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The three basic goals of an economic system must be efficient allocation, equitable distribution, and sustainable scale. The first two have a long history in economic theory, and specific independent policy instruments have been developed for their realization. However, scale has not been formally recognized in economic theory, and no corresponding policy instrument has developed. In practice, however, where real problems must be acknowledged and addressed, scale has implicitly been recognized as a separate and distinct area of concern. This has occurred especially in the practice of issuing tradeable permits for resource depletion and pollution rights.

The basic definitions of the three goals and their policy mechanisms are as follows:

1) **Allocation:** This entails the channeling of society's scarce resources to their alternative productive uses. An allocation is considered efficient when resource distribution satisfies material needs in conformity with individual preferences, as weighted by the ability to pay. The policy instrument that produces this outcome is the price mechanism of competitive markets.

2) **Distribution:** This is the division of final goods and services. A good distribution is one that is considered just or fair, i.e., one in which the degree of inequality is confined within an acceptable range. The policy instruments used to achieve this goal are transfers, such as taxes and welfare payments.

3) **Scale:** Scale is 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 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."(186) Though scale is usually measured in money terms (e.g., per capita resource use), throughput might better be measured in terms of embodied energy, and the economy viewed as an open subsystem of the larger, but finite, closed, non-growing ecosystem. Thus the scale of an economy becomes significant relative to the fixed size of the ecosystem, and can be considered sustainable if it is not eroding the carrying capacity of the ecosystem. Sustainability is an important characteristic of the optimal scale. We may very generally define the optimal scale as that sustainable scale at which the combined services of both man-made and natural capital are as great as possible.

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Standard economic theory has neglected the importance of scale in two opposite ways. First, it has assumed that environmental resources and sinks are infinite relative to the scale of the economy. Second, it has assumed that nature is just one more sector in the economy and that allocative decisions merely move natural resources between alternative uses. Consequently, scale is not seen as a constraint, and policies continue to encourage growth, producing demands on the ecosystem that are increasingly serious and unsustainable. There is therefore a need for a separate policy instrument to control scale.

The usual way of dealing with scale is to subsume it under allocation; i.e., get the prices right and you are assured of an efficient allocation of resources. If productive facilities tend towards larger scales, it is assumed that this merely reflects efficient individual evaluations that the marginal benefits of scale exceed the marginal costs to the environment. Of course, these individual determinations may be biased by externalities, but the "right prices" ought to have internalized those external costs.

In practice, nature is excluded from the world of commodities whose value, or opportunity costs, are measured by market prices. As a result, marginal ecosystem services sacrificed for increased production are not adequately balanced against the marginal social benefit of larger population or greater per capita resource use. Traditionally it has been assumed that by imputing "shadow prices" for these hidden costs a reasonable assessment of opportunity costs can be made. This, however, requires heroic assumptions about our capacity to quantify the costs to the eco-system; "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."(190)

The plain truth is that among the three parameters, allocation is the only one that can be satisfactorily resolved through the price mechanism. "Distribution and scale involve relationships with the poor, the future, and other species that are fundamentally social in nature rather than individual."(190) Prices that may reveal the opportunity cost of reallocation are irrelevant to measures of the opportunity costs of redistribution or of changes in scale. These are parameters that are subject to ethical judgments and are not reducible to a simple willingness to pay criterion. Pretending that these social choices exist on the same moral plane as the choice between chewing gum and shoelaces "seems to be dominant in economics today and is a part of the retrograde modern reduction of all ethical choice to the level of personal tastes weighted by income."(191)

Economists today correctly keep distribution and allocation quite separate, and the same must be done for scale issues as well. We may use "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). . . 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."(191-2)

Some economists (Norgaard and Howarth) have recently endeavored to subsume scale under distribution by focusing on future generations. A sustainable scale is determined by an

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intergenerational distribution of the resource base that is fair to those in the future. Thus, through intertemporal discounting we may efficiently provide for the future. Apart from the numerous difficulties with assessing a "discount rate" for the future that will truly produce a just intergenerational distribution, the question of optimal scale is complex and goes beyond merely being able to pass on a sustainable system to the future. For example, the scale of human activities can become too large for the present, resulting in the destruction of non-essential species and habitats, and yet through rigorous and costly management this too-large economy may be sustainably passed to the future. "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."(193)

The best policy is to treat the three goals independently. One example of such a policy is the use of tradeable pollution permits. In practice, this policy would require the following steps:

1) Creation of a limited number of rights to pollute in which the total level of pollution is limited to the absorption capacity of the airshed and watershed and is thus sustainable. Far from ignoring scale, this policy requires us to deal with this issue at the outset.
2) Distribution of these rights to different people - i.e., to citizens or firms directly, or perhaps to a public body that can auction or sell them to individuals.
3) Reallocation of the permits among individuals through markets in the interest of efficiency after the scale and distributional issue is settled by the first two steps. This separation of allocation and scale requires the number of permits to be fixed, but the price must be allowed to vary. In this system, environmental costs will be borne by those firms responsible for the generation of pollution, which will be willing to purchase the permits if it is profitable and efficient to do so. Those firms unwilling to pay to buy the permit will have to develop sustainable methods of production.

In this example, both scale and distribution are determined by a social decision, not prices. These scarce rights, subject to socially determined limits, are then allocated efficiently through trading. "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."(193)

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