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BOOK REVIEWS

Aggregate Theory and Policy

Public Investment, The Rate of Return, and Optimal Fiscal Policy. By KENNETH J. ARROW and MORDECAI KURZ. Baltimore and London: The Johns Hopkins Press (published for Resources for the Future, Inc.), 1970. Pp. xxviii + 218. \$9.00 (in U.K., 86s. net).

Many of the chapters of this book are based on articles by one or both of the authors that have already appeared elsewhere. Taken singly, the previously published work is rather impressive in its own right, but in this book Arrow and Kurz present a whole which is very much greater than the sum of its parts. This is an important contribution to the theory of public policy in the mixed economy. The emphasis is on optimal government policy over time, so that much of the analysis should be considered to be an application of the modern theory of optimal growth.

To my mind, the book's most important contribution to public-policy analysis is the formalization of the concept of *controllability*. This concept has been fundamental to engineering control for some time, but until Arrow-Kurz economists (following Tinbergen) have found it sufficient in judging the potency of public policy to compare the number of government instruments with the number of social objectives. Counting objectives and instruments—like counting equations and unknowns—has important limitations.

Arrow and Kurz define a *publicly optimal policy* as one that optimizes the social criterion functional subject only to technological constraints. This is a baseline policy derived from some thought-experiment: either a centrally directed economy that issues orders without loss in efficiency or other costs, or a mixed enterprise economy with a government that possesses full power to make lump-sum transfers costlessly. A given allocation policy is *controllable* by a given set of instruments if there exist values of the instruments (in general, varying with time) which cause the private and government sectors to realize that policy. Somewhat crudely, given a set of instruments (the income tax rate, size of the government deficit, the debt-money ratio, . . .) a program could be said to be controllable if the "second-best" policy yields the same welfare as the "first-best" policy.

An example might be useful. Consider a two-sector model in which consumption is a fixed fraction of perceived income (equal to factor rewards plus net government transfers to the public). If there are no government expenditures, net government transfers are equal to the government's deficit. The social objective is to choose a government fiscal (deficit) policy that is consistent with some feasible consumption path. There is one tool, fiscal policy, and one goal, the composition of output. Because the consumption function is linear in the deficit, at each instant of time the government can call forth *any* feasible consumption-investment mix. Therefore, any feasible consumption path is controllable by fiscal policy in this full-employment economy. Such a policy may, however, imply an unacceptable rate of inflation of the money price of goods. To control inflation, the government must use another tool such as control of the debt-money ratio. We have then two goals, price stability and output mix, and two instruments, fiscal and monetary policies, but it is not clear whether feasible trajectories are controllable. This is because the behavior of the system will

depend upon the interaction of three asset-market clearing equations. There is no reason to believe, for example, that a zero inflation policy is consistent with all feasible paths of accumulation. Tools may be sufficient in number, but insufficient in potency to achieve controllability.

If our instruments are not sufficiently potent, why not add to the number of our instruments until controllability is achieved? This is an important question, which Arrow and Kurz do not explore. The answer must be based on the fact that in life taxes (and other policy instruments) are costly to administer and have distorting allocational effects. The true theory of public policy should not be a "second-best" theory, but a "first-best" theory: first-best but constrained by production, technology, behavior of individual agents, and by *administrative technology*. By including administrative technology," I mean to "count" the resources costs associated with administration of taxes, etc.

I should like to remark on one of the special models Arrow and Kurz study: the one-sector, three-factor technology. Output is produced by the cooperation of government capital, private capital, and labor. If the production function is assumed to be homogeneous of degree one in these three factors and if government capital serves as a pure public good of production, then individual firms face decreasing returns to scale. The implicit assumptions about industrial organization are unclear to me. It would seem more natural to me to posit that firms face constant-returns-to-scale in the two factors under their control, so that the aggregate production function must exhibit increasing returns. I admit that this sort of assumption complicates the analysis greatly: Hamiltonians may not be concave in state variables and steady states may not exist. Arrow and Kurz extend the model to accommodate a simple class with overall increasing returns, but nonetheless the method of income distribution does not seem to be altogether clear, because with increasing returns, not all factors can be rewarded by marginal products.

Much else is to be found in this fine book. The Maximum Principle of Pontryagin is derived from fundamental notions of dynamic programming. This is excellent pedagogy, although I would prefer to derive the Maximum Principle from the Euler equation of the calculus of variations, making Kuhn-Tucker type allowance for certain corner solutions. The authors apply the Maximum Principle to the one-sector optimal growth problem. By inadvertence, they fail to note the work of David Cass, which is much like theirs.

The sections on risk and the rate of return are most provocative. It is contended that uncertain benefits and costs should be evaluated at expected values and discounted at the rate appropriate to riskless investments. The prescription is shown to be appropriate for an economy where there is an optimal allocation of risk-bearing before the proposed government investment. The prescription also holds if the random returns on the government investment are statistically independent of other investments in the economy. While optimal risk-bearing is a dubious assumption because of the insufficiency of surrogates for full contingent-claims markets, the statistical independence assumption might be palatable.

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Making Monetary and Fiscal Policy. By G. L. BACH. Washington, D.C.: The Brookings Institution, 1971. Pp. ix + 281. \$7.50.

Making Monetary and Fiscal Policy is an adequately extensive description of the problems associated with and the organizations involved in monetary and fiscal