

E. Recent price hikes, and ongoing deregulation, are bringing huge increases in wealth to owners of California oil and gas.

F. California derives no revenue from Federal OCS lands, for they are outside the State's boundaries. It is possible that if the State puts in place a working, active tax-gathering mechanism for upland oil and gas, it can be adapted to the tricky job of taxing offshore extraction through a "first-use" tax.

G. There is a State gasoline tax. Some of this is shifted backwards, to sellers. However, it fails to tap much of our mineral rents, for at least three reasons.

1. The real value of the State gas tax has fallen over many decades now, because of "reverse bracket creep." That is, it is a "specific" tax, so much per gallon, rather than ad valorem. So it fails to keep up with inflation. On an ad valorem basis it is now much lower than it was 90 years ago. In 1920, incredible as it seems, it was our largest source of State revenue.

2. The tax bears the same on gas from high cost wells as from low-cost wells. Thus, it cannot begin to tap the economic rent from the low-cost wells. It may be a tolerably good way to tap the taxable surplus from some of the high-way users, to the extent it is shifted forward to them. It is no way at all to tap rent from low-cost producers, even to the extent it is shifted back to producers: it hits the high-cost fields as hard as the low-cost fields.

3. The State subsidizes gasoline consumption by building and policing and maintaining and replacing its huge highway network. The gasoline tax falls short even of paying for that.

III. Some voice concern that a severance tax would simply be shifted forward to California consumers, and therefore be regressive, like a retail sales tax. The concern is unfounded in this case. The severance tax comes out of the surpluses now received by equity owners of the natural resource: it is largely a tax on rents from the natural resource in situ. Let us explain why.

There are four conditions that let producers shift a tax forward to consumers. These are:

A. Inelastic demand

B. Elastic supply

1. Lots of production from marginal fields

2. High elasticity of production

C. A high share of world production comes from the taxed jurisdiction.

D. The tax is based on activity (unit-of-production tax base), and structured so as to hit marginal production.

The first three of these conditions are not met in this case, as we will now see; the fourth is only partially met. Let us look at them one at a time.

A. World demand for oil is sensitive to price; it once proved to be quite so. That is why there was an oil glut, and

sinking prices following the initially successful Arab Oil Embargos, and in spite of OPEC's strong hold over world production.

To be sure, following these successes Americans foolishly let suburban sprawl run wild again, so now demand is elastic from a higher base. Clearly Americans collectively, represented by their governments and intellectual leaders, need to take permanent measures to curb sprawl and the excess demand for fuel that it generates. This calls for "shock therapy", such as we have sought to impose on Poland and Russia. Natural scarcity has just administered the shock to us. We must respond by throwing out the pro-sprawlers and re-compacting our settlements. Pro-sprawlers, or "the road gang", are a highly organized lobby led by oil firms, auto firms and dealers, cement and asphalt firms, civil engineering firms, certain law firms, various allied firms, and (tragically) certain universities and think tanks whose personnel dance to their tune.

B. Supply is fairly inelastic

1. California was a major producer long before the Oil Embargo, at a much lower price level than that prevailing today. Much of our production is not, therefore, from fields that are marginal at today's higher prices. California is not primarily an active margin of new exploration and production, like the Overthrust Belt that was brought in by high prices.

California does extract a good deal of "heavy," low-quality oil. This fact is often cited in opposition to severance taxes. For two reasons, this is not a reason for opposing this tax.

a. The extra refining cost needed for heavy oil takes place "after the Christmas-tree (wellhead)." The severance tax is imposed on the value of oil at the wellhead, thus exempting any value-added after the Christmas-tree.

b. Heavy oil is dirty oil. Refining it pollutes air severely, so it should pay a special tax as a pollution charge. (Economists call this a "Pigovian" charge, after A.C. Pigou, a British economist and advocate.) In this case, it would actually make more sense to impose the severance tax on value-after-refining. PROP. 87 might be faulted for having too narrow, rather than too broad a base, in this special case. In general, though, it would work better to impose a Pigovian pollution charge on its own merits separately. It should be tuned to pollution damages, rather than value-added in refining.

With increased awareness that global warming is real, and a problem, the case for taxing combustion, and the fossil hydrocarbons that fuel it, is now so strong that many people would favor severance taxes for this reason alone.

Some oil is now being extracted using costly advanced recovery techniques, like steam injection. This is another matter, because these costs are undertaken before the Christmas tree, and add to wellhead value, the tax base. It is against our interest to discourage advanced recovery by taxing the values it conserves. Objective facts are needed concerning the relative importance (continued on page 10)

of this special cost factor. Where oil revenues are 95% consumed by costs of extraction, there is little net rent remaining to tax at the wellhead.

Evidence cited above suggests that the marginal portion of California oil and gas production is not so great as to make most California production untaxable. It is only traditional, in any industry it is proposed to tax, for industry speakers to exhibit marginal firms and marginal lands as though they were typical. These are the "widows and orphans" of every tax debate, advanced to distract attention from the high taxable surpluses received by the more rentable (rent-yielding) fields.

2. The basic resource is supplied originally by nature, not man. Like other forms of land, it comes in a fixed quantity.

Most oil has a low "elasticity of production." That is, marginal variable costs of O&M per unit are low relative to the value of the unit. In economics, the marginal product of the current variable inputs is low relative to their average product. That implies you could cut back on O&M by, for example, 10%, and by so doing lower output only by, say, 2%. This is at the other extreme from a labor-intensive operation where lowering the labor input by 10% would lower output by 9% or even 10%. The difference is because oil to some extent produces itself, with minimal help from man: this is why oil in the ground sells for such fancy prices.

The points above may be expressed equally well in terms of costs per barrel of oil. Costs/barrel are simply the reciprocal of value-of-product/unit of input. The above reasoning says that the costs of squeezing out the marginal barrel, and converting it to high-quality oil, may be high, while the average cost per barrel (including the low-cost barrels) remains much lower.

C. Only a little of world supply comes from California. In fact, only part of California supply comes from California: much comes from Alaska. The middle east and Latin America stand ready to move in were California prices to rise much. Hugo Chavez is more than eager to supply American demands, and only doctrinaire bigotry would bid us refuse him. Alberta's fabled tar sands, containing more reserves than Saudi Arabia, have at last come on line. The giant machines needed are made in Milwaukee, abating any balance of payments problem. Thus, even if world demand were inelastic, demand for California oil would be highly elastic.

D. The proposed tax (severance) does hit marginal production. We will see (IV, *infra*) that this fault would be considerably offset by a drop in private royalties. These, like the severance tax itself, are a variable cost. They are based on units-of-production, and have the same disincentive effects as the severance tax. Private lessors, anticipating the severance tax, would offer about that much less to landowners in the form of royalties.

The remaining faults of a severance tax may be corrected by modifying it, as will be shown, to allow deduction of some costs.

IV. The severance tax does have some disincentive and anti-conservation effects on producers. However, these are only moderate compared with excise taxes on other bases. This is owing to the nature of the resource, and the institutions of the industry.

A. It is the nature of oil and gas fields to yield very high returns, with little variable cost, in a few "bonanza" years, followed by a long "tail" of dwindling yields over many years or decades. Then finally they go on a "stripper well" basis at the end of a long cycle. During the bonanza years, a 6% tax on yields has little effect. During the stripper years, it is possible and, in some jurisdictions, routine to lower severance tax rates.

If the explorer for oil finds nothing, it is no matter. If he does find something, revenues are so much greater than variable costs that a severance tax has little impact. After production declines, variable rates may be renegotiated, and often are. It is generally feasible to distinguish the bonanza years from the stripper years, as a practical matter.

B. Much oil and gas is produced by lessees who have negotiated payment packages with private, public, or aboriginal landowners. Part of the payment is always a "royalty" element. Like the severance tax, the royalty is a share of well-head value. The lowest royalty rates are 1/8, or 12.5%, more than double the severance tax rate proposed in PROP. 87.

Such rates have been standard since the beginning. In the last 50 years they have risen well above the old standard of 1/8. In Saudi Arabia they have long since risen above 50% with no noticeable disincentive effects. Many other private and public lessors, following the Saudi lead, have broken out of the old mold (imposed and long enforced by a unified group of major lessees) and raised royalty rates to high levels. Alaska, for example, takes a royalty from Prudhoe Bay, plus a 12.25% severance tax, plus a transit tax on use of the Trans-Alaska Pipeline, plus a tax on profits of oil corporations.

In such perspective, the 6% severance tax proposed in PROP. 87 seems trivial as a variable cost. The existence and prevalence of high royalty rates within the industry itself, voluntarily negotiated by private parties, indicates that they do not regard variable charges on production as significantly aborting economic surpluses.

Where a severance tax does drag down the rate of extracting oil, the loss is not total. Deferring is not destroying or aborting. The power of falling water, if not used today, is lost forever. Oil is different: less now means more later. Mis-timing may indeed result in substantial net economic losses, considering the time value of money. I do not minimize such losses, which most people, and even petroleum engineers, undervalue. However, many conservation-minded people, including some inside the industry, make the case that such deferral is a net social gain. One of its benefits is alleged to be, and may actually be, that slower extraction rates increase the total quantum ultimately recovered. On such grounds, (continued on page 11)

engineers have traditionally referred to a slow rate, that maximizes ultimate recovery while disregarding the time-value of money, as the "Maximum Efficient Rate", or MER.

On balance, tax-induced deferral is a net social cost. However, in the larger context, tax-induced drag offsets subsidy-induced acceleration of extraction rates, and is not obviously, on balance, a net social loss. For example the "depletion allowance" of the Federal income tax, which still applies to stripper wells, is a kind of "negative severance tax", i.e. a subsidy to rapid extraction. It is at tax rates much higher than the 6% severance rate we are considering here.

C. In negotiating new leases on private land, lessees would probably offer lower royalties than now, in light of anticipated severance taxes to fall on the lessee. Lessors would have to accept them. Thus the variable charge imposed by the State would probably be offset by lowering the variable charge paid to lessors.

It is true that lessors would then have lesser incentive to produce, but their incentives are hardly relevant. In the standard lease, production rates are determined by lessees. Lessors' incomes are almost purely parasitic, and useless as incentives. The standard lease terms simply recognize that lessors serve no economic function. The State might tax their royalties 100%, with little disincentive effects.

There are other possibilities, which lawyers writing the fine print in leases will want to cover, but we will leave the elegant variations to them. In general, lessees subject to future taxes might lower either the royalty rate, as above; or the "bonus bid" paid up front. If they lower bonus bids it is another social gain, because it tends to ease entry into the industry, and increase competition. Thus, either way the market goes, imposing the new tax would lead to an off-setting gain.

D. It is an interesting question how a new severance tax would be split between lessees and lessors under existing lease contracts. It seems most likely that existing contracts, if not simply silent on the matter, provide that a royalty owner receiving X% of wellhead value would also bear X% of the tax; and also that contracts that are silent would be interpreted in that same manner.

With incentives in mind, it would be most desirable to structure the proposed severance tax so that it would all come out of royalty-owners' shares, and none out of lessees' shares. This would eliminate disincentive effects on extraction rates, since royalty recipients have no control over such rates.

With distributive consequences in mind, however, the matter is not so clear. It is possible that lessees as a group are fewer, and wealthier, than royalty-recipients as a group. Facts are needed on concentration of ownership. A full-scale study is called for. Ownership of resources, and of corporate shares, are both traditionally shrouded in secrecy. Indeed, proposing and carrying out such a study might be more of a public benefit than the proposed tax itself. Perhaps the most politic way to proceed is first to impose the tax

at a high rate, on the assumption that ownership is highly concentrated; then let those taxed press, if they will, for a study of the concentration of ownership. Of course, that assumes an administration not dominated by the industry, something we have not seen for a while.

E. Intergovernmental relations.

1. The severance tax, like many other state taxes, would be deductible from the Federal income tax bases, both corporate and individual. Thus, from the State view, its disincentive effects are partly abated by an added contribution from Washington. In this respect it is superior to the most likely alternative state taxes, on retail sales. These are not deductible.

2. Federal income tax treatment of income from minerals, especially oil and gas, is generally very lenient on the taxpayer. In tax lingo, this tax source is "unpreempted." There is vast "tax space," a vacuum this or any State might reasonably occupy.

This answers the concern that might be raised about any tax on minerals, however structured: will it erode motives to find new mineral sources through exploration? The U.S. Congress is so unreasonably generous in this regard, the rents are there for the State to take.

F. Refiners and distributors.

Most of the oil industry is vertically integrated, so shifting a tax from one stage to another is mostly arbitrary, determined by internal transfer pricing policies. To the extent that competition prevails, however, tax incidence depends on the relative supply elasticities. Whichever stage of production has the most inelastic supply conditions will bear most of any tax. In this case, for reasons given, elasticity of supply of oil and gas in situ is probably less than that of refining services. As to distribution involving pipelines, these operate everywhere under quasi-monopoly conditions, mostly in vertically integrated form. Questions of shifting are primarily institutional, depending on the facts and agreements of each case. There is no general simple theoretical answer to the outcome in such cases.

In one sense a drag on extraction rates may benefit refineries. They may save capital by building less capacity, and using it over a longer period.

G. Air pollution

A severance tax has been advanced as a surrogate for a Pigovian pollution charge. It is not a good surrogate, in general, because it only slows down the flow of California oil. Unlimited foreign oil lies in wait to replace it.

On the other hand, see comments on heavy oil, supra.

V. The severance tax may be improved by allowing certain cost offsets.

The idea of a severance tax is to tap the rent from oil and gas. Rent is the value given by nature, before man adds value. Ideally, a severance tax would be imposed not at the well-head, as now proposed, but at the well-foot, before the costs of lifting.

There are several standard approaches to allowing cost offsets, to move from simple (continued on page 12)

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wellhead value to something approximating what we may call a true or pure severance tax. I will mention three.

A. Sliding rate based on flow. The idea here is that low-cost (high-rent) wells flow faster than high-cost (low-rent) wells, so the tax rate rises with the flow per well. This is clearly an approximation based on an incidental attribute of most low-cost wells, rather than low cost itself. Like any approximation, it will give results that only approximate a sought-for outcome. In some cases it will be far off target.

B. Use of rate classes, based on known standard recovery techniques. Under this system, wells are divided discretely into those using primary, secondary, and tertiary techniques. Oil from steam injection, a costly advanced technique, would be taxed at the lowest rate; modern gushers, if any, at the highest. The workability of the system depends in part on there being no "gray areas" between the standard recovery techniques. Its even more general weakness is that it is based on distinguishing among techniques, rather than the natural resource to which applied.

C. Redefining the tax base to exclude costs of extraction. This is getting to the "well-foot" basis of valuation cited above. The common American term for this tax base is "net proceeds." It is used in Nevada, Idaho, Utah, and South Dakota. It has eloquent expositors in Australian economists Ross Garnaut and Anthony Clunies-Ross, who have helped implement the system in Papua-New Guinea.

The net proceeds tax has something in common with an income tax, but with important differences. The ordinary income tax is in personam (human or corporate), so funny things may happen en route to the tax base. For example, overhead from headquarters in Houston or New York may be over-allocated to a California field, wiping out much of its net income. The net proceeds tax avoid this. It is based on the facts of particular fields or deposits, regardless of the owners' other circumstances. Only expenditures in situ are deductible.

The theoretical purist may prefer some scheme for perfect allocation of overhead to specific fields, for otherwise such overhead is not recognized as a legitimate cost. There are practical reasons, however, for preferring the net proceeds-in-situ approach. These are:

1. Local tax authorities are not equipped to audit the books and evaluate the allocations made by multinational firms, nor would the firms want them to;
2. There are strong sociological, anti-trust, and local reasons for embedding some bias against large, absentee owners;
3. It is widely believed that almost all large American firms would gain by cutting their administrative overhead. In addition, field operations are more purely productive. Some of the expenditures of central offices are for machinations that may benefit the firm at the expense of the public good.

Any of those modifications of the severance tax will lower the tax base. The lost revenue may be more than regained, however, by raising the tax rate. This, indeed, is a major purpose of removing non-land costs from the tax base: it allows the Treasury to tap more of the pure surplus from low-cost fields, without jeopardy of aborting production from high-cost fields, or marginal production from all fields.

A tricky question with taxing net proceeds is that of when to let capital costs be deducted. The subject deserves more time and space than available here; the writer has addressed it elsewhere.

VI. Conclusion

Rent has been informally defined as "fat in the private sector." To tap rent for public purposes there are two requirements. First, the tax base must be a source of rent; second, the tax itself must not abort or destroy rent. Oil and gas are indeed a source of rent. The severance tax would abort only a minor share of it, and this flaw may be remedied by modifying the tax to allow reasonable cost deductions. These would permit raising the rate to secure more of the rent from low-cost fields.

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(Editor's note: For GroundSwell space reasons, the above article's footnotes were not published, but they are available on request from the author.) <<