

Scale, Equity and Efficiency:
A Stone May Kill More Than One Bird

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Abstract

Policy goals of efficiency, equity, and sustainability may not be independent. Also the policy instruments .e. price mechanism, fiscal policy, and scale may be related. We need to find answers about who shall decide the scale at the national and international level ? If equity and scale are related, the interests of the countries in the resource-intensive growth phase and of the post-industrial societies, may clash.

Introduction

Neo classical economics has traditionally focussed on allocative efficiency. Subsequently it been enlarged to incorporate the issue of equity. However, neo classical economics does not, and cannot, handle the issue of scale (Daly,1990;1992) . Hence, for sustainability, societies need to explicate 'social minimas' (Kapp,1963,192-3; 1970,27-30), maximum level of throughput flow (Daly, 1990,1992) , or 'ecologically bounded possibilities' of using natural resources (Dietz and Straaten,1992,45-51).

Daly (1990,190; 1992,190), by invoking Tinberg (1952,27-42), has argued that for achieving the three independent policy goals of efficiency, equity, and sustainability, three independent policy instruments are needed.

Price mechanism and fiscal policy are the instruments for achieving allocative efficiency and equity respectively.² There is no independent instrument yet in the armory of traditional econom-

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2. For achieving equity, Daly advocates the use of fiscal policy but has worded it differently - income and wealth redistribution (1990), and tax and welfare payment (1992). Both these instruments are equivalent. Redistribution can be affected through taxes and subsidies or through expropriation of property. However, a hundred percent wealth tax (confiscatory taxation), could be interpreted to be equivalent to expropriation of property. Hence fiscal policy includes all means to redistribute income and wealth.

ics, to handle the goal of sustainability.³ Daly rejects the use of internalization of externalities for achieving sustainability (1990,190).⁴

Issues

Our discomfort with Daly's argument is at three levels. First, are the goals of efficiency, equity, and sustainability really independent? Second, can we compartmentalize the effects of policy instruments and claim, for example, that fiscal policy will only affect distribution, and not efficiency? Third, assuming we need to set the scale of throughput, who shall decide what the appropriate scale is? Further, even if the scale at the country level is fixed, who shall decide the scale and quotas (of use of global commons) at the international level.

Are the Goals Independent?

Daly believes that the three goals of efficiency, equity, and sustainability are independent. However, he points out (1990,191) that "scale, like distribution is price-determining, and not price determined" (emphasis his). This implies non-independence of price and scale on the one hand, and price and distribution on the other. Obviously the three goals are not independent.

Above also implies that even if we were to find independent policy instruments each of which targets a separate goal, the independence of such instruments would be compromised, given the

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3. Daly (1992,186) has defined scale to be the " physical volume of 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 capacity of the eco system to regenerate the input, and absorb the output on a sustainable basis".

Georgescu-Roegen (1966,68; 1971,5) has explained the concept of entropy in the following way. * According to Classical thermodynamics, energy consists of two qualities: 1) free or available and 2) bound or latent. Free energy is that energy that can be transformed into mechanical work".... " Let us take the case of an old-fashioned railway engine in which the heat of the burning coal flows into boilers. . . . at the beginning, the chemical energy of the coal is free, in the sense it is available to us for producing mechanical work. In the process, however, the free energy loses this quality, bit by bit. Ultimately, it always dissipates completely into the whole system where it becomes bound energy, that is, energy which we no longer use for the same purpose entropy is an index of the relative amount of bound energy in an isolated structure or, more precisely, of how evenly the energy is distributed in such a structure. In other words, high entropy means a structure in which most or all energy is bound ..." .

4. Daly (1990,190) argues for distinguishing scale from efficiency; " No one argues that the costs of injustice should be internalized into prices as a part of the efficiency problem. Justice is one thing and efficiency another and economists take great pains to keep them separate. Yet many seem to think that the cost of excessive scale can and should be internalized into prices and that there is no fundamental distinction between optimal allocation and optimal scale*.

non-independence of the goals.

Let us illustrate how the goals of distribution and sustainability may be related. Take the case of India which is in a phase of a resource intensive growth. Bulk of the investment is in the infrastructural (resource intensive) sector. Thus a curb on scale of economy would tantamount to a curb on growth. In the absence of growth, given the limited size of the existing economic cake, India shall merely redistribute poverty. Hence scale impinges on equity.

When virgin forests are cut down for timber, creating plantations and ranches, biodiversity declines. Since no market exists for bio-diversity, it is not valued as a resource. Higher the price of alternative uses of the forest land, faster will be the cutting down of forests, and decline of bio-diversity.⁵ Suppose that to service the foreign debt, bulk of the timber, beef, and plantation crops (alternative uses of forest land) is exported. Enter an organization committed to protect bio-diversity. Debt-Nature swaps between this organization and this country take place. Biodiversity has now a price; country shall agree this swap only if the cancellation of debt by protecting say 'X' acres of forests is greater than the exports earnings from timber, plantation or ranches on the same 'X' acres. The implications are, a) swap has helped the cause of allocative efficiency, Forest land is put to most productive use - produce the service of bio-diversity, b) protection of the forest has limited the scale of resource use.⁶ Hence the goals of sustainability and efficiency are related.

Does a Single Policy Instruments Affect Only One Goal ?

It is possible for an instruments to affect more than one goal e.g. fiscal policy may affect income distribution as well as efficiency (through its effect on the incentive structure). High import duties, which provide protection to domestic industry, redistribute income in favour of such industries. Also these duties, by providing protection, militate against improvement in efficiency in such industries. Hence both efficiency and equity are affected by the same policy instrument.

Another example could be the case of emission quotas which serve the objective of sustainability. However the distribution of these quotas influences equity e.g. distributional implications differ if only the existing polluters get such quotas versus if some quotas are also earmarked for future polluters.

5. We are not getting into the discussion of the 'Hotelling rule'. Reader may also see Hotelling (1931); Dasgupta & Heal (1979), and Chakravorty (1991,69).

6. Interestingly, in this case, allocative efficiency has determined scale This is contrary to Daly's assertion (1990,191) that" scale, like distribution, is price-determining, not price determined (emphasis his).

Let **us take** yet another example. Suppose fiscal policy provides for a massive subsidy for use of a resource so that the resource becomes a de facto free good. This happens in India where electricity tariff for farmers is charged on the basis of horse power of the motors of the pumps and not on units of electricity used by the pump to draw out water. This subsidy from the exchequer redistributes income in favour of the tracts using ground water for irrigation.⁷ Also farmers have no incentive to judiciously use water (efficiency is sacrificed) as the cost of pumping out from the ground is negligible. Excess withdrawal of ground water renders the existing scale of agriculture unsustainable. Hence one policy instrument - fiscal policy, has affected, efficiency, equity, as well as sustainability.

Pareto efficiency requires well functioning markets. Imperfect delineation of property rights⁸ over common resources (both open access and common property resources) results in market failures (efficiency implications). However redefinition of these property rights to internalize externalities has equity implications (Dasgupta,1982,25) e.g. Prof. Pigou's (and not Prof. Coase's) confectioner is generating noise through the use of mortars and pestles. The medical practice of the doctor in the neighborhood gets adversely affected. This externality is due to imperfect delineation of property rights over air which transmits the sound. If the confectioner is held guilty (i.e. doctor has property rights over air) and is made to compensate the doctor, then externality might be internalized (goal of efficiency). However this has equity implications as there is redistribution of income in favour of the doctor.⁹

Who Shall Set the Limit ?

Daly and others have argued for setting a maximum limit for throughput flow. Daly, in particular, is not against growth. He wants growth from an increase in efficiency and not from an increase in the throughput flow.¹⁰ In principle, we agree with

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7. Equity has a space, time, and constituent dimension eg. farmers (constituent), who draw water through indigenous (non-mechanized means) methods from shallow wells, get affected adversely when ground water table falls due to excessive withdrawal by those using mechanized means (Farmer, 1977).
 8. Property rights over resources are the rights to " consume, obtain income from, and alienate" these resources (Barzel, 1989,2).
 9. See Coase (1960) for a full discussion on this issue
 10. Daly (1990,195,200) has defined sustainable development to be " "development without growth" where a) growth means increase in size by addition of material through assimilation or accretion (i.e. quantitative increase), b) development means expansion or realization of potentialities; bringing gradually to a fuller, greater or better state (i.e qualitative improvement)"...." Technological progress for sustainable development should be efficiency-increasing rather than throughput increasing".

this line of thinking. However the question is, who shall decide the maximum scale of throughput flow, first at the national level, and then at the international level.

At the national level, would the legislature decide the optimum scale with the help of bureaucracy or the technocracy. Inadequacy of centrally planned economies and market economies to handle issues of scale is well known. Institutional innovations in this regard are imperative.

Inter-nation issues concerning global commons are even more complex. Who decides scale and quotas of use of such resources? Would the quotas be based on current GNP, current per capita consumption or on equal per capita consumption across nations?¹¹ Interests of the developing and the developed countries would invariably clash. Developed countries would like to protect ecosystem from further damage keeping current distribution constant. This would require developing countries to slow down their growth.¹² ? Developing countries, striving hard to improve their material well-being, may find this unacceptable. If developed countries bracket equity (same per capita norms for all countries) with sustainability, then the living standards of their citizens would decrease. Would this be politically feasible in an era of recession and protectionism?

Conclusion

We share the vision of Daly and others of an ecologically sustainable global society. The issue is, whether 'sustainability' is sustainable in an inequitable order.

Daly (1992,185) has observed that "you cannot kill two birds with one stone". We believe that this categorical assertion may have exceptions. If the birds are of the same flock they tend to move together. In such cases, a single stone may suffice to kill more than one bird.

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11. Anil Agarwal has argued for per capita entitlement to global sinks for emission of green house gasses (personal communication, 1993).
 12. Global externalities have a stock and a flow dimension. If the gravity of crime is related to the stock dimension, developed countries lose out. On the other hand, developing countries may be on a weak wicket if the flow dimension is considered.

References

- Chakravorty S (1991) : Sustainable Development : The European Journal of Development Research, Vol. 3(1), June 1991, 67-77.
- Coase R H (1960) : The Problem of Social Cost : The Journal of Law & Economics, Vol. 3, Oct. 1960, 1-40.
- Daly H E (1990) : Ecological Economics and Sustainable Development : Proceedings of an International Workshop, 8-12 Nov. 1990; Siena, Italy, 185-201.
- (1992) : Allocation, Distribution, and Scale - Towards an Economics that is Efficient, Just, and Sustainable : Ecological Economics, Vol. 6(3), Dec. 1992, 185-193.
- Dasgupta P (1982) : The Control of Resources : Oxford, Basil Blackwell.
- Dasgupta P & Heal G M (1979) : Economic Theory and Exhaustible Resources : Cambridge, Melbourne, & New York, Cambridge University Press.
- Dietz F J and Straaten J V D (1992) : Rethinking Environmental Economics : Journal of Economic Issues, Vol. XXVI, No. 1, March 1992, 27-51.
- Farmer B H (1977) : Green Revolution ? Technology and Change in Rice Growing Areas of Tamil Nadu and Sri Lanka : London, MacMillan.
- Georgescu-Roegen N (1966) : Analytical Economics - Issues and Problems : Cambridge, Mass. Harvard University Press.
- (1971) : The Entropy Law and the Economic Process : Cambridge, Mass. Harvard University Press.
- Hotelling H (1931) : The Economics of Exhaustible Resources : Journal of Political Economy, Vol. 39, 137-175.
- Kapp W K (1963) : Social Costs and Social Benefits - A Contribution to Normative Economics : Berlin, Verlag Von Dunker & Humblot, 183-210.
- (1970) : Environmental Disruption - General Issues and Methodological Problems: International Social Science Council, No. 8(4), 15-32.
- Libecap B D (1989) : Contracting for Property Rights : Cambridge, Melbourne, & New York, Cambridge University Press.
- Tinberg J (1952) : On the Theory of Economic Policy : 2nd ed. 1966, Amsterdam, North-Holland Publishing Company.