years of the study. These coal types and the years these types are estimated to be mined are shown in Table 8.

Table 8. Types of Coal

Coal Type	Code Number	1985-1988	1989-1990	1991-2000
ZA	TypeC1	X	X	X
ZB	TypeC2	X	X	X
ZD	TypeC3	X	X	X
ZF	TypeC4	X	X	X
HA	TypeC5	X	X	X
HB	TypeC6	X	X	X
HD	TypeC7	X	X	X
HF	TypeC8	X	X	X
HG	TypeC9	X	X	X
HH	TypeC10	X	X	X
MD	TypeC11	X	X	X
MF	TypeC12	X	X	X
MG	TypeC13	X	X	X
MH	TypeC14	X	X	X
ZG	TypeC15		X	X
ZH	TypeC16			X

X represents presence of type of coal in the sample

The elasticity coefficient of coal for each of the years of the study was estimated using the regression formula first introduced on page 132 of Chapter V. This formula is:

$$\ln Q = b_0 + \Sigma\, b_i \text{ Coal Type } i + \beta \ln P + e$$

The results of this regression are shown in Tables 9 through 20 on pages 142 through 153. These tables provide the parameter estimate as well as the t value for the intercept, each coal type, and the mine mouth price. The coefficient of determination, r^2, is shown in the tables also. The coefficient of determination may be defined as the percentage of the variation in the values of the dependent variable that is explained by variations in the values of the independent variable. The low r^2 in each year indicates that price is not the strongest factor creating a variation in demand. Other factors, therefore, give rise to changes in demand without changes in price.

Several of the coefficients of coal type or binary variables are significantly different from zero. The negative coefficients are associated with less marketable coal types. This indicates that consumers do not want to buy as much of that coal type at the same price. For example, in Table 9 Coal Type 3 and Coal Type 13 are preferred while Coal Type 11 is less preferred in

comparison to Coal Type 14, which serves as a basis for comparison for all of the other coal types.

The LMPR in Table 9 through Table 20 is the overall price elasticity coefficient (β). A β value greater than one implies that the demand for coal is elastic while a β value of less than one implies that the demand is inelastic.

Table 9. Price Elasticity Coefficient of Coal Produced in Kentucky During 1985

Variable	Parameter Estimate	t For H_o Parameter=0
Intercept	3.02942401	0.723
TypeC1	0.34648547	0.492
TypeC2	0.12241710	0.187
TypeC3	2.32322573	2.365*
TypeC4	0.86911921	1.422
TypeC5	0.82580326	1.268
TypeC6	0.83649689	1.400
TypeC7	-0.54014953	-1.062
TypeC8	0.60482071	1.219
TypeC9	-0.14086321	-0.272
TypeC10	-0.04589844	-0.095
TypeC11	-2.09259798	-3.442*
TypeC12	-0.41829406	-0.985
TypeC13	1.77580749	2.199*
LMPR	-1.24567761	-0.933

R^2 = 0.0985

* $p \geq .05$

Table 10. Price Elasticity Coefficient of Coal Estimated to be Produced in Kentucky During 1986

Variable	Parameter Estimate	t For H_o Parameter=0
Intercept	0.75012586	0.187
TypeC1	0.09187873	0.139
TypeC2	-0.24945186	-0.394
TypeC3	1.31816392	1.409
TypeC4	0.83661463	1.409
TypeC5	0.63161855	1.039
TypeC6	0.69117478	1.195
TypeC7	-0.45746888	-0.886
TypeC8	0.52776537	1.172
TypeC9	0.02212397	0.047
TypeC10	0.08780258	0.203
TypeC11	-2.12474418	-3.563*
TypeC12	-0.38888515	-1.016
TypeC13	0.76757190	1.145
LMPR	-0.51356930	-0.402

R^2 = 0.0726

* $p \geq .05$

Table 11. Price Elasticity Coefficient of Coal Estimated to be Produced in Kentucky During 1987

Variable	Parameter Estimate	t For H_o Parameter=0
Intercept	-5.69226576	-1.894*
TypeC1	-0.72296991	-1.427
TypeC2	-0.71069006	-1.443
TypeC3	-0.75879109	-1.255
TypeC4	-0.10846168	-0.213
TypeC5	-0.10324526	-0.215
TypeC6	-0.02982141	-0.064
TypeC7	-1.15300522	-2.653*
TypeC8	-0.13428491	-0.371
TypeC9	-0.22716566	-0.550
TypeC10	-0.07804956	-0.223
TypeC11	-2.02507109	-3.710*
TypeC12	-0.77834721	-2.475*
TypeC13	-0.15363970	-0.271
LMPR	1.58568861	1.663

R^2 = 0.0461

* p ≥ .05

Table 12. Price Elasticity Coefficient of Coal Estimated to be Produced in Kentucky During 1988

Variable	Parameter Estimate	t For H_o Parameter=0
Intercept	-2.60666103	-0.807
TypeC1	-0.45538972	-0.908
TypeC2	-0.63460038	-1.291
TypeC3	-0.32533399	-0.556
TypeC4	-0.29847186	-0.564
TypeC5	-0.01430827	-0.030
TypeC6	0.01881857	0.041
TypeC7	-0.99994287	-2.233*
TypeC8	-0.09733575	-0.250
TypeC9	-0.09183537	-0.230
TypeC10	-0.14504105	-0.424
TypeC11	-2.21577778	-4.287*
TypeC12	-0.93528018	-2.786*
TypeC13	0.11584646	0.219
LMPR	0.68949009	0.681

R^2 = 0.0473

* p ≥ .05

Table 13. Price Elasticity Coefficient of Coal Estimated to be Produced in Kentucky During 1989

Variable	Parameter Estimate	t For H_o Parameter=0
Intercept	1.70116574	0.535
TypeC1	0.12327658	0.247
TypeC2	-0.10842679	-0.228
TypeC3	0.52441495	0.937
TypeC4	0.58638562	1.210
TypeC5	0.65778160	1.356
TypeC6	0.63529394	1.352
TypeC7	-0.25962576	-0.612
TypeC8	0.09161492	0.240
TypeC9	0.09437891	0.258
TypeC10	0.04952322	0.156
TypeC11	-2.09965275	-4.123*
TypeC12	-0.54363586	-1.609
TypeC13	0.18164489	0.318
TypeC14	1.02509891	1.077
LMPR	-0.69122227	-0.696

R^2 = 0.0459

* p ≥ .05

Table 14. Price Elasticity Coefficient of Coal Estimated to be Produced in Kentucky During 1990

Variable	Parameter Estimate	t For H_o Parameter=0
Intercept	5.08955949	1.418
TypeC1	0.74356473	1.405
TypeC2	0.62337277	1.198
TypeC3	0.67154364	1.119
TypeC4	1.36771708	2.517*
TypeC5	1.03040373	1.961*
TypeC6	0.51002456	1.022
TypeC7	0.34877551	0.740
TypeC8	0.09234809	0.192
TypeC9	-0.12440222	-0.306
TypeC10	0.26877898	0.810
TypeC11	-1.92397614	-3.619*
TypeC12	-0.78967125	-2.205*
TypeC13	0.41229840	0.787
TypeC14	0.50913544	0.754
LMPR	-1.76305802	-1.575

R^2 = 0.0545

* p ≥ .05

Table 15. Price Elasticity Coefficient of Coal Estimated to be Produced in Kentucky During 1991

Variable	Parameter Estimate	t For H_o Parameter=0
Intercept	7.33163093	1.816
TypeC1	0.53669908	0.712
TypeC2	0.26295230	0.352
TypeC3	0.78949649	1.018
TypeC4	0.87489839	1.118
TypeC5	0.89267766	1.136
TypeC6	0.31607075	0.409
TypeC7	0.20834750	0.278
TypeC8	0.64565264	0.840
TypeC9	-0.59243196	-0.785
TypeC10	-0.04287890	-0.057
TypeC11	-1.92084849	-2.285*
TypeC12	-0.21001233	-0.271
TypeC13	0.45905315	0.514
TypeC14	-0.19671795	-0.239
TypeC15	0.08402301	0.104
LMPR	-2.33157170	-2.058*

R^2 = 0.0468

* p ≥ .05

Table 16. Price Elasticity Coefficient of Coal Estimated to be Produced in Kentucky During 1992

Variable	Parameter Estimate	t For H_o Parameter=0
Intercept	5.16459428	1.362
TypeC1	0.35492066	0.654
TypeC2	0.21003957	0.340
TypeC3	0.79275990	1.222
TypeC4	0.82852240	1.262
TypeC5	1.08738568	1.626
TypeC6	0.93909764	1.412
TypeC7	0.34446599	0.551
TypeC8	0.42020795	0.638
TypeC9	-0.56496928	-0.899
TypeC10	0.17634658	0.283
TypeC11	-1.75491643	-2.387*
TypeC12	-0.06633265	-0.102
TypeC13	-0.12260531	-0.164
TypeC14	0.17695320	0.252
TypeC15	0.76070278	1.119
LMPR	-1.73166326	-1.626

R^2 = 0.0509

* $p \geq .05$

Table 17. Price Elasticity Coefficient of Coal Estimated to be Produced in Kentucky During 1993

Variable	Parameter Estimate	t For H_o Parameter=0
Intercept	0.96232679	0.260
TypeC1	0.04373577	0.053
TypeC2	-0.12936159	-0.158
TypeC3	0.07961034	0.095
TypeC4	0.40522576	0.583
TypeC5	0.72773842	0.857
TypeC6	0.66362732	0.775
TypeC7	0.69899544	0.843
TypeC8	-0.10089626	-0.117
TypeC9	-0.50655452	-0.613
TypeC10	-0.00329423	-0.004
TypeC11	-1.76931522	-1.967*
TypeC12	-0.39727094	-0.471
TypeC13	0.36771764	0.397
TypeC14	0.29410021	0.335
TypeC15	0.06308158	0.075
LMPR	-0.44818345	-0.437

R^2 = 0.0525

* $p \geq .05$

Table 18. Price Elasticity Coefficient of Coal Estimated to be Produced in Kentucky During 1994

Variable	Parameter Estimate	t For H_0 Parameter=0
Intercept	0.94096838	0.266
TypeC1	0.39375248	0.695
TypeC2	0.36078111	0.640
TypeC3	0.31072695	0.526
TypeC4	0.51206251	0.840
TypeC5	1.01646827	1.691
TypeC6	0.71155879	1.174
TypeC7	0.54872370	0.949
TypeC8	0.83706498	1.400
TypeC9	-0.11143615	-0.196
TypeC10	0.41070563	0.727
TypeC11	-1.22605972	-1.894*
TypeC12	-0.13904529	-0.235
TypeC13	0.52440191	0.718
TypeC14	0.75099558	1.174
TypeC15	0.46379983	0.792
LMPR	-0.55382786	-0.559

R^2 = 0.0412

* $p \geq .05$

Table 19. Price Elasticity Coefficient of Coal Estimated to be Produced in Kentucky During 1995

Variable	Parameter Estimate	t For H_o Parameter=0
Intercept	2.32843069	0.661
TypeC1	0.68560253	1.287
TypeC2	0.71353430	1.346
TypeC3	0.18798300	0.338
TypeC4	0.71447613	1.245
TypeC5	1.46173615	2.402*
TypeC6	0.41658855	0.738
TypeC7	0.75995643	1.384
TypeC8	1.31004994	2.312*
TypeC9	0.17584623	0.328
TypeC10	0.53907478	1.014
TypeC11	-1.14169806	-1.895*
TypeC12	-0.17088228	-0.304
TypeC13	1.07720744	1.522
TypeC14	0.74852856	1.229
TypeC15	1.03414800	1.848*
LMPR	-0.97101288	-0.988

R_2 = 0.0600

* $p \geq .05$

Table 20. Price Elasticity Coefficient of Coal Estimated to be Produced in Kentucky During 2000

Variable	Parameter Estimate	t For H_o Parameter=0
Intercept	4.85593052	1.114
TypeC1	-0.05478423	-0.071
TypeC2	-0.26425625	-0.361
TypeC3	-1.12246645	-1.467
TypeC4	-2.51377847	-3.089*
TypeC5	-0.35049500	-0.467
TypeC6	-0.02174612	-0.029
TypeC7	0.90749316	1.146
TypeC8	-0.70852049	-0.904
TypeC9	-1.28319327	-1.750*
TypeC10	-0.47876914	-0.663
TypeC11	-1.95121121	-2.616*
TypeC12	-1.88434684	-2.491*
TypeC13	-0.74446935	-0.862
TypeC14	-0.41063245	-0.506
TypeC15	-0.64480049	-0.825
LMPR	-1.42090931	-1.176

R^2 = 0.1013

* $p \geq .05$

The use of binary or "dummy" variables effectively controls the different elasticities by coal type. With some exceptions, the price elasticities were negative as anticipated. In order to concentrate more on the elasticity information, Table 21 showing estimated elasticities is provided.

Table 21. Estimated Elasticities

Year	β	Standard Error
1985	-1.24567761	-0.933
1986	-0.51356930	-0.402
1987	1.58568861	1.663
1988	0.68949009	0.681
1989	-0.69122227	-0.696
1990	-1.76305802	-1.575
1991	-2.33157170	-2.058
1992	-1.73166326	-1.626
1993	-0.44818345	-0.437
1994	-0.55382786	-0.559
1995	-0.97101288	-0.988
2000	-1.42090931	-1.176

$\mu\ (\beta) = -.783$

There are speculations which may be made concerning the positive elasticities in 1987 and 1988. The most plausible explanation concerns the tendency for consumers, fearing that the price of coal will climb to an even higher level, to stockpile coal when the price increases.

Despite the anomalies in 1987 and 1988, the negative elasticity of demand was equal to .783 on average. In order to test the hypothesis, H_o: $\beta < 1$, the following statistical test is performed.

$$\beta < 1 + 1.645\ \hat{\sigma}$$

$$-.783 < 1 + 1.645\ (.6)$$

$$-.783 < 1.987$$

where

1.645 is the alpha risk for a one-tailed test at the 95 percent level of confidence.

.783 is the elasticity coefficient.

.6 is the standard deviation for the estimated price elasticity.

The results of this one-tailed test indicate that the hypothesis should not be rejected. Since the elasticity coefficient is less than one, part of the tax will fall on the producer as it cannot be entirely passed on to the consumer.

The elasticity coefficient for coal is negative, thus the demand elasticity for coal is said to be

relatively inelastic. The magnitude of the elasticity coefficient, however, indicates that a portion of the burden of the tax would fall on coal companies operating in Kentucky.

To estimate how much of the tax burden would fall on the coal companies and how much would be passed on to consumers in the form of a price increase, three graphs, shown in Figures 3, 4 and 5, have been constructed. The equilibrium for Kentucky coal, with various levels of tax (low tax - $.41, average tax - $.56, and high tax - $.78) added as a cost parameter, is indicated in the graphs.

In constructing the graphs the quantity of coal demanded (Q^d) was determined using the equation:

$$(1)\quad \ln Q^d = 1.988 - .783 \ln P$$

The quantity of coal supplied before the tax was added (Q^s) as a cost parameter was calculated using the equation:

$$(2)\quad \ln Q^s = -4.159 + 1 \ln P$$

The quantity of coal that would be supplied after the tax was added as a cost parameter ($Q^{s'}$) was calculated using the equation:

$$(3)\quad \ln Q^{s'} = -4.159 + 1 \ln (P - \text{tax})$$

In each of these equations providing data to be plotted on the graphs

P is a range from $27 to $38 which represents the average mine mouth price for coal ($32.89) + and - the standard deviation ($5.08) for mine mouth

price. 1.988 is the average intercept, found by taking an average of the intercepts for each year for years 1985 through 1995 and year 2000. The yearly intercepts can be found in Tables 9 through 20.

-.782 is the elasticity coefficient, found by taking an average of the elasticity coefficient for years 1985 through 1995 and year 2000. The elasticities for each year are found in Table 21.

4.159 is a value that causes supply to intersect demand at the average price. This value is computed using the formula $Q^S = .514 + e^{(X + 1 . lnP)}$. The value .514 represents the quantity demanded when P = average price.

Thus, the equations represent average estimated values of the elasticities and intercepts shown in the preceding tables. For the purpose of simulation, supply elasticities have been set to one, a neutral value. Table 22 on the following page, shows the data used in constructing the graphs.

The graphs in Figures 3, 4, and 5 on pages 159, 160, and 161, show that prior to the enactment of the proposed tax on unmined coal, the mining industry produces an amount OQ and receives a price OP. Before taxation, the equilibrium is at point A. Mining firms, however, view the imposition of a production tax as an increase in unit cost. Thus, the state's supply curve moves upward, from SS to S'S', by the amount of the tax. The new equilibrium point is at B. Price increases from OP to OP^1. With each of the tax rates, low, average, and high, the increase in price, PP', is less than the amount of

the tax, CP^1. Thus, although a portion of the tax is shifted to consumers in form of higher prices, mining firms will absorb a portion of the tax. As the graphs depict, just how much of the tax is passed on to

Table 22. Data for Construction of Graphs

Values Entered For Price (P)	Resulting Q Values				
	Q^d	Q^s	$Q^{s'}_l$	$Q^{s'}_m$	$Q^{s'}_h$
27	.608	.422	.415	.413	.410
28	.590	.437	.431	.428	.425
29	.572	.453	.447	.444	.441
30	.556	.469	.462	.459	.456
31	.540	.484	.478	.475	.472
32	.526	.500	.494	.491	.488
33	.512	.516	.509	.507	.503
34	.499	.531	.525	.522	.519
35	.487	.547	.540	.538	.535
36	.475	.562	.556	.554	.550
37	.464	.578	.571	.569	.566

consumers and how much is absorbed by the mining firms depends on the tax rate in effect. The graphs are not exact as they are not drawn to scale, but they are a good approximation of what should happen.

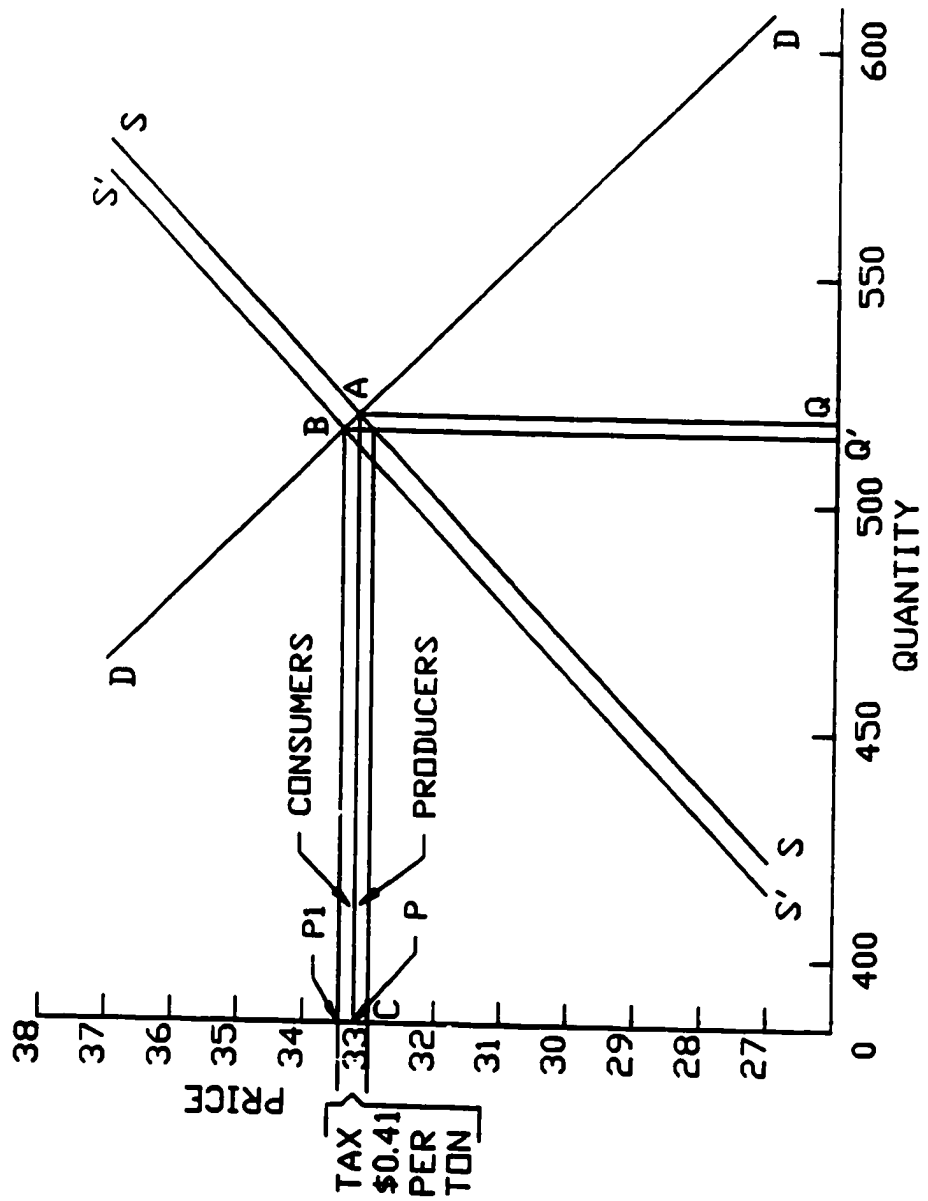


Figure 3. Incidence of Proposed Tax on Unmined Coal at Low Rate - $0.41 Per Ton

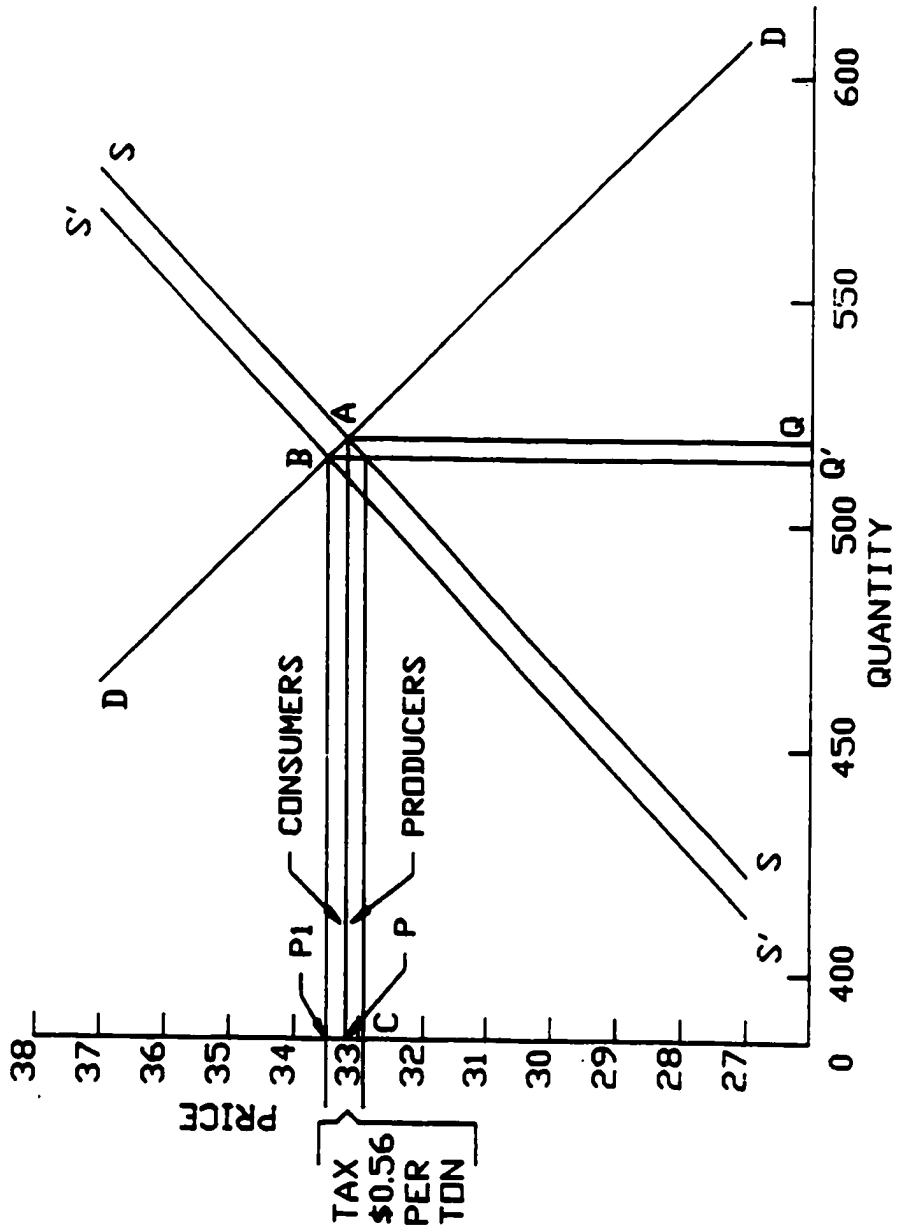


Figure 4. Incidence of Proposed Tax on Unmined Coal at Average Rate - $0.56 Per Ton

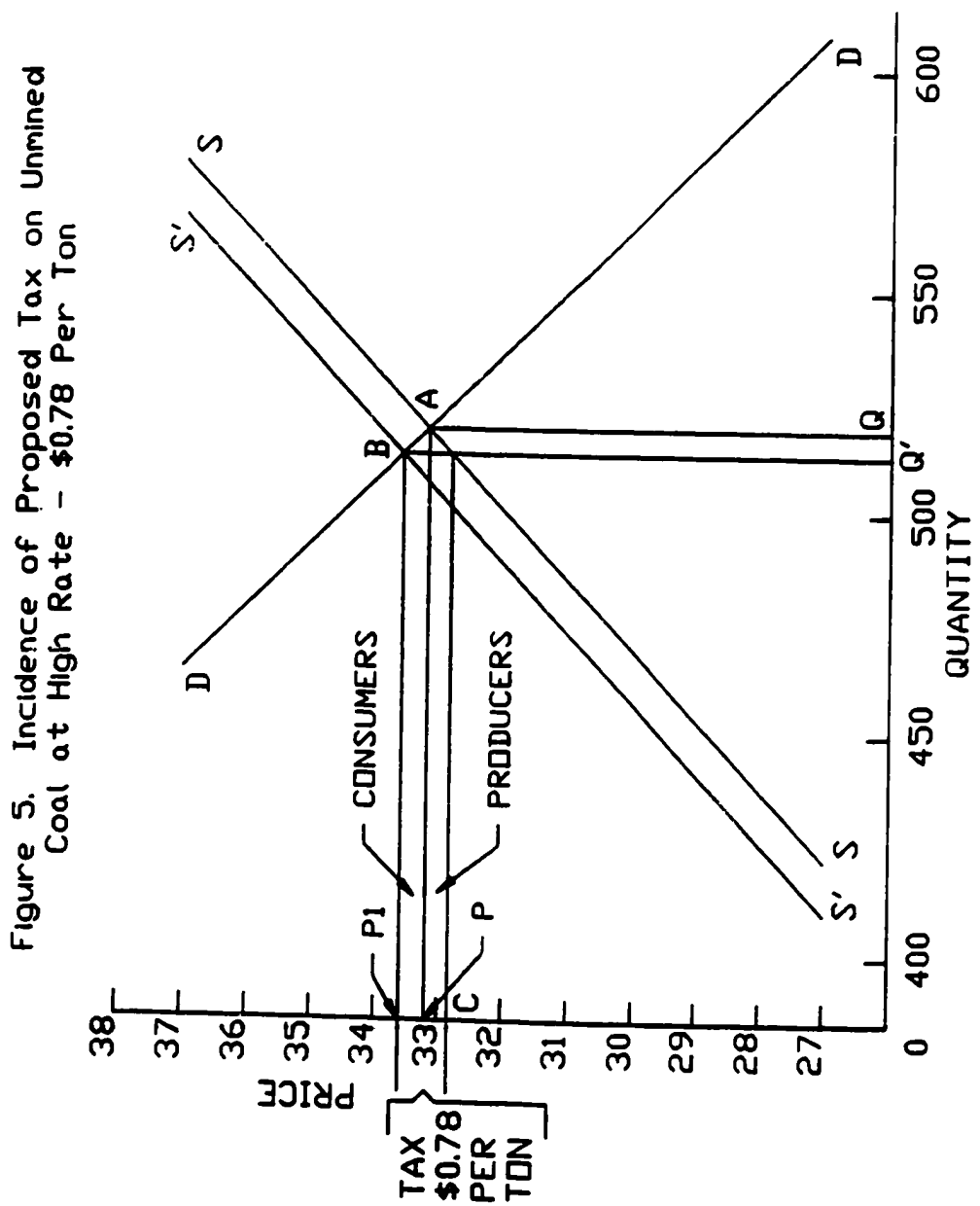


Figure 5. Incidence of Proposed Tax on Unmined Coal at High Rate - $0.78 Per Ton

The incidence of the tax at each of the three levels, low, average, and high, is divided almost equallybetween the consumers and the producers. Thus, the tax would cause an increase in the price of coal as well as a decrease in the gross profit percentage earned by producers.

If data for all years are combined, price discrimination across consumers creates a weak positive relationship between price and quantity obscuring the normal behavior of demand. A rational for this effect is that larger budget buyers pay a premium for priority of delivery. This effect is minimized by examining the years separately.

In addition to computing the elasticity coefficients of coal, regression analysis was performed in order to determine whether the level of taxation had an effect on the demand for coal. The various levels of tax are coded 0, 1, 2, and 3 for no tax, low tax, average tax, and high tax, respectively. There were a different number of observations being compared in each cell. Tukey's t test was used as it controls for the experiment wise error rates by making sure that every tax type is compared with the other types while maintaining the observed level of significance.

The results of the regression analysis are shown in Tables 23 and 24. In the "t Test" as well as "Tukey's t

Test", the demand for Kentucky coal without an ad valorem property tax added as a cost parameter was compared first to the demand for Kentucky coal with the tax, computed using the low tax rate, added as a cost parameter. Next, the demand for Kentucky coal without the tax added was compared to the demand for Kentucky coal with the tax, computed using the high tax rate, added as a cost parameter. The results of both tests, the "t Test" and "Tukey's t Test", indicate that there was no significant difference in the demand for Kentucky coal with the tax added as a cost parameter, regardless of the rate. One possible explanation for this is that the magnitude of the tax is so small relative to the price of coal per ton. Mine mouth price was used rather than delivered price as delivered price was composed of mine mouth price plus the cost of transportation which was a large cost which cannot be controlled.

The interaction of independent variables was considered with respect to tax type. The independent variables included method of mining, coal type, supply region, and year. No significant difference was found. A taxing authority might infer that a tax on unmined coal would not cause a change in the demand for coal since the study indicates that there is no significant difference in demand for Kentucky coal with an additional tax.

However, it could be that the model is not sensitive to changes in the regional parameter.

Table 23. t Tests (Least Significant Difference)

Taxtype Comparison	Lower Confidence Limit	Difference Between Means	Upper Confidence Limit
0 - 1	-0.09057	0.00795	0.10646
0 - 3	-0.08644	0.01215	0.11075
0 - 2	-0.07902	0.01994	0.11890
1 - 0	-0.10646	-0.00795	0.09057
1 - 3	-0.09444	0.00421	0.10286
1 - 2	-0.08702	0.01199	0.11100
3 - 0	-0.11075	-0.01215	0.08644
3 - 1	-0.10286	-0.00421	0.09444
3 - 2	-0.09131	0.00779	0.10688
2 - 0	-0.11890	-0.01994	0.07902
2 - 1	-0.11100	-0.01199	0.08702
2 - 3	-0.10688	-0.00779	0.09131

0 - No tax added as cost parameter
1 - Low tax rate, $.41, added as cost parameter
2 - Average tax rate, $.56, added as cost parameter
3 - High tax rate, $.78, added as cost parameter

Table 24. Tukey's Studentized Range

Taxtype Comparison	Simultaneous Lower Confidence Limit	Simultaneous Difference Between Means	Simultaneous Upper Confidence Limit
0 - 1	-0.12119	0.00795	0.13708
0 - 3	-0.11709	0.01215	0.14139
0 - 2	-0.10978	0.01994	0.14965
1 - 0	-0.13708	-0.00795	0.12119
1 - 3	-0.12510	0.00421	0.13352
1 - 2	-0.11779	0.01199	0.14178
3 - 0	-0.14139	-0.01215	0.11709
3 - 1	-0.13352	-0.00421	0.12510
3 - 2	-0.12211	0.00779	0.13768
2 - 0	-0.14965	-0.01994	0.10978
2 - 1	-0.14178	-0.01199	0.11779
2 - 3	-0.13768	-0.00779	0.12211

0 - No tax added as cost parameter
1 - Low tax rate, $.41, added as cost parameter
2 - Average tax rate, $.56, added as cost parameter
3 - High tax rate, $.78, added as cost parameter

An attempt was made to answer the third research question by determining how much the producer's rate of return would decrease if the proposed tax were added as a cost parameter while the price of coal is held constant. Unlike state taxes, which can be added as regional parameters, the rate of return on investment is a global parameter. Thus, the model was insensitive to changes in rate of return.

CHAPTER VII

Summary and Conclusion

The purpose of this chapter is threefold. First, it will provide a brief summary of the study. Second, the conclusions drawn from the study will be discussed. Third, suggestions for future research will be offered.

Summary

During the 1900's, unmined coal in Kentucky has been subjected to taxation under a variety of regimes. As early as 1920, Letcher County had a "zone method" which was used in determining the value of unmined coal properties. In 1965, the Kentucky Court of Appeals ruled in Russman that all property must be valued at one hundred percent of its fair cash value. Since unmined coal property was included in the property classification, it was subject to the one hundred percent of fair cash value rule. Thus, the Russman ruling presented the Department of Revenue with the most difficult task of

placing a value on unmined coal property. After numerous meetings with engineers and representatives from the coal industry, the Department of Revenue instructed other coal producing counties to use the "zone method", developed in Letcher County, in valuing coal interests.

In 1972, the Kentucky Legislature enacted a four percent severance tax. Four years later, in 1976, a separate property tax for unmined coal was established. This piece of legislature called for the taxation of unmined coal at $.315 per $100 of fair cash value the same rate as other real property. At this same time the severance tax was increased to four and one half percent. In 1978 the legislature reduced the tax rate on unmined coal to one tenth of one percent. This low rate effectively exempted coal in place from taxation. During each of the past four legislative sessions there have been attempts to tax unmined coal reserves. In addition, there have been three court cases questioning the constitutionality of the present system of taxing unmined coal.

The purpose of this study was to determine whether a tax on unmined coal would increase the cost of producing Kentucky coal and thereby render it noncompetitive with coal produced in other states. The following research questions were addressed:

Research Question #1. To what extent would a tax on unmined coal be passed on to consumers through a price increase?

Research Question #2. How would a resulting price change affect the quantities of coal demanded?

Research Question #3. If taxed at the same rate as "other real property" and the price of coal is held constant, by how much will the producer's rate of return on investment decrease?

Two models, RAMC (a supply model) and CSTM (a demand model), developed by the United States Department of Energy were used in the study. The proposed tax on unmined coal was included as a regional cost parameter in the RAMC model which provides coal supply curves for the CSTM. In order to address the first two research questions, the elasticity coefficient of coal produced in Kentucky was calculated using the following formula:

$$\ln Q = b_0 + \Sigma\, b_i \text{ Coal Type } i + \beta \ln P + e^{394}$$

The elasticity coefficient was determined to be -.783. The negative elasticity indicates that the demand for coal is somewhat inelastic. Thus, a portion of the tax can be passed on to consumers in the form of higher prices. A portion of the tax, however, will be borne by the producer. To estimate how much of the tax burden would fall on the producer and how much of the burden

---

[394]Neter and Wasserman, supra note 387.

would be passed on to consumers in the form of higher prices three graphs were produced. In constructing the graphs the quantity of coal demanded (Q^d) was determined using the equation:

$$(1)\quad \ln Q^d = 1.988 - .783 \ln P$$

The quantity of coal supplied before the tax was added (Q^S) as a cost parameter was calculated using the equation:

$$(2)\quad \ln Q^S = -4.159 + 1 \ln P$$

The quantity of coal that would be supplied after the tax was added as a cost parameter ($Q^{S'}$) was calculated using the equation:

$$(3)\quad \ln Q^{S'} = -4.159 + 1 \ln (P - tax)$$

These formulas generated the data summarized in Table 25.

Table 25. Data for Construction of Graphs

Values Entered For Price (P)	Resulting Q Values				
	Q^d	Q^s	$Q^{s'}_l$	$Q^{s'}_m$	$Q^{s'}_h$
27	.608	.422	.415	.413	.410
28	.590	.437	.431	.428	.425
29	.572	.453	.447	.444	.441
30	.556	.469	.462	.459	.456
31	.540	.484	.478	.475	.472
32	.526	.500	.494	.491	.488
33	.512	.516	.509	.507	.503
34	.499	.531	.525	.522	.519
35	.487	.547	.540	.538	.535
36	.475	.562	.556	.554	.550
37	.464	.578	.571	.569	.566

Using average estimated values of price, elasticities, intercepts, and demand, three graphs shown in Figures 3, 4, and 5 on pages 159, 160, and 161 were constructed. These graphs show how much of the tax would be passed on to consumers and how much of the tax burden would be absorbed by the producers.

In addition, regression analysis was performed in order to determine whether the tax would cause a

significant difference in quantity demanded. The results of the general linear model "t Test" indicates that, controlling for various levels of tax, region where coal was produced (Eastern Kentucky or Western Kentucky), year of the study, type of recovery method (deep or surface mining), and coal type, there was no significant difference in the demand for coal produced in Kentucky, regardless of the level of taxation. The results of "Tukey's t Test" also indicate that while controlling for various levels of tax rates, region where coal was produced, year of the study, recovery method, and coal type, there was no significant difference in the demand for Kentucky Coal.

The graphic analysis at various levels of taxation indicate that approximately half of the tax would be passed on to consumers in the form of a price increase, while the other half of the tax would be absorbed by producers, causing their rate of return to decrease. The results of the statistical analysis, however, indicate that the tax would have no significant impact on the quantity of coal demanded. Perhaps this is because of the relatively small size of the tax in relation to the mine mouth price of coal per ton.

The third research question could not be answered since the rate of return is a global parameter in the RAMC. When attempting to adjust the rate of return for

Kentucky producers, the rate of return for all coal producers was adjusted, causing the model to be insensitive to the changes.

Conclusions

In the past decade, the United States coal industry has encountered a multitude of obstacles, many of which threaten its financial stability. Among the more serious of these problems are competition from imported coal, a decrease in energy requirements brought about by improved technology, inter-fuel competition, acid rain legislation, and concerns over the greenhouse effect. In addition to the grave concerns just cited, there are a number of other problems that are unique to the Kentucky coal industry. These concerns include high workmen's compensation premiums, the Broad Form Deed Amendment, and competition from other states which have lower taxes and/or give tax incentives to users of coal produced in that state. While the tax currently being proposed might not have a significant effect on the demand for Kentucky coal, the cumulative effect of the tax and the other concerns cited could place Kentucky in an unfair competitive position.

Proposed Solution

It appears somewhat inconsistent for the federal income tax laws to allow percentage depletion to be deducted from revenue when calculating net income of a mining firm, when state and local government units add additional taxes on the industry in the form of severance taxes. The governmental units, however, have different objectives. The objective of the federal government in granting a deduction for percentage depletion is to encourage firms to invest in an industry that requires large outlays of capital and has a high degree of risk. The state and local governments, on the other hand, must raise revenue in order to finance the increasing need for roads, housing, sewers, and schools that are a natural consequence of the boom and bust cycle of mineral extraction.

States find it difficult to impose or increase current rates of severance taxes today, as one state acting alone may place its coal industry at a competitive disadvantage relative to industries operating where there is no severance tax.[395]

---

[395]U.S., Congress, Senate, A Bill to Assist the States in Raising Revenues by Encouraging More Uniform Severance Taxes on Coal and Oil Shale and to Impose a Countervailing Duty on Imported Coal and Oil Shale, Congressional Record - Senate, October 30, 1975, pp. 34358-34360.

Coal producers could compete in a more efficient manner in the market and be taxed in a more equitable fashion if Congress would enact a uniform severance tax on coal. In addition, Congress should impose a duty on coal imported from other countries so that coal produced in the United States would not be at a disadvantage when competing with coal produced in countries where labor is substantially cheaper. Senator Metcalf from Montana introduced a bill proposing a similar tax on the Senate floor on October 30, 1975. However, the rate of tax proposed, twenty-five percent of the gross selling price, led to the demise of the bill.

The Federal government, having no revenue collection motive, would grant a credit for severance taxes levied and collected by individual states. The credit for State and local severance taxes would be the major thrust of the Federal tax. The credit would encourage individual coal producing states to enact a severance tax or increase the rate of a tax already in force to an amount equal to the federal rate. Thus, the Federal government would collect taxes only in the early years of the tax. The tax revenues collected by the Federal government would offset the cost of administering the tax initially. States which do not currently have severance taxes would impose such a tax. States which tax at a rate lower than the federal level would increase the rate. Thus, because

of the credit for state and local severance taxes, the Federal government would collect very little, if any, severance taxes in later years.

The purpose of the federal severance tax would not be to raise revenue for the Federal Treasury. Rather, it would increase uniformity of taxation among coal producing states since producers would be taxed equally regardless of the state in which they were operating. In addition, coal producing states would have revenue available to meet the pressure for increased social services brought about by mining activities. Coal produced in this country would compete more favorably in the market place is a duty were iposed on coal imported from other countries.

Additional Research

Before seriously considering the federal severance tax suggested in the previous section, additional research is needed to determine the effect such a tax would have on the coal industry of each state. The research proposed would consider the competitiveness of coal produced in different states by comparing the elasticity coefficients, βs, of coal from each state. The elasticity coefficients of the various states would be computed, by state, using the equation used in this

study which was introduced on page 132. That equation is:

$$\ln Q = b_0 + \Sigma\, b_i \text{ Coal type } i + \beta \ln P + e$$

Information regarding mine mouth price and demand for each coal producing state would again be obtained from the Coal Demand Report produced by the CSTM.

Additional research should be undertaken in an attempt to determine whether the variables mentioned on page 171 (i.e. a decrease in energy requirements brought about by improved technology, inter-fuel competition, acid rain legislation, and concerns over the greenhouse effect) would affect the demand for Kentucky coal. The impact of these events can be analyzed using dummy variable techniques.

In 1989, Wyoming replaced Kentucky as the number one coal producing state in the nation.[396] Considering this fact, additional research should be undertaken comparing the price elasticity of coal produced in Kentucky with the price elasticity of coal produced in Wyoming.

Coal must be considered as a vital source of energy if we are to be independent of the monopolistic members of OPEC and safe from the devastation which can be wrought by a single mishap at a nuclear power plant. In

---

[396]Tom Daykin, "Kentucky Falls to Number 2 in Coal Production," Lexington Herald-Leader, May 19, 1989, Page 1, Col. 1.

addition, a number of states are highly dependent on the coal industry. Coincidentally, the states depending on the coal industry have few sources of industry other than coal.

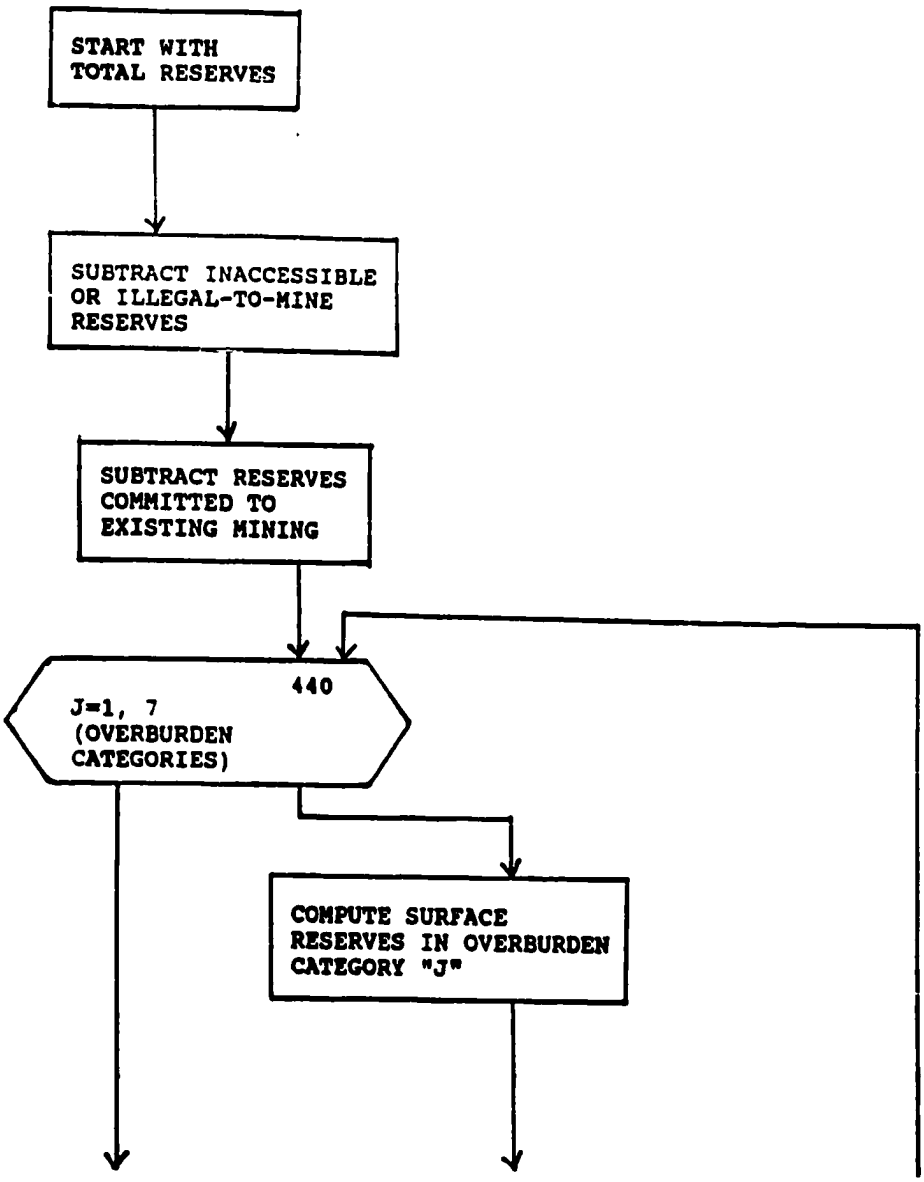
Certainly taxes should be equitable. The Kentucky Department of Revenue reported severance tax revenues for 1988 totaling $179,109,874.[397] Representatives of the coal industry contend that they are paying their "fair share". There are those, however, who argue that this is not enough, considering the social costs of coal mining. This same group contends that coal interest must be taxed at fair market value. If coal interests are taxed too heavily, however, they will have a fair market value of zero.

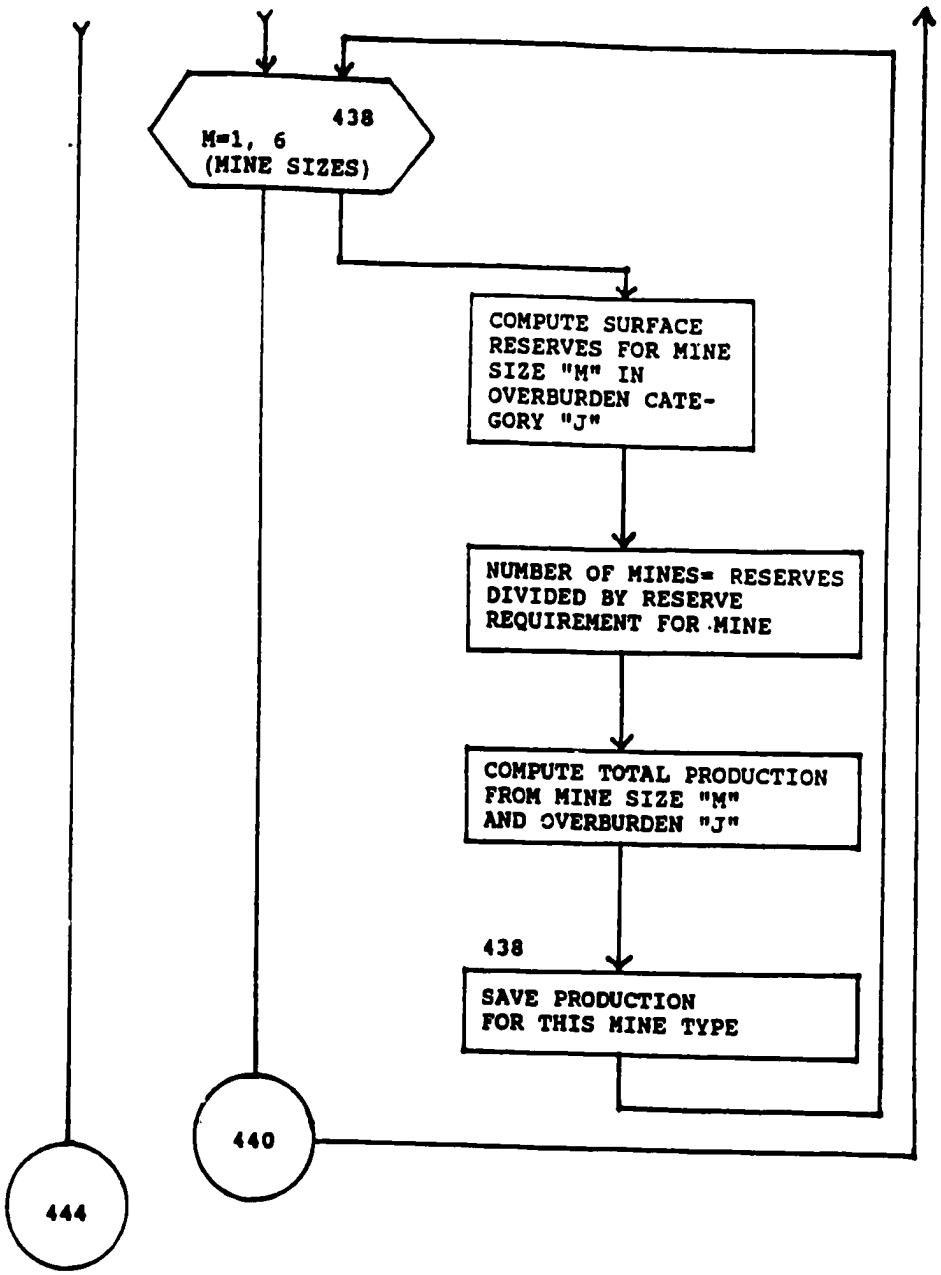
---

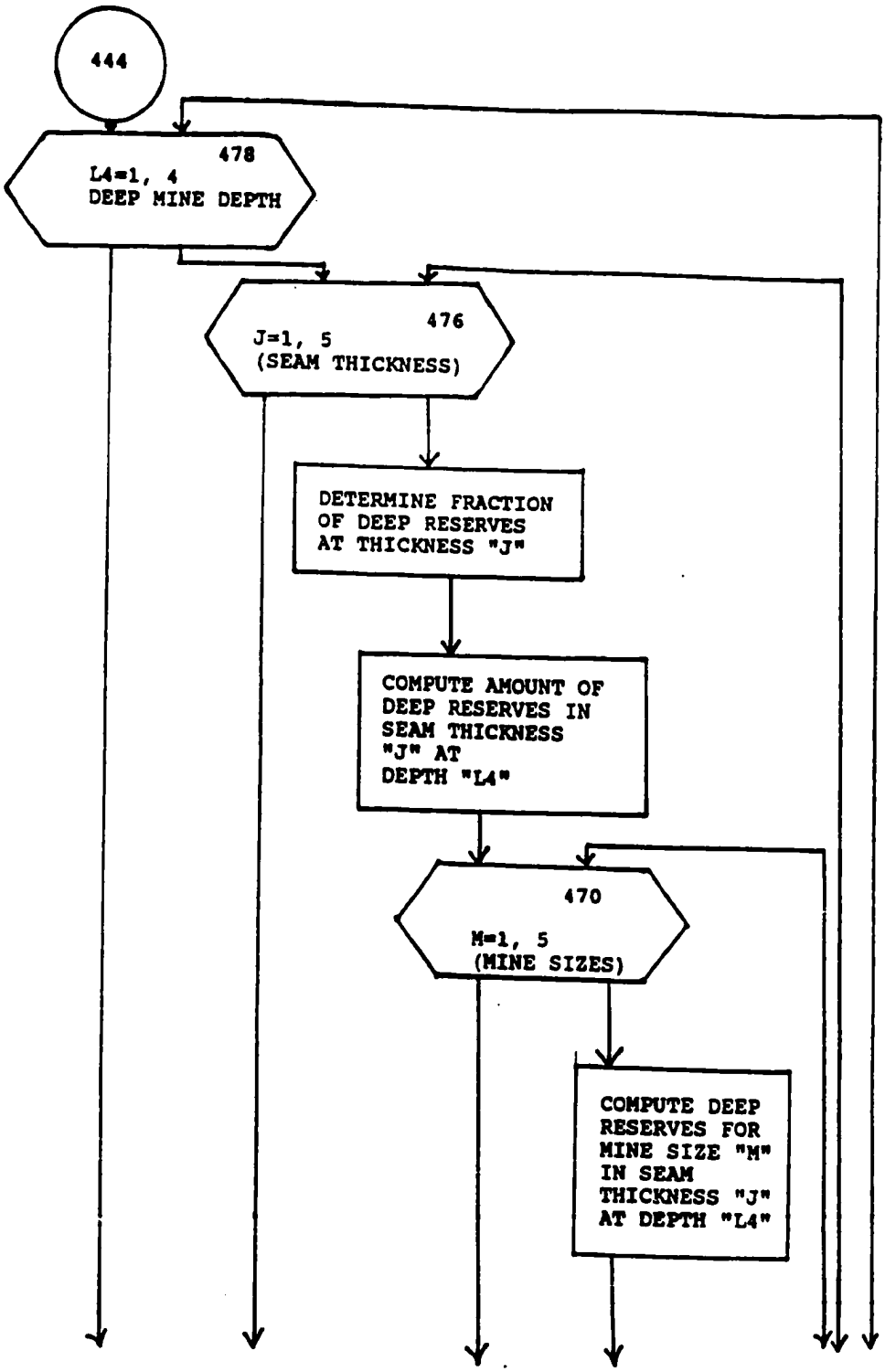
[397]"Coal Related Funding Data Fiscal Years 1975-1989", page 21, Kentucky Coal Journal, August 1989, Vol. 15, No. 8.

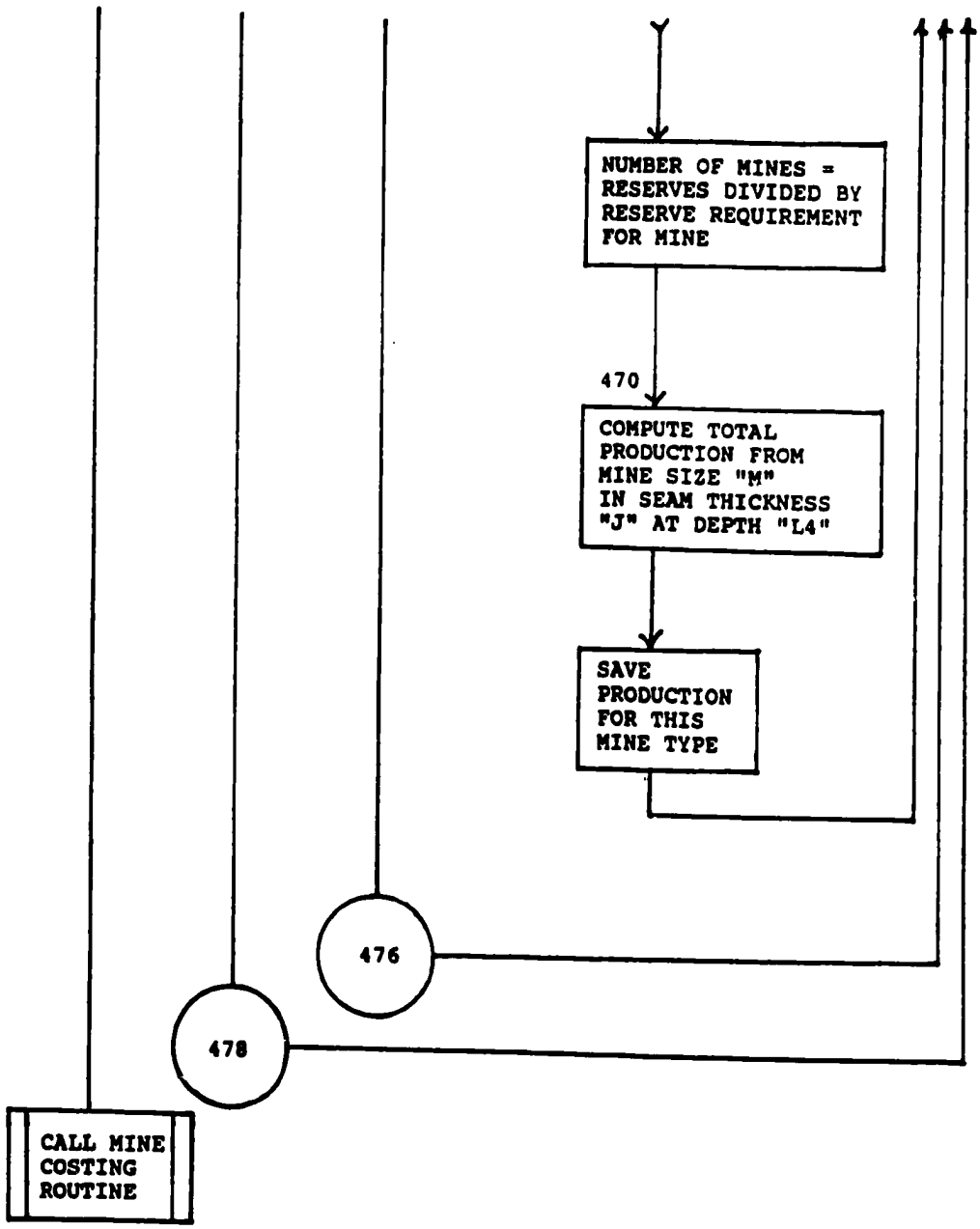
APPENDIX A

RAMC Reserve Classification Procedure



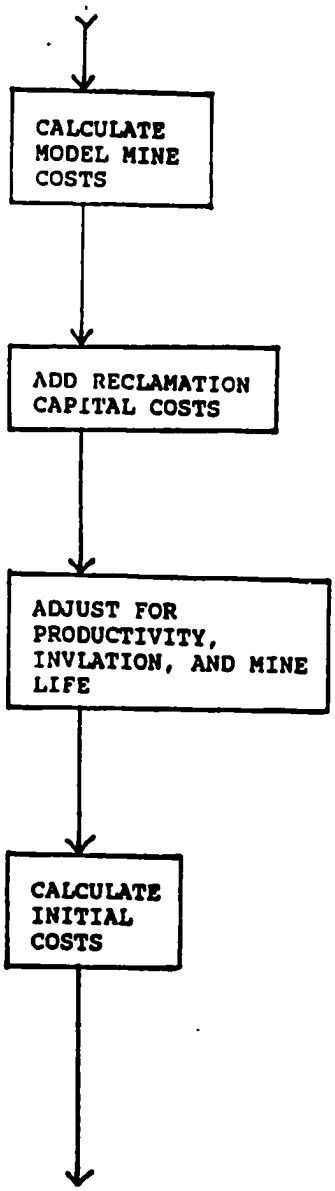


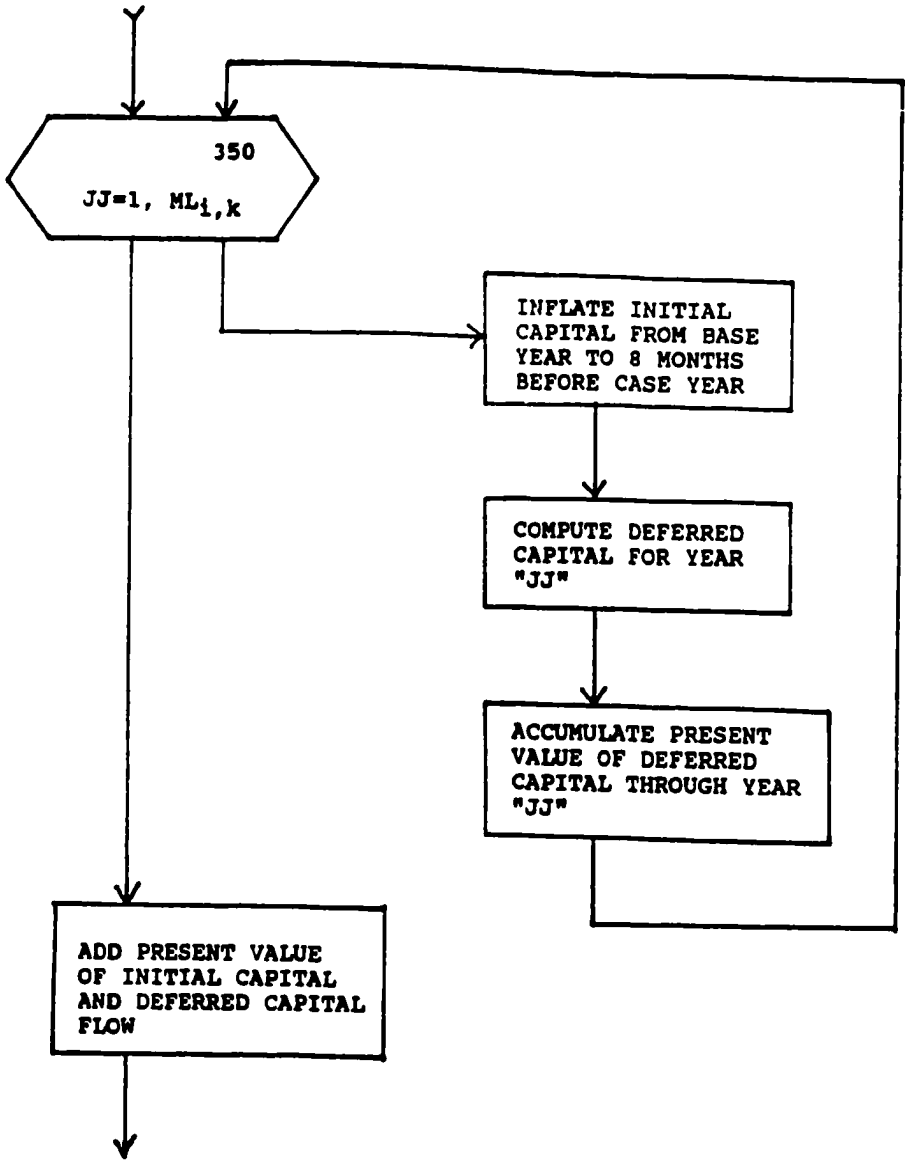


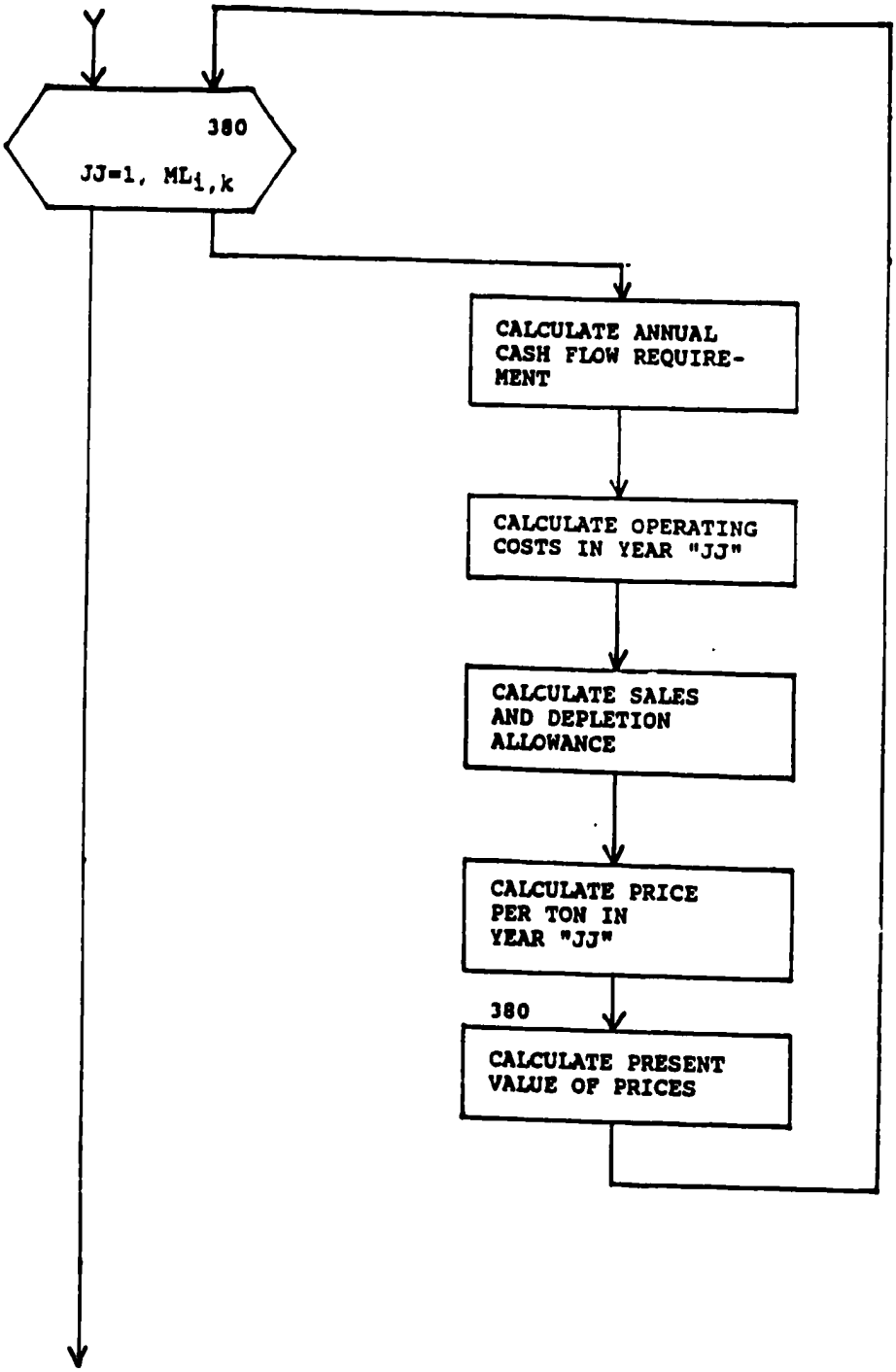


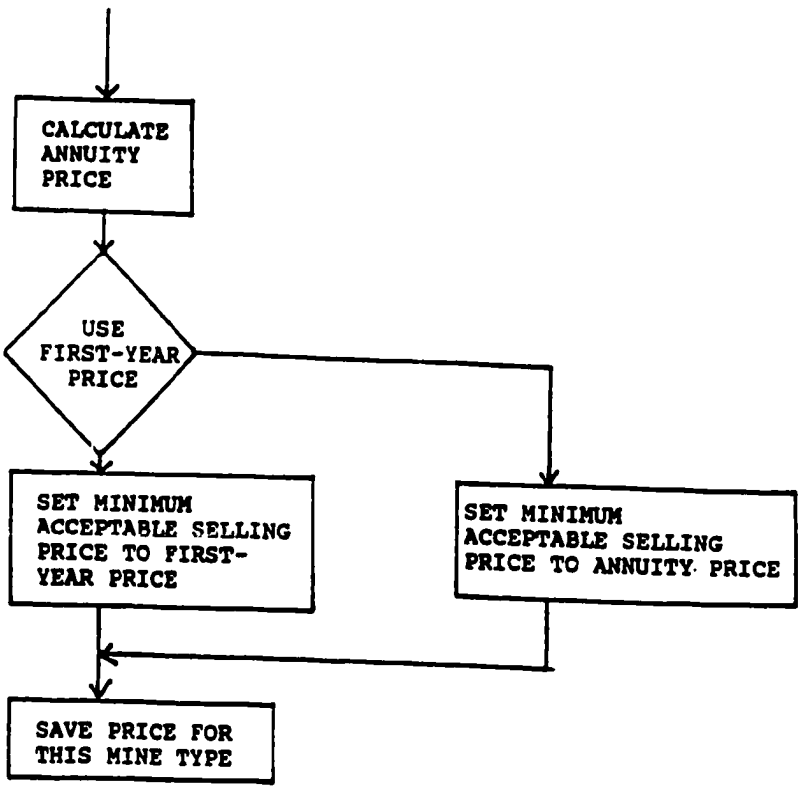
APPENDIX B

RAMC Mine Costing Procedure









APPENDIX C

Data Sources RAMC

The RAMC requires inputs concerning an estimate of coal reserves for each supply region and coal type within a region. Thus, it is necessary to assemble information on coal quantity and quality at the most disaggregated level possible. Although a variety of data sources were used in the development of the inputs, three of these sources are of crucial importance: the demonstrated reserve base (DRB) of U.S. coal, the EIA-7A database, and the EIA analytical file.[398]

The DRB is the ultimate source of the coal reserve estimates used as inputs to the RAMC. The original DRB estimates were developed by the U.S. Bureau of Mines in 1971 and revised in 1976 and 1979.[399] The estimates were derived from coal resource data obtained from a wide variety of published documents and in some instances unpublished resource data. Since 1979, EIA has updated the estimates on an annual basis to reflect the depletion of reserves by mining, and to incorporate any new resource estimates.

---

[398]Energy Information Administration, Documentation of the Inputs to the Resource Allocation and Mine Costing (RAMC) Model, Report for the U. S. Department of Energy, June 1987 (DOE/EIA-M024).

[399]Id. at 12.

The DRB consists of estimates of the quantity of coal remaining in the ground meeting certain minimum criteria of geological assurance and mineability. The DRB does not include all of the coal believed to exist within the United States. Rather, it includes only those resources known to exist with a relatively high degree of certainty, that could be mined under present or near-future technological and economic conditions. The geologic assurance criterion used for inclusion of coals in the DRB is based on the resource classification system used by the U.S. Geological Survey (USGS) which is used to categorize resource estimates according to their reliability.[400] Identified resources are classified as measured, indicated or inferred depending on their location with respect to the nearest measurement or observation point (e.g., drillhole, surface outcrop, underground mine, etc.). The DRB includes only those resources classified as either measured on indicated. Inferred resource estimates, less reliable than measured and indicated estimates, are excluded from the DRB estimates.[401] With regard to mineability, only those resources contained in coal seams falling within certain depth and seam thickness ranges are included in the DRB.

---

[400] Id.

[401] Id.

Coal seams located more than one thousand feet below the surface are generally not minable under current technological and economic conditions.[402] Thus, the resources contained in such seams are usually excluded from the DRB. There are, however, exceptions to both the standard geological assurance and mineability criteria, in order to account for unusual conditions which are found to exist.

The EIA-7A database contains data that is collected via an annual reporting form that must be completed and submitted to EIA by all mining operations that produced over ten thousand tons during the year.[403] The mine operator must report information concerning, among other things, the name of the county and seam(s) in which the mine is operating; the average thickness of each seam being mined; the percentage of the total quantity of coal produced during the year that was extracted from each seam; the type of mining conducted at the operation; an estimate of the recoverable reserves committed to the mine and the assumed recovery percentage used to calculate the recoverable reserves; the quantity and total dollar value of coal produced during the year that was sold on the open market, sold or transferred to an

---

[402] Id.

[403] Id. at 13.

affiliated company, and remained in stocks at year end; and finally, various data related to productivity, such as, the total direct labor hours worked during the year, the average number of shifts worked per day, and the daily productive capacity of the mine.[404]

The EIA-7A database contains additional data which was collected via a separate EIA-7A Supplement form.[405] This form, originally intended as a biannual report to be submitted by all operations that produced over one hundred thousand tons of coal during the reporting year, was used once to collect data for 1983 and was subsequently discontinued. The Supplemental form was similar to the standard form in that it was mandatory. The Supplemental form, however, required considerably more information and data than did the standard form. Included in the Supplemental form was information concerning estimates of the quantity and quality of coal produced during the year that was shipped to various utilization sectors, the current and projected annual productive capacity for 1983, 1985, 1990, and 1995, the average maximum depth of the seam for surface mines, the quantity of raw coal produced during the year that was processed by preparation plants, the quantity of clean

---

[404]Id.

[405]Id. at 14.

coal and refuse produced by these plants, the name(s) and location(s) of the preparation plant(s) used to clean the coal, and the quantity of coal that was shipped to the user without any preparation.[406]

The EIA analytical file is used to classify reserves by coal type as required by the RAMC. The analytical file contains the results of laboratory analyses of approximately fifty thousand coal samples from throughout the United States.[407] Each analysis includes, in addition to other data, estimates of the Btu content and sulfur content of the samples.[408]

---

[406] Id.

[407] Id. at 13.

[408] Id.

APPENDIX D

Data Sources CSTM

The coal supply component of the CSTM is derived from coal supply curves produced by the RAMC model. The RAMC uses thirty-one supply regions. These regions correspond to the same regions used in the CSTM. Coal types are defined by five ranges of heat content and six ranges of sulfur content, for a total of thirty possible combinations.[409]

The demand data required by the CSTM consists of the information needed to specify a set of job demands. The variables that must be input are: the amount of coal demand in trillion Btu; the acceptable types of coal that may be used to meet the demand, defined by the index of a coal group; the demand region; the demand sector; the scrubber type if scrubbing is required; and if the demand is from an existing contract, the supply region. Although the CSTM can be run with any source of demand data that can provide a complete set of information needed, these demand inputs are derived from the National Coal Model and the Midterm Energy Forecasting System.[410]

---

[409]Science Applications, Inc., supra note 241, at 41.

[410]Id. at 42-43.

Transportation data are important as transportation costs are becoming an increasingly large portion of the delivered price of coal. Most coal is transported by rail, although barges are a common transportation mode where convenient access is possible. Trucks are used primarily for short-haul movements. Transportation data are provided by three principal sources: Rand-McNally Handy Railroad Atlas of the United States, U.S. Corps of Engineers' National Waterways Study, and discussions with knowledgeable industry personnel.[411]

---

[411]Id. at 45.

APPENDIX E

Calculation of Tax Rates

Low Tax Recapitulation

Type	Region	Tons	Tax per ton	Total tax
Deep	EK	63.889	$.56569968	$36.14198686
Surface	EK	55.646	.23306718	12.96925630
Deep	WK	17.073	.55514246	9.47794722
Surface	WK	14.221	.22430644	3.18986188
		150.829		$61.77905226

÷ Total tons - 150.829

= Weighted average tax per ton - $.409596644

Low Tax

Eastern Kentucky

	Deep Mines	Surface Mines
Sales	$2717.10764300*	$2175.90892400*
Production costs	1782.36800000*	1483.32000000*
Net income	$ 934.73964300	$ 692.58892400
Present value factor	x 8.2442**	x 3.992700***
Present value of property	$7706.18056500	$2765.29979700
	÷ $100	÷ $100
	$ 77.06180565	$ 27.65299797
Tax rate	x $.469****	x $.469****
Total tax	$ 36.14198685	$ 12.96925605
Number of tons	÷ 63.889	÷ 55.646
Tax per ton	$ .56569968	.23306718

* Coal Supply and Transportation Model

** Present value of an annuity factor - fourteen years, eight percent

*** Present value of an annuity factor - fourteen years, eight percent

**** State rate - $.207, plus county rate for coal producing county with lowest tax - $.262

Low Tax

Western Kentucky

	Deep Mines	Surface Mines
Sales	$ 654.37429100*	$ 466.32039900*
Production costs	438.74200000*	347.96500000*
Net income	$ 215.63229100	$ 118.35539900
Present value factor	x 9.3719**	x 5.7466***
Present value of property	$2020.88426800	$ 680.14113590
	÷ $100	÷ $100
	$ 20.20884268	$ 6.80141136
Tax rate	x $.469****	x $.469****
Total tax	$ 9.47794722	$ 3.18986193
Total tons	÷ 17.073	÷ 14.221
Tax per ton	$ .55514246	$ .22430644

* Coal Supply and Transportation Model

** Present value of an annuity factor - eighteen years, eight percent

*** Present value of an annuity factor - eight years, eight percent

**** State rate - $.207, plus county rate for coal producing county with lowest tax $.262

Average Tax Recapitulation

Type	Region	Tons	Tax per ton	Total tax
Deep	EK	63.889	$.76833837	$49.08837012
Surface	EK	55.646	.31655392	17.61495943
Deep	WK	17.073	.75399946	12.87303278
Surface	WK	14.221	.30465502	$ 4.33250046
		150.829		$83.90886279

÷ Total tons - 150.829

= Weighted average tax per ton - $ .55631783

Average Tax

Eastern Kentucky

	Deep Mines	Surface Mines
Sales	$2717.10764300*	$2175.90892400*
Production costs	1782.36800000*	1483.32000000*
Net income	$ 934.73964300	$ 692.58892400
Present value factor	x 8.2442**	x 3.9927***
Present value of property	$7706.18056500	$2765.29979700
	÷ $100	÷ $100
	$ 77.06180565	$ 27.65299797
Tax rate	x $.637****	x $.637****
Total tax	$ 49.08837020	$ 17.61495971
Number of tons	÷ 63.8890	÷ 55.646
Tax per ton	$ .7583383710	$ .31655392

* Coal Supply and Transportation Model

** Present value of an annuity factor - fourteen years, eight percent

*** Present value of an annuity factor - five years, eight percent

**** State rate - $.207, plus average county rate for all coal producing counties - $.43

Average Tax

Western Kentucky

	Deep mines	Surface Mines
Sales	$ 654.37429100*	$ 466.32039900*
Production costs	438.74200000*	347.96500000*
Net income	$ 215.63229100	$ 118.35539900
Present value factor	x 9.3719**	x 5.7466**
Present value of property	$2020.88426800	$ 680.14113590
	÷ $100	÷ $100
	$ 20.20884268	$ 6.80141136
Tax rate	x $.637***	x $.637
Total tax	$ 12.87303279	$ 4.33249904
Total tons	÷ 17.073	÷ 14.221
Tax per ton	$ .75399946	$ .30465502

* Coal Supply and Transportation Model

** Present value of an annuity factor - eighteen years eight percent

*** Present value of an annuity factor - eight years, eight percent

**** State rate - $.207, plus average county rate for all coal producing counties - $.43

High Tax Recapitulation

Type	Region	Tons	Tax per ton	Total tax
Deep	EK	63.889	$1.08194587	$ 69.12443969
Surface	EK	55.646	.44575961	24.80473926
Deep	WK	17.073	1.06175434	18.12733185
Surface	WK	14.221	.42900401	6.10086603
		150.829		$118.15737680

÷ Total tons - 150.829

= Weighted average tax per ton - $.78338633

High Tax

Eastern Kentucky

	Deep mines	Surface Mines
Sales	$2717.10764300*	$2175.90892400*
Production costs	1782.36800000*	1483.32000000*
Net income	$ 934.73964300	$ 692.58892400
Present value factor	x 8.2442**	x 3.992700***
Present value of property	$7706.18056500	$2765.29979700
	÷ $100	÷ $100
	$ 77.06180565	$ 27.65299797
Tax rate	x $ .897****	x $ .897****
Total tax	$ 69.12443967	$ 24.80473918
Number of tons	÷ 63.889	÷ 55.646
Tax per ton	$ 1.08194587	$ .44575961

* Coal Supply and Transportation Model

** Present value of an annuity factor - fourteen years, eight percent

*** Present value of an annuity factor - five years, eight percent

*** State rate - $.207, plus a county rate for coal producing county with highest tax - $.69

High Tax

Western Kentucky

	Deep mines	Surface Mines
Sales	$ 654.37429100*	$ 466.32039900*
Production costs	438.74200000*	347.96500000*
Net income	$ 215.63229100	$ 118.35539900
Present value factor	x 9.3719**	x 5.7466***
Present value of property	$2020.88426800	$ 680.14113590
	÷ $100	÷ $100
	$ 20.20884268	$ 6.80141136
Tax rate	x $.897****	x .897****
Total tax	$ 18.12733188	$ 6.10086599
Total tons	÷ 17.073	÷ 14.221
Tax per ton	$ 1.06175434	$ .42900401

* Coal Supply and Transportation Model

** Present value of an annuity factor - eighteen years, eight percent

*** Present value of an annuity factor - eight years, eight percent

**** State rate - $.207, plus county rate for coal producing county with highest tax - $.69

BIBLIOGRAPHY

Articles

Barnard, V. O., III, Testimony before the Unmined Mineral Commission (1983).

Bowker, W., Testimony before the Unmined Minerals Commission (1983).

Caudill, H. M. "Taxation of Unmined Coal Reserves in Kentucky," Presented to the Kentucky Unmined Minerals Tax Advisory Commission (1983).

Clark, J. E., "Taxation of Unmined Minerals: Is It Inevitable, or Is It Unconstitutional?," Journal of Mineral Law and Policy 1 (1985): 97-125.

"Compromise Reached on Unmined Coal Tax," Lexington Herald-Leader, (March 22, 1988), p. B2, col. 5.

Daykin, T., "Court Bars Tax Break for Unmined Coal," Lexington Herald-Leader, (March 4, 1988), p. A1, col. 5.

Daykin, T., "Lawmakers to Look at Bill for Taxing Unmined Coal," Lexington Herald-Leader (March 9, 1988), p. A1, col. 1.

Daykin, T., "Unmined-Minerals Tax Faces Long Fight," Lexington Herald-Leader (March 27, 1988), p. E1, col. 5.

Daykin, T., "Unmined-Minerals Tax Passed By House," Lexington Herald-Leader, (March 26, 1988), p. A1, col. 1.

Daykin, T. and Chriss, C., "Studies Say Tax Will Mean Millions for Coal-Rich Pike," Lexington Herald Leader (March 9, 1988), p. A16, col. 2.

Dutton and Bratton, "The Feasibility and Revenue Effects of an Ad Valorem Tax on Unmined Coal," Report to the Kentucky Legislative Research Commission (October 31, 1983).

Kentucky Coal Association, Legislative Bulletin, (March 28, 1988), LB-88-12.

Kentucky Department of Economic Development, "Energy and Natural Resources in Kentucky," (1984), at iv.

Kentucky Department of Energy, Economic Impact of Taxes on Selected Eastern Coal States, 1983.

Kentucky Fair Tax Coalition, "Position Paper on the Taxation of Unmined Coal and Other Minerals in Kentucky," Presented to the Kentucky Unmined Minerals Tax Advisory Commission, (1983).

Kentuckians For the Commonwealth, "Unmined Coal Tax To Be Collected," Balancing the Scales 7 No. 6 (March 31, 1988): p. 4, col. 3.

McLure, C. E., "Economic Constraints on State and Local Taxation of Energy Resources," National Tax Journal 31 (1978): 257-262.

McLure, C. E., "The Interstate Exporting of State and Local Taxes: Estimates for 1962," National Tax Journal 20 (1967): 49-61.

Miles, P. M. "Kentucky Coal Land Valuation December 1965-June 1966," Report prepared for Kentucky Department of Revenue (June 1966).

Mill, John Stuart, Principles of Political Economy, at 802, (Augustus M. Kelley, 1965).

Muellier, L., "Push Resumes for Higher Tax on Unmined Coal," Lexington Herald-Leader (February 28, 1983): p. D2, col. 1.

Reeves, H. C. and Spalding, H., "Assessment of Coal Producing Properties in Kentucky," National Tax Journal 3 (June 1950): 173-178.

"Sidetracked, Unmined Coal Tax Detoured," Kentucky Coal Journal, No. 4, 1 (April 1986): p. 1, col. 1.

Steele, H., "Natural Resource Taxation: Resource Allocation and Distributional Implications," Extractive Resources and Taxation, edited by Mason Gaffney, (University of Wisconsin Press, 1967).

Stephens, B., Jr., "Taxation of Coal Land In Kentucky," Presented to the Kentucky Unmined Minerals Tax Advisory Commission (October 1983).

Thompson, J. H., "State and Local Taxation of the Bituminous Coal Industry," West Virginia Law Review 76 (1973-74): 297-335.

Vasek, S. J. Jr., "Impact and Desirability of Taxing Unmined Coal Interest in the Same Manner as Other Property," Journal of Mineral Law and Policy 1 (1985): 221-265.

West Virginia Research League, Inc., A Comparison of State Tax Burdens Imposed Upon the Coal Industry, West Virginia and Selected States, A Report Prepared for the Taxation Subcommittee of the Legislature's Joint Committee on Government and Finance, May 28, 1975.

West Virginia State Tax Department, Coal and Other Mined Minerals Valuation Procedures, July, 26, 1985.

Whiteside, W. F., Jr. and Buechel, Edward J., "Kentucky Taxation," Kentucky Law Journal 65 (1976): 425-443.

Books

Church, A.M., Taxation of Nonrenewable Resources, (Lexington Books, 1981).

Conrad and Hool, Taxation of Mineral Resources (D.C Heath and Company, 1980).

Ely, R., Taxation in American States and Cities (Thomas Y. Crowell and Company, 1888).

Energy Information Administration, Documentation of the inputs to the Resource Allocation and Mine Costing RAMC) Model (U.S. Department of Energy, June 1987).

Energy Information Administration, Documentation of the Resource Allocation and Mine Costing (RAMC) Model (U.S. Department of Energy, May 1987).

Georgia Tax Reform Commission, 1980, Mineral Resources Taxation in Georgia, Atlanta, Georgia.

Gaffney, M., Extractive Resources and Taxation, (The University of Wisconsin Press, 1967).

Groves, H. M., Financing Government, sixth edition, (Holt, Reinhart and Winston, 1964).

Harvey, C. E., Coal in Appalachia, An Economic Analysis (The University Press of Kentucky, 1986).

Harvey, C. E., The Economics of Kentucky Coal, (University Press of Kentucky, 1977).

Hellerstein, W., State and Local Taxation of Natural Resources in the Federal System, Legal, Economic and Political Perspectives (American Bar Association, 1986).

Hirsch, W. Z., The Economics of State and Local Government, (McGraw-Hill Book Company, 1970).

McConnell, C. R., Economics, ninth edition, (McGraw-Hill Book Company, 1984).

Musgrave, R. and Musgrave, P., Public Finance in Theory and Practice, (McGraw-Hill Book Company, 1973).

Neeter, John and Wasserman, William, Applied Linear Statistical Models, (Richard D. Irwin, Inc, 1974).

Samuelson, P. A., Economics, ninth edition, (McGraw-Hill Book Company, 1973).

Schenck, G. H. K., Handbook of State and Local Taxation of Solid Minerals, second edition, (The Department of Mineral Economics The Pennsylvania State University, 1984).

Science Applications, Inc., Coal Supply and Transportation Model Description and Data Documentation (U.S. Department of Energy, August 1983).

Smith, A., The Wealth of Nations, vol. 2, edited by E Cannan (Putnam, 1904).

Starch, K. E., Taxation, Mining, and the Severance Tax, (U.S. Government Printing Office, 1979).

Stinson, T. F., State Taxation of Mineral Deposits and Production, (U.S.Environmental Protection Agency, Office of Research and Development, 1977).

Synergic Resources Corporation, Documentation of the Reserve-Related Data Inputs to the Resource Allocation and Mine Costing Model (U.S. Department of Energy, September 1982).

Ward, M. P., Coal Severance Taxes: The Effect of Western States' Tax Policy on the U.S. Coal Market, (The Rand Corporation, 1982).

Kentucky Constitution, Kentucky Revised Statutes, and Legal Cases

City of Louisville v. Fiscal Court, 623 S.W. 2d 219 (1981).

Dolan v. Land, 667 S.W. 2d 684 (1984).

Eminence Distillery Co., v. Henry County Board of Sup'rs, 200 S.W. 347 (1918).

Gary Gillis, Secretary of the Revenue Cabinet v. William D. Yount, Scott Barbour, et al. No. 87-SC-286-DG and The Kentucky Coal Association, Inc. v. Alison Moore, J. D. Miller, et al. No. 87-SC-288-DG, (1988).
Ky. Const. of 1891

Ky. Rev. Stat. Ann. (Michie/Bobbs-Merrill 1985).

Martin v. High Splint Coal Co., 163 S.W. 2d 711 (1937).

McDevitt v. Luckett, 391 S.W. 2d 700 (1965).

Miller v. Layne, 391 S.W. 2d 701 (1965).

Moore v. Gillis, No. 84-CI-0867, slip op. Franklin Cir Ct., July 10, 1985).

Nowak v. Foster, No. C84-0057 P(J) (W.D. Ky. filed Feb. 17, 1984).

Parrent v. Fannin, 616 S.W. 2d 501 (1981).

Russman v. Luckett, 391 S.W. 2d 700 (1965).

Yount v. Gillis, No. 84-CI-0815, slip op. (Franklin Cir. Ct., July 10, 1985).

Legislative Action

H.B. 549, Ky. Gen. Assembly, Reg. Sess. (1982).

H.B. 92, Ky. Gen. Assembly, Reg. Sess. (1984).

H.B. 503, Ky. Gen. Assembly, Reg. Sess. (1986).

VITA

Jessica Johnson Frazier was born in Corbin, Kentucky on June 8, 1944. She attended Eastern Kentucky University as an accounting major, receiving a Bachelor of Science degree in May, 1966. She received a Master of Business Administration degree from Eastern Kentucky University in August of 1982.

She has held teaching positions at the University of Kentucky in Lexington and Northern Kentucky University in Highland Heights. Jessica is presently an assistant professor at Eastern Kentucky University located in Richmond, Kentucky.