

Commentary

Allocation, distribution, and scale: towards an economics that is efficient, just, and sustainable

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ABSTRACT

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The practical policy of issuing tradeable permits for depletion and pollution requires for its implementation the clear separation of the three basic economic goals of efficient allocation, equitable distribution, and sustainable scale. Economic theory needs to catch up with policy in recognizing that scale issues cannot be reduced to either allocation or distribution.

The basic rule that for every independent policy goal we must have an independent policy instrument has been emphasized by Professor Jan Tinbergen (*On the Theory of Economic Policy*, North Holland Press, Amsterdam, 1952), but seems to have been forgotten in recent discussion. Yet we all recognize that “you can’t kill two birds with one stone”, at least not if the birds are flying independently. If they are flying in tandem or sitting on the same fence, then one might manage to do it. In economic theory today we are trying to kill three birds with two stones. The thesis argued here is that we need a third stone because the birds are flying independently. The birds, of course, are the three goals of allocation,

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distribution, and scale. The first two have a long history in economic theory and have their two specific independent policy instruments. The third, scale, has not yet been formally recognized and has no corresponding policy instrument.

Practice, however, responding to real problems, has moved ahead of theory by implicitly recognizing scale, as well as allocation and distribution, and forcing a clear distinction among the three. The practical context in which this has happened is the policy of tradeable pollution permits. In what follows, the three goals will be more fully defined, and a "third stone" or policy instrument related to scale will be suggested. Also, attempts by traditional neoclassical theorists to subsume scale as a special case of allocation, and attempts by others to subsume it under distribution, will be discussed.

Basic definitions of the three goals and related policy instruments are given below.

Allocation refers to the relative division of the resource flow among alternative product uses — how much goes to production of cars, to shoes, to plows, to teapots, etc. A good allocation is one that is efficient, i.e. that allocates resources among product end-uses in conformity with individual preferences as weighted by the ability of the individual to pay. The policy instrument that brings about an efficient allocation is relative prices determined by supply and demand in competitive markets.

Distribution refers to the relative division of the resource flow, as embodied in final goods and services, among alternative people. How much goes to you, to me, to others, to future generations. A good distribution is one that is just or fair, or at least one in which the degree of inequality is limited within some acceptable range. The policy instrument for bringing about a more just distribution is transfers — taxes and welfare payments.

Scale refers to the physical volume of the throughput, the flow of matter-energy from the environment as low-entropy raw materials, and back to the environment as high-entropy wastes. It may be thought of as the product of population times per capita resource use. It is measured in absolute physical units, but its significance is relative to the natural capacities of the ecosystem to regenerate the inputs and absorb the waste outputs on a sustainable basis. Perhaps the best index of scale of throughput is real GNP. Although measured in value units ($P \times Q$), real GNP is an index of change in Q . National income accountants go to great lengths to remove the influence of changes in price, both relative prices and the price level. For some purposes the scale of throughput might better be measured in terms of embodied energy. The economy is viewed as an open subsystem of the larger, but finite, closed and nongrowing ecosystem. Its scale is significant relative to the fixed size of the ecosystem. A good scale is one that is

at least sustainable, that does not erode environmental carrying capacity over time. In other words, future environmental carrying capacity should not be discounted in present value calculations. An optimal scale is at least sustainable, but beyond that it is a scale at which we have not yet sacrificed ecosystem services that are at present worth more at the margin than the production benefits derived from further growth in the scale of resource use.

Economic theory has abstracted from scale in two rather opposite ways. First, by assuming that environmental sources and sinks are infinite relative to the scale of the economic subsystem. Second, by assuming that scale is total rather than infinitesimal, i.e. that nature is just one more sector like agriculture or industry, and that each micro-allocative decision for each resource includes the *in natura* use among the set of alternative uses. Consequently, under these abstractions, there is no separate macro issue of scale, and no policy instrument for the control of scale is needed.

To the extent that our policy instruments do affect scale, e.g. growth-stimulating macro policies, the consequence is nearly always to expand scale, which, of course, creates no problem if sources and sinks are infinite. But scale has become important because the economic subsystem has grown to the point where its physical demands on the ecosystem are far from trivial. We have moved from a relatively empty world to a relatively full world from the point of view of human beings. Since scale can no longer be considered infinitesimal, its dismissal now rests on the view that it is total, and that the ecosystem is not the containing natural matrix of the economy, but just one more sector within the all-inclusive economy waiting for its due allocation of resources according to individual willingness to pay for its service or product. To put it starkly, in the neoclassical view the economy contains the ecosystem; in the view advocated here (call it ecological economics), the ecosystem contains the economy to which it supplies a throughput of matter-energy taken from *in natura* uses according to some rule of sustainable yield rather than according to individual willingness to pay. This difference in view is rather like the difference between Ptolemy and Copernicus — is the earth or the sun the center of the universe? If the earth is the center we have to deal with too many epicycles to “save the appearance” of uniform circular orbits. If the economy contains everything then we have to internalize too many externalities to save the appearance of methodological individualism.

The scale problem is thus “new wine” and requires a new wineskin, namely the concept of optimal scale and a corresponding policy instrument. But economic theory has tried to pour the new wine into the same old wineskin of allocation, or more reasonably into the old, but different wineskin of distribution. We will discuss these attempts below, but first it is

useful to solidify the conceptual distinctions made above by showing how they have been operationally recognized in policy, even as theory has tried to conflate them.

The tradeable pollution permits scheme is a beautiful example of the independence and proper relationship among allocation, distribution, and scale. Consider step by step what this policy requires in practice.

(1) First we must create a limited number of rights to pollute. The aggregate or total amount of pollution corresponding to these rights is determined to be within the absorptive capacity of the airshed or watershed in question. That is to say, the scale impact is limited to a level judged to be ecologically sustainable — an economic “Plimsoll line” must be drawn as the very first step. Far from ignoring scale, this policy requires that the issue of sustainable or optimal scale be settled at the beginning. It may be done on the basis of a carrying capacity estimate, a safe minimum standards estimate, or a cost-benefit study, but some limit to total pollution must be set.

(2) Second, the limited number of rights corresponding to the chosen scale must be distributed initially to different people. Perhaps equally to citizens, or to firms, or perhaps collectively as public property then to be auctioned or sold by the government to individuals. But there must be an initial distribution before there can be any allocation and reallocation by trading.

(3) Only in third place, after having made social decisions regarding an ecologically sustainable scale and an ethically just distribution, are we in a position to allow reallocation among individuals through markets in the interests of efficiency. A separation between allocation and scale requires that the total quantity of permits be fixed, but that the price at which the permits trade be free to vary. If the total quantity were determined by a willingness to pay study that also gave a shadow price as well as an aggregate quantity, then the neoclassical economist who wants to avoid separating allocation and scale must insist that trading take place at the calculated shadow price. Otherwise there will be a separation between allocation and scale. In practice, the price is always free to vary, clearly indicating that the pragmatic, operational solution has been to separate allocation and scale.

It is clear that scale is not determined by prices, but by a social decision reflecting ecological limits. Distribution is not determined by prices, but by a social decision reflecting a just distribution of the newly created assets. Subject to these social decisions, individualistic trading in the market is then able to allocate the scarce rights efficiently. For some reason economists have analysed the tradeable pollution permits scheme almost entirely in relation to the command and control allocative schemes. They

have indeed shown it to be superior to command and control in terms of allocative efficiency. But with all the emphasis on allocation the critical role of scale went unnoticed, and the role of distribution, while certainly noticed, was not sufficiently emphasized. Tradeable permits have been considered the individualistic “free market” solution, without emphasizing that this market is free only after having been firmly and collectively fixed within scale and distributive limits.

The greens too have shown considerable misunderstanding of this scheme, condemning it as “giving away licenses to pollute”. The point is that this scheme limits the total scale of pollution, need not give away anything but can sell the rights for public revenue, yet allows reallocation among individuals in the interest of efficiency. Some greens complain that under this scheme the rich have an advantage. The rich *always* have an advantage, but does this scheme increase or decrease the pre-existing advantage of the rich? It could do either, it all depends on the initial distribution of ownership of the new assets, and not on the fact that they are tradeable.

The usual way for economists to deal with the scale issue, when forced to think about it at all, is to try to subsume it under allocation, claiming that if we just get prices right there will be no scale problem. Of course, when the scale of the economy was small then the right price for nonscarce environmental services was zero. Economists reason that when these services become scarce it is simply necessary to find the right positive price and everything will be efficiently allocated. It is true that pricing newly scarce resources is necessary to solve the allocation problem. The mistake is to assume that it therefore solves the scale problem as well. A small scale with a lot of zero prices for environmental services is quite a different state of the world from a large scale with a lot of positive prices for those previously free environmental services. In both cases “prices are right” and allocation is efficient. But it still makes sense to ask whether people are better off in the first or second case. The difference is a matter of scale.

The neoclassical economist would reply that such a question is easily answered. If the larger scale exists, it was obviously chosen by individuals in numerous micro decisions in which they were willing to pay the marginal environmental costs of growing to the larger scale because they judged them to be less than the marginal benefits. Of course, the individuals’ judgment could be biased by “externalities”, but “right prices” means that these have all been internalized in prices.

The price of a commodity reflects the value of the next-best alternative commodity to which the factors embodied in the commodity in question could have been allocated. In practice, nature is excluded from the world of commodities whose opportunity costs are measured by market prices.

Prices do not balance marginal ecosystem services sacrificed against marginal social benefit of a larger population or greater per capita resource use (i.e., larger scale). This balance requires calculation and imposition of shadow prices that value the *in natura* use of all resources in terms commensurate with the customary pecuniary exchange valuation of commodities. This view requires heroic assumptions about our knowledge of the external costs resulting from ecosystem disruption, and how these costs are imputed to the micro decisions that gave rise to them. The ecosystem is under no obligation to respond to increasing stress by sacrificing its services in order of their increasing importance to us, conveniently giving economists a “well behaved” marginal cost function. Discontinuities, thresholds, and complex webs of interdependence make a mockery of the idea that we can nicely balance smoothly increasing ecosystem costs with the diminishing marginal utility of production at the macro level. The notion that systemic vital costs of collective behavior (greenhouse effect, ozone depletion) are best dealt with by pretending that every individual could and should, on the basis of assumed perfect knowledge, decide his or her own willingness to pay to avoid the loss of such services, is not an idea that comes easily to the unprejudiced mind. It requires years of indoctrination in “methodological individualism”.

The distribution and scale questions, like the allocation question, are *economic* in that they involve costs and benefits. But the dimensions in which costs and benefits are defined are different in the three cases. Allocative prices are not even relevant to estimating the costs and benefits of scale expansion, just as they are not relevant to estimating the costs and benefits of a step towards a more equal distribution of income or wealth. We have three independent optima requiring three independent policy instruments. In each case an optimum is formally defined by the equality of rising costs and falling benefits at the margin. But the definitions and measures of costs and benefits in each of the three cases are different because the problems being solved are different. The relative price of shoes and bicycles is instrumental in allocating resources efficiently between shoes and bicycles, but is clearly not instrumental for deciding the proper range of inequality in wealth or income, nor for deciding how many people consuming how much per capita of natural resources is best.

Distribution and scale involve relationships with the poor, the future, and other species that are fundamentally social in nature rather than individual. *Homo economicus* as the self-contained atom of methodological individualism, or as the pure social being of collectivist theory, are both severe abstractions. Our concrete experience is that of “persons in community”. We are individual persons, but our very individual identity is defined by the quality of our social relations. Our relations are not just external,

they are also internal, i.e. the nature of the related entities (ourselves in this case) changes when relations among them changes. We are related not only by a nexus of individual willingnesses to pay for different things, but also by relations of trusteeship for the poor, the future, and other species. The attempt to abstract from these concrete relations of trusteeship and reduce everything to a question of individual willingness to pay is a distortion of our concrete experience as persons in community, an example of what A.N. Whitehead called “the fallacy of misplaced concreteness”. (see H. Daly and J. Cobb, *For the Common Good*, Beacon Press, Boston, 1989).

The prices that measure the opportunity costs of reallocation are unrelated to measures of the opportunity costs of redistribution or of a change in scale. Any tradeoff among the three goals (e.g., an improvement in distribution in exchange for a worsening in scale or allocation, or more unequal distribution in exchange for sharper incentives seen as instrumental to more efficient allocation) involves an ethical judgment about the quality of our social relations rather than a willingness to pay calculation. The contrary view, that this choice among basic social goals and the quality of social relations that help to define us as persons should be made on the basis of individual willingness to pay, just as the tradeoff between chewing gum and shoelaces is made, seems to be dominant in economics today and is part of the retrograde modern reduction of all ethical choice to the level of personal tastes weighted by income.

It is instructive to consider the historical attempt of the Scholastic economists to subsume distribution under allocation (or more likely they were subsuming allocation under distribution — at any rate they did not make the distinction). This was the famous “just price” doctrine of the Middle Ages which has been totally rejected in economic theory, although it stubbornly survives in the politics of minimum wages, farm price supports, water and electric power subsidies, etc. However, we do not as a general rule try to internalize the external cost of distributive injustice into market prices. We reject the attempt to correct market prices for their unwanted effects on income distribution. Economists nowadays keep allocation and distribution quite separate, and argue for letting prices serve only efficiency, while serving justice with the separate policy of transfers. This follows Tinbergen’s dictum of equality of policy goals and instruments. The point is that just as we cannot subsume distribution under allocation, neither can we subsume scale under allocation — the third bird does not fly in tandem with the first and cannot be killed with the same stone.

It is better to change the brutal bird-stoning metaphor to the life-saving metaphor of the Plimsoll line on a boat. In loading a boat we also have the problems of allocation and scale — allocating or balancing the load is one

problem (a microeconomic problem), and not overloading even a well-balanced boat is another problem (a macroeconomic problem). To avoid overloading and sinking even a well-balanced boat we have a Plimsoll line defining an absolute scale limit. But the boat can be well or badly balanced even when the water line is far below the Plimsoll mark. And if the water line is above the Plimsoll mark, rearranging the load will be only a small help. Economists who are obsessed with allocation to the exclusion of scale really deserve the environmentalists' criticism that they are busy rearranging deck chairs on the Titanic.

Some argue that the price system will "keep the boat from sinking", that when we reach the Plimsoll line the price of adding an extra unit of weight will soar to infinity. This view sees carrying capacity as that which is being allocated by prices. But then as long as there is excess carrying capacity the proper allocative price would be zero. So in this view price would be zero until it shot to infinity. And a zero price would not help to balance the load efficiently. It is much more satisfactory to recognize two independent problems: allocation (relative position or balance) and scale (absolute total weight), each having its own optimal solution achieved by its own specific instrument.

Although the usual attempt is to subsume scale under allocation, a few economists have recently implicitly subsumed it under distribution [Richard Norgaard and Richard Howarth, "Sustainability and Discounting the Future", in R. Costanza (Editor), *Ecological Economics: The Science and Management of Sustainability*, Columbia University Press, New York, 1991]. The argument is that excessive scale erodes carrying capacity and inflicts a cost on future generations. Since future generations are different people this is a matter of distribution, not allocation. A sustainable scale is nothing other than an intergenerational distribution of the resource base that is fair to the future. This argument is raised against economists who subsume scale under allocation by arguing that intertemporal allocation via discounting the future is the rational (efficient) way to deal with provision for the future. The intergenerational discounting argument is circular because the discount rate, like other prices, is determined on the basis of some given distribution (intergenerational distribution of the resource base in this instance). To then use the discount rate to determine that same distribution between generations is circular. You have to have the distribution to get the discount rate, yet the discounting approach wants to use the discount rate to determine the intergenerational distribution — which is mistakenly called an intergenerational "allocation".

I think that this critique of discounting is correct. But it should not be thought of as a way to subsume the scale problem entirely under the distribution problem. Although justice with respect to the future is cer-

tainly an important motivation behind sustainability as a goal, and excessive scale can indeed mean a loss of sustainability, that does not exhaust the question of optimal scale. Scale can become too large from the point of view of the present, even if it remains possible to pass on the too-large economy to the future forever. For example, we could take over the habitat of most other species, driving all non-essential species to extinction, and by careful self-discipline impose on ourselves a rigorous and costly management to compensate for the displaced self-managing natural systems. Scale could be too large even if sustainable. For this reason scale cannot be totally subsumed under distribution, although it must be admitted that scale issues do overlap with one part of distribution, the intergenerational part, to a considerable degree.

An economic Plimsoll line keeping the economy from overloading the ecosystem in the present may also be the best instrument available for protecting the future. If one insists on subsuming scale under one of the first two goals, then it is better to subsume it under distribution than under allocation. But the best thing is to treat the three goals independently, as done in the paradigm policy of tradeable pollution permits. Although discussed in terms of pollution, the logic of tradeable permits extends to controlling depletion as well. It can be applied regionally, nationally, and even internationally as with carbon emission permits to limit the greenhouse effect. It can even be applied to population control as in the tradeable birth quotas suggested by Kenneth Boulding (*The Meaning of the Twentieth Century*, Harper and Row, New York, 1964). In fact, to my knowledge, Boulding's was the first clear exposition of the logic of the scheme, although applied to the politically least likely area of acceptance. The tradeable permits idea is truly a paradigm for many sensible policies, as well as by now a fact of experience that should be allowed to alter economic theory. Specifically, theory should recognize scale, along with allocation and distribution, as a fundamental part of the economic problem. If operationality (the congruence of abstract concepts with policy instruments) is a criterion for judging theories, then the theoretical separation of scale and allocation advocated here is superior to the neoclassical approach of lumping them together, because the latter requires nonoperational assumptions to save appearances of methodological individualism, while the former is already being accepted in the practical policy of tradeable permits.