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7 July 1989

Dear Charles

GLOBAL ENVIRONMENT: ECONOMIC ISSUES

Thank you for your letter of 3 July to Roger Bright recording the Prime Minister's comments on the paper on economic aspects of international environmental issue and her suggestions for amendments to the paper.

I attach a revised version of the paper taking in the changes set out in your letter. I have not recirculated the annexes as these remain unchanged from the original version.

I am copying this letter and the revised paper as before to Alex Allen (HM Treasury), Stephen Wall (Foreign and Commonwealth Office), Neil Thornton (Department of Trade and Industry), Myles Wickstead (Overseas Development Administration), Stephen Haddrill (Department of Energy), Roy Griffins (Department of Transport), Shirley Stagg (Ministry of Agriculture, Fisheries and Food), Trevor Woolley (Cabinet Office) and Nigel Wicks (HM Treasury).

Yours

CEJBush

KATE BUSH
Private Secretary

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THE GLOBAL ENVIRONMENT: ECONOMIC ISSUES

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THE GLOBAL ENVIRONMENT: ECONOMIC ISSUES

1. INTRODUCTION

1.1 There are a number of major global environmental concerns on which the need for urgent international action is now widely recognised. These include, inter alia, climate change and global warming (see Annex 1); CFCs and the ozone layer (see Annex 2); and deforestation, desertification and loss of genetic diversity (see Annex 3). Acid rain and marine pollution issues are further examples. Such concerns raise difficult scientific, technological and economic issues, not least of analysis and policy. The more advanced industrialised nations have an essential role to play in addressing these challenges. Developing countries are deeply affected by all of them. This paper addresses some of the key economic issues involved.

1.2 Explicitly or implicitly decisions are continually being made about trade offs between the environment and economic development. A major purpose of economic analysis is to try to ensure that such decisions are fully informed about the economic value and functions of the environmental assets affected. This is essential if priorities in resource use are to be established and assessed, and a proper balance struck between policies of prevention and adaptation. Economic progress need not be at the expense of the environment. Indeed, in many developing countries, the prospects for long term economic development depend on the careful management of natural resources such as pasture, water, fertile soil and forest. Environmentally sustainable development is now recognised as both possible and essential.

2. ECONOMIC ISSUES

Common property resources: the global commons

2.1 Industrialised countries are dependent for their raw material and energy on the international exploitation of forests, fisheries, fossil fuels and mineral reserves. Many of these resources - tropical and temperate forests, coastal and shelf fisheries, mineral and fossil fuel reserves - fall within or across national boundaries. The countries having sovereignty over

them exercise exclusive property rights over them and can therefore determine whether they are exploited or conserved, although a major factor in the pace of exploitation will be international demand.

2.2 For resources that lie outside national boundaries, such as ocean fisheries, no country has exclusive property rights and these resources may therefore be seen as common property resources - the global commons. In the absence of international agreement to ensure cooperation among all users, no country has a strong incentive to manage such common property resources sustainably. On the contrary individual countries will tend to exploit such resources, possibly regardless of the long term consequences.

2.3 Economic progress has also become dependent on the atmosphere and stratosphere and oceans for disposing of pollutants. There is a widely recognised need to control or limit the use of this capacity through international agreement, since individual countries do not face the costs of using the assimilative capacity of the environment until it becomes overloaded. Only when pollution gives rise to threshold effects - changes in climate, ozone depletion, pollution hazards and so on - do the costs of thus treating the global commons become apparent. At this point, everyone has to face the consequences regardless of whether they are major polluters or not.

2.4 To avoid this problem there is a need to place proper values on the services provided by the environment and to ensure that users are faced with the true costs involved. Many of these services are currently provided at zero price simply because no market exists in which their true values can be revealed through the acts of buying and selling. Obvious examples are the services provided by the atmosphere and the oceans as pollution 'sinks'. If something is provided free, more of it will be demanded than if it is priced. The danger is that this greater level of demand will not be matched by a sustainable supply. The stock of natural resources should ideally be analysed in a manner analogous to the way that the stock of man-made capital is in national and international accounting systems, but more progress in developing and applying this principle is needed.

Sustainable development

2.5 The Brundtland report established the concept of sustainable development as the basis for integrating economic and environmental policy. The message of Brundtland is that it is possible to achieve a path of economic development which meets the needs of the present without compromising the chances of future generations to meet their own needs. The implication is that the present generation should leave future generations a wealth inheritance - a stock of knowledge and understanding, of technology, of man-made capital and, last but not least, of environmental assets - no less than that inherited by the present generation. Consideration is currently being given by the UN Statistical Office to the possibility of modifying the present national accounting conventions to accommodate sustainability concerns. The issues involved in translating the concept of sustainable development into operational language are being explored by Professor Pearce in research undertaken for UK Department of the Environment.

2.6 It is desirable that the Brundtland concept of sustainable development should be translated into practice, measured and progress towards its achievement assessed. The relevance of resource accounting procedures in monitoring progress towards sustainable development is now widely recognised and is the subject of OECD and UNECE work. This involves assembling statistics on the stocks and flows of natural resources and drawing up balance sheets setting supply against the rate of use.

3. GENERAL AND METHODOLOGICAL ISSUES

Anticipatory versus adaptive policies

3.1 A feature of environmental policy making is a high degree of uncertainty about the precise extent of the environmental damage caused by economic activity. In some cases - eg the extinction of wildlife species through habitat destruction - it is irreversible. In other cases - eg the damage to the ozone layer caused by CFCs - it is potentially catastrophic. In many cases, of which climate change is an obvious example, despite major scientific

research efforts - and it is important that countries examine the science thoroughly - there is a high degree of uncertainty about the extent or even the nature of environmental damage.

3.2 There are no firm rules for choosing which policy to adopt in the face of uncertainty. But most people are risk averse: they do not like uncertainty. Most people would also argue that taking risks is not worthwhile when the negative 'pay off' - what happens if they lose - is very large. Some current environmental problems risk very large losses. In these circumstances it is better to anticipate the risk with corrective policies; the Montreal Protocol designed to phase out the use of CFCs is a case in point. However, to the extent that environmental damage has already arisen, there may be no alternative to policies which adapt to the new situation; the response to sea level rise is a striking example. Clearly it is important that an early assessment of the relative costs of prevention and adaptation is made. Measurement of the costs of various forms of environmental degradation and of policy options should therefore be one of the main objectives of research.

Measuring environmental benefits

3.3 It is important to try to place monetary values on environmental gains and losses partly for the reasons outlined in para 2.4. For analytical purposes cost benefit analysis (CBA) makes operational the simple, and rational, idea that decisions should be based on some weighing up of the advantages and disadvantages of an action. CBA is the only technique of evaluation which explicitly makes the effort to compare like with like using a single measuring rod of costs and benefits, ie money. Techniques of research into 'willingness to pay' for environmental improvement are now well established and have an important part to play in improving the estimation of benefits in money terms. However even where the process of environmental degradation is well understood, an agreed assessment, in monetary terms, of the likely environmental benefits of policy options may not be possible. In these circumstances policy evaluation can nevertheless make good use of cost effectiveness analysis - the determination of the most cost effective way of

achieving an environmental quality standard - for example the effectiveness of afforestation as against investment in energy efficiency as a means of removing a given amount of carbon dioxide from the atmosphere.

3.4 Whatever formal economic analysis is adopted it will need to take full account of relevant scientific research. For example, the concept of critical loads which aims to identify the physical capacity of the environment to tolerate acid deposition has played an important role in the development of abatement strategies for combating long range transport of air pollutants. The critical loads approach also includes consideration of the costs of attaining tolerable levels.

Future generations

3.5 There is considerable uncertainty about how best to value the interests of future generations in economic appraisal. Sustainable development effectively involves compensating future generations for losses they might otherwise incur because of action by the present generation. As has been argued above in para 2.5, to ensure that future generations have the capability to meet their needs, it is essential to leave the next generation a stock of wealth no less than that inherited by the present generation. This requirement is likely to feature in environmental economic research programmes as they develop.

4. ECONOMIC PRINCIPLES FOR POLICY FORMULATION

The need for international regulation

4.1 When governments enter into international negotiations in order, for example, to protect the ozone layer by regulating the production of CFCs or to reduce pollution in the North Sea by regulating dumping of pollutants, those negotiations involve bargaining designed to ensure that each country derives a fair share of the expected benefits and incurs a fair share of the anticipated costs. This implies recognition of the fact that the use of the ozone layer and of the North Sea need to be regulated if these resources are to be saved from destruction. Previously unlimited rights to use, particularly as regard

pollution, are now being restricted and it is no accident that international organisations, such as OECD, UNECE and UNEP, are playing an ever more important role in the process. The reason for the restrictions is the recognition that the capacity of the ozone layer to absorb CFCs, and of the North Sea to absorb a range of pollutants is limited. They are therefore scarce resources and free access to them by all, including those with no responsibility for their conservation - the so-called free rider problem - is increasingly seen as intolerable.

4.2 The nature and scale of some problems requires that we seek internationally agreed measures to reduce regional and global pollution, and raise public awareness of the need for action. Unilateral action in such cases is ineffective and can easily become self defeating. Pollution control brings costs and unless international agreements are reached on common goals or standards the measures necessary to reduce pollution may make individual countries industry uncompetitive in world markets if these countries alone incur these costs. Every country needs to participate in the regulation process.

The Polluter Pays Principle

4.3 One way of dealing with pollution problems is through the Polluter Pays Principle (PPP). This ensures that the costs of pollution fall upon the economic agent causing that pollution, and would, if consistently applied, avoid the free rider problem. Application of PPP has the advantage that it establishes a clear framework of property rights in favour of those suffering from the effects of pollution. PPP is already put to good use for the purposes of national environmental policy. There are however difficulties in applying the principle at international level.

4.4 These difficulties may be illustrated by reference to the analogous issue of free trade. Free trade policies maximise global welfare and national interest by allowing resources to be more effectively allocated, in line with underlying comparative advantage and encourage the growth of both the volume of trade and GDP. These objectives are being advanced both through the multi-lateral negotiations on reducing tariffs in the current GATT round and through

the completion of the internal EC market. For the same reasons elimination through multilateral negotiations of export finance subsidies provide a fair basis on which export contracts are awarded according to underlying comparative advantage rather than subsidisation.

4.5 Conceptually the same approach is relevant to say global climate problems. The objective should be to "internalise" environment costs into the market process of the efficient allocation of resources. An exporter who wins a contract, because the price he pays for his fuel inputs does not reflect the wider costs for society of the gases emitted as a result of the burning of that fuel, has won a contract "unfairly" in exactly the same way as an exporter who has won a contract through a mixed credit provided by his Government. In the latter case the cost of the subsidy has visibly fallen on the country providing it is "internalised" but in the former case the cost is "externalised" to fall on someone else.

Compensation payments

4.6 Whatever the merits of the Polluter Pays Principle, it will be no easy task to apply it between countries on an international basis. It would depend on world wide consent which may take considerable time to achieve. In the meantime, because property rights in pollution rest with the polluter it may be in the interests of third countries to pay the polluter to stop. Everyone will be better off if the costs of payment are less than the avoided costs of pollution which would otherwise have occurred (in the paying countries). For this reason, certain countries such as the Netherlands and West Germany are having to contemplate paying East European countries to curtail their emissions of sulphur dioxide.

4.7 In the case of the Eastern bloc, there are obvious arguments against these kind of payment arrangements, not least that it should be in their own long term interests to address their own environmental problems. On the other hand, in certain cases such payments may represent a relatively cheap means of persuading these countries to do something about environmental pollution to the benefit of all countries.

Developing countries

4.8 In the case of developing countries, it is necessary to recognise the resource limitations imposed on them by their poverty and that their priorities for this reason give a much greater weight to economic development relating to growth and poverty than global environmental protection. The notion that developed countries should make financial amends to developing countries for past environmental pollution is not acceptable. However, external resources, both concessional aid and commercial investment, have an important part to play in encouraging developing countries to give higher priority to solving their environmental problems and to ensure that priorities for action include things of global as well as local importance. Additional public (and private) resources channelled to developing countries could represent a worthwhile investment in the protection of the global environment to the benefit of all countries.

The framework of international negotiations

4.9 In the international negotiations on climate change ahead, free riders will need to be dealt with, through a combination of possible concessions and inducements. To participate effectively in the negotiations of standards and on the mechanisms for ensuring environmentally sound behaviour, every country needs to be aware of the costs and benefits of different options.

4.10 It is implicit in our stance that we are willing to join other industrial countries in accepting some additional cost in the interests of the world's future. While we must not pay unnecessarily, we should be alive to the possibility that greater benefits may accrue in the future if all countries agree to pay a higher price now. Adopting an anticipatory policy stance would be an investment. An appropriate national negotiating position should logically therefore be based on a medium-term time horizon, which takes account of both costs and benefits over time.

The role of market mechanisms

4.11 Market mechanisms such as charges, taxes and schemes allowing dischargers to trade permits are increasingly being used to complement environmental regulation. They may offer an efficient and cost effective way of achieving environmental standards, or provide a means of influencing environmental behaviour or simply raise money. Examples in the UK include the tax differential on unleaded fuel, waste disposal fees, and schemes in prospect for cost recovery charging with respect to environmental pollution generally. Potentially such mechanisms have a wide application.

4.12 The case of unleaded petrol illustrates the effects of taxes. The tax differential in favour of unleaded petrol in the UK was introduced in order to encourage a switch in consumption from leaded petrol. The impact of the differential can be seen from Figure 1. However environmental aspects of petrol consumption go wider than lead. It is now recognised that petrol consumption, as with other fossil fuels, contributes to the greenhouse effect. Petrol tax has served a number of functions during its history from purely revenue raising, to charging for roads and to providing an incentive to reduce consumption when supplies threatened to dry up in the early 1970s. Most topically it can be regarded as a form of carbon tax tending to reduce carbon dioxide (CO₂) emissions.

4.13 Emission trading and some forms of pollution charging offer ways of using the market to achieve environmental standards cost effectively. Allowing dischargers to sell or trade the difference between actual and allowed discharges has been extensively tested as an approach to pollution control in the US. The approach has been found to be workable and the US plans more extensive application as described in President Bush's recent new proposals. The benefits of using market mechanisms where they are appropriate to the problem and in line with the national legal and financial characteristics of the country concerned are widely recognised. This is clearly an important area for research.

5. ILLUSTRATIONS OF ECONOMIC ISSUES

The problem of CO2 emissions

5.1 The general problem of climate change and global warming is discussed in Annex 1. Options for reducing emissions of CO2 include:

(i) Energy conservation - improved insulation; more efficient lighting devices, motors and appliances, and vehicles; improved building and process control; more use of combined heating and power systems (CHP) in industry and services.

(ii) Substitution of alternative fuel in road vehicles - diesel, gas, bio-alcohol and hydrogen; electric vehicles.

(iii) Removal of carbon dioxide from power stations' flues - (thought to be technically feasible).

(iv) Electricity generation from renewable energy sources - bio-fuels, on-shore wind, small scale hydro, tidal energy, geothermal hot dry rocks, solar energy, and wave power.

(v) Electricity generation from nuclear power - (to reduce carbon dioxide emissions in electricity generation).

(vi) Alternative methods of fossil fuel generation - eg substituting gas for coal; more efficient systems of generation.

5.2 Market Mechanisms have a role to play in choosing between these options; the options themselves need to be evaluated for their cost effectiveness. Some will be much more expensive than others per unit of CO2 emission. However it is not obvious that governments, rather than the burners of fossil fuels, are best placed to carry out this evaluation. A tax on fossil fuel consumption would provide an appropriate incentive to economise on its use. Precisely what form those economies take, and who introduces them, can then be left to the market. In designing any carbon tax(es) government

will however need to take a view on price elasticities - ie what level of tax would be needed to achieve the desired rate of CO2 emissions. Any such approach must be pursued on an international basis if it is to be effective, and will also need to take account of the characteristics of national energy supplies.

Energy conservation in developing countries

5.3 Developing countries with 70% of the world's population currently contribute only 30% of total energy consumption. Total energy use including traditional forms such as woodfuel, dung and biomass waste per capita is only one-sixth of OECD levels. Nevertheless, in future the LDC demand for energy is likely to grow at least as fast as their GDP and most forecasts suggest that, by 2020, their energy use could have doubled.

5.4 In developing countries the contribution to global CO2 levels from deforestation is of the same order as that from fossil fuel consumption. Deforestation occurs to accommodate agricultural (which is given added impetus by poverty and population growth) and to meet fuelwood demands as well as through the activities associated with commercial logging. Fossil fuels, particularly coal, are the major inputs for power generation. Electricity generation and distribution are often characterised by poor technical efficiency, high energy losses as well as pricing policies that fail to reflect full economic, let alone environmental costs.

5.5 From an environmental viewpoint the challenges are to use existing energy plant more efficiently, to use energy more economically and to expand capacity in systems which are more environmentally benign. There is no simple answer to these challenges but policy options are likely to include the reform of power tariffs; the introduction of levies on fossil fuels; reduction in generation and transmission losses in existing electricity systems and the installation of best practice fossil fueled and non-fossil fuel capacity.

6. CONCLUSIONS FOR G7

6.1 Management of global common property resources and resource systems requires a coordinated policy response involving cooperation on a global scale. As major users of the world's environmental resources and as the economically most powerful countries, the advanced industrialised countries will have to take the lead in this cooperative effort. In this G7 can play a vital role.

6.2 G7 should also use its economic and financial resources to assist the promotion of sustainable development in developing countries and to encourage them to use more of their own resources to protect their own and the global environment. This will assist in developing the cooperation between nations with highly unequal resource bases, necessary to protect and conserve the global environment.

6.3 G7 can also give a much needed political impetus to the environmental economics research programmes of international organisations including OECD, the World Bank, United Nations Environment Programme (UNEP), Inter-Governmental Panel on Climate Change (IPCC) and United Nations Economic Commission for Europe (UN/ECE). The protocols for any international climate convention are likely to need economic analysis in their preparation, monitoring and evaluation. This is not simply a matter of applying techniques of cost effectiveness and cost benefit analysis, important though they are, but also of the design of the conventions themselves including the framework of rules and enforcement.

6.4 The aim should be to establish the relative cost effectiveness of different techniques of ameliorating the impact of human activity on the environment. The priorities for international economic research look to be as follows:

- (i) The choice between anticipatory and adaptive strategies, particularly in relation to climate change, through assessment of the costs of environmental degradation and policy options.

(ii) The role of market mechanisms as a complement to the regulation of property rights in the global commons.

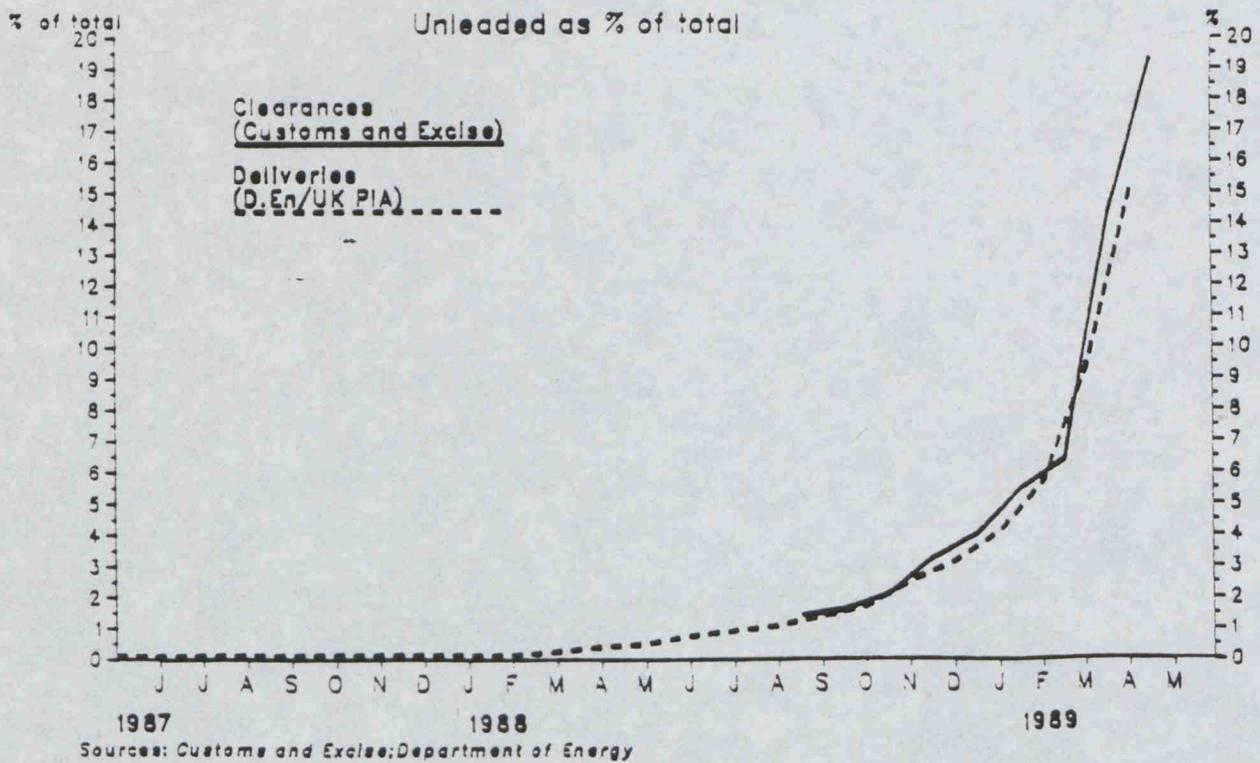
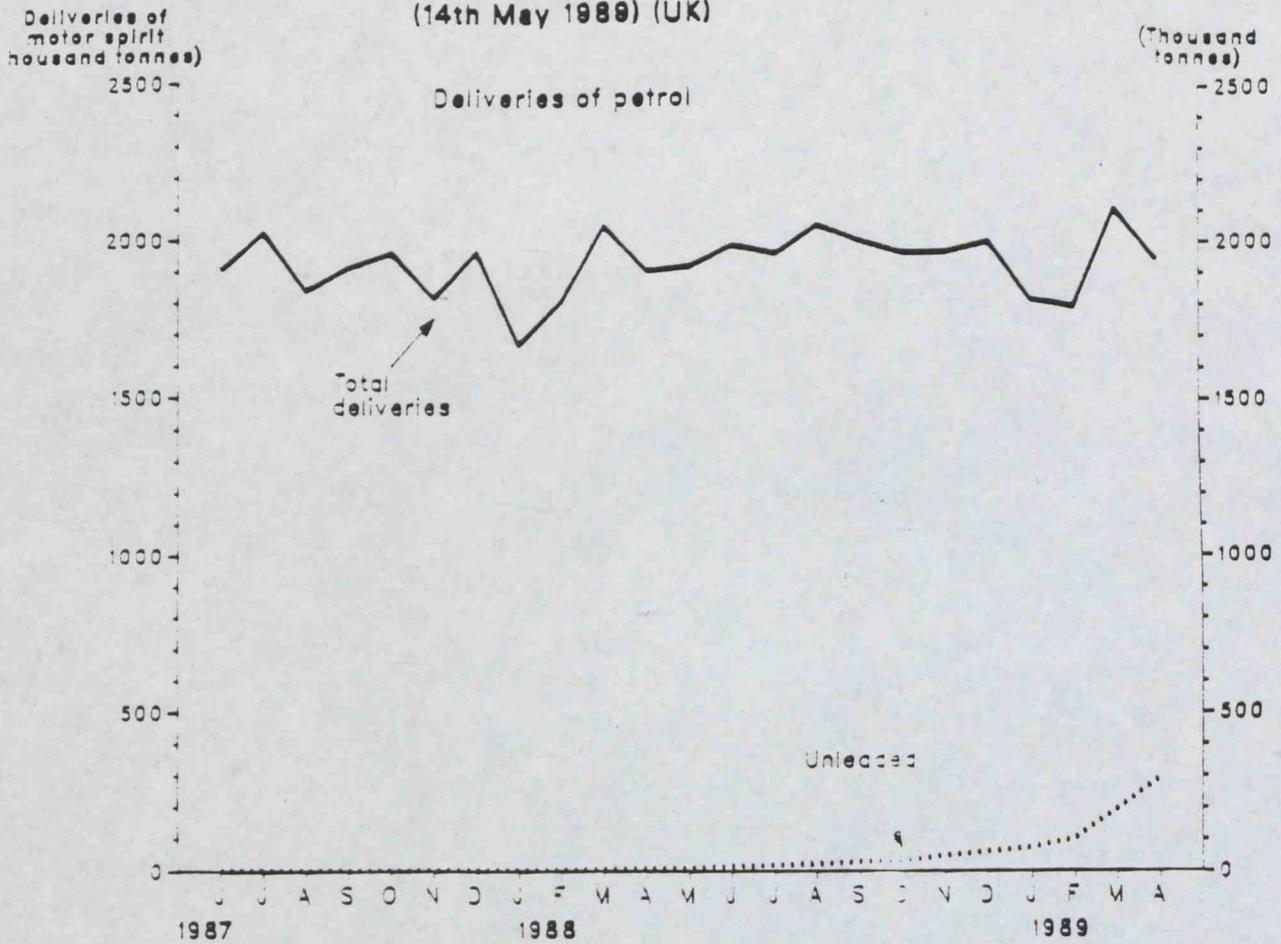
(iii) The assessment of the effects of global environmental strategies on the economies of national states, including the identification of divergences between national and international interest.

(iv) The cost effectiveness of different techniques of encouraging less developed countries to adopt environmental policies.

(v) Energy policy and its implications for energy pricing and conservation.

Figure 1

Unleaded Petrol
(14th May 1989) (UK)



NB. A tax differential between leaded and unleaded petrol of approximately 4 pence per gallon was introduced in 1987 making making unleaded the same price as 4-star leaded. The differential was increased to 10.6 pence in 1988 and 14.2 pence in 1989.

