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COMMENTARY

Do individual preferences explain the Environmental Kuznets curve?

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Abstract

Some economists maintain the optimistic view that individual preferences of rich people eventually lead to a virtuous-circle relationship between rising income and environmental degradation. In this article, I review some of the models that establish a relationship between individual preferences and environmental quality. These models provide a basis for discussion of the key role played by two factors: individual preferences and technology. They do not, however, capture the distributive conflicts that occur between different social groups in the process of defining environmental policy. Neither do they provide a good basis for distinguishing between environmental costs caused by the decisions of particular consumers, and those which affect the same consumers. This point is related to the various manners in which environmental costs are displaced. Displacement often occurs within a country for current costs and is even clearer and more relevant when costs are transferred across a great distance or to a remote future. In such cases, there are few incentives to reduce consumption (or alter its composition). Displacement, moreover, can become a strategy (pursued more or less consciously) for maintaining high and rising levels of consumption without dealing with the associated environmental costs.

Keywords: Environmental Kuznets curve; Distributional conflicts; Individual preferences; Environmental cost-shifting

1. Introduction

Within the extensive body of literature that has been published in recent years concerning the Environmental Kuznets Curve, two main theoretical arguments have been formulated to account for the fact that beyond a particular level of per capita income, the relationship between economic growth and environmental quality becomes a 'virtuous' circle[1]. Both arguments concern the

[1] Theoretical discussions concerning the Kuznets curve often refer to environmental quality and environmental pressure (e.g., pollution) as if one variable were equivalent to the other with the opposite sign. In reality, matters are much more complicated: in general, environmental quality depends on current and past environmental pressures.

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changes in levels of relative demand that occur as per capita income varies.

The first argument suggests an endogenous change in the demand structure for goods and services. According to this argument, the sectors that become increasingly important as per capita income increases are those which have less environmental impact. The evidence that generally underlies this position is the increasing demand directed at the service sectors at the expense of demand directed at the industrial sector. However, much more empirical research needs to be done on the assumptions this argument is based on: some activities that are regarded as services may have as much or more environmental impact (direct and/or indirect) as others involving the industrial sector (consider, for example, long-distance tourism). In any case, this argument would only explain a reduction in environmental pressures per unit of GDP as income increases; it would not explain a reduction of these pressures in absolute terms unless we suppose that the sectors that are most environmentally problematic produce inferior goods. In fact, this is not at all likely (Torras and Boyce, 1998). In other words, if we apply the distinction made by de Bruyn and Opschoor (1997), the change in demand structure could account for a 'delinking' of economic growth and (some) environmental pressures in the 'weak (or relative) sense' but not in the 'strong (or absolute) sense'.

The second argument is also based on individual preferences and changes in relative demand that occur as income increases. In this case, however, it is not the changes in the relative demand for different goods and services acquired in the market that are crucial, but those between the consumption of marketable goods and services on the one hand, and environmental quality on the other. In this analysis, it is proposed that a high 'income elasticity of demand for environmental quality' could potentially explain the delinking of economic growth and environmental pressures in the 'strong sense'. The objective of this paper is to examine this argument. In Section 2, some of the main models that formally express this idea will be analysed. If the assumptions underlying these models are accepted, the only conclusion to be drawn is that the Environmental Kuznets Curve could have a microeconomic basis depending on preferences and technological restrictions.

Section 3 examines one of the main limitations of the models analysed: their inability to reflect the fact that decisions about environmental policy tend to involve conflict between different groups within a society. This phenomenon is placed in a broader context in Section 4, which considers the possibility of displacing environmental costs associated with consumption decisions so that those costs affect others. To observe the different forms that this displacement can take, it is essential to distinguish between environmental pressures with local, short-term effects and those whose effects are transboundary and/or have long-lasting effects. Section 5 presents the conclusions drawn from this analysis.

2. Models of individual preferences and environmental quality

In this section, I will refer to the models formulated by López (1994), Selden and Song (1995) and McConnell (1997)[2]. In spite of their different specifications, all of these models are, in my view, very similar both conceptually and in their conclusions and limitations.

All of these models posit a tradeoff between environmental quality (or reduction of polluting emissions) and consumption. In one case, this tradeoff results from the fact that environmental resources are considered one of the inputs for the production function: for a given technology, greater use of this input leads to the production of more goods but also to the generation of more pollution (López, 1994). For the other models, the tradeoff stems from the fact that the part of income used to pay pollution abatement costs could otherwise be used for consumption (Selden and Song, 1995; McConnell, 1997). These are

[2] McConnell's model (with slight variations) is also presented and subjected to an interesting critical analysis in Ansuategi et al. (1998).

aggregate models with a single consumption good[3] and a single pollutant that defines the level of 'environmental quality'. Given that 'environmental quality' is multidimensional in nature, the focus on a single pollutant is another significant limitation of these models. There may be a great deal of variation both in preferences with respect to each of the components of environmental quality and in the difficulty of achieving an improvement in each component. Consequently, it is quite possible that one of these components may improve while another worsens, or even that one improves due to the deterioration of another.

In the models referred to above, a 'social planner' seeks to maximise social welfare. The objective function of the planner is concerned with the utility of a representative consumer, which is assumed to be subject to all of the effects of environmental degradation. The limiting condition for this representative economic agent is, as we have seen, that in one manner or another greater consumption implies a decline in environmental quality.

In spite of their major limitations, it is worth noting some of the conclusions that emerge from these models. All of them point to two key factors in the determination of the 'optimal' consumption-environmental quality combination: one is the relative preferences for each of these 'goods'; the second is the cost in consumption terms which, as income rises, is associated with reducing environmental pressure (or increasing environmental quality). For example, in McConnell (1997) model, the problem is formulated as:

$$\max\ U(C,\ P(C,\ A)) \quad \text{subject to} \quad Y = C + A$$

where C, P, A and Y represent consumption, pollution, abatement costs and income, respectively.

Assuming an 'interior' solution (with some spending on pollution abatement) the condition for maximisation is that[4]:

$$U_C + U_P P_C = U_P P_A$$

In other words, the marginal utility of dedicating a monetary unit to consumption plus the (negative) additional disutility this causes in terms of added pollution must be equal to the marginal utility of the reduction in pollution that results from dedicating the same monetary unit to pollution abatement spending[5].

In this model, as in the others discussed, it is very important the manner in which the preferred combinations of consumption and environmental quality vary as income varies. If preferences are not homothetic, and, moreover, at a certain level of income a relatively higher value is placed on improvement of environmental quality and a lower value on consumption, then it is more likely that more environmental quality will be 'purchased', even though this may mean a lower level of consumption than would otherwise be possible. Nevertheless, even within the framework of these models, the assumption that environmental quality is a 'luxury good' is not sufficient to support the conclusion that increased income will necessarily lead, sooner or later, to improved environmental quality.

There is, as we have indicated above, another factor to bear in mind. This factor, which we could call 'technological', concerns the greater or lesser ease of reducing pollution as measured in terms of its opportunity cost in consumption units. The impact of this factor can be highlighted by considering an extreme case. As López (1994) indicates, based on his model in which the use of

[3] As a result, it is not possible to study one of the important factors in the relationship between income and environmental quality: the effect of changes in the structure of production/consumption.

[4] Sub-indices indicate partial derivatives.

[5] A limitation of this utilitarian approach is that it implicitly assumes that people has complete information about the problems associated with environmental degradation. In fact, 'there is always a lag time between the application of the technology and the realization of its full costs. Due to scientific, cognitive, and cultural lapses, that time may be days, decades, or, in the case of fossil fuels and global warming, even centuries. During this time, the costs are real but invisible' (Princen, 1997).

environmental services is an input for the production of consumer goods, if the technology were 'Leontief-type', with zero elasticity of substitution between conventional factors and pollution, economic growth (unless 'pollution-saving' technological changes appeared) 'would necessarily lead to ever expanding pollution levels regardless of the nature of preferences' (López, 1994, p. 164). In terms of the McConnell (1997) model, and that of Selden and Song (1995), it follows that if the problems we face cannot be effectively dealt with by incurring pollution abatement costs (i.e., if $P_A = 0$), then only if consumption does not increase at all will an increase in pollution be avoided.

In a real economy, of course, there is a range of different technologies available. Moreover, there are many goods and services, and it is always possible for the consumption structure to shift toward less polluting alternatives. Nevertheless, even without making the assumptions that underlie the extreme case outlined above, it is quite possible that increased aggregate consumption may lead to situations in which the difficulty of improving environmental quality is also increased. This effect may well offset preferences that favour a higher level of environmental quality. Accordingly, Selden and Song (1995) indicate that it is important to bear in mind 'the possibility that development reduces the 'carrying capacity' of the environment, so that ever greater abatement effort would be required to offset the direct effects of growth' (p. 167). A simple example of this would be a case in which greater water use reduced the volume of flow in rivers, resulting in a need for larger reductions in pollution to achieve the same concentration of pollutants.

It should be added that the models of López (1994) and McConnell (1997) also take into account the possible negative effect of environmental degradation on production, which would act in favour of its reduction. In many cases, however, this effect would only be noted in the future. This raises a broader issue, one that is not addressed in these models (and which will be discussed in Section 4): the possible displacement of costs to the future.

Furthermore, as McConnell (1997) indicates, the idea that when a certain level of income is reached environmental quality behaves like a 'luxury good' should not be accepted on an a priori basis: 'environmental quality is a set of heterogeneous goods, only some of which may be valued more highly at higher incomes' (p. 384). Moreover, as income increases, the possibility of defensive spending to counteract the negative effects of pollution is also greater[6]. The author provides two examples: one is the greater utility of air conditioning as atmospheric pollution increases; another is the purchase of bottled water to reduce exposure to water pollution (p. 391). Some of the implications of this possibility, however, can only be captured by a model that incorporates individuals with different levels of income.

It can be concluded that these models based on individual preferences make possible a story according to which per capita income increases to a point where there is a willingness to accept a level of consumption lower than that which could be achieved in exchange for a reduction of environmental pressure and a higher level of environmental quality (Stern, 1998). This is more likely to occur when the cost of reducing the environmental impact is relatively low[7]. It is, for example, easier to accept the cost of reducing sulphur emissions than that associated with reducing emissions of oxides of nitrogen.

3. Individual preferences, inequalities and environmental policy

The possible willingness to give up potential consumption to obtain a higher level of environ-

[6] In the McConnell's model this is reflected in non-additive preferences so that the marginal utility of spending on consumption could increase as the level of pollution rises (i.e. we would have $U_{CP} > 0$).

[7] When we speak of environmental quality (in spite of environmental pressure), it should be noted that improvement of environmental quality is also much more likely when environmental impacts are easily reversed.

mental quality can be metaphorically described as the 'purchase' of more environmental quality, but this is a metaphor that should not be taken too far. 'Environmental quality' is in most cases a public good that individuals cannot buy in the market: the extent to which public goods are made available is decided in the political realm. Consequently, in no case can it be expected that public environmental problems will automatically be solved as a result of economic growth, without the need for environmental policy (Arrow et al., 1995). If we deny the need for environmental policy, we are renouncing the mechanism through which higher income could lead in some cases to reduced environmental impact.

The models reviewed (which are based on the principle of maximisation of utility) are used to explain the existence of 'Environmental Kuznets Curves'. This implies an assumption that the political decisions that end up determining environmental quality (by forcing businesses and consumers to 'internalise' the environmental damage they cause) are made and implemented in such a way that they precisely reflect individual preferences. In fact, this is the role that is assigned to the 'social planner'. This view of political decisions only could be regarded as a reasonable approximation of reality in a completely unreal world of identical individuals.

When social inequalities are taken into account, the translation of individual relative priorities concerning consumption and environmental quality into actual determination of the level of environmental quality through political decisions is by no means direct, and there are conflicts of interest between individuals. Even in the simplest models, in which individuals have identical utility functions, distribution of income becomes a key variable (along with per capita income) and leads to different interests with regard to the level of environmental quality. The models should specify how these interests are 'aggregated' in order to determine what the level of environmental quality will be and how the costs associated with reaching this level will be distributed.

A fundamental issue is overlooked by models based on 'representative' economic agents: if conflicts of interest are taken into account, inequalities in the distribution of political power must be considered (Torras and Boyce, 1998). Even if a preference for a higher level of environmental quality is shared by the majority, environmental policy will produce winners and losers. If the losers have greater power, certain decisions can be blocked (Boyce, 1994). Kapp (1976) was correct when he pointed out that social costs associated with production and consumption should be seen as a manner of redistributing wealth through different mechanisms than those that operate in the price system.

Rich people, whatever the degree of their concern about their well-being from an environmental perspective, generally have a wider range of options available and hence a greater capacity to avoid the effects of environmental degradation. It is easier, to use the term of Hirschman (1970), for them to take advantage of an 'exit', in a figurative sense, by spending money to avoid the negative effects of environmental degradation, or even in a literal sense, as occurs when those with greater purchasing power move away from more polluted areas. According to Gawande et al. (2001), this explains the apparent EKC observed in the United States between hazardous waste sites and level of income. This curve, however, cannot be interpreted as indicating a reduction in the level of these wastes: it simply reflects a spatial separation from the consumption side. It may often be the case that consumers with the highest incomes—who also generally wield more political power—have fewer incentives to find a solution to a 'public bad' whose effects are felt primarily by the poorest members of society. If this is so, it is likely that greater equality—political and economic—could lead to less environmental degradation, a conclusion that some authors have defended and attempted to assess empirically (Boyce, 1994; Torras and Boyce, 1998; Boyce et al., 1998).

There are, moreover, many cases in which some individuals gain greater environmental quality for themselves by purchasing it as a private good, but at the cost of an overall increase in environmental degradation. As Lekakis and Kousis (2001) point out, 'some forms of this demand (for environmental quality) may indeed lead to environmental

degradation. This is typically true for the demand for houses in cleaner areas, which advances the transformation of natural spaces (e.g., forests) into residential areas' (p. 169).

The issues involved should not, however, be oversimplified, and obstacles to the development of environmental policy can come from many different sectors depending on the particular case. Coal miners, for example, may effectively oppose the closure of a mine, in spite of the fact that maintaining this activity generates environmental costs and even monetary losses for society (due to massive subsidies). The agricultural policy of the European Union is another example: it is aimed at maintaining a system of intensive agriculture that has significant negative environmental effects and is, in addition, costly in monetary terms for EU citizens (Ekins, 2000).

The defensive 'exit' within a country of rich people when faced with environmental problems, or of well-organised interest groups that resist some changes aimed at reducing environmental pressure are, in reality, simply specific cases of a more general problem: the displacement of environmental costs.

4. International and intergenerational displacement of environmental costs

In spite of international agreements in some areas, environmental policy is essentially set for a territory defined by national borders (though in some cases, such as that of the European Union, a broader framework is also very relevant). In the preceding discussion, we have seen that even within this context conflicts of interest arise in the process of setting environmental policy.

Environmental costs may, however, also be displaced spatially to other territories. A key distinction must be made at this point between different types of environmental impact. Some act at a local level without crossing national borders, while others have a transboundary or even global effect. In the latter case, the very nature of the problem is such that some (or most) of the problem stemming from consumption decisions is displaced to people who have no voice in the national decisions on environmental policy (Ansuategi et al., 1998; Ansuategi and Perrings, 2000).

In the case of more local environmental problems, there is another indirect but also highly relevant means by which displacement of environmental costs can occur—the import of goods whose production involves environmental costs that affect other populations (Arrow et al., 1995; Stern et al., 1996; Muradian and Martinez-Alier, 2001). An even clearer case of displacement is the export of dangerous waste products. It has been argued that these interchanges are mutually beneficial for the different territories involved, given that they presumably reflect different preferences with regard to environmental issues. Once again, however, it must be noted that political decisions do not necessarily reflect the interests of the majority of the population (particularly in the absence of democratic institutions). Moreover, environmental costs may disproportionately affect some sectors of society that have very limited political power to oppose the decisions involved.

According to McConnell (1997), to specify whether pollution has its origin in consumption or production is a minor issue. If international trade is taken into account, this view is clearly not correct. In the final analysis, all environmental impacts can be seen as the outcome of consumption decisions (which need to be specified through product life-cycle assessments). The environmental impacts and the benefits of consumption, however, are not necessarily felt by the same people or in the same territory. This justifies the insistence by some authors that analysis of possible EKCs should focus on the evolution of the consumption structure of a country, rather than being based on the evolution of the production structure (Rothman, 1998).

Intergenerational displacement of costs is another highly relevant consideration that cannot be reflected in any manner in the models discussed (as Ansuategi et al., 1998 also stress). The relevant distinction in this case is between transitory, reversible environmental impacts (noise, for instance) and those whose effects are long-term. Or

as the distinction is sometimes expressed, between flow pollutants and stock pollutants[8]. None of the pollutants examined in the literature fulfils the EKC hypothesis unequivocally. However, the outcomes are generally more favourable to this hypothesis for pollutants with local and regional impacts and a relatively low cost of abatement, as is the case of sulphur atmospheric emissions, while in the case of global pollutants—as greenhouse gases—the most part of studies clearly conclude against this hypothesis.

The models analysed either make no reference to future effects of environmental degradation or assume, implicitly or explicitly, that these effects will be internalised by a social planner. The social planner's decisions will presumably reflect preferences for current and future consumption of goods and 'environmental quality' for a representative consumer whose life span is unlimited (and who, it is supposed, discounts the future)[9]. The problem, however, is that when it is not consumers themselves who are affected (given their limited life spans), but rather future generations, the incentives for exchanging consumption for environmental quality may be non-existent, or, at the very least, impossible to model on the basis of a 'hedonistic' utility function. To employ a distinction made by Sagoff (1988), the sacrifices that current citizens may be prepared to accept for the benefit of future generations are an expression of their attitude as 'citizens' rather than as 'consumers'.

5. Conclusion

In this article, I have reviewed some of the models that establish a relationship between individual preferences and environmental quality. These models provide a basis for discussion of the key role played by two factors: individual preferences and technology. They do not, however, capture the distributive conflicts that occur between different social groups in the process of defining environmental policy. Neither do they provide a good basis for distinguishing between environmental costs caused by the decisions of particular consumers, and those which affect the same consumers.

Some economists maintain the optimistic view that individual preferences of rich people eventually lead to a virtuous-circle relationship between rising income and environmental degradation. Several critical comments could be made concerning this point of view but the most important point is related to the various manners in which environmental costs are displaced. This holds within a country for current costs: the inhabitants of a city where consumption is concentrated, for example, need not concern themselves with the negative health effects of a waste treatment installation located in a sparsely populated area. The same displacement effect is even clearer and more relevant when costs are transferred across a great distance or to a remote future. In such cases, there are few incentives to reduce consumption (or alter its composition). The displacement, moreover, can become a strategy (pursued more or less consciously) for maintaining

[8] The distinction can be modelled in the following manner: if F_i represents the flow of a specific pollutant that starts to be emitted in period 1, in general, the environmental costs borne in the period i would be a function $C_i(F_1, F_2, \ldots, F_i)$, whose extreme cases would be those in which costs could be reduced to $C_i(F_i)$ and those which in practice can be expressed as $C_i(F_1+F_2+\ldots+F_i)$. An example of the latter case would be radioactive wastes with a very long half-life.

[9] Some authors have approached environmental issues using overlapping generations models. These models can address intergenerational problems. John et al. (1995), in an interesting article titled 'short-lived agents and the long-lived environment', analyse the decisions of a government which impose taxes in order to maintain and improve the environment. They contrast the decisions of a 'short-lived government' that maximize the utility of those alive during its term in office and the hypothetical decisions of a 'long-lived planner' who takes into account the utility of all the generations. In the first case (assuming no altruistic preferences), the outcome is that intergenerational externalities are not internalised. According to the authors: 'our model (...) suggests that environmental policies, such as those proposed at the Earth Summit, are unlikely to be adopted in the absence of intergenerational altruism, and that intergenerational conflict may be at least as significant as international disagreement' (John et al., 1995) (see also John and Pecchenino, 1994). In several articles, Howarth and Norgaard also use overlapping generations models to analyse environmental problems (see Howarth and Norgaard, 1995). An other recent contribution is Jones (2001).

high and rising levels of consumption without dealing with the associated environmental costs.

In situations of this type, the only 'internalisation' to be expected is likely to be imposed either through the opposition of affected parties (when they are capable of it) or through action based on 'altruistic' concern about the effect of environmental degradation on others. Some may argue that such concern—and the corresponding willingness to exchange consumption for environmental improvements that affect people remote in space or time—could increase as income increases. This is a hypothesis which, to say the least, should be approached with a great deal of scepticism.

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