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INTRODUCTION

The remarkable developments in world energy markets in the 1970s revitalized interest in coal as an energy source. There is now widespread agreement that coal can provide a sizeable portion of future increases in the domestic supply of energy. The greatest potential for additional coal production lies in the nation's huge reserves of so-called surface coal. The development of these coal reserves, however, could be significantly impeded by federal regulations recently instituted to control the environmental effects of the method—strip mining—by which surface coal is extracted.

This study amounts to a quantitative cost–benefit analysis of the Surface Mining Control and Reclamation Act of 1977 (SMCRA). Incidence and welfare effects of SMCRA are developed within the context of a multi–sector model of the U.S. coal industry. It appears that, on net, the national economic costs of SMCRA outweigh the benefits, albeit by a fairly narrow margin. Indeed, the net effect is probably too close to call. This, itself, is a valuable finding in view of the strong claims made in the policy debate by interested parties.

In contrast to its national effects, SMCRA appears to produce substantial improvements in resource allocation in certain regions of the country. Still, SMCRA is far from a first best policy. An optimally designed law would yield significant net benefits, while at the same time providing slightly higher levels of benefits for the consumers of environmental amenities. Notwithstanding the interest of these findings to economists, the "real story" of SMCRA probably lies in the wealth transfers it produces. These are found to be large and, most likely, *regressive*.

THE INCIDENCE AND WELFARE EFFECTS OF SURFACE MINING REGULATION

Background on the U.S. Coal Industry

Although only 32 percent of demonstrated U.S. coal reserves (in tons) are strippable, the recent trend in coal production has been toward more

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surface mining relative to underground mining. By 1978, 64 percent of domestic coal production was derived from surface mining, up from 19 percent immediately following World War II and 38 percent in 1969. The relative expansion of surface mining has occurred in all regions of the country, but has been most pronounced in the West. Roughly 90 percent of all western coal is strip-mined and approximately 65 percent of demonstrated domestic coal reserves lie in the West. While the West possesses large reserves of both surface and underground coal, relative costs of extraction make surface production considerably more attractive than underground production in the West.[1]

The geographical unevenness of surface coal resources may carry political consequences in a federal system. The potential for massive surface coal development, particularly in the West, threatens the preeminent economic and political position that underground (primarily Appalachian) mining interests have historically occupied. Moreover, the prospect of substantial expansions of surface coal production in the West threatens significant alterations in the physical and cultural environment of an area that is widely regarded as an important part of America's natural and historical heritage.

The strip mining of coal requires an unusually large amount of inputs from the environment. The most obvious impact of surface mining is the complete removal of the stripped land from non-mining uses. The unsightliness of stripped land degrades surrounding property values, as well as scenic and recreational qualities. Strip mining can also cause extensive damage to hydrologic systems through sedimentation and silting of rivers and streams and/or through the drainage of acidic waste from mine operations. In addition to the adverse effects on water quality, sedimentation can reduce the carrying capacity of waterways and increase the frequency of flooding. This is particularly applicable to surface mining in the Appalachian region. The relatively steep slopes of this region create a further problem of landslides in which the soil and rock (or "overburden") removed to get at the coal seam result in damage to land, buildings, and roads adjacent to mine areas.[2]

In addition to these obvious environmental effects, strip mining imposes psychic costs on those individuals who value the mere existence of an undisturbed environment. These are individuals who, although they do

1. For a good description of U.S. coal resources and regions, *see* BUREAU OF LAND MANAGEMENT, U.S. DEP'T OF INTERIOR, FINAL ENVIRONMENTAL IMPACT STATEMENT: PROPOSED FEDERAL COAL LEASING PROGRAM (1975) [hereinafter BLM].

2. For a description of the environmental impacts of strip mining, *see* BLM, *supra* note 1. *See also*, ENERGY AND ENVIRONMENTAL ANALYSIS INC., OFFICE OF MINERAL POLICY AND RESEARCH ANALYSIS, U.S. DEP'T. OF INTERIOR, BENEFIT/COST ANALYSES OF LAWS AND REGULATIONS AFFECTING COAL: CASE STUDIES ON RECLAMATION, AIR POLLUTION, & HEALTH AND SAFETY LAWS & REGULATIONS (1977) [hereinafter DOI].

not anticipate observing affected areas, suffer from the mere knowledge that a portion of the American wilderness is altered from its relatively pristine state.[3] Analogously, failure to develop surface reserves can impose psychic costs on individuals who have tastes for the existence of a developed, industrial environment.

To the extent that the costs (or benefits) of the physical and psychic environmental consequences of coal strip mining are not internalized by surface mine owners, allocative inefficiencies will result if there are market or non-market methods of internalization that have costs of administration (i.e., transaction costs, in the generic sense) that are less than the otherwise external costs. Many of the environmental costs of strip mining noted here are not internalized by mine owners in an unregulated market. Organization costs and free rider problems appear to be sufficient, for example, to prevent the typically large number of neighbors suffering property devaluation and aesthetic losses from effectively organizing to make Coasian payments to would-be mine operators. The infeasibility of such transactions is, of course, even more pronounced in the case of distant individuals who attach existence value to unstripped land areas. In the case of water pollution, the absence of a market in water and the prevalence of governmental allocation of water supplies often leave polluting mine operators free of the costs they impose on downstream water consumers. Similarly, many recreational amenities, game animals, and fish on both public and private lands are communally owned and are not permitted to be marketed, thus precluding or inhibiting the use of Coasian transactions by hunters, fishers, campers, and hikers.[4]

In short, externalities are likely to be present to a significant degree when a land area is strip-mined: As a result, relative to the optimum selected by the hypothetical benevolent economist-dictator, surface coal could be expected to be overproduced and produced with too many environmental inputs in the absence of a corrective policy. Conceivably, SMCRA could be such a policy.

The Provisions of SMCRA

The Surface Mining Control and Reclamation Act was signed into law on August 3, 1977.[5] SMCRA empowered the Department of the Interior

3. So-called "existence values" of undisturbed environment and related issues are examined by J. KRUTILLA & A. FISHER, THE ECONOMICS OF NATURAL ENVIRONMENTS: STUDIES IN THE VALUATION OF COMMODITY AND AMENITY RESOURCES 124 (1975). W. SCHULZE, D. BROOKSHIRE, E. WALTHER & K. KELLEY provide pathbreaking empirical measurements in the U.S. ENVTL. PROTECTION AGENCY, THE BENEFITS OF PRESERVING VISIBILITY IN THE NATIONAL PARKLANDS OF THE SOUTHWEST (1981) [hereinafter SCHULZE].

4. Demsetz, *Toward a Theory of Propety Rights*, 57 AM. ECON. REV. 347 (1967), provides a classic statement of the operation and feasibility of such transactions.

5. Surface Mining Control and Reclamation Act, 30 U.S.C. §§ 1201–1328 (Supp. III 1979).

to promulgate and enforce nationwide mining and reclamation regulations. The central thrust of the Act is to require the complete restoration of strip-mined land to its pre-mining state upon the cessation of mine operation. Surface coal mines, as well as the surface operations of underground coal mines, must return utilized land to approximate original contour and productivity. Reclaimed land must be revegetated and stablized so as to prevent soil erosion and damage to hydrologic systems. During mining, mine operations and overburden disposal must be managed in order to prevent acid drainage, waterway sedimentation, and damage to neighboring property. To provide for the reclamation of already-stripped land, an Abandoned Mine Reclamation Fund is supported by a $.35 per ton tax on surface bituminous coal production, a $.15 per ton tax on underground bituminous coal production, and a $.10 per ton tax on lignite coal production.[6]

In addition to direct regulation of the environmental impacts of strip mining, SMCRA addresses itself to the problems of property rights assignments in water, land, recreational, and aesthetic amenities. The Act prohibits surface mining in the national park, trails, wildlife refuge, and wilderness systems. Surface mining is technically permitted (but effectively prohibited) in national forests if there are no significant recreational, timber, economic, or other values that would be adversely affected. Prime farmlands cannot be strip-mined unless the land can be returned to equivalent or higher agricultural yields. Alluvial valleys in the West cannot be mined if mining disrupts or precludes farming. Importantly, where surface rights and subsurface mineral rights are held by different parties, subsurface right holders (lessees) must obtain written consent from surface right holders before commencing strip mining if subsurface rights were originally federally owned. Where both surface and subsurface rights are privately owned, disputes are to be settled by each state.

Modeling SMCRA

As might be inferred from the foregoing description of the provisions of SMCRA, federal regulation of strip mining has potential for creating significant costs for the surface coal mining industry and the domestic economy. At the same time, the vociferousness with which certain parties, notably the environmental groups, have promoted the case for SMCRA suggests that federal regulation of strip mining has potential for creating substantial benefits. In order to answer the question of whether the benefits exceed the costs, as well as to measure the impact on winners and losers, we construct a six-sector model of the domestic coal market. This model is used to simulate equilibria with and without SMCRA. Conventional

6. *Id.* at § 1232.

measures of changes in producer and consumer surplus provide the necessary ingredients for the cost-benefit tests.

SMCRA can be conceived of as a tax on the use of environmental inputs in strip mining. This tax can be expected to induce both a reduction in the intensity with which these inputs are employed relative to other factors of production, as well as an overall contraction of surface mining. The former effect redounds to the benefit of non-mining users of environmental resources. The latter effect tends to raise the price of all coal, both surface and underground. This benefits underground coal producers and harms coal consumers.

This somewhat simplified view of SMCRA can be given more content with an analytic model of the coal market. In proceeding in this direction, we take before-and-after snapshots of the marketplace, with each snapshot covering a one-year period. This procedure does not allow the ideal measurement of the present values of SMCRA costs and benefits over the life of the domestic surface mining industry. It does, however, provide a representative picture of the flow of costs and benefits at any point in time.

The model of the coal market that is employed here is a partial equilibrium model in the sense that changes in coal prices are assumed to have no effect on the markets for the close complements and substitutes for coal. Of most relevance, changes in coal prices are assumed to have no significant effect on world oil prices. With coal primarily demanded as feedstock for electric power generation and the firing of industrial boilers, the alternative fuel of most significance to buyers is residual fuel oil. Taking the price of this fuel as fixed is tantamount to assuming that world oil prices are invariant with respect to changes in domestic coal markets. Most available research on the determinants of world oil prices suggests that this assumption probably does not do significant violence to reality over the range of changes attendant to SMCRA.[7]

The supply side of the U.S. coal market can be appropriately divided into four competitive segments: underground producers (u), Appalachian surface producers (a), midwestern surface producers (m), and western surface producers (w). The three-way division of surface coal producers reflects corresponding discrete geographic differences in the costs of meeting SMCRA (see below). In each production sector, pre-SMCRA supplies are taken to be of the form:

$$q_i = g_i P_i^{\epsilon_i} ; \qquad (1)$$

where ϵ_i is the elasticity of supply, g_i is a scalar, and $i = u,a,m,w$. The constant elasticity functional form of (1) does not appear to be terribly

7. Analysis of this issue is relatively sparse. For a summary see J. KALT, THE ECONOMICS AND POLITICS OF OIL PRICE REGULATION 33 (1981).

at odds with the supply schedules which provide the available empirical estimates of ϵ_i used in this study.

The marginal tax, T_i, associated with SMCRA, varies across producing sectors and raises each sector's (inverse) supply function by $T_i>0$.[8] Producers, of course, see an after-tax price ($\bar{P}_i$) that is less than the market price. Accordingly, supply under SMCRA can be written as

$$\bar{q}_i = g_i\bar{P}_i^{\epsilon_i} = g_i (P_i - T_i)^{\epsilon_i} ; \qquad (1')$$

where $\frac{\partial T_i}{\partial q_i} = 0$. The formulation in (1′) implicitly makes the tax of SMCRA the same over all levels of coal production, i.e., the marginal tax is equal to the average tax. While this is probably inaccurate, available estimates of the cost of SMCRA do not allow a more refined approach. The possible inaccuracies introduced are discussed below.

The demand side of the U.S. coal market is divided into two sectors: the domestic market (d) and the export market (x). Again, for methodological reasons, underlying demands are taken to have constant elasticities. Holding income and other non-coal prices constant, the domestic market's demand at any point in time is given by:

$$q_d = h_d P_d^{\eta_d} ; \qquad (2)$$

where η_d is the price of elasticity of demand and h_d is a scalar. Foreign demand for U.S. coal is taken to have a similar functional form. The elasticity of export demand (η_x) is derived from the residual demand of the foreign rest-of-world sector (f) after it has consumed its indigenous supply. This elasticity is given by

$$\eta_x = \eta_f \frac{q_f}{q_x} - \epsilon_f \frac{q_f - q_x}{q_x} ; \qquad (3)$$

where η_f is the elasticity of foreign coal demand, q_f is total foreign demand, and ϵ_f is the elasticity of rest-of-world coal supply.

Equilibria with and without SMCRA are found by requiring that equilibrium prices leave no excess supplies or demands. The simple approach to this would merely involve solving for the price that equates the sum of the four sectors' versions of (1) (or (1′)) to the sum of (2) and (3). This, however, overlooks important details. All of the supplies and demands in (1) (or (1′)), (2), and (3) have prices and quantities that are subscripted for a separate market. This reflects differences in geographic location and coal quality. To capture these differences, all quantity and value measures are first expressed on a Btu (British Thermal Unit) basis,

8. Note that even for $i = u$, $T_i > 0$ because of the \$.15 per ton Abandoned Mine Reclamation Fund Tax on underground producers.

since Btus of coal are much more homogeneous than tons of coal. The market for coal is then "located" for modeling purposes on the eastern seaboard (where all regions sell some supply) and the mine-mouth prices relevant for production decisions are calculated as delivered prices less transportation costs.[9] Small *relative* differences in delivered prices due to, for example, sulfur content are assumed constant over the range of coal prices relevant here.

The Costs of SMCRA

Federal regulations requiring revegetation, restoration of original contours, prevention of hydrologic disruption, and avoidance of damage to neighboring land raise the costs of surface coal mining. Estimates of these increases in costs are available from a number of sources. Reported estimates, however, vary considerably from source to source. The federal Office of Surface Mining and Reclamation Enforcement, for example, estimates that SMCRA would increase Appalachian strip mining costs by only $2.54 per ton. A committee of the National Coal Association and American Mining Congress has argued that the OSM estimates understate costs by between $7.65 and $20.15 per ton.[10] The American Consulting Engineers' Council projects that SMCRA would raise mining costs by $3.50–$6.00 in relatively flat terrain and by $9.50–$14.00 in steep terrain.[11] In support of 1979 legislation that would have weakened SMCRA, the Department of Energy (interested, at the time, in increasing domestic energy production) estimated that the costs of SMCRA's original contour provision alone would raise surface coal production costs by $3.50 per ton.[12] Finally, in a report on the 1976 House version of SMCRA prepared for the Council on Environmental Quality and the Environmental Protection Agency, ICF, Inc. estimates that national average surface mining costs would be raised by only $1.10 per ton.[13]

On the theory that investors in the private market place will pay more for information designed to aid business decisions than for information produced as input to the political process, we take a 1978 investors' advisory guide prepared by Mann and Heller as our base-case source for

9. Data on the Btu content of coals is from THE PRESIDENT'S COMMISSION ON COAL, COAL DATA BOOK 73 (1979). Transportation cost data are from 1, 2 ENERGY MODELLING FORUM, STANFORD UNIVERSITY, COAL IN TRANSITION: 1980–2000 D 6 (1978).

10. 84 COAL AGE 11 (1979).

11. *Id.*

12. *Id.*

13. This average is calculated from data reported in REPORT BY ICF, INC., ON THE ENERGY AND ECONOMIC IMPACTS OF THE SURFACE MINING CONTROL AND RECLAMATION ACT OF 1976: HEARING BEFORE THE SUBCOMMITTEE ON PUBLIC LANDS AND RECOURCES OF THE COMMITTEE ON ENERGY AND NATURAL RESOURCES, 95th Cong., 1st Sess. (May 11, 1977) [hereinafter ICF].

estimates of the cost of SMCRA.[14] Mann and Heller examine the additional per ton production costs created by each of SMCRA's major provisions for a broad sample of representative mines in each producing region. Their data and methods permit the costs of SMCRA to be isolated from the surface mining reclamation costs created by state regulations in effect prior to SMCRA. Where Mann and Heller's information is incomplete, it is supplemented by technical U.S. Bureau of Mines (1975, 1977) reports[15] which employ similar research methods and obtain comparable cost estimates. The estimates used in this study are consistent in absolute and relative magnitudes with those reported in available academic studies.[16]

The top panel of Table 1 shows estimates of the marginal state- and SMCRA-mandated costs of surface mine reclamation. The regional estimates are weighted averages of Mann and Heller's state estimates. The within-region variation in reclamation costs is typically fairly small when compared to the across-region variation. In fact, one of the most significant aspects of the estimates reported in Table 1 is the sharp rise in reclamation costs that occurs as surface mining moves from west to east. This is due in large part to the law of gravity: the greater frequency of steep slopes in the eastern United States significantly increases the costs of moving, piling, and reshaping the land. In addition, western surface coal deposits occur in considerably thicker seams and under substantially less overburden than in other parts of the country. As a result, the amount of land that must be reclaimed per ton of coal recovered decreases markedly as mining moves westward. These cost-reducing factors are not offset by the tendency for the more arid climate and more fragile soil of the western U.S. to raise revegetation costs.

The costs of SMCRA reported in Table 1 serve as the values for T_i in the supply functions described by (1′). Data are available, of course, on the coal prices and quantities needed to initialize (1), (2), and (3). Estimates of supply and demand elasticities, however, are more difficult to

14. *See*, C. MANN & J. HELLER, COAL AND PROFITABILITY: AN INVESTOR'S GUIDE (1980).

15. Other sources examined for reclamation costs included: EVANS & BITLER, BUREAU OF MINES, U.S. DEP'T. OF INTERIOR, COAL SURFACE MINING RECLAMATION COSTS: APPALACHIAN AND MIDWESTERN COAL SUPPLY DISTRICTS (1975) (Circular 8695); PERSSE, LOCKARD & LINDQUIST, BUREAU OF MINES, U.S. DEP'T. OF INTERIOR, COAL SURFACE MINING RECLAMATION COSTS IN THE WESTERN UNITED STATES (1977) (Circular 8737).

16. Schlottomann & Spore, *Economic Impacts of Surface Mine Reclamation*, 52 LAND ECON. 265 (1976); Lin, Spore & Nephew, *Land Reclamation and Strip-mined Coal Production in Appalachia*, 3 J. ENVTL. ECON. & MGMT. 236 (1976); Randall, Grunewald, Johnson, Ausness & Pagoulatos, *Reclaiming Coal Surface Mines in Central Appalachia: A Case Study of the Benefits and Costs*, 54 LAND ECON. 472 (1978) [hereinafter Randall]; and Goldstein & Smith, *Land Reclamation Requirements and their Estimated Effects on the Coal Industry*, 2 J. ENVTL. ECON. & MGMT. 135 (1975).

TABLE 1.

Marginal Externalities Due to Strip Mining and Estimated Regulatory Internalization[1] (1981 $ per ton)

I. INTERNALIZATION INCENTIVES			
Regulatory Taxes on Environmental Use	*Appalachia*	*Midwest*	*West*
State Regulation	$ .70	$ .51	$ .13
SMCRA	5.44	2.56	.41
Total	$6.14	$3.07	$ .54
II. EXTERNAL COSTS			
Externality	*Applachia*	*Midwest*	*West*
Water Damage	$ .10	$ .06	$ .01
Land Damage	1.42	.75	.01
Flooding	.10	—	—
Reduced Recreation	.53	.22	.04
Reduced Aesthetics (local)	1.08	.31	.04
Reduced Aesthetics (non-users)	1.26	2.00	.93
Total	$4.49	$3.34	$1.03

1. Source: See text for sources and derivations.

come by. Based on the survey by Bohi, η_d is taken to be equal to -1.1.[17] Griffin's extensive study of OECD energy demands indicates that -1.125 is a reasonable estimate of η_f.[18] Elasticities of coal supplies are taken from the U.S. Energy Information Administration's in-depth analysis of coal supply schedules in the U.S. Department of Energy's National Coal Model.[19] These schedules suggest elasticities of approximately $\epsilon_u = 1.8$, $\epsilon_a = 1.7$, $\epsilon_m = 2.3$, and $\epsilon_w = 5.8$. The relative magnitudes of these elasticities appear to be consistent with Zimmerman's model.[20] In the absence of any other helpful information, the value of ϵ_f is assumed to be 2.4, which is the weighted average of domestic supply elasticities.

With elasticities specified as described here, (1), (2), and (3) are initialized (i.e., solving for the scalar terms yields log-linear intercepts) for

17. D. BOHI, ANALYZING DEMAND BEHAVIOR: A STUDY OF ENERGY ELASTICITIES 140–45 (1981).

18. J. GRIFFIN, ENERGY CONSERVATION IN THE OECD: 1980–2000 at 95, 136, 168 (1981).

19. ENERGY INFORMATION AD., U.S. DEP'T. OF ENERGY, NATIONAL COAL MODEL: COAL SUPPLY CURVES (1978).

20. M. ZIMMERMAN, THE U.S. COAL INDUSTRY: THE ECONOMICS OF POLICY CHOICE (1981).

actual 1977 prices and quantities. The year 1977 is used in order to capture the domestic coal market as it appeared immediately prior to the impact of SMCRA. Substituting (1′) for (1), valuing T_i as shown in Table 1, and solving for the equilibrium then provides a comparative static look at what 1977 would have looked like with SMCRA in place.

Valuing the Externalities of Unregulated Strip Mining

Considering the extent to which coal mining and its environmental impacts have been examined and written about, explicit estimates of the values of the environmental externalities generated by surface mining are surprisingly rare. Still, whether or not the new market equilibrium induced by SMCRA represents an efficiency-improving move depends on these values and SMCRA's ability to force their internalization.

The external costs of unregulated strip mining are shown in the bottom panel of Table 1. These estimates of environmental damage are, needless to say, tenuous, but they represent best-guess assessments of available information. The primary source for these figures is Randall and others' comprehensive cost-benefit analysis of surface mine reclamation in Central Appalachia, which employed willingness-to-pay benefit measures.[21]. The relatively narrow geographical focus of the study forces the extrapolation of estimates to other regions of the country. Where possible, these extrapolations have been checked against information from other sources.

The estimates of the externalities of strip mining in Appalachia are assumed to hold, with adjustments, for the rest of the country. The Appalachian water damage figure is adjusted to reflect regional differences in water value and coal yield per acre of overburden destroyed.[22] It is acres disturbed, rather than coal extracted, that gives rise to hydrologic damage.[23] The same argument applies in the case of damage to land, which is also adjusted to reflect interregional differences in land values (as reported by the U.S. Department of Interior) and coal yield per acre.[24] Surface mine-related flooding is not a significant phenomenon except in the relatively steep terrain of Appalachia.[25]

Surface mine reclamation benefits in the form of restored recreational amenities have been estimated for Appalachia by Randall and others,[26] and Spore and Nephew.[27] In the former study, only wildlife-related rec-

21. Randall, *supra* note 16, at 476.
22. As reported in ICF, *supra* note 13.
23. For analysis of the technological aspects of damage and reclamation, *see* DOI, *supra* note 2, at IV-200.
24. *Id.* at IV-73.
25. *Id.* at IV-207.
26. Randall, *supra* note 16, at 485.
27. Spore & Nephew, *Opportunity Costs of Land Use: The Case of Coal Surface Mining*, in ENERGY: DEMAND, CONSERVATION, AND INSTITUTIONAL PROBLEMS 209 (M. Macrakis ed. 1974).

reational externalities could be estimated. The latter study is relied upon here. Spore and Nephew's estimate applied to Appalachia in 1973. The real demand for outdoor recreation has been estimated to have been growing at a rate of approximately 10 percent per year over the 1970s. The estimate reported in Table 1 reflects this growth. Moreover, Spore and Nephew estimate the present value of *benefits* of reclamation. This is less than the external cost of failing to reclaim by an amount equal to the benefits foregone during the disturbance period of mining and reclamation. Based on mine-life estimates from ICF, Inc. and reclamation periods estimated by U.S. Department of the Interior, disturbance periods are estimated to be 10 years in Appalachia, 14 years in the Midwest and 21 years in the West.[28] Table 1 reports external costs in the absence of reclamation and, assuming a social discount rate of 3 percent, accounts for during-disturbance foregone environmental benefits. To arrive at estimates for the Midwest and West, the Appalachian estimate has been adjusted for coal yield per acre disturbed and the relative frequency of use per recreational acre.[29]

The low value of recreational damage per ton of strip-mined coal in the West is the result (again) of very high coal yields per acre and relatively low frequencies of recreational use per acre (and, hence, per ton). We suspect that, if anything, the recreational externality in the West is overstated. With some notable exceptions (e.g., the Kaiparowits Plateau in Utah), the primary recreational uses of most Western land area underlain by strippable coal are deer, antelope and game bird hunting and some downstream lake and reservoir fishing.[30] This reflects the predominance of prairie and grassland in the potentially mineable area of the West. Other important recreational activities (such as camping, picnicking, hiking and stream fishing) are primarily concentrated in mountainous regions in the West. Strippable areas in the Midwest and, particularly, in Appalachia, on the other hand, typically provide a full range of high quality recreational amenities.[31] Strippable acres are closer to average recreational acres outside the West. Treating western strippable acres with below-average recreational yields as average western recreational acres will tend to overstate the recreational externalities of strip mining.

The local population in the neighborhood of strip-mining activity bears aesthetic damage in the form of landscape modification, water discoloration, increased motor vehicle congestion and noise, and the disruption of lifestyle and community ambiance. Randall and others are able to estimate local aesthetic externalities through the carefully designed bid-

28. ICF, *supra* note 13, at B 1–11; DOI, *supra* note 2, at J 1–7.

29. BUREAU OF LAND MANAGEMENT, U.S. DEP'T. OF INTERIOR, PUBLIC LAND STATISTICS 1979, at 73 (1979).

30. BLM, *supra* note 1.

31. *Id.*

ding games developed by Bradford, Randall and others, Schulze and others, and Brookshire and others.[32] The clearly public goods attributes of local aesthetic amenities suggest that individual valuations be summed across the affected population. Accordingly, Randall and others' estimate of aesthetic reclamation benefits in Appalachia is adjusted for the Midwest and West to reflect regional differences in population density (i.e., affected local population). Adjustment is also made for regional coal yield per acre and foregone during-disturbance benefits.

The last externality estimates in Table 1 to be discussed are the surface mine-induced reductions in a mining region's aesthetic appeal to the non-local population (i.e., "outsiders"). The estimates arrived at are probably the most problematic, requiring the most tenuous assumptions and the greatest leaps of faith. They depend on the application of a relatively new methodology for assessing the value of environmental amenities and are derived from the only quantitative study of its kind, by Schulze and others.[33] This study has applied the bidding game technique noted above to environmental degradation of the Grand Canyon and surrounding area in the Four Corners region. The study's extremely careful attention to methodology is a source of confidence. Schulze and others are able to separate the value of the region to outside users from the pure existence value of the region to both users and non-users. They find that the latter swamps the former and that the element of the environment from which existence value is derived is pristineness. The existence value of the roughly 45 million pristine acres of the Southwest region is found to be approximately $5.5 billion per year.[34]

Notwithstanding the authors' admonition against extending their findings to other environmental attractions, there is no alternative to the estimates provided by Schulze and others. The following assumptions are made to arrive at the external cost estimates noted in Table 1. First, user values damaged by strip mining are captured in the estimates of recreational damage. Second, valuable levels of pristineness (of the type associated with the Southwest) are taken to be available in each coal producing region. While folklore holds that the West is the last and only repository of America's undisturbed natural heritage, there are indeed highly valued pockets of pristineness in other regions.[35] To be sure, there are fewer such pockets of pristineness outside the West and to reflect this

32. Randall, *supra* note 16; Bradford, *Benefit-Cost Analysis and Demand Curves for Public Goods*, 23 KYKLOS 775 (1970); Randall, Ives & Eastmen, *Bidding Games for Valuation of Aesthetic Environmental Improvements*, 1 J. ENVTL. ECON. & MGMT. 132 (1974); SCHULZE, *supra* note 3; and Brookshire, Thayer, Schulze & d'Arge, *Valuing Public Goods: A Comparison of Survey and Hedonic Approaches*, AM. ECON. REV. (forthcoming).

33. SCHULZE, *supra* note 3.

34. SCHULZE, *supra* note 3, at 77–83.

35. Spore, *supra* note 27.

we assume that their frequency is taken to be inversely proportional to regional population density. Further, it is assumed that the Grand Canyon is "special" and that pockets of pristineness threatened by strip mining are more like the other area covered by Schulze and others. Third, the existence value per acre is assumed to apply to the entire undeveloped portions of western surface coal regions, as defined by the U.S. Bureau of Land Management.[36] Fourth, since each acre of strip mining could be expected to reduce the existence value of nearby acres (perhaps within the so-called "integral vista"), the total region threatened by strip mining is taken to be the undeveloped portions of the surface coal regions.

With values in hand for coal yield per physically disturbed acre and total threatened acres, it is possible to estimate the number of acres with damaged existence values per unit of coal mined. This estimate times the existence value of pristine acres yielded by the second and third assumptions from above produces an estimate of the annuity value of the external damage of coal strip mining to environmental existence values. The present value of this annuity is the non-user aesthetic externality reported in Table 1.

The total external costs per ton of surface coal output are shown in Table 1. These costs are highest in Appalachia and lowest in the West. The implication for efficiency-seeking policymakers is that strip mining should be taxed more heavily as mining moves from west to east. Although SMCRA requires the same level of environmental protection in all surface coal regions, the general regional pattern of the implicit taxes that are created by SMCRA's regulations is consistent with this policy prescription. A comparison of total externalities per ton and regulatory taxes per ton suggests that SMCRA, indeed, had a job to do. In no region was pre-SMCRA regulation by the states stringent enough to force optimal internalization of strip-mining externalities. But SMCRA appears to have erred relative to the optimum in each region. Whether or not this has resulted in more or less misallocation of the nation's resources than would have occurred otherwise can only be answered by an empirical analysis, which is the object of the next section.

RESULTS: SMCRA GETS MIXED GRADES ON THE COST-BENEFIT TEST

The estimates developed here for the costs of satisfying SMCRA, the benefits of internalizing the environmental damage of strip mining, and the necessary coal supply/demand parameters are appropriately viewed as (at least approaching) the best available. They are certainly not the

36. BLM, *supra* note 1.

best conceivable. With this in mind, we now proceed to put SMCRA to the cost-benefit test. The results are then examined for their robustness and compared to a first-best coal strip-mining policy.

Winners and Losers Under SMCRA

Table 2 shows what appear to be the most reasonable values for the aggregate incidence and welfare effects of SMCRA. Table 3 shows the associated impacts on coal supply and demand. On purely economic grounds, SMCRA does not appear to be worth the cost it imposes on the nation's economy. It generates substantial benefits for non-mining environmental users ($1.1 billion per year), as well as not-insignificant gains for underground coal producers ($130 million per year). These pluses, however, are slightly outweighed by the losses of consumers and surface coal producers. The largest costs are imposed on domestic coal consumers ($399 million per year) and Appalachian surface producers ($773 million). Small levels of exports leave the foreign coal sector relatively untouched. Relatively low costs of SMCRA in the Midwest and, particularly, in the West hold down the effect of the Act on surface coal producers in these regions.[37] The net economic effect on the nation as a whole is a loss of roughly $122 million per year. If the welfare of foreigners is irrelevant in questions of national economic policy, the net national loss would be put at approximately $111 million per year.[38]

Although SMCRA's overall performance on the cost-benefit test may not yield a passing grade, the Act's effects at the regional level are mixed. If changes in consumer surplus can be apportioned in accord with sectoral output shares, the application of SMCRA to the midwestern and western sectors generates environmental benefits that exceed costs. Improved resource allocation in the midwestern surface mining sector yields net benefits of $1.5 million per year. SMCRA yields net benefits from improved resource allocation in the western surface mining sector worth $47.7 million per year. In the Appalachian surface coal sector, however, an efficiency loss of roughly $159.7 million per year results from SMCRA's standards and regulations. Of course, this regional pattern is suggested by the differences between SMCRA's costs and the externalities shown in Table 1. SMCRA is excessively stringent in Appalachia, but pays in the rest of the country.

37. In addition to SMCRA's tax on actual mining, the prohibitions on strip mining in National Forests and alluvial valleys reduce (the present value of) producer surplus. To build this consideration into the analysis, "prohibited" acres and annual tons are taken from ICF and valued at the per acre value of National Park land found in SCHULZE, *supra* note 3. The benefits of prohibition clearly exceed the costs, although the resulting magnitudes are relatively insignificant.

38. The U.S. has some minor monopoly power in the world coal market. From a narrowly nationalistic standpoint, an optimal coal policy would have to take advantage of this power. Such considerations, however, are beyond the scope of this study.

TABLE 2.

Incidence and Welfare Effects of SMCRA: 1977
(millions of 1981 dollars)

Interest Group	*Gain*	*Loss*
Domestic Coal Users		$ 399.1
Foreign Coal Users		11.8
Underground Coal Producers	$ 130.0	
Surface Coal Producers		
Appalachia		773.2
Midwest		192.4
West		12.2
Environmental Users[1]		
Appalachia	720.7	
Midwest	274.9	
West	140.8	
Total	$1,266.4	$1,388.7
Efficiency Change		
Including Foreigners		$122.3
Excluding Foreigners		
Appalachia		159.7
Midwest	$ 1.5	—
West	47.7	—
		$110.5

[1]This is the geographical source of environmental benefits, rather than the location of the beneficiaries.

TABLE 3.

Coal Supply and Demand Under SMCRA: 1977
(millions of Btus)

	SMCRA Supply	*SMCRA Demand*	*Change Due to SMCRA*
Domestic Coal Users		13,763.0	−291.8
Foreign Coal Users		66.8	−1,218.4
Underground Coal Producers	6,578.0		+211.3
Surface Coal Producers			
Appalachia	3,337.4		−1,347.2
Midwest	1,910.7		−433.8
West	2,003.7		+59.5
Total	13,829.8	13,829.8	−3,020.4

In terms of quantities, SMCRA causes underground coal producers and, to a small extent, western surface producers to expand their operations. In fact, western producers would have shown a small income gain from SMCRA were it not for the prohibition on production in areas such as alluvial valleys. Midwestern and, especially, Appalachian surface producers cut back production. Higher coal prices, of course, reduce overall consumption. SMCRA raises coal prices to buyers by approximately 2 percent. To some extent, the associated reduction in consumption reflects substitution away from coal and toward other sources of energy. In particular, any SMCRA-induced increases in the price of coal can be expected to increase the demand for oil. Based on Griffin's estimates[39] and Bohi's survey,[40] a cross-elasticity of oil demand with respect to coal prices of approximately 1.0 seems reasonable; and, hence, SMCRA raises oil demand by roughly 2 percent. In 1977, this amounted to 120 million barrels of oil per year (or 330 thousand barrels per day out of a daily demand of 15 million). With the marginal source of oil being from foreign sources, this represents the impact of SMCRA on the U.S. demand for imported oil. This is only a special cost (to be added to the losses shown in Table 2) if there are externalities associated with imported oil (see next section).

The conclusions that SMCRA 1) worsens the allocation of resources nationally; 2) improves the allocation of resources in the midwestern and western strip mining industry; 3) does not discourage development of western surface coal reserves; and 4) increases oil imports all carry significance for on-going national energy policy debates. Of at least equal relevance, however, is the question of SMCRA's impact on the distribution of income across income classes. On this account, it appears that SMCRA is fairly strongly regressive.

The loss of consumer surplus as a result of SMCRA is disproportionately concentrated below the median of the income scale. The impact of higher coal prices is felt most severely in the form of higher electricity prices. Electricity consumption is strongly income inelastic; the fraction of income spent on electricity by consumers falls sharply as income rises.[41]

Among coal producers, affected individuals include mine owners (i.e., stockholders), land owners receiving royalties, and miners. The distribution of each of these groups across income levels appears to put them toward the upper end of the income scale, on average. Royalty recipients are most likely higher income individuals, given the positive relationship between land ownership and income. Similarly, stockholders in coal companies are somewhat skewed toward upper incomes, if coal stockholders

39. GRIFFIN, *supra* note 18, at 95.
40. BOHI, *supra* note 17.
41. BUREAU OF LABOR STATISTICS, U.S. DEP'T. OF LABOR, HANDBOOK OF LABOR STATISTICS 368–72 (1980).

are like average stockholders in the energy sector.[42] Finally, coal miners' average wages exceed national average wages considerably.[43]

The remaining affected parties—environmental users—also appear to be concentrated toward the upper end of the income scale. Virtually all measures of the consumption of outdoor recreational amenities, for example, are correlated with income.[44] Moreover, Schulze and others[45] find existence values to be income elastic; and Kalt and Zupan[46] find the environmentalism expressed in national politics to be positively related to income. The caricatures of environmentalists as well-educated and wealthy, and outdoor recreationalists as Winnebago owners and back-to-the-earth college-aged offspring of well-to-do families are inaccurate, but not terribly so.

Data are not available that would allow detailed description of the income class structure of each interest group affected by SMCRA. Nevertheless, if we make the gross division of coal consumers as "lower income" and coal producers and environmental users as "upper income," there is a net transfer from lower to upper income individuals. Within the upper income level, the losses of surface producers ($847.8 million) are more than offset by the combined gains of underground producers and environmental users ($1134.6 million). The gain at upper income levels is $288.6 million per year, while $399.1 million is lost at the lower end of the income scale.[47]

The regressivity of SMCRA does not constitute an economic criticism. Such criticism can only emanate from ethical considerations, and might well be tempered by recognition of the possibility that the political system has already selected society-wide income redistribution mechanisms designed to offset the kinds of regressive transfers (e.g., SMCRA) that occur continually in a dynamic economy. It is also worth noting that SMCRA's regressivity is not a function of its slightly deleterious impact on resource allocation. Rather, regressivity is likely to be a property of even a SMCRA redesigned to be economically efficient (see below). This arises from the fact that, as individuals move down the income scale, they generally want to fill their consumption baskets with more of the commodities produced from natural resources and less of the amenities produced by a clean environment. The regressivity of environmental policy is a recurring dilemma for environmentalists.

42. TOLTEC ASSOCIATES, SHAREOWNERSHIP OF THE SIX LARGEST U.S. OIL COMPANIES (1974).

43. NATIONAL COAL ASSOCIATION, COAL DATA 1978 II-4 (1980).

44. Data are reported in, *e.g.*, LEISURE TIME SURVEY '79 (1979).

45. SCHULZE, *supra* note 3, at 77–83.

46. *See* J. KALT & M. ZUPAN, FURTHER EVIDENCE ON CAPTURE AND IDEOLOGY IN THE ECONOMIC THEORY OF POLITICS, DISCUSSION PAPER NUMBER 979, HARVARD INSTITUTE OF ECONOMIC RESEARCH 50 (April 1983).

47. *See* note 38.

How Robust Is SMCRA's Failing Grade?

The relatively narrow margin by which the aggregate benefits of SMCRA are estimated to exceed the aggregate costs suggests that the Act's ability to pass the cost-benefit test is quite sensitive to certain assumptions and parameter values. As noted, the greatest uncertainty in the analysis probably centers on the estimates of the environmental externalities of strip mining. Indeed, if the environmental benefits of SMCRA have been underestimated by only 10.8 percent (9.7 percent if foreigners are irrelevant), SMCRA's aggregate benefits would exceed the costs. Considering that Schulze and others believe that their estimates of environmental existence values are subject to errors of plus or minus 50 percent, not to mention the many assumptions needed to arrive at Table 1, it is not difficult to imagine that the estimates of environmental benefits used here are in error by 50 percent.[48]

Another source of sensitivity in the aggregate results might be found in the supply/demand parameters. Model simulations under a fairly wide variety of elasticity estimates, however, repeatedly produce a negative, albeit narrow, gap between benefits and costs. The same robustness cannot be ascribed to estimates of the costs of meeting SMCRA's environmental standards. If these costs are only slightly less in each region than reported in Table 1, SMCRA would cure more resource misallocation than it produces and would pass the cost-benefit test. In fact, the only study that is comparable in scope and detail to the sources employed to arrive at Table 1 reports costs considerably less than those used here.[49] This might suggest that biases in Table 2 resulting from cost inaccuracies make SMCRA appear less beneficial than it is.

Additional inaccuracy in at least the estimates of efficiency changes may arise from SMCRA's tendency to increase oil imports. The likelihood that such imports carry significant external costs of their own has been examined extensively and is generally found to be substantial.[50] Any oil import externalities that are present magnify the reported aggregate efficiency losses of SMCRA by the amount of the externalities times the induced increase in oil imports. Distributionally, these external costs appear to accrue to the general public in the form of reduced national security, higher world oil prices, or macroeconomic disruption.[51] This broad impact of costs suggests that the distributional gains shown in Table

48. SCHULZE, *supra* note 3, at 7.
49. ICF, *supra* note 13, at II 1–60.
50. D. DEESE & J. NYE, ENERGY AND SECURITY (1981); R. STOBAUGH & D. YERGIN, ENERGY FUTURE 47–55 (1979); KALT, *supra* note 7, at 222–32.
51. On national security, *see* DEESE & NYE, *supra* note 50. On world oil prices, *see* STOBAUGH & YERGIN, *supra* note 50. On macroeconomic disruption, *see* Tolley & Wilman, *The Foreign Dependence Question*, 85 J. POL. ECON. 323 (1977).

2 may be overstated, while the distributional losses may be understated.

It is clear that the estimated incidence and, especially, efficiency effects of federal regulation of strip mining are not very robust. The direction of any bias, however, is hard to call; and it is possible that sources of bias are offsetting (e.g. overestimated reclamation costs and oil import externalities). In lieu of any convincing quantitative improvements, however, Table 2 will have to stand as best-guess estimates of SMCRA's costs and benefits.

Designing a First-Best Policy

From an economic standpoint, the efficient alternative if SMCRA fails the overall cost-benefit test is not the removal of all regulation. The very concept of an externality suggests resource misallocation in the absence of some mechanism of internalizing costs. The design of an improved SMCRA is suggested by the regional pattern of gains and losses. Full reclamation in the West and Midwest imposes costs on producers and consumers that are less than the environmental benefits generated. In Appalachia, however, an undisturbed environment is worth only $4.49 per ton of coal mined, while it costs $6.14 per ton to restore the land roughly to its undisturbed state.

One approach to a first-best SMCRA would be to: (1) require reclamation through performance standards up to the level of associated benefits in each region; (2) impose a per-ton tax equal to the remaining foregone during-disturbance environmental benefits; (3) allocate any tax collections to environmental users; and (4) continue to prohibit mining in pristine areas of particular natural beauty.

This proposed policy would involve no substantive changes in SMCRA's reclamation requirements as applied to the Midwest and West. Note, also, that SMCRA already embodies the principle of imposing a tax in addition to reclamation standards (i.e., the Abandoned Mine Reclamation Fund Tax). In the proposed policy, no strip-mining damage tax would be imposed on underground producers. The prohibition on mining in particular areas such as Wilderness Areas and National Forests is based on the conclusion that their value per acre (derived from Schulze and others in the manner described above) exceeds the total coal producer surplus such acres would generate as strip mines.[52]

The most extensive changes required by a first-best policy would involve SMCRA's treatment of Appalachia. In Appalachia, some measures designed to control sedimentation, land damage and water damage appear to be worth the costs.[53] Other SMCRA requirements such as original

52. *See* note 38.

53. MANN, *supra* note 14.

contour restoration, original topsoil replacement, and zero hydrologic damage, however, do not generate benefits sufficient to cover costs. In other words, given a choice of 1) paying a tax equal to the environmental value of, for example, undisturbed contours or 2) incurring the costs of restoring those contours, Appalachian surface mine owners would elect to pay the tax.

Tables 4 and 5 report the incidence, welfare, and supply/demand effects of the first-best policy outlined here. This policy would incrementally (i.e., given state regulation) eliminate a national deadweight loss (Table 4) of approximately $154 million per year ($142 million when foreigners are included). The proposed first-best policy would also generate improved resource allocation regionally.

The proposed first-best policy raises coal prices by less than 0.02 percent relative to SMCRA, and by approximately 2.0 percent relative to the state-regulation-only equilibrium. As Table 5 indicates, the first-best policy has virtually no effect on coal demands relative to SMCRA. It does, however, encourage more underground and Appalachian surface coal production while discouraging midwestern and western surface production. The first-best policy has virtually the same impact as SMCRA on oil imports; and, like SMCRA, it increases oil demand by approximately 2 percent relative to the pre-SMCRA equilibrium. Finally, the distributional patterns shown in Table 4 exhibit the same regressivity as produced by SMCRA.

The proposed policy would appear to be politically feasible. Coal consumers are virtually unaffected relative to SMCRA, while all other interest groups, except midwestern and western surface producers, are better off. The allocation of tax collections to environmental users makes them better off in the aggregate and in each region despite less environmental protection in Appalachia than under SMCRA.[54] This result, coupled with underground producers' gains relative to SMCRA, would apparently make the first-best policy amenable to Congress: Kalt and Zupan find that congressional voting on strip-mining policy has been controlled by the combination of underground interests and policymakers' environmental concerns.[55] The implied support of Appalachian surface producers and the associated regional split in the interests of surface producers would further suggest political feasibility. Of course, the net efficiency gain of a first-best policy would make it possible to leave everyone better off with an appropriate set of side payments. While such

54. As noted above, the estimates of environmental values used here are based on willingness-to-pay criteria as are the proposed damage taxes. These magnitudes are likely to understate the amount of money needed to compensate environmental users for failure to fully reclaim strip mined land.

55. KALT, *supra* note 46.

TABLE 4.

Incidence and Welfare Effects of a First-Best Federal Strip Mining Policy: 1977 (millions of 1981 dollars)

Interest Group	*Gain*	*Loss*
Domestic Coal Users		$ 403.2
Foreign Coal Users		11.8
Underground Coal Producers	$ 189.0	
Surface Coal Producers		
Appalachia		551.2
Midwest		215.7
West		64.4
Environmental Users[1]		
Appalachia	745.8	
Midwest	309.6	
West	144.1	
Total	$1,388.5	$1,246.3
Efficiency Change		
Including Foreigners	$142.2	
Excluding Foreigners	154.0	

[1]This is the geographical source of environmental benefits, rather than the location of the beneficiaries.

TABLE 5.

Coal Supply and Demand Under a First-Best Federal Strip Mining Policy: 1977 (millions of Btus)

	Supply	*Demand*	*Change Due to Policy*	*Change Relative to SMCRA*
Domestic Coal Users		13,760.0	−288.8	−3.0
Foreign Coal Users		64.8	−1,216.4	−2.0
Underground Coal Producers	6,672.7		+306.0	+94.7
Surface Coal Producers				
Appalachia	3,785.5		−899.1	+488.1
Midwest	1,854.8		−489.7	−55.9
West	1,511.8		−551.4	−491.9
Total	13,824.8	13,824.8		

a compensation scheme is usually only the pipedream of economists, it suggests that some measures could be taken to soften the opposition of midwestern and western surface coal producers. On ethical grounds, of course, it may be quite appropriate to compensate these producers.

SUMMARY AND CONCLUSIONS

The nation's very large reserves of coal put coal regulatory issues at the heart of energy policy debates. Among these issues, the question of appropriate regulation of the notable environmental damage that results from the strip mining of coal has been the most contentious. This is not surprising. The energy, environmental, and financial stakes are sufficiently important to motivate competing political interest groups. The federal response to this competition has been the Surface Mine Control and Reclamation Act of 1977, which established strict standards for control of the environmental damage of strip mining.

This study has attempted to assess the aggregate costs and benefits of SMCRA. This has required a model of the U.S. coal market, as well as disaggregated estimates of the costs of satisfying SMCRA's standards and the values of the environmental amenities yielded by coal-bearing land areas. Development of the latter has proven to be most problematic. While the selected values of environmental values and other model inputs are undoubtedly subject to wide ranges of possible error, they do not appear to be unreasonable.

Both the costs and benefits of strip mining regulation increase as policy moves from the West through the Midwest to Appalachia. SMCRA is least cost-effective in Appalachia, where stringent regulatory requirements produce a high level of environmental benefits at an even higher level of costs. SMCRA performs better relative to economic criteria of efficient resource use in the Midwest and West, although it apparently fails the overall national cost-benefit test and imposes aggregate deadweight losses on the nation's economy in the range of $100 million per year. It does this while transferring significant amounts of income from coal consumers ($400 million per year) and surface coal producers ($980 million per year) to underground coal producers ($130 million per year) and the consumers of environmental amenities ($1.1 billion per year).

A first-best federal policy that reduces reclamation efforts in Appalachia and taxes environmental damage that cannot be cost-effectively avoided would improve resource allocation in the surface coal industry. The result would be an annual national efficiency gain of $150 million. If tax revenues were allocated to environmental users, they would fare even better than under SMCRA. Underground and Appalachian surface coal producers would also be helped, although other surface producers would be harmed somewhat unless compensated out of tax collections. Overall, the distribution of harm and gain from a first-best policy would be regressive, as under SMCRA.

The finding that current federal strip mining policy does not improve the overall allocation of the nation's resources puts that policy on the same footing as many other regulatory policies that have been investigated by economists. Indeed, this finding should not be regarded as the most important of this study. If anything, the deadweight losses generated by SMCRA are most notable for their relative insignificance (and perhaps their lack of robustness). The impact of SMCRA on the distribution of income, on the other hand, is clear and large. Politically feasible improvement in federal strip mining policy will have to be based on recognition of the political role of the distributional stakes of affected interest groups.