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CONSERVATION & ECONOMIC EFFICIENCY: AN APPROACH TO MATERIALS POLICY

By TALBOT PAGE

Baltimore: The Johns Hopkins University Press for Resources for the Future,
Pp. 251, \$4.95, s.c. 1977

Talbot Page's book is a lucid discussion of the difference in the use rate of resources—whether reproducible or nonreproducible—that follows from adoption of either the criterion of economic efficiency (Pareto optimum), or conservation, a rule of behavior that is given specific definition by Page.

As used by the economist, the term "economic efficiency" commonly is viewed in a static context: a given time in which a specified population, endowment of resources, distribution of these resources, tastes, and technology, compose an economic system.

In a dynamic, or intertemporal context, the condition of economic efficiency is realized when decisions are such that, in addition to the static conditions being satisfied, the present value of the stream of future net incomes, discounted by an appropriate rate of interest, is maximized. "Maximum present value" implies that today's generation makes decisions that control the use of resources for many years into the future and perhaps at the expense of the welfare of future generations. Rational action, given a market rate of interest greater than zero and a stock of nonreproducible resources or a resource that is reproducible but at a growth rate that is below the market rate of interest, usually will lead to higher rates of consumption in the present and near-term years than in later years.

The conservation principle is defined by Page as a rate of resource exploitation that leaves each succeeding generation as well off as the previous (or present) generation. This means that current consumption rates of natural resources are controlled to allow improvements in technology to keep pace with the rise in the unit cost of natural resources that results from depletion. An alternative definition of the conservation criterion as applied to renewable resources is a consumption path consistent with maximum net sustainable yield (yield net of management costs). Neither of these conservation criteria embodies the principle of discounting or maximization of present value. Page points out that neither of the two rules of behavior—efficiency and conservation—is more "valid." Each meets a well-defined social objective: economic efficiency is the guide for attain-

ing maximum output with given inputs within a single time period; the conservation ethic, as defined, is the guide for attaining inter-generational equity.

For Page, the severance tax emerges as the primary instrument for putting the conservation principle into effect. "Probably the simplest policy instrument is the severance tax . . . (p. 185). . . . Severance taxes are like import tariffs collected at a relatively small number of entry ports to the economy" (p. 204). The severance tax slows down the rate of resource use by stimulating recycling, the search for substitutes, and technologies that economize in the use of virgin materials. By application of the severance tax the use of virgin materials is reduced to the point at which the rate of improvement in technology matches the increased cost of exploitation that accompanies depletion, so that units costs of resource materials net of the severance tax are kept constant. Rising costs are a signal for higher severance taxes.

The straightforward logic of Page's presentation should not blind us, as it did not blind him, to the fact that his analysis hinged upon a critical value judgment, namely, that "the resource base is owned jointly across generations" (p. xv). Somewhat less critical, but sufficiently grave to warrant further discussion is the assumption that the severance tax will effectively achieve its objective.

This assumption rests upon two observations: (1) the rate of recycling and the strength of secondary markets in the United States apparently are responsive to relatively small variations in the relationships between the prices of virgin and secondary materials; (2) except for the price of lumber, prices of natural resources have remained relatively constant in real terms over the past hundred years or so.

Page is deliberately vague about the details of the severance tax mechanism. Its level would be guided by the behavior of an index of the prices of relatively important natural resources. The severance tax would move up or down rather slowly since its effects would be observable only over a ten or twenty-year period. Page doesn't say whether the tax would be levied uniformly over all materials, whether it would vary in accordance with the volatility of costs (prices) of particular materials, or whether the coverage of the tax would correspond to the composition of the price index.

Given the importance assigned to it by Page, the question is whether a severance tax by itself can bear the burden of the task assigned to it—i.e., keeping prices of virgin materials constant in real terms—without introducing distortions that create their own prob-

lems. A severance tax is not likely to be an effective instrument against intergenerational inequities created by degeneration of soils, production and storage of long-lived radioactive wastes, and crowding caused by continued population growth.

In similar vein Page may be overly optimistic about the system's ability to cope with foreign trade, a subject explicitly avoided in his analysis. If the severance tax were adopted only by some producing countries would these countries also adopt a countervailing import tax? If all producing countries adopted a tax, would the rate be chosen in each country in such fashion that the index of worldwide virgin materials prices remained constant? If on a worldwide basis the demand for natural resources were inelastic the effects of severance taxes on balances of payments could be considerable. How much weight rests upon the assumption that the "invisible hand" will guide the worldwide economy in a benign fashion?

These questions are not meant to detract from the usefulness of a severance tax as a conservation tool but only to suggest that a cluster of instruments will be necessary. It is true, however, that the particular instrument by which the conservation rule is made effective is not central to the argument of *Conservation and Economic Efficiency*. Nonetheless, by failing to consider explicitly other instruments or to give some space to the limitations of the severance tax Page leaves uncertain the boundaries of the conservation principle.

Page may not be ready to respond to every critical comment that every reader might raise, nor should we demand that he do so. His objective was more modest, and I think that he accomplished it superbly. He clarified the concept of conservation, gave it operational meaning, and showed how it could be incorporated into the analytical and prescriptive apparatus of the economist. En route he made other valuable contributions: he reviewed the literature on present value and explained the consequences of using maximum present value as a guide for determining the rate of resource consumption over a succession of time periods; he described the major impediments to efficient functioning of natural resource markets and the corrective steps required to make them work better; and he explained how perfectly functioning markets provide no assurance to later generations that they will inherit anything more than a wasteland.

He has added an important element to economic theory: a constraint to market behavior that is operationally (and quantitatively) defined and likely to receive the intellectual support of most of his

readers. His proposal for a broadly based severance tax should become law as quickly as possible, imposed in such way that its effects can be accurately monitored. Other conservation instruments, more intrusive and cumbersome, designed to control human population, ensure protection of the gene pool, control the discharge of long-lived wastes, and maintain the quality of air, soil and water, also are needed if intergenerational equity is to be assured.

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