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TAX EXPORTING AND THE COMMERCE CLAUSE: REFLECTIONS ON COMMONWEALTH EDISON

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ABSTRACT

This paper appraises the conflicting contentions found in the majority and dissenting opinions in Commonwealth Edison Co. et al. v. Montana et al. about the feasibility of basing findings of constitutionality under the Interstate Commerce Clause on the results of incidence analysis. Severance taxes, property taxes, corporate income taxes levied by both producing and consuming states, and gross receipts taxes levied by consuming states in conjunction with price controls are considered. Factors affecting tax exporting by producing states include the degree of geographic concentration of natural resources, cartelization by producing states, the mobility of various resources, international competition, natural substitutability, government regulations, the prevalence of long-term contracts, and transportation costs. The analysis of tax exporting is sufficiently complicated that attempting to base constitutionality on estimates of tax exporting is fraught with danger, expecially in times of rapid economic and institutional change, in part because it is so difficult to know when the tax exporting question is being asked properly.

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I. Introduction

The appellants in Commonwealth Edison Co. et al. v. Montana et al. argued, among other things, that the 30 percent severance tax levied on coal by Montana imposed a burden on interstate trade proscribed by the Commerce Clause, because much of the tax would be exported to consumers residing outside of Montana. In the majority opinion written by Justice Marshall, the Supreme Court gave short shrift to this argument, noting (p. 8) that

> appellants' assertion that Montana may not "exploit" its "monopoly" position by exporting tax burdens to other states, cannot rest on a claim that there is need to protect the out-of-state consumers of Montana coal from discriminatory tax treatment. As previously noted, there is no real discrimination in this case; the tax burden is borne according to the amount of coal consumed and not according to any distinction between in-state and out-of-state consumers.

The Court went on to say in a footnote (footnote 8),

> nor do we share appellants' apparent view that the Commerce Clause injects principles of antitrust law into the relations between the States by reference to such imprecise standards as whether one State is "exploiting" its "monopoly" position with respect to a natural resource when the flow of commerce among them is not otherwise impeded. The threshhold questions whether a State enjoys a "monopoly" position and whether the tax burden is shifted out-of-state rather than borne by in-state producers and consumers would require complex factual inquiries about such issues as elasticity of demand for the product and alternate sources of supply. Moreover, under this approach, the constitutionality of a state's tax could well turn on whether the in-state producer is able, through sales contracts or otherwise, to shift the burden of tax forward to its out-of-state customers.

It then quoted with approval (also in footnote 8) the Montana Supreme Court,

which had said, "It would be strange indeed if the legality of a tax could be made to depend on the vagaries of the terms of contracts."[1]

Justice Blackmun, in the dissenting opinion, in which he was joined by Justices Powell and Stevens, disagreed with the majority view on both the relevance of tax exporting for determination of constitutionality under the Commerce Clause and the ability of the Court to base such a determination on estimates of tax exporting. Quoting earlier commentators, Blackmun noted (p. 13),

> 'like a toll gate lying athwart a train route, a severance or processing tax conditions access to natural resources.' Thus, to the extent that the taxing jurisdiction approaches a monopoly position in the mineral, and consumption is largely outside the State, such taxes are 'economically and politically analogous to transportation taxes exploiting geographical position.'

The dissenting opinion concludes (p. 14) that

> the mere fact that the burden of a severance tax is largely shifted forward to out-of-state consumers does not, standing alone, make out a Commerce Clause violation. But the Clause <u>is</u> violated when, as applicants allege is the case here, the State effectively selects 'a class of out-of-state taxpayers to shoulder a tax burden grossly in excess of any costs imposed directly or indirectly by such taxpayers on the State.'

Blackmun agrees with the majority opinion, when he states, "It is true that a trial in this case would require 'complex factual inquiries' into whether economic conditions are such that Montana is in fact able to export the burden of its severance tax." But he concludes by saying, "I do not believe, however, that this threshhold inquiry is beyond judicial competence."[2]

This paper appraises the conflicting contentions found in the majority and dissenting opinions about the feasibility of basing findings of constitutionality under the Commerce Clause on the results of incidence analysis. The conclusion is, in brief, that the analysis of tax exporting is sufficiently

complicated that attempting to base constitutionality on estimates of tax exporting is fraught with danger, especially in times of rapid economic and institutional change. This does not, of course, mean that the Congress should not consider the likely incidence of taxes on natural resources in deciding whether to limit state use of such taxes. Whether the degree of tax exporting would be an appropriate basis for the appraisal of either the constitutionality of state tax provisions or the desirability of Congressional limits on state taxes, if the degree of tax exporting could be quantified with ease and certainty, is not addressed here. Nor does the paper comment on the decision reached in the Commonwealth Edison case, including the interpretations of the tests of Complete Auto Transit found in either the majority opinion or in the dissent.

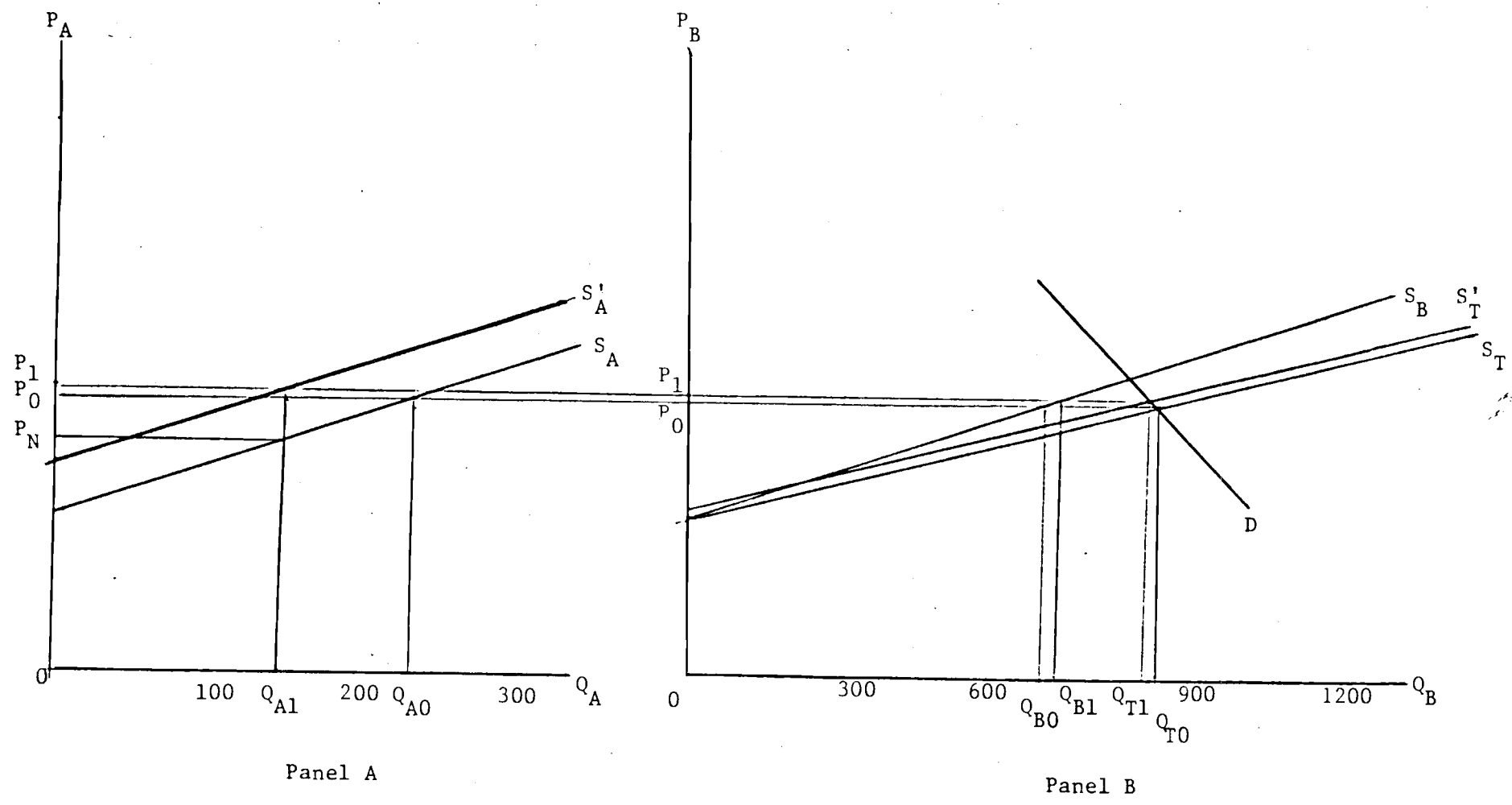
In Commonwealth Edison v. Montana the Court was dealing with the narrow issue of whether the Montana severance tax on coal was levied at a rate so high as to burden interstate commerce unconstitutionally. Much of this paper deals with severance taxes, and many examples are drawn from institutional experience in the coal market. But the question that must be examined here goes well beyond this narrow case. First, severance taxes are only one of many ways in which natural resources can be taxed by producing states.[3] Obvious alternatives that have been widely used for similar purposes are property taxes and corporate income taxes. Moreover, producing states are not the only ones attempting to play the tax exporting game. Gross receipts taxes imposed by consuming states in combination with statutes intended to prevent the taxes from being passed forward to consumers, if consitutional, might also entail tax exporting, but to non-resident owners of oil companies. Some in consuming states appear to believe that adoption of the unitary approach to the taxation of

the net income of oil companies would have the same effect.

Most popular discussion of tax exporting, and all that in the Commonwealth Edison case, focuses on exporting to non-resident consumers. But tax exporting occurs just as surely when rents received by non-resident owners of resources are reduced by a tax. Again, how this kind of tax exporting should be viewed in adjudication of the constitutionality of state taxes under the Commerce Clause is not considered here. But it is well to keep in mind that determination of a tax burden on rents often implies tax exporting to non-residents.[4]

While it is true that all taxes levied on natural resources by producing states bear a general resemblance, there are important differences in likely outcomes, depending on a) the particular type of tax (severance, property, or income tax), as well as b) the conditions under which it is levied. The latter result from differences in the degree of geographic concentration and the mobility of resources or industry, cartelization by taxing states, international competition or price umbrella effects, natural substitutability, government regulation, the prevalance of long-term contracts, the importance of transportation costs and the way in which such costs are determined, unionization, and market structure, as well as the more mundane attributes of long and short-run elasticities of supply and demand.[5]

It is, of course, very difficult to allow for all these factors simultaneously in one simple analytical model, especially if the primary exposition of the model is verbal. The exposition therefore begins in section II with the relatively simple case of a severance tax levied in a competitive market that is free of non-fiscal government intervention that would significantly affect the outcome of the analysis. Market dominance and collusion by producing



Panel A

Panel B

Figure 1

Illustration of Possibility of Tax Exporting
by State A

states play an important role in this analysis. In section III various other complications listed above are then considered. Following that, property taxes and corporate income taxes levied in producing states are considered briefly in section IV. This discussion of taxation of natural resources by producer states is augmented by brief consideration in section V of the incidence of taxes that could be used by consumer states to try to tap rents from natural resources.

II. Severance Taxes in a Free-Market Setting

Figure 1 provides a useful starting point for the analysis of tax exporting. In it, panel A shows the production situation in state A, the one levying the tax to be examined. That is, curve S_A is the supply curve of the natural resource in question, based on costs prevailing in the state. Panel B shows the analogous information for production in the rest of the country, indicated by curve S_B. For convenience, different horizontal scales (in the ratio of three to one) are used in the two panels. Curve S_T in panel B represents the aggregate supply curve for the nation as a whole. It is derived by summing horizontally the supply curves for the two individual states, S_A and S_B. The way these curves are drawn implies that state A provides only a relatively small part (approximately one-fourth) of the entire national output of the commodity in question.[6] The demand curve for the nation as a whole is indicated in panel B by curve D, and its intersection with S_T determines the equilibrium price, P_0, and national output of the commodity in question, Q_{T0}. Since, by assumption, there are as yet no taxes in the model, this price prevails in both markets, and the output produced in each of the two states (Q_{A0} and Q_{B0}) is indicated by the intersection of the relevant state supply curve with this price line.

Imposition of a severance tax in state A can be illustrated by an upward

shift in curve S_A by the amount of the tax, to S_A'.[7] This shift is also reflected in an analogous shift in S_T to S_T'. The new equilibrium price is given by P_1. At this price national output has been reduced somewhat, from Q_{T0} to Q_{T1}. The fall in national output is not greater, given the elasticity of national demand, because the relatively elastic production outside the taxing state rises in response to the higher price (from Q_{B0} to Q_{B1}) and partially offsets the lost output in the taxing state that has been choked off by the tax. This reduction in output resulting from the tax is indicated by the shift in the quantity produced in state A from Q_{A0} to Q_{A1}. Because of the increase in market price, resource rents in the state not imposing the tax increase (by the vertical difference between P_1 and P_0, per unit of output, at least for the quantity produced in the absence of tax). Those in the taxing state fall, per unit of output, by the vertical distance between the price net of severance tax, P_N, and the initial price, P_0.[8]

Tax exporting to non-resident consumers occurs to the extent that a) the tax induces an increase in the price of the commodity and b) the good is bought by non-residents.[9] As is suggested by this diagram, if a state producing only a small fraction of the national output of a given commodity levies a severance tax, there will be little effect on the national price of the commodity, and therefore hardly any exporting of the tax to out-of-state consumers, even if virtually all of the state's output of the taxed commodity is exported. If, however, the taxing state were the only producer, the analysis of tax incidence would be identical to that for a nationwide tax, and the likelihood that the tax would be reflected in higher prices and exported to consumers would be substantially greater. (Such a case could be examined in figure

1 by assuming state B to be the only producer and examining a tax levied there, that is, by ignoring panel A and considering only curves S_T, S'_T, and D in panel B. Realistic cases that are of interest in the context of the present policy debate are, of course, intermediate between these two. That is, interest is strongest from a policy point of view where there is substantial market dominance by one state or a few states; but rarely is dominance complete.

Figure 1 can be employed to examine the incidence of a tax levied by a state with substantial market dominance. One need assume only that the tax that causes the aggregate supply curve to shift is imposed by state B, rather than state A. Clearly, for a given configuration of elasticities of supply and demand and percentage of out-of-state consumption, tax exporting is greater if the tax is imposed by state B than by state A.[10] Indeed, it can be shown (see McLure, 1981a) that the degree to which a severance tax is reflected in higher prices is directly related to the degree of market dominance by the taxing state. In the extreme case in which all supply curves are perfectly elastic and the aggregate demand curve is totally inelastic, the conditions under which a national severance tax would be shifted forward completely, the percentage of the tax that is reflected in higher prices is exactly equal to the taxing state's share in national output of the commodity. This conclusion will be employed further below.[11]

Understanding the role market dominance plays in the analysis of tax exporting makes it easy to appreciate the importance of cartelization by producing states. Suppose that only two states with equal output produce the entire national output of a natural resource, but consume very little of it. If only one levies a severance tax on the commodity, ordinarily at most one-half of

the tax will be reflected in higher prices and possibly exported to non-resident consumers. The remainder will simply reduce resource rents originating in the state. (Note, in addition, that because of the nationwide rise in price, the non-taxing state will also "export" half the tax, per unit of output sold to non-residents, levied by the taxing state. Its economic rents will rise by the other half of the tax, per unit of output.[12]) If, however, the two states agree to levy identical severance taxes, market dominance by taxing states will be complete and shifting to consumers, most of whom are presumed to be non-residents, will be much more nearly complete. In the polar cases of either completely elastic supply or completely inelastic demand, all the tax will be shifted to consumers in this case.

Consider now the situation in which one producing state imposes a severance tax and then the second imposes an identical tax, acting independently and perhaps after the passage of a substantial amount of time. This might occur, for example, if the resource were discovered in the second state long after it had been discovered, exploited, and taxed in the first. To simplify matters assume that supply is equally elastic in the two states and demand is completely inelastic. If we consider imposition of the two taxes as <u>independent</u> actions, we are forced to conclude that one-half of each tax would be shifted forward to consumers, even though the entire tax would be shifted forward if it were imposed simultaneously, and perhaps <u>collusively</u> in both states. These apparently inconsistent results are easily reconciled. Recall that when the tax is imposed in one state the price rises throughout the nation by half the amount of the tax, and rents fall in the taxing state and rise in the non-taxing state, in both cases by one-half the amount of the tax. If the same tax is imposed

sequentially in both states the total price rise equals the tax, and effects on rents cancel. But the tax of either state, considered by itself, to repeat the point, only raises the price by 50 percent of the tax.[13] This anomalous result plays an important part in the discussion of table 1 below and in the discussion of the ability of energy-rich states to hide under the rent-increasing umbrella of OPEC.

It takes little imagination to see the relevance of this analysis to concrete situations occurring in the United States. Montana alone accounts for a significant percentage of the nation's output of low-sulfur soft coal, and with Wyoming and North Dakota it produces an even greater percentage of the low-sulfur coal used in the midwestern area defined by the economics of transportation. Moreover, the market share of these three states is projected to grow rapidly. All three states export virtually all of their coal, either directly or through electricity generated within the state for transmission to other states. Acting alone, Montana might therefore be able to export a substantial fraction of any severance tax it imposed. But if it were to act in collusion with one or both of its two neighboring states to raise taxes, the degree of exporting would be even greater.[14]

From the discussion of the previous paragraphs it can be seen that important questions of interpretation of facts can arise. Suppose that three states completely dominate the national market for one resource. To simplify the analysis assume that each state supplies one-third of the market, that supply in all three states is equally elastic, that aggregate demand is totally inelastic, and that no consumption of the resource in question occurs within any of the three producing states. (The last assumption implies that any tax that

is shifted to consumers is also exported.) Suppose now that the three states impose severance taxes of 10 percent, 20 percent, and 30 percent, and that consumers of the taxed resource question the constitutionality of one or more of the severance taxes under the Commerce Clause, on the grounds of tax exporting. Our objective is to attempt to help the Court to determine how much of any tax under challenge is exported in this hypothetical case.

The answer to this question depends upon exactly how the factual situation described above is interpreted. First, suppose that only one of the state taxes is under constitutional challenge, but it is asserted that this tax was set with the collusion of the other two producing states.[15] Since the state tax rates are set at different levels, by assumption, "collusion" must be interpreted as being complete at the 10 percent level, as involving only two of the states at the 20 percent level, and as being non-existent at the 30 percent level, at which one of the states is "going it alone." The result of an analysis under these assumptions is given in the top part of the second group of four columns in Table 1. (The bottom part of these columns just repeats information contained in the top, and is therefore ignored.) The 10 percent tax can be exported entirely to non-resident consumers, because dominance by colluding states is complete at that level. The same is true of the first 10 percentage points of the 20 percent tax. But only two-thirds of the second 10 percentage points of the 20 percent tax can be exported. This raises the interesting question of whether the courts should be concerned with this <u>marginal</u> export rate of 67 percent or with the <u>average</u> export rate of 83 percent. Finally, by analogy to the results for the first two rates, we see that 67 percent of all revenues resulting from the 30 percent tax can be assumed to be exported to

Table 1

Percent of Taxes Exported
Under Alternative Conceptual Experiments

Tax(es) under Challenge (percent)	Taxes in Other States Assumed to Be Set Independently of Tax(es) Challenged*				Taxes in Other States Assumed to Be Set In Collusion			
	1st 10%	2nd 10%	3rd 10%	Total	1st 10%	2nd 10%	3rd 10%	Total
10	33	-	-	33	100	-	-	100
20	33	33	-	33	100	67	-	83
30	33	33	33	33	100	67	33	67
10 and 20	67 67	- 33	- -	67 50	100 100	- 67	- -	100 83
10 and 30	67 67	- 33	- 33	67 44	100 100	- 67	- 33	100 67
20 and 30	67 67	67 67	- 33	67 55	100 100	67 67	- 33	83 67

*Where two taxes are challenged, it is assumed that they are set in collusion, but independently of the tax in the third state.

non-residents. But at the margin only 33 percent can be exported.

Collusion between the states is, of course, only one possible analytic scenario. Any state defending the constitutionality of its severance tax against a charge of exporting would naturally deny that it had acted in collusion with its sister states in choosing its tax rate.[16] This denial would probably be especially convincing if all the taxes under examination had not been imposed at their existing rates within a short period of time.[17] Under this description of events, taxes levied in other states would be of no direct analytical relevance. Stated alternatively, they would be of no more relevance than geologic overburden or the weather, regardless of their levels. Under this "independence" description of the process of setting tax rates, each state would export one-third of its tax, both on average and at the margin, as indicated by the top part of the first four columns in Table 1. This rate is, of course, well below any of the export rates in the "collusion" columns of table 1, except for the marginal rate on the last 10 percentage points of the 30 percent tax. Thus it matters a great deal whether the courts believe severance taxes are set independently or through collusion.

Even the difficulties arising from the ambiguities described thus far are compounded if more than one tax is challenged in a particular suit. Suppose, for example, that both the 10 and 20 percent taxes are challenged, but under the independence assumption. (That is, it is argued that the 10 and 20 percent rates are set collusively, but independently of the 30 percent rate.) Since these two states account for two-thirds of total output, 67 percent of the first 10 percentage points of the taxes could be exported. But only 33 percent of the next 10 percentage points of the 20 percent tax could be exported. Thus

we have an export rate for the 10 percent tax (67 percent) that differs from both those previously determined (100 percent under total collusion and 33 percent under total independence). The 33 percent marginal export rate for the 20 percent tax equals the export rate for the 20 percent tax challenged alone under the independence assumption. But both it and the 50 percent average export rate differ substantially from the marginal and average rates under the collusion assumption (67 and 83 percent, respectively). Even worse, contrast this situation with the case in which the 20 and 30 percent tax rates are challenged, under the assumption that they are set collusively, but independently of the 10 percent rate. Here the marginal and average export rates for the 20 percent tax are both 67 percent, a figure found in several other cases, and for the 30 percent tax considered under these circumstances the marginal rate is 33 percent, as is always the case for this tax. But the average export rate of 55 percent is found in no other case, including that in which the 10 and 30 percent rates are challenged simultaneously, under the assumption that they are set independently of the 20 percent rate (where it is 44 percent).

This simple example suggests the difficulty of gaining the "evidentiary evidence" needed to determine whether or not an unconstitutional degree of tax exporting occurs. In this case the basic economic analysis is relatively straightforward, being severely circumscribed by the simplifying assumptions underlying the example.[18] But the degree of tax exporting one finds depends crucially on a) which of the three taxes is being examined, b) whether it is being examined alone or in conjunction with a suit questioning the constitutionality of the tax levied by one or more other states, c) whether it is assumed that the tax (or taxes) is (are) set independently or in collusion with one or more other

states, and d) whether one is interested in the average or marginal rate of tax exporting. It is difficult to know whether these questions can generally be answered satisfactorily, given that except for the third, independence versus collusion, none of them has ever been explicitly asked before. Certainly, one might want to agree in principle with Justice Blackmun (footnote 17) that "the complexity of a properly presented federal question is hardly a suitable basis for denying federal courts the power to adjudicate." But one should probably not be overly sanguine about the outcome of such adjudication, in part because it is so difficult to know when the question is presented properly.

III. Substitution, Regulation, and Transportation

Discussion to this point has been entirely in terms of "a commodity" or "a natural resource." In order to focus on the role played by market dominance, we have generally assumed that aggregate national demand for that commodity is totally inelastic. But aggregate demand for commodities tends to have at least some price elasticity over some range of price, especially in the long run, if only because of the existence of substitutes of various degrees of perfection. Thus aluminum can be substituted for steel in the production of automobile engines; glass and aluminum are substitutable in the packaging of beer and soft drinks; for some uses electrical wiring can be made of either aluminum or copper; and coal, gas, oil, nuclear power, and solar energy are actual or potential substututes. Cutting the other way is the fact that "coal" can be either high or low sulfur. The two are not perfect substitutes, and the Great Plains states come much closer to complete dominance of the market for the preferable low sulfur variety. Moreover, the degree of potential substitution changes over time, as new technology evolves, in part in response to shifts in relative prices. This,

alone, makes it difficult to make estimates of tax exporting that are immutable, as well as accurate when made.

Any state attempting to export taxes on natural resources must recognize these possibilities for substitution between commodities in designing its tax system. Of particular interest in the context of Commonwealth Edison is the potential for substitution between coal and various alternative sources of energy, particularly in the generation of electric power. A simple relabeling of figure 1 will allow us to examine this situation. Suppose that panel A describes the supply of steam coal and panel B that for oil and gas used in generating electricity, as well as aggregate supply and demand for fuels used for this purpose. (It would be necessary to rescale the horizontal axes in terms of B.T.U.'s and the vertical axis in terms of price per B.T.U.)

Suppose, now, that the prices of oil and (indirectly) gas are determined outside the model, say through the actions of OPEC. (The role of federal agencies responsible for the regulation of the prices of oil or gas is considered below.) If coal were sold in spot markets, an increase in this externally-determined price for oil or gas would be reflected in a corresponding increase in the price at which coal could be sold, and therefore in the economic rents being received by owners of coal. This increase in rents is much like that resulting in a non-taxing state when a tax is imposed by one producing state. Some observers tend to conclude from this induced rise in the price of coal that a severance tax levied on coal would be shifted forward to consumers. This would, of course, be erroneous, unless one believes that the higher taxes on coal were enacted in collusion with the members of OPEC. In a sense, the higher price for the competitive fuel acts like an umbrella over owners of coal,

allowing them to raise their price. But it is the OPEC umbrella, not the tax on coal, that would cause the price of coal to rise.[19] The analysis presented thus far indicates that in a situation such as this, where the taxing states do not dominate the relevant market, in this case the market for fuel for generation of electricity, the severance tax on coal cannot be exported to non-resident consumers.

Coal has a very high ratio of bulk and weight to value. Thus, transportation costs loom large in the price of coal delivered to electric utilities in Texas and the Midwest. But the demand for transportation is also extremely price inelastic, especially in the short run, since coal that cannot be taken to market has little immediate value. (Of course, over the longer run electric generating plants can be built nearer the coal mines so that electricity, rather than coal, can be transported.) To the extent that railroads have monopolies in the transportation of coal, and are not hindered by price regulation, they can capture some of the increased rents resulting from higher prices by raising freight rates.[20] Indeed, in a sitution in which coal is sold in spot markets and aggregate resource rents are determined by the price umbrella being held by OPEC, the states and the railroads may compete to capture the available rents. Which is more successful probably depends on the relative abilities of a) the states to collude and play off railroads against one another and b) the railroads to whipsaw the states.[21] In any event, if either taxes or freight rates were raised, rents would be captured by the states or the railroads. Neither kind of increase in cost could be shifted forward to consumers, since an attempt to raise the prices for coal above the umbrella price would cause conversion to oil or gas, at least in the long run.[22]

There is, of course, considerable difficulty in pretending that coal is sold on spot markets. As is well known, the great majority of coal presently being produced is sold to public utilities under long-term contracts. The price received for coal under such contracts would generally not be directly affected by the actions of OPEC. But if the contracts provide for the pass through of severance taxes, price would rise by the full amount of any increases in taxes, up to the level equivalent to the new price for oil and gas.[23] That is, the existence of such contracts would greatly modify the spot market result, by providing that the creation of rents through increases in price could occur if, and only if, the rents were taxed away. Under these circumstances it is clearly more natural to think of the increase in severance tax as being borne by the consumer than by the recipient of rents, since in the absence of the tax the rents that are "taxed away" would not exist.

Government regulatory activities have tended recently to accentuate the ability of coal-producing states to export severance taxes.[24] First, the decontrol of the price of oil would have freed economic forces that would have created the kind of price umbrella described earlier; this would have facilitated tax exporting via price increases sanctioned under long-term contracts. A similar effect might have occurred if natural gas had been decontrolled. In fact, however, regulatory activity has gone even further than merely allowing the umbrella prices of oil and gas to rise to the level set by OPEC. Prohibition of the use of oil and gas in new electric power plants segments the market for hydrocarbon fuels and makes the umbrella price set by OPEC largely irrelevant.[25] The coal-producing states do, of course, enjoy substantially greater dominance of the market for coal than of the market for all fuels poten-

tially used in generating electricity. The only important remaining potential competition for coal comes from nuclear power, hydroelectric power (especially imported from eastern Canada), and eventully perhaps solar energy. Government regulation of nuclear power, which could even take the form of a moratorium on future installations, further segments the market and reduces the constraining influence of power from this alternative source.

As suggested above, freight rates for the shipment of coal resemble taxes. If coal is sold under long-term contract, increases in freight rates are likely to be borne by consumers, until the umbrella price is reached. If the discipline provided by the world price of oil is removed by government regulation, the only limit that would remain on the ability of states and railroads to tax consumers would appear to be joint maximization of the sum of severance taxes and railroad profits. A study by Zimmerman and Alt (1981) suggests that if Montana and Wyoming were to act collusively, but as the residual supplier of coal, the tax rate that would maximize joint tax revenues, given present freight rates, would be 62.5 percent. This would represent an increase of about $3 per ton over the present tax. Zimmerman and Alt (1981, p. 20) note that increases in freight rates since 1975 that cannot be explained by various determinants of costs amount to over $2.

The discussion of this section indicates that in addition to the considerations described in section II, it is important to know the extent of potential substitution between various natural resources, in order to be able to predict the degree of tax shifting and exporting. By itself, this may be a tall order, especially for a commodity such as aluminum. Moreover, the existence and nature of long-term contracts can be important. Finally, changes in government

regulations can make it either more or less difficult to export a tax, and railroads may vie with states for the economic rents potentially available from natural resources. Considerations such as these add to the "formidable evidentiary difficulties" encountered in estimating the degree to which taxes on natural resources would be exported in a given situation.

Moreover, analytical results might well be capricious, or at least transitory. For example, one could easily construct an example in which nothing differed between two situations except the extent to which sales were made under long-term contracts. Should the tax be held constitutional in one case, but not the other? Might a natural evolution of contracts that did not depend on influences of taxes result in a change in the finding of constitutionality? Would private parties really be allowed to rewrite contracts to provide that any new tax would be passed through, and therefore be found unconstitutional? What if contracts allowed pass through for some taxes but not others? It is not unusual for constitutionality to depend on the exact way in which statutes are written. But should the constitutionality of a tax depend upon the degree of tax exporting, if that, in turn, were to depend upon possibly subtle differences in the wording not of the tax statutes, but of private contracts? Should constitutionality of a severance tax on coal ride the actions of OPEC or on whether or not a moratorium on the construction of nuclear power plants eliminates a potential constraint on the ability to shift taxes forward, especially when regulations such as these may depend on the occurrence of accidents such as that at Three Mile Island?

IV. Other Producer Taxes on Natural Resources

To some extent, the incidence of property taxes and income taxes is

more difficult to assess than is that of severance taxes. This is true, in part, because the incidence of those taxes depends on how they are assessed on natural resources, details that are not necessarily revealed by these generic terms. Beyond that, the theoretical literature on the incidence of excises, of which a severance tax is one variant, shows less recent "churning" than does the analogous literature on these two taxes. It does, however, generally appear that such taxes imposed by producer states are less likely to be shifted forward and exported to non-resident consumers than are severance taxes.

Producing states are likely to attempt to use a net income tax to tap rents from natural resources in one of two ways.[26] The most effective way would be to employ separate accounting, under which the firm or group of firms operating in the state would be required to treat their activities in the taxing state, or those functions that are particularly profitable, such as production, as separate entities. Thus, for example, Alaska has required that separate accounting be used to measure the taxable income of oil and gas companies resulting from production and pipeline transportation, although it uses formula apportionment (to be discussed immediately below) to tax other industries.[27] If the deductions allowed in calculating net income under this approach are set arbitrarily, as they are in Alaska, so that they vary little with expenses actually incurred, a tax that is described as being levied on net income may actually resemble fairly closely a peculiar form of severance tax with a fixed deduction or credit. In that instance the analysis of sections II and III applies. (But pass-through of such taxes may not be allowed under long-term contracts.) If, however, actual expenses are used in measuring net income, the tax is more likely to resemble a true income tax and to be borne by recipients

of rents. Certainly there is little reason to expect shifting to consumers, except in the case of substantial market dominance by the taxing state.

Most states actually employ formula apportionment, rather than separate accounting, to determine the part of the income of a nationwide firm on which to levy tax. That is, the state taxes a fraction of the firm's total income equal to a weighted average of the firm's fractions of nationwide payroll, property, and sales occurring within the state. (Usually these three "factors" are accorded equal weight.) I have argued elsewhere that a tax such as this should be interpreted as economically equivalent to three separate taxes, levied on payroll, property, and sales, at rates equal to the product of one-third the statutory rate and the firm's nationwide profit margins on payroll, property, and sales.[28] The portion of the corporate tax related to property is likely to have incidence much like that of a property tax, the effects of the payroll-related part of the tax are likely to resemble those of a payroll tax, and the incidence of the sales-related part of the corporate tax can be expected to resemble that of a tax on sales.

States generally base the sales factor on sales at destination. But substantial producing state interested in exporting its income tax (or, indeed, gaining substantial income from it) would define sales at origin, rather than at destination. For example, before moving to separate accounting for the oil industry, Alaska had employed sales at the wellhead in its sales factor for that industry. Only this case seems worth considering in the present context. (The use of formula apportionment by consuming states in an attempt to tax resource rents is considered in section V.) An income tax on a resource sector levied on sales at origin is, of course, roughly equivalent to a severance tax.

It seems unlikely that the parts of the income tax related to property or to payroll would result in much exporting of burden to nonresident consumers. Both would probably be borne largely by recipients of rents originating in the state.[29] The conditions under which the sales-related part of the corporate tax could be exported would seem to resemble those for the severance tax, except that effects would be much more difficult to untangle, because the effective rate of tax applied to sales differs between firms, depending on their rate of profitability throughout the nation. This complication, does, of course, make it more difficult to assess the likelihood of tax exporting.

There are a number of ways of valuing deposits of natural resources for the purpose of levying property taxes. These do, however, tend to be reducible to an attempt to set an assessed value on property based on the present value of the stream of future income.[30] If that is a stream of net income, the analysis of the incidence of a property tax resembles that of the incidence of an income tax. (Presumably the similarity is to an income tax levied under separate accounting, not formula apportionment. If, as is more common, a stream of gross receipts is being discounted, the property tax tends to resemble a severance tax. In either event the analysis presented earlier should be generally applicable, and is not repeated.[31]

V. Tax Exporting by Consuming States.

Apparently spurred on by widespread publicity of the image of "blue-eyed Arabs," consuming states have been considering, and even enacting, legislation that they probably hope would allow them to cut themselves in on the increased rents from natural resources that have resulted from the actions of OPEC and from shortages of various natural resources. The likely distributional

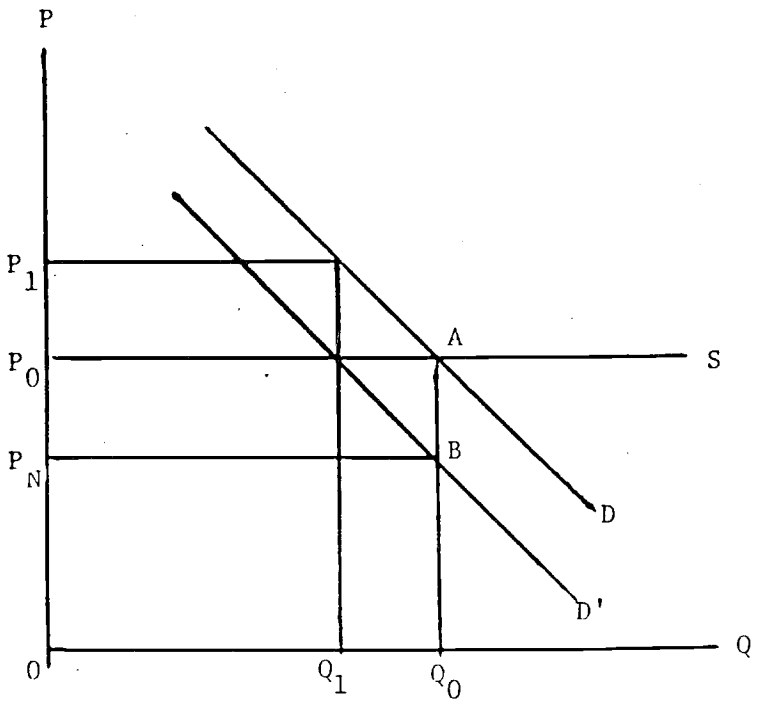


Figure 2

Incidence of a State Tax on
Gross Receipts, with and
without Price Control

effects of two such efforts by consuming states deserve special attention.

Several states, among them New York and Connecticut, have passed gross receipts taxes on petroleum companies operating within their boundaries, coupled with provisions intended to prevent the companies from raising prices of products sold in the state in response to the tax. The intended effect can be examined using figure 2, and is easily understood. The supply curve S faced by any individual consuming state is almost completely elastic. Imposition of a gross receipts tax implies that the state's demand curve, as seen by the industry, D', would lie below the actual demand curve D by the amount of the tax. In the absence of the limitation on price increases, the price in the taxing state would rise by the full amount of the gross receipts tax, or from P_0 to P_1, and the equilibrium quantity of petroleum products sold in the state would shrink from Q_0 to Q_1. Needless to say, such a tax would simply be borne by resident consumers, and would not be a very popular measure in states already burdened by high and rising costs of energy.

The prohibition on raising price in response to the tax is intended to change the nature of the demand curve faced by the oil companies in the taxing state. The price ceiling implies that to the left of point A the demand curve becomes horizontal at price P_0. As seen from the vantage point of the consumer, it appears that nothing would be changed by imposition of the tax; the price would remain at P_0 and the consumer would be in equilibrium at Q_0. Rents of the oil companies would simply be reduced by the vertical distance between P_0 and P_N. Note, however, that the oil companies would not be in equilibrium in this situation, at least in the long run. As seen by them, the demand curve (net of tax) would be P_NBD'. The attempt to combine the gross receipts tax with price

controls would result in diversion of petroleum products to other markets; if the supply curve were as elastic as shown here diversion would be complete, because $P_N BD'$ lies below the supply curve at every point. In short, in long run equilibrium the goal envisaged in this legislation would not be realized.

Of course, rents could be captured in the short run. While the long-run supply of petroleum products might be almost as elastic as shown in figure 2, in the short run supply is less elastic than is indicated here. In particular, service stations cannot be converted instantaneously to other uses and long-term contracts of various kinds exist. Depending on the exact nature of contractual arrangements and other rigidities, the short-run effect of a policy of this type might very well be a substantial reduction in rents.[32] Note, however, that this burden might very well be borne in large part by resident owners of service stations, rather than by oil companies, depending on contractual arrangements.

Finally, if the tax and price ceiling described here were imposed in the context of federal allocation of energy among states, the consuming states would find long-run exportation of their tax to owners of oil companies substantially simpler. This combination of policies would have the effect of imposing on the oil companies a totally inelastic supply curve and confronting them with a totally elastic demand curve at the prevailing retail price. The use of state ceilings on prices has, however, been found to conflict with federal regulation of prices of energy, and therefore to be illegal.[33]

It appears that a movement is underway in many consuming states to attempt to use the so-called unitary method of taxing corporate income to capture part of the rents of the oil companies. This movement can be traced to two

recent Supreme Court cases.[34] In Exxon Corp. v. Wisconsin Department of Revenue the company had used functional separate accounting to argue that only its production activities were profitable. (It claimed that both exploration and development and marketing were not profitable.) It therefore argued that Wisconsin should tax none of its income, since only marketing occurred there. The Supreme Court rejected this argument, noting that Exxon carried on a "unitary business" extending from exploration and development through production to marketing. In such a case, the Court ruled, a state was justified in using formula apportionment of the entire income of the corporation and that separate accounting could not be used to insulate production income from the tax net of the consuming state.

In Mobil Oil Corporation v. Commissioner of Taxes, a case decided shortly before Exxon, the Court went even further, in ruling that states could constitutionally include dividends, including those paid from income earned abroad, in income to be apportioned by formula, so long as a unitary business was involved. Consuming states may see in the unitary business approach the opportunity to apportion to themselves income of the oil companies that they would not be able to tax under separate accounting. (Naturally they define sales on the basis of destination.) This, they apparently think, will allow them to take a share of the rents of the petroleum companies.

The analysis of the incidence of the corporate income tax outlined above suggests that these expectations may not be realized, at least in the long run. Where any one state is concerned, the corporate income tax is best considered to be a composite of taxes levied on whatever enters the state's apportionment formula. This being the case, it appears that the sales-related part

of the state corporate income tax should have incidence very much like that of a state sales tax. We would not, of course, ordinarily expect this to be borne by rents, in the absence of measures to prevent pass-through of the tax, such as those discussed earlier. Similarly, to the extent that property and payroll are required to provide distribution of energy within the taxing state, we would expect the burden to be on consumers, rather than on rents.[35]

Note, however, that once again the incidence of a particular tax depends on the exact question being asked. Suppose all consuming states were to impose corporate income taxes using the same rate and apportionment formula. In such a case the aggregate of all such taxes would, indeed, be just a corporate income tax, not a composite of taxes on the factors in the formula. Such a tax would probably be borne largely by rents. Thus we are faced again with the question of whether taxes are set independently by consuming states, or in collusion. In this case independence would imply a burden on resident consumers, while collusion would imply exporting to recipients of rents.

VI. Concluding Assessment

Despite the venerable position the analysis of tax incidence has occupied in the history of microeconomic thought, much work remains to be done in establishing the principles that determine the ability of states to export taxes and in gaining general understanding of, and agreement on, those principles. Often the results of analysis depend crucially on exactly what question is being asked and how it is framed, something that is not generally recognized. Moreover, even if there is widespread understanding and agreement of the principles of tax incidence and the proper questions are being asked, extremely complex factual inquiries may be required in some instances to determine the

extent to which taxes are likely to be exported. These involve careful investigation of the considerations discussed in this paper and the impact they have. Even worse, economic considerations are not constant over time, as tastes, technological opportunities, and known availability of resources change. Beyond that, institutional change can bring with it changes in the extent of tax exporting. It seems extremely difficult to gain sufficient agreement on the likelihood of exporting of various taxes to provide the basis for adjudication. Basing legislation on estimates of tax exporting, is, of course, somewhat more practical, since Congressional hearings provide a forum in which to consider such estimates -- though not one particularly conducive to determination of truth.

Footnotes

*The author is a Senior Research Fellow at the Hoover Institution at Stanford University. At the time this paper was prepared he was Vice President of the National Bureau of Economic Research. The opinions expressed here are solely the author's, and not those of the Hoover Institution or the National Bureau of Economic Research.

[1]Throughout this paper references made by the Court in quoted material are omitted.

[2]Blackmun's dissent goes on to say, "If the trial court were to determine that the tax is exported, it would then have to determine whether the tax is 'fairly related' within the meaning of Complete Auto Transit." The Blackmun dissent also disagrees with the majority's interpretation of the important fourth prong of the Complete Auto Transit test of a Commerce Clause violation. As Blackmun noted (p. 8), the majority interpretation "emasculates the fourth prong." Under Blackmun's interpretation of the forth prong, substantial additional evidentiary burdens would arise. (See Hellerstein, 1978). These issues are not discussed further here. Nor do I consider the extent to which taxes can be considered payments for benefits received; indeed, benefits of public services are ignored completely in the discussion of incidence analysis that follows.

[3]Taxation of energy is only one source of potential conflict in a nation that suddenly believes it is running short of natural resources. As has been noted by many observers, other natural resources, Florida sunshine, the histori-

cal advantage of the New York stock exchange, and various other instances of geographically-concentrated production, such as automobiles in Detroit in the 1950's, have the potential of raising constitutional challenges akin to those in Commonwealth Edison. These are not considered here. Nor do I consider taxes on "processing" of natural resources, such as oil refining in Texas or generation of electricity in the coal states. But see McLure (1980b).

[4]Gillis and McLure (1974, p. 391) distinguish between the legal owner of resources and the economic owner, the distinction being that the focus in incidence analysis is on who bears the burden of taxes that reduce resource rents. Note that this can be taxpayers, throughout the nation, when taxes reduce royalties on federal lands.

[5]A careful reader will note that the elasticities of supply and demand cannot really even be specified until the various factors mentioned in this sentence are considered. The somewhat imprecise wording of the text is used simply to emphasize that in the analysis of geographic tax incidence one must be particularly careful to consider such factors, rather than simply drawing a diagram containing the supply and demand curves for the entire nation, as is sometimes done. Elaboration on this point is the purpose of much of the remainder of this paper. Unionization and market structure, factors that can significantly affect incidence even in closed economies, are not considered here, in order to allow focus on determinants of incidence that are particularly important in a geographic context.

[6]One fourth probably should not be considered to be a "relatively small" part of national output for the purpose at hand, which is to show the role

played by market dominance in the analysis of tax exporting. But a tax levied by a state that really produced only a very small share of national output would have such a small impact on price that the effect could not be shown clearly in this diagram.

[7]This exposition treats severance taxes as simple per unit levies on output. Consideration of a similar tax based on value of output would change little. But more complicated forms of taxation could render the analysis substantially more difficult and -- to stress a major theme of this paper -- determination of the degree of tax exporting perhaps more uncertain.

[8]This reduction in rents per unit of output applies, strictly speaking only to the quantity produced in the situation with the tax in place. Producer surplus is also lost over the range between Q_{AO} and Q_{A1}. But because the supply curve is upward-sloping the average loss of surplus over this range is only about one-half that on the units that are produced when the tax is imposed.

[9]A careful statement of the second requirement should probably be in terms of net exports of the taxed good. No net exporting of the tax would occur if state A bought from state B as much (or more) of the taxed commodity as it sold to state B. This complication is ignored here, as elsewhere. See also footnote 12 for further consideration of this interpretation of tax exporting.

[10]One way to see this is to realize that to produce a given shift in S_T a higher tax is required in state A than in state B. Thus a given tax-induced increase in price represents a greater fraction of the tax if B is the taxing state.

[11]The fraction of a production tax that is reflected in higher prices is given by $F = \frac{S}{S + D} \cdot \frac{\alpha s_t}{\alpha s_t + (1 - \alpha)s_n}$, where S and D are the nationwide elasticities of supply and demand for the taxed product, s_t and s_n are the elasaticities of supply in the taxing and non-taxing states, respectively, and α is the taxing states' share in national output. Strictly speaking the result given in the text occurs if either a) all supply curves are equally elastic and demand is totally inelastic or b) all supply curves are perfectly elastic, regardless of the elasticity of demand. The second condition is rather misleading, since the slightest effort to tax output would price the taxing state completely out of the market. For convenience the discussion that follows employs the first of these weaker conditions. Of course, to the extent that demand has some elasticity, the degree of tax shifting is overstated.

[12]This conclusion can, of course, be generalized to any number of producing states. In the extreme case of completely inelastic demand consumers would pay an additional amount for the taxed commodity (including quantities bought from non-taxing states) that is exactly equal to the tax revenues collected by the one state levying the tax. This has led Peter Mieszkowski to suggest that perhaps the entire tax should be deemed to be exported. I find such an interpretation quite inferior to my own, which I believe to be more in accord with prior literature and intuitive understanding of tax exporting. Moreover, the implication that tax exporting would always be complete under these conditions, and not dependent on the degree of market dominance, seems misleading, as well as counter-intuitive.

[13]Analysis similar to that of figure 1 can be employed heuristically to see

this. When the tax is imposed in the first state, it does not exist in the second. Thus 50 percent forward shifting is our standard result. If, now, the second state imposes a tax, we do our analysis with a supply curve for the first state that includes its tax. Again, 50 percent forward shifting and exporting occurs.

[14]The following statements quoted from Zimmerman and Alt (1981, pp. 20-21) are worth note:

> ...Montana and Wyoming have considerable market power. It would be in the interest of Montana and Wyoming to raise taxes above the currently high levels. The only effective break [sic] on the market power of these states is inter-regional competition...Clearly, concerted action among states or among railroads could remove the limits on market power.

The role of railroads is considered below.

[15]The relevance of this assumption is seen by noting that (in footnote 5) the dissenting opinion contains the following quotation from Church (1978, p. 278): "'[t]ax leadership' in western states appears to be an emerging reality." Similarly, it notes that "the 1974 Montana Subcommittee on Fossil Fuel Taxation was directed by the Montana legislature 'to investigate the feasibility and value of multistate taxation of coal with the Dakotas and Wyoming, and to contract and cooperate joining with these other states to achieve that end...'"

[16]This raises the interesting question of how "conscious parallelism" in setting state tax rates should be treated.

[17]Suppose, however, that the three rates had previously been zero, 10 per-

cent, and 20 percent. A uniform 10 percent increase in tax rates would be completely reflected in higher prices under the conditions assumed.

[18]Note that the possible variation in export rates is reduced somewhat in this example by the simplifying assumptions that a) output is split evenly between the states, b) rates differ by 10 percentage points, c) there are only three producing states, and d) all production is exported.

[19]Martin Zimmerman has noted in his comments on this paper that this result would hold only if both fuels continued to be competitive in the B.T.U.-equivalent equilibrium prevailing after the increase in oil prices by OPEC. Under these conditions the OPEC price constitutes a ceiling, as well as an umbrella. If the members of OPEC priced themselves out of the market for generating fuel, oil would cease to be a substitute for coal in that market, the OPEC price would not be a ceiling, and the ease of shifting and tax exporting would simply be given by the analysis of section II. In this respect, beyond the price at which oil became non-competitive the result would be quite similar to that for regulatory segmentation of the market discussed below. Shifting and exporting would be much more likely than if the OPEC price effectively constituted a ceiling price, as well as an umbrella.

[20]For more on this point, see Zimmerman and Alt (1981).

[21]Presumably the coal companies would not act as disinterested bystanders in this conflict; given their desire to protect their own interests, they can be expected to do some whipsawing of their own.

[22]In the situation described in footnote 19 above increases in freight

rates might be partially reflected in consumer prices.

[23]The price could, of course, go even higher, depending on whether taxes were set at rates greater than needed to capture all rents.

[24]An earlier federal policy that helped energy-rich states was the import quotas imposed on crude oil during the 1960s. This raised prices and created greater pools of rents for the states to tap, as did the pro-rationing activities of the Texas Railroad Commission and the complementary actions of the Interstate Oil Compact.

[25]Martin Zimmerman has noted that given present levels of OPEC prices these regulations have little such effect; OPEC has, in effect priced itself out of this market.

[26]On the general nature of state corporation income taxes, see McLure (1981c, 1981d, and 1981f).

[27]Alaska has recently gone back to a more conventional tax based on formula apportionment.

[28]For an analysis of the incidence and other economic effects of state corporation income taxes, especially those levied using formula apportionment, see McLure 1980a and 1981e.

[29]In an industrial context it might be more likely that the part of the corporate tax related to payroll would be borne by labor, since the later might be relatively immobile, geographically. But given the need to bring in large amounts of capital and labor to exploit natural resources, it seems unlikely

that in the long run either the payroll or property-related parts of the tax would not be borne by rents, except where taxing states dominate the national market.

[30]For more on this, see Mieszkowski and Toder (this volume).

[31]The point is not that the incidence and other economic effects of a property tax are identical to those of an income or severance tax. Substantial differences in the speed and efficiency of exploitation can be induced by differences in these taxes. But tendencies for tax exporting may be quite similar, despite these differences. Mieszkowski and Toder (this volume) note that in several states assessed value is based directly on the value of current output, making the similarity to a severance tax even closer.

[32]This could be shown by drawing an upward sloping short-run supply curve passing through point A and intersecting $P_N BD'$. The short-run price increase in the absence of the price control would, of course, be less than shown in figure 2.

[33]On this and other cases involving constitutional challenges of state taxes on energy, see Hellerstein (this volume).

[34]For an excellent discussion of these two cases, see Hellerstein (1980).

[35]These tendencies might, of course, not be fully realized in the short run, when there are many contractual obligations and other rigidities that would prevent escaping the burden of the tax.

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