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Objectives of Government Policy in Leasing Mineral Lands

MASON GAFFNEY

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The statesman who should attempt to direct private people in what manner they ought to employ their capitals, would not only load himself with a most unnecessary attention, but assume an authority which could safely be entrusted to no council or senate whatever, and which would nowhere be so dangerous as in the hands of a man who had folly and presumption enough to fancy himself fit to exercise it.

Adam Smith

The statesman in charge of leasing vast crown lands might seem forced to direct private people how to employ their capitals, and their persons, too. He certainly has the power, and he certainly has the responsibility to use his power in the Crown's interest, but there is a way to do so without being arbitrary, capricious, meddlesome, subjective, tyrannical, or inefficient. To serve his citizens best, the statesman should act much like a private landowner maximizing his net income from lands. He should resist the temptation to use his power to manipulate and control, foster and suppress, divert and channel, reward and punish on the too easy presumption that the market has no rationale or normative value of its own. Generations of economists have established that it has, and governments seeking to improve on it need face a certain burden of proof. A landowner maximizing the net income from lands is tolerably likely, thereby, to be directing them to their highest and best use—that of meeting the most human wants and needs. Net income, after all, is a measure of the excess of benefits over costs.

The official who grasps that concept may then identify many costs that some people dump on others and benefits they bestow on each other. He may seek to internalize these externalities in his planning. But as one surveys the dogmas that hold sway in many professions concerned with land use, one sees a dozen bad ones for every good one. It is the rare official today who can sort these dogmas out well enough to improve on the market. This article is an attempt to help with the sorting. But the improvements that are possible consist mainly in helping the market work better, not in rejecting it.

In Canada a province that owns land may be subject to federal sanctions when it sets about collecting resource revenues. In 1974 John Turner, the minister of finance, advanced a budget in which provincial royalties were made nondeductible for federal income tax. The government fell, but the ensuing election made the new rule stick. A province must proceed with one eye on the constant power struggle on this front. We will show, however, that the most economic ways of collecting rent are also the least vulnerable to being declared nondeductible.

A maximizing landowner does not simply "maximize rent." First, there is intertemporal interdependence of rent, and the objective is to maximize the present value of net land income over time, not the rent of *any* one year. With minerals especially, timing is of the essence—not just when to produce but also when to explore, when to begin, how fast to produce, and when to stop. Second, there must be a rent base, which presupposes public investment in infrastructure and private and/or public investment in exploration. From the provincial viewpoint this need is eased by the over-proclivity of Ottawa to subsidize both exploration and infrastructure, and the province will frame its best strategy vis-à-vis Ottawa by knowing how to exploit this knee-jerk in the other team. But, whoever does it, it must be done.

Third, we must find ways to collect rent while preserving its total amount. This means avoiding heavy dependence on high gross royalty rates which destroy marginal incentives. We need other means to collect most of the rent, for rent is 60 per cent of the gross value of very low-cost mines, and 0 per cent of marginal ones.

Fourth, the land administrator should avoid dissipating rent by fostering or allowing excessive and premature investment. Land can be overdeveloped and prematurely developed as well as the reverse, and it is net, not gross rent one should maximize. Our "free mining" regulations make prospecting something like fishing on the open seas with unlimited entry, attracting new boats—or prospectors—until the average entrant can earn nothing above real costs, so there is no rent remaining. At the same time the land manager who puts reserves in cold storage should distinguish clearly between merely establishing tenure control to maximize net rent and the wielding of market power to raise prices. The latter approach is of negative social benefit when consumers are included and is of questionable benefit to the would-be monopolist unless he be exceptionally lucky and astute.

Fifth, we should avoid dissipating rent by letting lessees keep it on condition they plough it back into mining or exploring. This is in effect treating a capital investment in Mine B like a current expense of Mine A. It diverts rent from lessor to lessee and force-feeds capital into new mines below the social opportunity cost. Again, we should avoid dissipating rent by allowing rebates for domestic refining and consumption. The purported goal of subsidizing domestic secondary processing is to generate employment. But cheap feedstock induces substituting feedstock for labour. To foster jobs we should allow a wage credit, not a raw material credit. Fostering secondary industry to "develop resources" is a way of dissipating rent, not maximizing it.

Sixth, we should check and control the common itch just to meddle and manipulate. It is said that excess profits are either competed away or "imputed away" as rents. To that we should add they are often piddled away. A common kind of frittering arises from indulging the uneconomic ideologies of officials who control resources. A classic example is the "even-flow" doctrine of the forest service, embedded in the Hanzlik Formula.[1] Mining laws are replete with provisos where you pay less in return for doing this or that with supposed benefits to society. Redistributing wealth is a frequent rationale. Many a man with a little market power rationalizes his policies by assuming the mission to play Robin Hood, or perhaps God's avenging angel, within his little sphere, rather than use his resources efficiently. The result is neither efficiency nor equity, because equity far outreaches any one local industry. The official usually has no commission to impose his subjective concepts of equity on others and may only be putting a good face on self-interest in any event. The manager serves society better simply by maximizing the bottom line.

Subject to such provisos and understandings, the objective of government policy is to maximize rent and then, of course, to collect it. Rent is by definition a surplus above the return required to motivate production. It is equally well defined as the return imputed to land. In either concept it is essentially the fat without the lean. The less of the lean one cuts into by clumsiness, the more of the fat he can secure without impairing functional incentives.

The positive art of securing rent from minerals is the subject of other articles in this volume. Here I begin by clearing the ground of common and characteristic errors and blunders, errors embedded deep in our institutions, rhetoric, and cultural baggage; errors that preclude any rational effort to maximize welfare. I define eight of them: (a) overdecentralization, a hornet's nest of at least ten blunders likely to be committed in the effort to collect rent; (b) overdelegation of public authority to private giants; (c) overallowance for alleged risk; (d) overadmission of prospectors; (e) underpricing to domestic users and consumers; (f) confusion of rent and profit; (g) overlooking the taxation of nonmining activity; (h) overconsolidation of accounts, letting the strong hide behind the weak as to equity, and the weak behind the strong as to viability.

OVERDECENTRALIZATION

Overdecentralization is a transcendent bias in resource institutions. The bias makes us produce too little too late from rentable, superior deposits, too much too soon from marginal and unripe deposits and, on the whole, carry excess inventories of half-developed deposits and fixed capital along with inadequate working capital and flexible capacity to meet surprises. Overdecentralization has several causes and aspects.

Regional Development

The positive value of pushing back frontiers and opening new land is a notion engraved deeply on the cultural subconscious, inherited from generations of aggressive, landgrabbing ancestors. Having already grabbed more than our share, it is time in today's crowded world that we recognize this as overdone and concentrate on utilizing what we already have.

What is it we are trying to accomplish by regional development? Development and growth are not ends in themselves. The tundra lies peaceably until we need it; there is no call to occupy it just "because it is there." As human settlement expands we reach a margin where there are negative returns from more land development. To reach beyond that point is folly, and no less so because our ancestors did it.

Are mines the first wave of civilization? They are outriders all right, but they lack the power which agriculture used to have (when it was more labour-intensive) to pull much behind them. Mines are isolated and narcissistic, not seminal. Mine location is determined by geology with little relation to other resources and where people like to live. Output moves long distances to market. It is a truism of geography that mines create no great cities.

Mines do require much ancillary capital: rails, roads, power supply, ports and superports, unit trains, and pipelines are examples. But these are not shared much with other industries; they tend to be single-purpose.

In the philosophy of regional development private investment exerts great leverage over public investment. When someone finds a deposit way out in the bush the public chips in by extending utility and transportation networks. The marginal extensions are usually heavily cross-subsidized by the consolidated account bookkeeping that characterizes such networks. If regional development remains the lodestar, there can be no end to the submarginal extensions until they have completely drained off the surpluses generated by the rich territory of the systems. Thus, a good deal of the new capital that mines do pull behind them is a hidden subsidy of negative social benefit.

Mines do, of course, attract smelters, refiners, and reducers. But separating metal from oxygen consumes more energy per dollar of value added than any other industrial operation. Aluminum consumes some 133 kwh per dollar of value added, compared to about 10 in industry generally. Thus processing ores ties up great blocks of scarce energy and witholds it from higher uses. When the smelters are running they are known for their high load factors. This achieves some saving of capital, usually cited as a plus for the smelters. But in terms of regional development such savings accentuate their narcissism. With one consumer using the whole capacity of a power source or line there is no need to diversify the market to share the capacity. So again, subsidizing isolated mines can hardly be justified on the grounds of spillover benefits fostering regional development.

Smelters and refiners also consume another resource whose value has suddenly rocketed from the neglected to the exaggerated: the environment. A noisome smelter destroys the amenity value of real estate for miles around, which is to say the smelter owners have, in effect, appropriated part of the resources owned by others. Blighting the land repels people and discourages regional development.

As to employment, mining, often described as British Columbia's second largest industry, employs only 1.2 per cent of the labour force. Smelting and refining, too, are capital-intensive operations with a low share of labour cost per dollar of value added. The property income goes to develop those other regions like Palm Springs, Palm Beach, and Point Grey, where investors live.

Discriminating against On-stream Operations.

Governments that control price often pay less for "old" than "new" production. Prices may be controlled by a regulatory commission (like the United States Federal Power Commission) or by a government monopsony (like the British Columbia Petroleum Corporation). The British Columbia Petroleum Corporation pays 20¢ per mcf for old and 35¢ for new gas, (raised to 35¢ and 55¢ late in 1975). Where royalties are used, we sometimes find lower rates applied to newer wells or mines. Saskatchewan uses the tax mechanism so that new oil brings higher revenues to the producer than old oil. There is a tough surtax on prices over $3.38 a barrel, with exemption for new oil.

James R. Nelson labels this genus of policies "chronological marginalism."[2] It is a splendid example of the fallacy of identification. Old gas is identified with low-cost, rent yielding gas, and new gas the reverse. There is a half-truth in it when (real) gas prices are rising, because newer gas may have required the higher price to meet higher costs. But half-truths are not good enough. For collecting rent, chronological marginalism is like performing surgery with a rusty tin can.

The high royalty (or low price) in the case of older gas (or oil or ore) causes "high grading" there—marginal gas or ores are left in the ground. Even if old gas is really lower cost, it is so only on an average. Low-cost deposits have high-cost margins, and the policy in question here shuts in these intensive margins of the old deposits in favour of diverting effort to new ones. The results are overdecentralization, needless scatter, and territorial expansion.

An important aspect of high grading is "slow grading." That is, production plans are shifted to the future because when the fisc takes a gross percentage off the top from a mine, the percentage growth rate of the owner's equity rises by a leverage effect, if (as is normal) rising demand and falling real costs lie ahead.

D. Gale Johnson has pointed out that a share tenant has every incentive to take as much land as his landlord will allow, and skim the cream.[3] There is no cost to the share cropper if he uses more land; therefore, he substitutes land for effort in every trade off. He high-grades the land and spreads out.

The Indonesian system proposed for the United States by Senator Bentsen is a variation of chronological marginalism. Here, royalties are low until the lessee recovers his exploration and some other capital costs (which may mean a range of things); then royalties slide up to very high rates. There is a rough intuitive appeal—another half-truth—in the idea; however, it is only a variation on the rusty tin can analogy. Production from old units is choked off in favour of getting new ones off to a roaring start. The result resembles the lives of so many people: too many starts, too few completions.

Yet another variation is the system currently being introduced in Manitoba, which operates a bit like utility regulation. A firm is given a "profit base" equal to a percentage of its unrecovered capital. The tax rate on base profits is low, followed by a steep surcharge on excess profits. As capital depreciates the profit base falls. Utility economists will recognize the familiar setup that opens the door to "Averch-Johnson Effect."[4] The profit base is like a utility rate base. To maintain the base, the firms will sink capital into new ventures including many that are subeconomic and/or premature. Instead of collecting rent, Manitoba will subsidize waste as it forces the overdecentralization of mining.

Overallowance for Amortization

The private owner of minerals is likely to programme his extraction rate so as to maximize the present value, as he should. The lessee, however, is only too happy to tie up crown owned reserves on the cheap, if the Crown allows. Then the speculative gains accrue to the lessee while the holding costs, invisible to most citizens, are borne by them.

A frequent route to this end is to overstate required amortization periods. "Long production runs" are worth a lot when "long" means say five years instead of two. But here we are talking about decades, and it makes a big difference, because when decades are involved the cost of interest totally dominates the cost of capital regardless of the length of the production run.

A passing acquaintance with tables of compound interest is enough to make the point. The cash flow required to amortize a capital outlay in twenty years is only a little more than the flow needed to pay interest on it in perpetuity. That is, if you could let a lessee tie up infinite reserves, so his capital cost could be spread over all future time, his annual cost of capital would not be much lower than if he had to recover it all in twenty years. For example, if the interest rate is 10 per cent, then an investor need get only 11.75 per cent yearly for twenty years to recover his principal plus 10 per cent on the unrecovered balance.

Continuing the example, if we give him double the reserves, so he can spread his cost over forty years, we only lower his yearly cash flow requirement from 11.75 per cent to 10.23 per cent. This gain is negligible relative to many other factors involved, such as claimed risk premia which run up allegedly "required" or "target" rates of return by many percentage points. Table 1 provides some more data on amortization.

TABLE 1

CASH FLOW REQUIRED TO AMORTIZE $1 IN $\underline{N}$ YEARS.*

(1) n	(2) c.f.	(3) Decline of c.f.	(4) Decline of c.f. as percentage
10	0.163	–	–
20	0.117	0.046	28
30	0.106	0.011	9
40	0.102	0.004	4
∞	0.100	0.002	2

The tabulated data were derived from the following equation:

$$\text{c.f.} = \frac{i}{1 - e^{-ni}}$$

where,
c.f. = cash flow
i = 0.10
e = base of natural logarithms
n = number of years of amortization period

*Also known as the "capital recovery factor," "the annuity whose present value is one," and "the instalment plan."

In fact, in twenty years a miner is likely to replace much of his capital anyway, piece by piece. What you accomplish by giving him forty years' reserves is to delay half your production by twenty years, and half your crown revenues. On the plus side, you may defer some of his costs for twenty years (somewhat less than half of them) but there remains a net loss, the delay of his revenues above costs and the delay of public revenues.

The world of public leasing is rife with devices to lock up rentable reserves. "MER"[5] regulations are notable. They force the better deposits to be produced slowly, thus forcing premature recourse to remote and marginal deposits. In locking up rentable reserves one loses not only the time value of the reserves themselves, but also that of the capital used to discover, prove out and extract them. That is, the early overhead capital has to be recovered slowly. Interest accruing on this capital cuts deeply into the net rent available for the crown landowner to tap, by whatever means.

Well spacing regulations are of like effect. They require that each unit of capital combine with more reserves, over more years. Wide spacing on rentable reserves reduces output per year, inducing premature recourse to other deposits. Of course *some* spacing requirement or unitization is needed for a common pool, but it is a question of how much.

Another bad practice is the one Alberta followed during 1950-64 of allocating production allowables in proportion to well capacity and well depth.[6] This is the way many cartels operate, and, of course, the practice encourages the construction of otherwise useless capacity to claim quotas.

Another device, whose ostensible purpose is unclear, is allowing vast area units on permits and letting a permittee or licensee or lessee hold the whole area by token activity or by production from a small part. This pattern has marked coal leases in British Columbia.

In addition to wasting rent by wasting capital, policies that slow down capital recovery sequester extra capital in a form minimally complementary to labour. Basically, capital combines with labour and makes jobs when it turns over, that is when capital is recovered and reinvested. Policies like prorating to MER force each unit of capital to lie passively a long time before being recovered. New wells, instead of being financed with capital recovered from old ones, now have to tap outside capital, drawing more and more into the industry. Slow capital recovery to investors is the counterpart of slow delivery to consumers. The latter maintains prices, again forcing recourse to marginal deposits, accentuating the industry's drain on capital from outside. All this helps to increase national unemployment rates by reducing the flow of gross investment, and hence payrolls, associated with the finite fund of national capital. In short, witholding rentable reserves wastes them by delay of use, wastes capital by misallocation, and wastes labour by reduction of job demand.

Federal Tax Provisions

The federal income tax is heavy on what are now called "tax expenditures," that is, the income tax gives preferential tax treatment that subsidizes exploration. Expensing of exploration investments is a major subsidy. Most people fail to appreciate the extent to which time is of the essence in tax matters. The privilege of deducting capital outlays currently is worth so much that it amounts to 100 per cent tax exemption. The reasoning is all simplicity. The investor lowers his present tax liability, and hence his investment, by an amount equal to the tax-rate percentage of his outlay. Later he shares the cash flow with the government on the same percentage basis. So on his reduced investment he recovers principal and interest free of all tax. The fisc only earns a return on its own investment.

A depletion allowance is offered to mineral and petroleum producers, but to obtain it in Canada they must invest in new wells or mines. This requirement of new investment makes depletion allowance less stimulating to extant producers by limiting their control over the funds retained. It arrogates part of the stimulus to the purpose of making money cheap for explorers. Thus a large flow of annual capital from producing wells is simply forced into exploring and developing new areas and deposits, even though much of it might have higher alternative uses. Tax law makes it easier to put capital in than to retrieve it, like putting data into a bad filing system.

The Canadian tax treatment embodies the idea that the rents of Mine A are not really income at all if only they are sunk into Mine B. This entails two dangerous fallacies. First, it invites consolidation of accounts, loss of identities, and cross-subsidization, all of which are maleficent devices for having economic winners carry subeconomic losers, subsidizing the investment of scarce capital into ventures each of which, individually considered, would not pay. In the case of exploration the abuse is redoubled by the pooling of risk, which lends itself to the same fallacy, simply by pooling good and bad risks together on the ground that they are all "risks." Second, capital outlays are treated as current expenses.

Some mineral spokesmen allege they require the rent from low-cost units (often collected in the form of risk premia included in "required" rates of return) to cover losses elsewhere and exploration costs. If these rents were indeed all so expended it would dissipate the entire rent, meaning all labour and capital might as well be applied to other resources. There is not much point in that, especially for the Crown, which is left holding an empty sack. Truly, each individual expenditure should justify itself and stand on its own feet with regard to its probability of success. Any regression from this principle invites cross-subsidy and dissipation. Pooling has its uses, but when it degenerates into waste, it becomes an abuse.

After one finds a deposit or a field, and before one produces it, it normally appreciates. Accrual of value is not taxable before realization—a provision that in effect lowers the effective tax rate on all assets that appreciate over some years before sale. It is the deferral of tax that lowers the effective rate, regardless of other provisions. But in addition there is a depletion allowance so that part of the cash flow of producing deposits is untaxed. This allowance is limited, since 6 May 1974, to 25 per cent of production income, a less generous allowance than that in the United States, but still one not limited to costs. In Canada bonus bids and other land leasehold acquisition costs are deductible—in the States they are not, if depletion is chosen. To deduct the costs of acquiring and building up an asset, and then besides to deduct 25 per cent of its income, entails substantial double counting.

Property Tax Policy

Capital sunk into exploration on crown lands creates values that are largely free of property taxes. The same capital invested in city buildings would have to earn interest plus property taxes each year to earn its keep. But dry holes are exempt, as are geological maps and files of costly secret information. Possessory interests and occupancy interests are virtually exempt, as are access roads and rights of way. Marginal feeder pipelines are undertaxed, because assessments in British Columbia are based on load factors, which get lower toward the ends of any system. Most of the capital and land value used in and resulting from exploration and development on crown land simply is not subject to property taxes.

Minerals on private land are usually underassessed for property tax, but minerals on public land are not assessed at all. As crown lands are generally more remote, this is a decentralizing force. The more remote the lands are from population, the less likelihood there is of their being subject to future school taxes.

It has been alleged that a property tax on mineral reserves (such as Saskatchewan now levies on potash, Alaska on oil, British Columbia on sand and gravel, and most American states weakly on all minerals) will overaccelerate recovery. But the allegation is based on a partial analysis which ignores the fact that a property tax falls on competing investments. The equimarginal arguments of general equilibrium analysis require that any investment in deferral of extraction pay the same as other investments. Failure to tax mineral reserves results in over*de*celerated recovery from rentable deposits; failure to tax capital in marginal mines results in overdecentralized development.

Claimstaking

The rule of capture or "finders keepers" that pervades mining psychology and tradition and institutions contains a strong decentralist bias. It is a landgrabbing business not far beneath the patina of legal procedure, and the legal rules reflect this underlying spirit. Resources firmly under control may be held in reserve. The preternaturally frantic urgency is to stake out new treasures before those greedy other fellows. The more precarious tenures get priority.

Thus the United States federal government has held much of the Gulf of Mexico back from leasing, while its foreign tax credit and military-C.I.A. support boosted exploration in other nations. For a long time, too, the United States held Canada in reserve, abetted by Alberta's restrictive prorate policy. Canada, in turn, has heavily subsidized subeconomic scouting in the high Arctic, where the nuclear submarine wolfpacks rove—the national dominion is precarious and urgently requires confirmation.

Observe oil drilling in the North Sea. The big strikes are almost on the boundaries between the preserves claimed by the neighbouring nations.[7] Drilling occurs at the boundaries first; territoriality is the name of the game. Boundaries are always precarious, and unratified boundaries doubly so. They attract explorers like flies around a pot of honey.

Sliding Scale Royalties

Sometimes we find higher royalties applied to bigger wells or mines. British Columbia and Alberta both apply this rule to oil royalties. The evident presumption is that large scale development is identical with low unit cost. That is a half-truth and leads to capricious or random results. It is another form of tin can surgery.

To the extent that the preceding presumption *is* true, its rationale is faulty. Low-cost units have high-cost fringes, as noted earlier, and high royalties cause high grading. High grading and slow grading of rentable units coupled with low grading and early use of subeconomic units means overdecentralization.

Internalizing Earnings

Suppose the Crown avoids enough pitfalls eventually to collect some rent. What happens next? There is another snare before the public can benefit, and it relates to the agency in charge. Many officials in charge of any resource that yields revenues develop appetites to internalize earnings and build the industry, the professional fraternity, and the power base. They develop in-group, in-house ideologies (complete with industrial dependencies and constituencies) that tell them it is immoral for any dollar earned in mining (or forestry, gas, transportation, or power, among others) to be "diverted" to other uses. This is familiar bureaucratic behaviour. The antidiversion provisions require that the captive capital be reinvested in the agency empire, and that means overdecentralization again.

The British Columbia Petroleum Corporation is an example. To get the premium price for "old gas," producers must now reinvest the revenue in exploration and development. Saskatchewan law and federal law have the same effect via tax policy.

Cheap Money

When governments decide to foster something they usually subsidize the capital input primarily—they find ways to apply cheap money rather than cheap labour. We have seen how tax policy acts to force cheap money into exploration and early development of new mines; we have seen how empire building officials seek to internalize profits and supply their agencies with cheap captive capital. In addition, it is common for governments to lease valuable lands on easy terms to large firms in order to improve the firms' credit ratings—to help them raise money at lowest rates. This is a perennial plea of lessees seeking easy terms, and governments often go along with it.

Cheap money in resource economics is another decentralizing bias. The effect of cheap money is to attract and hold capital in mining. That means earlier inception of new projects, longer planned programmes of development and schedules of extraction, and slower liquidation of established deposits. The effect is exactly the same as exempting mineral deposits and capital from property taxes. In short, the availability of cheap money makes the industry carry too much fat and spread itself out like a person who overeats and underexerts.

The use of cheap money in mining has philosophical support from many persons who wish to expiate their guilt toward future generations. The idea is that cheap money means less discounting of the future and slower extraction. This ignores many points, but here we need only note that it is self-defeating. It is true that cheap money in mining is going to slow the use of on-stream deposits but it speeds the development of new ones. Overall it must increase total current output because it draws more capital into mining. Each mine may produce more slowly, but new capital must be attracted to marginal opportunities until the advantage of cheap money is offset by lower prices and higher costs.

Valorization

The mineral industries are marked by cartel schemes. These usually involve the active cooperation of governments with private conspiracies in restraint of trade—save that when government lays on its hands, "conspiracy" becomes "orderly marketing." Cartel restraint takes the form of partly shutting in and slowing down the superior, low-cost mines.

Success in valorization means the seller nets some monopoly rent on top of other rent. What then will the seller do with the flow of cash? Many things, to be sure, are done, but one frequent answer is to use it to underwrite marginal exploration ahead of its time. This squirrels away capital for the future with minimal immediate impact on price. But over time the new deposits get quotas, too, resulting in overdecentralization.

All the foregoing factors add up to a powerful bias to overdecentralize mineral extraction, and thus are to be eschewed and/or compensated for in administering crown lands for the general good.

OVERDELEGATION

The Crown should avoid counterproductive meddling on the one hand, but it should also avoid the other extreme of delegating too much authority to one giant lessee, one chosen instrument—like the old East India Company or Hudson's Bay Company or the Canadian Pacific Railway—with the thought that it can "internalize externalities" and so achieve economies of scale in land development. Overdelegation is dereliction. We, the government, *are* the giant firm to whom this has been turned over. It is our job to create the institutions and infrastructure within which atomistic private enterprise can flourish; it is not our job to let some privileged private parties create institutions and infrastructure. They would internalize us.

The only way to find rent is to have competition for land in a free market. One giant lessee, even if efficient, will not generate this information. There must be an active market for crown lands. The Crown will be guided towards formulating the right policies simply by performing those functions prerequisite to having a viable market for its lands. To perform this function adequately is challenge enough for any administrator. It will occupy his time quite fully and very usefully.

Initially the Crown should avoid delegating the timing of issuing permits and leases. There is an optimal time for issue, from the Crown's viewpoint —the time when the present value of anticipated revenues stops growing faster than money in the bank. Canadian federal policies have let industry carry the initiative and tie up most of the North West Territories and offshore acreage far too soon. If the Crown were simply to employ people competent to decide on the timing of initial bargaining with permittees and lessees, the Crown would go far toward preparing for needed later functions.

The Crown should not let lessees dictate the size of units put up for bid. The more respectable, gentlemanly, cultivated, and articulate majors will naturally speak knowingly and persuasively of economies of scale, financial responsibility, pooling of risks, marketing contacts, lines of credit, and so on. That is their interest. The Crown should protect ours and, like a real estate subdivider, carve up the land to maximize the value. If the Crown should err, let it be on the small side, to foster large numbers of smaller competitive firms.

OVERALLOWANCE FOR RISK

Overallowance for alleged risk is an easy way to pad capital costs; it sounds so innocent and reasonable and legal. But it converts our rent into their income.

Are risk premia required in mining? Alfred Marshall wrote, "If an occupation offers a few extremely high prizes, its attractiveness is increased out of all proportion to their aggregate value." Lotteries, sweepstakes, casinos, and numbers games yield great returns almost wherever permitted to operate. Investors buy growth and glamour stocks and other speculations at very high P/E ratios. While some people prefer the steady yield, clearly there is a substantial fringe of others with a taste for risk and the associated *macho*. Some choose crime; some gambling; some growth stocks; and some prospecting. Some allege that more money goes into mining than ever comes out; others merely say the overall rate of return has been low, historically. Neither view jibes with the claim that capital requires high risk premia to enter mining.

Sometimes "risk premium" is a clumsy way of saying investors must make enough from the winners to return something on the capital in the losers, as well. That is fair enough but is quite different from and much more modest than claiming a risk premium on the total investment in losers plus winners. If the pleader wished to communicate clearly he could distinguish between a "reserve for dry holes" and a true risk premium. The former clearly has a rationale; the latter has not, while Las Vegas thrives. The "dry-hole reserve" is not income, it must go to cover losses. The true risk premium is income, and it may be removed and consumed before there is any return of principal invested. It covers no losses at all; it merely rewards investors for playing in a game where there are losses that must be covered —some other way.

One often hears that investors "require" or "target" a rate of return at some high level like 20 per cent, or they will not play. At the same time one hears that historical returns have been very low on total outlays (just as they are in gambling casinos). To reconcile these conflicting claims we have to conclude that the "required" rate of return is really some vague expression of what one hopes may happen if all goes well, before he will put it to the touch and take the chance of losing something. "We require 20 per cent" gives a spurious air of precision and brainwork to accounting in a very chancy business where actual returns are lower than 20 per cent.

As for the risk of losing your ante, the risk premium itself raises that risk and necessitates itself, a very circular kind of reasoning. If a man says "I never got back the money I sunk in that hole (I just earned 20 per cent on it for 25 years)," he is greatly exaggerating his woes. Earning 20 per cent for 25 years without recovering principal is the same as earning 19.78 per cent with complete recovery of principal—yes, really, it can be checked out in a set of interest tables or on an HP-80. All one need do is increase that risk premium the tiniest amount to be able to say he lost his stake—thus justifying the risk premium in a circle of reasoning he can extend as far as he dares.

It is a good talking point because most people are unaware of the quantitative relationships of interest rates and amortization. Politicians and publicists learn to throw around terms like "profits" and "risk" and "payback" as though they knew what they were talking about, but only the odd moneylender stops to define terms or look at the numbers. So the artful mining lobbyist presents his case to the best advantage. If he said, "We only make 19.78 per cent on Sourdough Mines when our target rate is 20 per cent," he would weep alone as his listeners mocked and jeered. So instead he says "We aren't getting any payback of our investment," which sounds much more drastic, and he may win some relief.

A reserve for dry holes has more rationale, as noted earlier. This gets into the pooling of risks, which is valid up to a point—the point where we pool good and bad risks. Then we are engaged in cross-subsidy, and it is time to ask "Who needs dry holes?" They are a means, not an end. Each exploration needs to justify itself in terms of its own individual probability of success. Each success needs to yield enough to cover *some* failures. The question is "how many failures?" The risk premium approach opens the door to raids on crown rents far in excess of legitimate reserves for dry holes, and it converts a reserve for losses, which is in no way income, into investor income to take home and spend for fun.

OVERADMISSION OF PROSPECTORS

It has become a cliché of modern resource economics that open access to common grounds permits overuse. New entrants crowd onto the open range so long as there is any return above cost—rent, that is—until all rent is dissipated. This doctrine has its classical expression in Arthur Young's "The magic of property turns sand into gold"[8] and its contemporary revival in Garrett Hardin's *The Tragedy of the Commons*.[9]

This principle, which is fairly obviously applicable respecting fisheries, grassland, beaches, and streets, is equally applicable, but less obviously so, with respect to prospecting. Under British Columbia's Free Mining laws there are free-ranging permits to explore. The "free miner" may enter onto all lands of the Crown and upon any other lands where the mineral rights are reserved to the Crown to stake claims and produce. In the United States the

Mineral Leasing Act of 1920 permits anyone to prospect on federal lands. Canadian federal oil and gas policy allows nonexclusive exploratory licences.[10] Exploration cost is small relative to other mining costs, but it comes earlier, and the unrecovered capital claims payment of interest. To earn 10 per cent it must double every seven years. So if exploration antecedes development by forty-two years, one dollar spent on exploration costs as much as $64 of investment in development. Thus premature investment is a form of overinvestment. It piles up a huge burden of unrecovered capital which later income must repay.

The explorer, however, will try to stake a claim just as soon as he thinks the claim is worth as much as his outlay. He is the fisherman and the claim is the fish. The claim has a present value long before the optimal time to begin producing. The value is evanescent because someone else may get there first. So as soon as the present value equals probable finding costs, out go prospectors to stake claims. Compound interest on premature outlays then may well eat up all the rent.

There is a time when mineral land should be swarming with and supporting many people—the time when it is ripe for use. But there is an earlier time when land is best held in reserve. To grubstake premature prospecting is to overapply expensive capital to land and let financing consume the potential rent.

UNDERPRICING

A common way of sharing mineral rents widely is to underprice the product. The United States Federal Power Commission has done this for years with natural gas. In Canada, an exporting nation, no one wants to share the rent abroad, but sellers of energy are forced to share with domestic consumers. This results in a two-price system. The nation has one such system for oil, and British Columbia has another one for gas. Domestics buy cheap, and foreigners dear.

There are several faults in the system. One is resource waste by consumers. To forego a world oil price of $10.50 a barrel by selling oil domestically at $6.50 a barrel is just as wasteful as buying at $10.50 to sell at $6.50.

And who is this worthy domestic consumer we subsidize? Energy is pretty clearly a superior good. It is the wealthy who own big homes to heat and have big cars to fill. The firms using most energy are those which have gone furthest substituting machinery and other capital for labour; farmers with the most land to till; and mineral refiners whose payrolls are a small share of the value added. Burning energy creates noise and other pollution. Using our not-so-progressive tax system to subsidize wealthy people who waste energy and pollute the homes of people who can't afford to buy the scarce unpolluted land is as regressive as it is wasteful.

An even more common kind of double pricing is the rebate granted to domestic processors. British Columbia's Mineral Royalties Act (Bill 31, 1974) contains an abatement of royalty for concentrates shipped to domestic processing plants. This is a way of supplying feedstock to local firms below the world price. The idea is to share rent with labour by creating jobs.

To create jobs, however, we must lower the cost of hiring labour. Cheap feedstock encourages the substitution of feedstock for labour, a substitution for which there is considerable scope. Rather than a rebate on mineral tax, what is needed is a rebate on wage taxes.

While underpricing fosters wasteful consumption, it simultaneously cuts down production. The British Columbia Petroleum Corporation made considerable profit the first year it assumed a monopoly of marketing gas for export. Its notion is to collect rent by buying cheap in the field and selling dear at the border. The trouble is, of course, that a uniform low field price fails to distinguish low-cost from high-cost producers—it treats them all like low-cost producers and suppresses half the supply.

So in its second year the Corporation was forced to raise field prices to raise supply. Logically this would soon lead to a nonprofit marketing agency setting a market-clearing price. That is, it leads to the other extreme, the one the industry constantly promotes, of treating all like high-cost producers. The government cannot let that happen, however, and one hopes that the government will soon look for better ways to collect rent.

The lesson to learn is that rent arises because the earth is not uniform. Low-cost gas can sell for as much as high-cost gas, so low-cost gas yields rent. The only way to collect rent is at the source, by identifying the low-cost deposits and charging higher rents for them.

The kind of thinking that obstructs clear understanding of that simple, basic, and essential point is exemplified in the practice of equating "rent" and "windfall." Windfall results from unexpected luck like the rise of demand for our gas exports. It adds to rent, but it is not the whole of rent. Rent exists because land is finite, and some land is better than other land. People pay rent for better land because they can produce at less cost per unit of output. Such reasoning is simple and obvious, yet many people overlook it and do great damage as a result.

Two British Columbia mining companies have reported a net income equal to half their sales.[11] That is one indication of a low-cost, rent yielding mineral deposit. Many others report little or no net income at all. It is of considerable interest in a society threatened by overconcentration of wealth and economic power that the rent collecting firms average out much larger than the marginal ones. Devices like general underpricing fail to distinguish the fat from the lean and fail to collect rent. At the same time they miss a splendid opportunity to strike at the core of concentration of wealth and market power.

CONFUSION OF RENT AND PROFIT

Some analysts refer interchangeably to the "profit" and the "rent" of mines. The terms do not mean the same thing, however, and this careless usage can cause confusion and error.

The "profit" from a property is the sum of the true rent plus the returns imputed to the capital used to develop it. In common accounting terms, profit equals cash flow less only depreciation.

To find the rent we must deduct, in addition to depreciation, the income of capital. This is the interest on unrecovered capital. Depreciation and income of capital together are called "capital recovery". Capital recovery is the figure shown in Table 1, column 2. It is the percentage a debtor would pay annually to retire a debt while also paying interest on the unretired balance. In the present analysis (as in all general economic theory), the term "interest" refers to the return to capital, whether or not there is explicit contractual interest paid on a debt.

Compactly:

$$\text{Cash Flow} = [\text{Gross Receipts}] - [\text{Current and Ancillary Expenses}] \quad (1)$$
$$\text{Profit} = [\text{Cash Flow}] - [\text{Depreciation}] \quad (2)$$
$$\text{Rent} = [\text{Cash Flow}] - [\text{Capital Recovery}] \quad (3)$$
$$\text{Capital Recovery} = [\text{Depreciation}] + [\text{Interest}] \quad (4)$$
$$\text{Rent} = [\text{Profit}] - [\text{Interest}] \quad (5)$$

In a marginal mine, cash flow equals capital recovery, profit equals interest, and so rent equals zero. However, the profit income going to capital may still be large. We have already stressed in Table 1 and elsewhere that capital recovery is many times depreciation whenever capital recovery is slow. In mining, capital recovery is often slow so the excess of profit income over rent may be substantial.

The statesman who attempts to socialize all the profit of mine property would drive all the capital out of mining and be left collecting only so much rent as labour could generate absent capital. Now it is true we have made mining overly capital-intensive as already noted, and there is room for some countermeasures. But to drive all capital out of mining is clearly far beyond the proper goal.

The result of trying to socialize the profit of mine property therefore would be the realization that it cannot be done. The government would then retreat to a lower rate, collecting less than all the rent from low-cost mines and aborting much productive investment. To avoid this doubly unhappy outcome, we need to distinguish rent sharply from profit or income, as shown.

Another important difference between rent and profit corresponds to the legal difference between a claim *in rem* (against the thing) and *in personam* (against the person). Rent is a claim *in rem* against the mineral deposit, regardless of who the lessee may be and regardless of his circumstances.

Profit, on the other hand, imputes to persons (including corporations). If they are in debt, profit is a personal concept, net of contractual interest paid to lenders and may be as low as zero, indeed lower. They may consolidate accounts and allocate large overhead charges to any given mine. They may even invest in exploration elsewhere and claim it as an expense against a local mine. They may allocate cash flow to reserve accounts and disclaim it as income. They may transfer profit elsewhere by buying too high and selling too cheap. In short, they may use the whole bag of tricks which multinationals use to outdo natives.

The advantage to the Crown of tapping rent rather than profit is evident. The Crown need only consider the circumstances of the mine alone, and one mine at a time. Losses on other mines and businesses are not our concern, nor is the overhead of the New York or Toronto headquarters.[12]

There is another legal aspect of rent which is of immense importance to the province. The British North America Act clearly sets aside the income of lands as a provincial preserve. That means rent not commingled with interest or wages which Ottawa may tax. It is by failing to define and insist on the distinction between rent and other income that the province has played into Ottawa's hands and made provincial revenues vulnerable to raiding.

The armour of the western provinces (where crown ownership of minerals is most significant) is section 125 of the B.N.A. Act: "No Lands or Property belonging to Canada or any Province shall be liable to taxation." The section read apart from its context might be interpreted very broadly, but has not been. In *Attorney-General of British Columbia* v. *Attorney-General of Canada*,[13] section 125 did not override the right of Ottawa to tax liquor imports of a provincial marketing agency, for example. The rather tangled line of judicial reasoning is expressed by Professor Gerard La Forest, in part, as follows: "section 125 does not provide a general immunity from taxation to the Dominion and provinces. Only their 'lands' and 'property' are exempted. . . . section 125 was intended merely to prevent the use of the taxing powers by either the federal or provincial governments in a manner that might impair the control of the other over its property; the taxes imposed here [on liquor in B.C.] were justifiable under the trade and commerce clause which. . . were not affected by section 125." Section 125 deals with "not taxation in general, but the liability of property to taxation."[14]

Finance Minister Turner made clear his position that provincial royalties had taken on the character of "disguised taxes." The provinces held that they were "reservations," an incident of property, and not taxes. Yet it is hard to maintain that a general royalty is an incident of property when it is collected at the same rate from production on valueless as on rich rentable property. It is not related to land rent or value so closely as to labour and capital inputs. That the federal view prevailed reveals the weakness of commingling rent with wages in the royalty base. Royalties are not based on land value or land income but on gross activity, an even broader base than property income. They proved easily raidable. Marketing agency profits are just like royalties, and they proved raidable. But property taxes and stumpage, which get closer to being direct taxes limited to land income, have not been raided. The province must disaggregate and impute rent to save its own revenues. Economics is the art that shows how.

In the unlikely event that section 125 should be cast aside completely and the issue turned over entirely to current electoral results, there is another and nearly invulnerable defence line, one that is also good economics and good administration. This is to alienate crown lands, selling the fees for a good price to the highest bidders, but subjecting them to property taxes at a high rate. Property taxes are certainly deductible, by law and long custom. The government that disallowed their deductibility would have to answer to massive electoral powers in all ten provinces.

The province that regards alienation as taboo locks itself out of this option. That is a mistake. Taxation asserts the Crown equity in land just as surely as do rents and royalties, and there is plenty of history to show that private taxpaying holders of fee simple title can manage property as well as lessees, occupiers, licensees and tenants of the Crown.

OVERLOOKING THE TAXATION OF NONMINING ACTIVITY

A good deal of industry pleading and some scholarly analysis proceed on the implicit presumption that other uses of labour, land, and capital are not taxed. If one overlooks that fact, it is easy to conclude that taxes, royalties, or other charges drive resources out of mining or distort decisions. But in fact there is only an antimining bias when mining is taxed more heavily than alternative resource uses.

Indeed, with that in mind, it might almost seem that a perfect system of collecting mining rents, if we could create one, would be in its very perfection imperfect, because it would draw too much labour and capital into mining. The taxes on other uses of labour and capital are clumsy and onerous, and if we should collect rent without the excess burden of aborting marginal increments of labour and capital, we would destroy the "second-best" balance and overintensify mining land.

It is a dreary doctrine which bids us endeavour for mediocrity and scorn perfection. Fortunately it is false. The reason is that one province is a small part of the world. It is true that a perfect system of collecting mining rents would attract extra[15] labour and capital into mining, but the net extra labour and capital would come from outside the province. Each immigrant would improve his own lot and also generate some rents for the Crown. Even though we ended with mining overdeveloped relative to other industries in the province, we would all be better off.

Other provinces may lose tax or other revenue from the marginal people lured our way. However, we have no control over other provincial policies; we can only presume they are doing what they think best for them. They always have the option of emulating our policies if they think them in their interest.

There may be proper applications of "second-best" reasoning, however. One concerns allocating land among competing uses. A province can draw on the world capital pool and national labour pool, but its pool of land is fixed, so the foregoing lines of argument do not apply to land. If we achieve a perfect tax or rent collecting policy in mining, but not in forestry, we will lure land from forestry into mining. There is only limited competition for land between the two, but there is greater competition between mining and recreation and agriculture. As we aspire to improve mining policies, we therefore need look to the margins of competition for land and improve policies in other industries. Alternatively we might strive for uniform suppressiveness in all industries and drive people and capital out of the province. Antigrowth forces may prefer this course, but one may doubt that the people who drive are morally superior to those who are driven. In any event, to achieve uniform suppressiveness is not practical.

A kind of partial equilibrium argument commonly made against royalties is that they cause miners to high-grade deposits. There is much truth in that, but it is much too partial. There are also many subsidies that encourage low grading. One is the depletion allowance in both federal and provincial income taxation, which is a negative royalty. The rate is high compared to most positive royalty rates. To make a big issue of royalty induced high grading while overlooking the larger and opposite effects of the depletion allowance would be misleading. The greater problem with royalties is that they substitue for cash delay rentals and bonus bids, and cause lessees to hold too much good land too cheaply without pressure to use it.

Another subsidy is in transportation. Freight rate schedules nearly everywhere follow a "value-of-service" rather than "cost-of-service" principle, resulting in a large cross-subsidy favouring primary producers. Secondary and tertiary producers whose goods have a high labour content carry the cost for primary goods of high land content. Like the depletion allowance the subsidy varies as a function of output.[16]

Another encouragement to low grading is the complex of tax subsidies and other provisions treated herein which pump cheap capital into mining. Some inputs complementary to capital (energy, for example) are subsidized too.

What is not subsidized in mining is the labour input. The problem is not a lack of encouragement to mining, but unbalanced encouragement. The net result of the various forces is not a bias against mining, but a bias against labour. Mining uses too much capital, too much land, and is undermanned.

The bias against labour is not peculiar to mining; it continues down to the consumer. Payroll taxes pervade all of economic life ubiquitously and are collected in advance with an iron and unforgiving hand.

One cannot study our tax laws without concluding that Parliament regards giving and accepting employment to be a social evil, like dealing in liquor or tobacco, to be discouraged by heavy discriminatory taxes coupled with rewards for abstinence. Payroll taxes on miners do not therefore drive labour out of mining peculiarly. Rather, payroll taxes everywhere cause employers to prefer capital, and potential employees to prefer welfare.

Coupled with minimum wage laws and union wage scales, payroll taxes cause employers to high-grade the labour force, leaving marginal workers on the bench, on unemployment insurance, in early retirement, in extended adolescence, in police blotters, on frequent strikes, in doll's houses, or other forms of involuntary idleness. This is the kind of high grading that the total tax system induces. This is a true social problem and a giant one, created by inept policy. The other kind of high grading is something of a figment by comparison.

In a world of heavy payroll taxes, what is the effect of net subsidies to mining? Downstream of mining there is great scope to substitute feedstock and energy for labour—to produce goods of higher resource content and less labour content. That is what the world has been doing; using lots of resources and high grading its labour. Net subsidies to mining helped to cause that. They make raw material feedstocks too cheap relative to labour.

Surveying the total system, royalties do less overall damage than a partial analysis would suggest. They still rank low among policy choices, but analyzing the total system forces us to put a higher priority on abating the system's overall bias towards substitution of primary feedstock for labour.

OVERCONSOLIDATION OF ACCOUNTS

We have mentioned this subject before in connection with underpricing. The strong use the weak as front men—or front widows, often enough. Holders of low-cost deposits pass off high-cost marginal deposits as typical, so all income of property may be regarded as functional and necessary. The way to beat this game is to disaggregate, to analyze each deposit separately.

A firm or public agency with many deposits, some rentable and some poor, consolidates its books so the rents are soaked up by the costs of the poor. This is especially worthwhile for the firms if the "poor" are merely premature, and capital outlays may be passed off as current expenses. Consolidation of accounts lets the rich look poor to avoid taxes and lets the unfit look viable to justify their continued existence.

Again the answer is to disaggregate. Large firms will attempt to justify their keeping high rents on the grounds of losses taken elsewhere, as though losing money were a social service. The objective of a government leasing lands should be to collect all the rent from rich lands and let the poor ones go. There is no call for any cross-subsidizing; and if there were, there is no private corporation with the moral authority to do it for us.

CONCLUSION

There are, then, eight common errors to avoid in the effort to maximize and collect rents from crown lands: overdecentralization, overdelegation, overallowance for risk, overadmission of prospectors, underpricing of primary products, confusion of rent and profit, overlooking of nonmining taxes, and overconsolidation of accounts. In reviewing them one appreciates more fully the proverb "It is easier to face a common enemy than to share a surplus." There are so many inane ideas about how to share a surplus that it is no wonder many polities cannot stand prosperity. Toynbee's *A Study of History* suggests it has not been the common enemies but the ineptly shared surpluses that destroyed great civilizations.

This article has attempted to clear ground, to dispose of fallacies and diversions so that we might focus on the substantial real problem of how to collect rent from crown lands. While the writer chafes to address that topic in a positive way, limits of space preclude it here. Prudence, too, might suggest that he defer to his coauthors who are so well equipped to do the job.

Notes

1. This formula is used to calculate *allowable cut* from public forests in Canada and the United States. It says that the annual cut should be no greater than the mature stock divided by the putative future rotation age (usually overstated) plus current annual increment.

2. James R. Nelson, "Energy Industry Alternatives for the Future," in John W. Wilson, ed., *The Energy Industry* (forthcoming).

3. D. Gale Johnson, "Resource Allocation under Share Contract," *Journal of Political Economy* 58 (April 1950):111-23.

4. Harvey Averch and Leland Johnson, "Behavior of the Firm Under Regulatory Constraint," *American Economic Review* 52 (December 1962): 1052-69.

5. MER stands for "Maximum Efficient Rate," but there is nothing efficient about it. It is a transparent rationalization for slow production by ignoring carrying costs and has no respectable support among economists. It is a remarkable example of how insider technicians, by calling something "efficient," can intimidate the public into accepting it.

6. For a detailed history of "market demand" prorationing in Alberta and of the Alberta system generally, see G.C. Watkins, "Proration and the Economics of Oil Reservoir Development" (Ph.D. diss., University of Leeds, 1971) and "Regulation and Economic Efficiency," Discussion Papers Series no. 32(Calgary: Department of Economics, University of Calgary, 1975), pp. 4-9.

7. See *North Sea Oil and Gas,* Study sponsored by the Council on Environmental Quality (Norman: University of Oklahoma Press, 1974), pp. 11-28.

8. Arthur Young, *Travels in France,* Vol. 1 (1790), p. 88.

9. Garrett Hardin, "The Tragedy of the Commons," *Science* 162 (December 1968): 1243-48

10. Michael Crommelin, "Offshore Oil and Gas Rights," *The Natural Resources Journal* 14 (October 1974): 463-72. The American "permit" and the Canadian "exploratory license" are nonexclusive as to location.

11. The firms are Lornex, a Noranda subsidiary, and Placer Development, a Rio Tinto Zinc(RTZ) subsidiary. RTZ also owns Bougainville Copper, Ltd., which, in 1974, made $236 million on $372 million in sales, or 63 per cent. It has been claimed that Rainbow oil from Alberta "costs less than 10¢ a barrel to find and produce": see *Business Week* (1 July 1967), p. 71. We believe 10c is below the correct figure, but not by much.

12. If in the process we create a small bias in favour of resident owners, there are plenty of biases against them that want offsetting. Fostering local ownership is consistent with public policy and in the interests of the province. Indeed it is undoubtedly in the interest of the whole world to strengthen small, decentralized, atomistic enterprise against the octopi of high finance and absentee control.

13. [1924] A.C. 222

14. G.V. La Forest, *The Allocation of Taxing Power under the Canadian Constitution* (Toronto: Canadian Tax Foundation, 1967), pp. 150-53.

15. Not extra relative to now, but relative to a hypothetical system of uniformly burdensome taxes on all industry.

16. Capacity-to-serve is a fixed subsidy, as well. The annual carrying cost of track serving intermittent miners is carried by the steadier parts of the system.