

**HOW TO MAKE DEMOCRACY WORK,  
WHEN FUTURE GENERATIONS ARE PART OF THE ISSUE?**

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**Abstract**

The renewed debate on the the social rate of discount provoked by the Stern Review of 2006 with contribution by i.a. Dasgupta, Nordhaus and Weitzman revealed deep differences of opinion concerning all of the elements of the Ramsey equation:

social discount rate = (pure time discount rate) + (unit elasticity of the marginal utility of consumption)\*(the growth rate) or  $r = \delta + \eta * g$ .

On this basis it is discussed how the very long-term decisions related to climate policy can be made in a democratic way and with due consideration for the interests of future generations. Advantages and problems connected with various democratic mechanisms are considered:

1. individual decisions in the market,
2. collective decisions in the political system,
3. decentralized self-management,
4. decisions by professional experts, including economic experts.

It is concluded that very long-term decisions related to climate policy apparently always end up in paradoxes, and the computations based upon the methods of environmental economics does not seem to reduce confusion.

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## **The uncertain state of the world**

The state of the world - climate change, the global distribution of income, conflicts concerning resources - forces us to look towards very far horizons of time. This transgresses habitual limits of our rationality and our morality. We are painfully aware, that our economic activity to day will influence life and welfare of our descendants 100, 200 etc. years from now, and we do not know how. It enforces us to weigh 1) our own against other humans' welfare and survival, 2) across the globe and across centuries, 3) under uncertainty, including a positive, yet unknown probability of future man-made cataclysm. And we have no idea how to proceed.

The coping strategy of traditional economic ideology is largely one of postulating non-existence of the problem.<sup>1</sup>

... our grandchildren will in all likelihood be much better off than we are. ... raising the spectre of our impoverished grandchildren if we fail to address global environmental problems is demagoguery.<sup>2</sup>

Thus the 2006 Stern Review assumes 1.3 per cent annual GDP growth as the baseline for the next century.<sup>3</sup> Likewise, the Danish report on future social welfare assumes 2.0 per cent annual productivity growth and furthermore claims that this is "well substantiated".<sup>4</sup> It is nothing of the sort; it is an unfounded extrapolation of recent, exceptional historical experience, namely average growth rates of GDP per capita in the

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1. There are dissenting voices and forerunners of the presently growing subbranch of economics called ecological economics.

2. in *The Economist*, 30 May 1992, p 71; for further examples cf. Aage (1984).

3. Stern, 2007:161.

4. Andersen & Pedersen, 2005:191,200. The confidence in future growth rates of about 2.0 per cent is widespread among economists for obscure reasons, cf. Weitzman, 2007:707,720.

20th century. Global GDP per capita changed little until 1000 A.D. During the following 800 years it grew by 0.05 per cent annually on average and in the 19th century by about 1 per cent. Since 1900 global GDP per capita has increased by a factor 5 (1.6 per cent annually), total GDP by a factor 17 (about 3 per cent p.a.), energy consumption by a factor 12 (half the original oil resource is used), water consumption by a factor 9 (one third of total resources is being used), and global population by a factor 4, from 1.6 to 6.1 billion people.<sup>5</sup> A repetition of the 20th century is physically impossible. Little is known about future GDP growth. Yet, something is known for sure about exponential growth: that it eventually grows very fast and that it eventually draws towards a close; the only question remaining is when and how.<sup>6</sup>

There is still some confidence, that market forces will correct any environmental problems. It has even been argued, that "market prices give no reason to believe that natural resources are a limit to economic growth".<sup>7</sup> This is mistaken.

First, the market is a peculiar place to search for information on the magnitude of resources and likely technical advances in the future. The sensible thing to do would be to directly address geologists and engineers. Second, the price will depend on market agents' preferences for present, respectively future consumption, which does not necessarily reflect market agents' assessment of future raw materials supply: A low price could just as well owe to the fact that the market is myopic, so that the scarcity price increment would be

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5. Maddison, 2003; McNeill, 2001.

6. Suppose, that Judas kept his 30 pieces of silver and deposited them at a moderate 3 per cent rate of interest. If they weighed 249.6 g in the year 30 A.D., the amount to day, 1977 years later, would be  $5.976 \cdot 10^{24}$  kg, which equals the total mass of Planet Earth. A fairly good approximation is that a capital on interest at  $r$  per cent per annum doubles every  $70/r$  years.

7. Mankiw, 1997:244.

minute until a few decades before depletion.<sup>8</sup> Third, no market and hence no market price exist for many ecological resources. Urgent problems are linked up with emissions to the environment caused by resource consumption, and even if certain types of pollution, notably the most concentrated ones, have been successfully eliminated, other and more elusive pollution problems have increased. However, there is no such thing as a market for air with a low CO<sub>2</sub> content, or for seawater not contaminated with nutrients. These environmental effects are externalities in relation to the market.

We cannot trust the market mechanism to allow for generations yet unborn, even though a profiteering owner of an oil well will let the oil remain in the ground, if prospective future price rises are sufficiently high. It is true that in theoretical terms market equilibria over long spans of time are possible, and that in theory there is no difference between those who will live in a hundred years from now and, say, those who live in Denmark today. Yet, in practical terms markets are only functioning in the short run, and there is another, rather more fundamental problem. There is always a large number of possible market equilibria. They produce widely different distributions of the final consumption among market agents, which is precisely the issue here. Which distribution is realised, depends on how resource control is distributed at the opening of the market, that is today, when the present generation owns all natural resources. The problem confronting future generations is that they do not own anything. It is equally decisive for those living in Denmark, how many resources they control, in the short term especially labour and capital.

If future generations are left at the mercy of the market and an interest rate of, say 5 per cent, it will require

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8. Moreover, for oil, an appreciation based on calorific value only, would seem short-sighted, since oil is a combination of chemical compounds with many other and more sophisticated applications than combustion.

considerable price rises, before the market will save anything for posterity. It is possible that the utility value to us of a barrel of oil is 132 times greater now than in a hundred years and 17,000 times greater than its utility value in 200 years, which would correspond to a 5 per cent discount rate. Still our great-grandchildren are likely to see things differently. Whether a hundred years is a long time obviously depends upon the point of view: from which of the two extreme points of the time span it is observed.

### **The social discount rate**

It is in fact widely recognized that market forces are not sufficient in the case of environmental problems because of the long time horizons and furthermore because of the externality problem, namely that the market does not charge a price for damage done to the environment. Instead of trusting the market the suggestion of most economists is, that the invisible hand of the market should be assisted by the firm and visible hand of cost-benefit analysis, the principle of which is to preserve the rationality of the market by computing and comparing money values of all sorts of relevant effects - including long-term effects and externalities, which the market ignores - of various alternatives. This applies to money values of human lives, global warming, diseases, children, the spotted owl, time saved by fast traffic, unspoiled wilderness etc. etc.

Cost-benefit analysis has proved useful for for comparing projects which are small, short-term and well defined. If used for long-term, extensive problems the results become very sensitive to the choice of assumptions, many of which are completely arbitrary, and results are invalidated by fundamental theoretical weaknesses, which include interpersonal comparisons of utility, the rate of discount, assumptions of substitutability, money values of human life, and uncertainty.

**Interpersonal comparisons of utility** is the very idea of cost-

benefit analysis. Individual utilities are measured as money values, and they are added in order to obtain a total, utilitarian social welfare. However, an extra \$ of consumption is likely to be worth more for a poor than for a rich person. Thus, the Stern Review assumes a value of  $\eta=1$  (unit elasticity of the marginal utility of consumption).<sup>9</sup> This arbitrary value means, that utility grows with the logarithm of consumption and that an extra \$ is worth ten times less if the original level of income is ten times higher.

**The rate of discount:** For short-term private decisions present values of future amounts of money are computed by discounting, reflecting the private choice of either consuming income now or deposit it on a bank account at some rate of interest for future consumption. But attempts at social cost-benefit assessment over long time spans are ruined by the discount rate problem. A discount rate of 6 per cent implies that \$100 30 years from now only count as \$17 and 41 cents to day; and \$100 100 years from now are reduced to 29 cents. And 6 per cent is, "what most economists think are decent parameter values".<sup>10</sup> This means that if the rate of discount is positive, future generations will have no weight; if it is zero, present generations will have no weight. There are several suggestions on how to formulate the optimisation problem over time with a reasonable allocation between generations, i.a. by including the condition that welfare must not decrease over time, or by applying a discount rate approaching zero over time.<sup>11</sup> But it is all arbitrary, and the whole exercise rests on shaky theoretical grounds and belongs more to ideology than to science. The Stern Review does not discount the utility of future generations at all, but uses a low value of the pure time discount rate at  $\delta=0.1$  per cent for one reason only, namely the

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9. Stern, 2007:46,161-163.

10. Weitzman, 2007:707.

11. Hansen, 2006; Pearce & Turner, 1990:211-238.

probability that the earth could perish, so that prospective generations will not exist.<sup>12</sup> Together with  $\eta=1$  and an assumed growth rate of 1.3 per cent this implies a discount rate for income of

$$r = \delta + 1.3\eta = 1.4 \text{ per cent (the Frank Ramsey equation).}$$

This is much below the conventional 5-6 per cent and fundamentally changes the calculation of costs and benefits of climate change and CO<sub>2</sub>-reductions.

**Assumptions of substitutability:** When adding the money value of various goods the possibility of substitution is a basic assumption. Therefore price calculations are well suited for marginal decisions that allow substitution, e.g. whether you want to have gherkins or beetroots with your roast pork. Substitution is also presupposed, when it is attempted to calculate true savings, i.e. savings adjusted for natural resources spent and environmental deterioration, namely possibilities of substitution between human capital, man-made physical capital and natural capital. Most economic calculations show that true savings are positive and hence fulfills a weak sustainability criterion, but it depends upon the assumption of substitutability, e.g. that less North Sea oil can be compensated by more lessons in French language.<sup>13</sup>

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12. Stern, 2007:45-47,161-163.

13. Interestingly, the fronts regarding green amendments to national accounts have been reversed: Economists used to be criticized by environmentalists for not including environmental effects; now, when attempts are made to do so and true savings appear to be positive, economists are still being criticized, though the criticism has switched sign. Previously, economists used to say, "How can I put a price on the lark's song?" Now the environmentalist organizations are saying with contempt, "Two pounds of larks, or two French lessons?".

**Money values of human life** are arbitrary and differ widely. Thus the standard is about 3 million US dollars in the USA, 1 million dollars in Denmark, and 150.000 dollars in the Netherlands.<sup>14</sup> Just imagine that physical constants, like gravitation or the velocity of light, differed by a factor 20 from one country to another.

**Uncertainty:** Of course, the best forecast for our future would hardly be the best decision basis. The task is not to find the best forecast for our future and then act as though that forecast were certain. If there is some probability of less positive scenarios with serious consequences, it can be rational to try warding them off, thus acting precautionary upon a less probable forecast. After all few people would consider their fire insurance premium to be wasted just because their houses did not burn down during the insurance period. The risk of fire can be described in terms of probabilities that can be subject to actuarial computations, but a more fundamental uncertainty is a marking feature of environmental problems because the risk of discontinuous, irreversible and cumulative changes, which renders marginal cost-benefit optimisation absurd.<sup>15</sup> No company sells insurances against effects of climate change. The marking feature of serious environmental problems is their incalculability. Human activity often has proved to have ever more extensive impacts that we had never suspected; many environmental effects come as total surprises: impacts of DDT in the 1960s, eutrophication in the 1970s, the ozone gap and the green house effect in the 1980s, and the mad cow disease in the 1990s.

We do not know how to handle these ethical problems. We are not

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14. Danish Ministry of Finance: Manual for cost-benefit analysis (Finansministeriet, 1999:63).

15. Arrow et al., 2004; Weitzman, 2007.



getting wiser from choosing some arbitrary numbers, like the  $\eta$  and  $\delta$  of the Stern Review, as we can not attribute any genuine meaning to them, neither as moral standard nor as objective knowledge. The debate on the proper magnitude of  $\eta$  and  $\delta$  is as futile as alchemy.<sup>16</sup> Probably it is not so that "the approach has the virtue of clarity and simplicity", but rather the virtue of exposing our fundamental ignorance and bewilderment. Indeed, "such excises should be viewed with some circumspection".<sup>17</sup>

### **An insight from economics**

Natural resources and the environment is an area where democracy can not rely on the market. Maybe it can not rely on government either because of the danger of short-sighted abuses at the expense of future generations. And cost-benefit calculations are also of little help, because they invariably end up in paradoxes. Thus, it is time to take a fresh look.

However, there is an important lesson for environmental policy and for democracy to be learned from economics. At the core of environmental policy problems is the inborne myopia of human nature and the inability of comparing future hardships against present gains. Long-term foresight is not the forte of the free market. Nor is it the forte of politicians. Thus the need for long-term decisions presents a problem for the two principal mechanisms of democracy: the market and the political system. However, examples exist of successfully coping with the time problem. Thus in monetary policy the problem is the balancing of presents gains (printing money instead of collecting taxes) against future hardships (destruction of the monetary system). A workable, democratic solution has in some cases been

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16. *The Economist*, 16 December 2006, p 84; Nordhaus, 2007; Weitzman, 2007.

17. *Stern*, 2007:30,31.

sucesfully achieved, namely that democratically elected politicians devolve monetary authority to an independent central bank, which enjoys confidence and is circumscribed by strict laws. A more extreme form of independent monetary authority is the system of "currency boards", which are more independent of government than central banks, but subject to very strict rules; it was first introduced in a number of former British colonies, and now it is used in a number of countries, including Estonia and Lithuania. A similar system could be necessary to manage resources and the environment, and various forms of "fisheries boards" and "environment boards" have been proposed. Recently similar institutions have been proposed even for financial policy.<sup>18</sup>

#### **Various mechanisms of democracy**

Economics is concerned with institutions for coordination of decisions for resource allocation. Given individual preferences, technological possibilities and initial resources, the basic theoretical problem in economics is to analyse how the problem of optimal allocation is solved or not solved, when decisions are governed by incentives inherent in various types of institutions, i.e. patterns of behaviour regulated by formal and informal rules. By far the most extensively investigated economic institution is the market, but there are many others including enterprises, planned economies, corporations, labour unions, labour-managed firms, the family, the feudal economy, slavery.

As in economic theory, the point of departure for democracy is individual preferences - and conflicts between them. Generally speaking democracy means that the individual is able to influence his own life as well as social life and that institutions exist through which conflicts of interest can be confronted and mediated on terms of equality. This simple

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18. cf. *The Economist*, 27 November 1999, p 100; Aage, 1998.

definition requires a few remarks. Firstly, it does not imply admiration for narrow selfishness, let alone repudiation of morality or altruism, but it disregards a social interest above the individual as found in traditional societies. Secondly, any suppression of individual freedom of action requires justification, which is, however, often obvious as most actions influence the freedom of action for fellow members of society. Thus minority rights are essential for democracy as opposed to mob rule. Thirdly, there is a close affinity between democracy and equality, the degree of which is a distinguishing feature of various democratic institutions.

One very potent mechanism of democracy is the market where preferences are expressed in terms of money. The demonstration of the optimality of individual market decisions under certain conditions is a major achievement of economics. As in principle nothing but quantity and price is bargained this leaves much freedom for the individual.

Concerning equality of influence another democratic institution takes the lead, namely voting in the political process. Whenever the very strict conditions for market optimality are not met, the market will need the help of a visible, collective government hand.

Other mechanisms than rule by money and rule by people could be considered as well. A third type is self-management, which distributes power according to active participation, energy and talent. It is essential in libertarian socialism and anarchism, in former Yugoslav social theory and in various contemporary proposals for economic democracy.

Finally, it is remarkable that democratic institutions sometimes renounce their power, not only concerning purely technical matters, but also in relation to decisions that involve political preferences. Instead power is entrusted to independent bodies which enjoy confidence and are subject to strict regulations. This professionalisation typically happens when short-sighted political decision makers are tempted to abuse their power and neglect long run harmful effects or when decisions are so painful that compromise is excluded. In the

economic sphere the paramount example is the independence of monetary authorities.

The characteristics of these four democratic institutions can be summarized as follows:

<b>market</b>	individual influence according to economic capacity;
<b>government</b>	collective influence mediated by politicians through the political process and voting;
<b>self-management</b>	influence depending upon active participation;
<b>professionalisation</b>	legitimacy depends entirely upon confidence in the judgment and honesty of the body entrusted with decision making power.

Other examples of the professionalisation type of democracy include independent courts of justice; the power of the medical profession to decide the allocation of scarce resources; and the delegation of decision making in the Danish, Lutheran state church to entrusted persons (the clergy) subject to strict rules (the Bible), as there is no direct democracy in confessional matters in the Danish state Church.

Cost-benefit analysis could be considered a curious example of professionalisation as well. Decision making power is (fortunately) not delegated to economists, but politicians apparently did impose strict, a priori rules upon themselves, namely the rules of cost-benefit analysis, although these are beset with inconsistencies.

Climate policy requires action, even global action, and various forms of global treaties and global government are considered.<sup>19</sup> Others trust individual action based upon bottom-up cultural changes, which is market-mechanism democracy, probably with some elements of self-management organisation.<sup>20</sup> Even if

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19. Bernstein, 2006.

20. Diamond, 2005.

culture changes slowly, it might change very fast, when its fundamentals are shaken, but still, there are strong argument in favour of collectively imposed rules and incentives, either by government or by independent, professional bodies.

### How to use economics

Environmental issues are taken increasingly seriously by influential economists as witnessed by the manifesto of Arrow et al. (2004) and by the impressive Stern Review (2006) and Weitzman (2007). Even in *The Economist* this trend is reflected. In 2001 Bjørn Lomborg's notorious book was praised loudly in *The Economist*, where the over-laudatory reviewer declared that "*The skeptical environmentalist is a triumph*" and "a modern classic of green demythology" and concluded "more power to him".<sup>21</sup> In 2006 Bjørn Lomborg was dismissed as a "hyperactive Danish" ... "controversialist".<sup>22</sup>

As a conclusion on the contribution of economics concerning the supply and optimal use of resources and environment, three different classes of issues can be delimited and considered separately, related to science, politics and economics, respectively. Compared to the first and the second group of issues, the third, economic group is a very minor, literally marginal one.

The first class of problems concerns sustainability, environmental effects of economic activity, the magnitude and nature of reserves and the available technical options, including possible substitutions in consumption and production. These are science problems, and naturally they must be investigated using methods of the natural sciences. Using economics in this sphere is mistaken and ideological, and examples are numerous: conclusions on scarcity from scrutinizing price trends for some raw materials markets; extrapolation of historical trends; unfounded assumptions about substitutability and automatic technological progress; presumptions that economic growth improves the carrying capacity and resilience of the environment.

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21. Lomborg, 2001; *The Economist*, 8 September 2001, p 97; 5 June 2004, p 59.

22. *The Economist*, 9 September 2006, p S4; 16 December 2006, p 84.

That Planet Earth "is so incredibly much larger than all our needs",<sup>23</sup> is true given a sufficiently short, very short, time horizon. Yet, with just a minimum of foresight, that conclusion ends up as suppression of the truth. The very basis of contemporary environmental awareness is that Planet Earth is limited in relation to our human capabilities and global activities. This problem of judgement permeates traditional economic ideology.

The second class of problems are the painful political and moral problems of how we want to allow for the welfare of future generations and to distribute the rights of exploiting resources and environment between rich and poor people. Using economics and cost-benefit analysis as a solution to these deep questions is equally mistaken and ideological. It boils down to the  $\delta$  and  $\eta$  of the Stern Review (2006), namely the many attempts to solve the problem of the rate of discount and the distribution between rich and poor in a simple and consistent way. Simple it is and dangerously so, as the inherent contradictions are only suppressed, but not solved, simply because the real world including man is contradictory.

When comparing welfare across generations, across the globe, under uncertainty, the quest for consistency and rationality is mistaken and leads to precisely the opposite: a distorted and irrational perception of reality. Growth rates and discount rates, on which computations rely, are largely guess-work. Cost-benefit analyses covering long time spans is invariably end up in paradoxes.<sup>24</sup> Even for modern physics time remains a mystery.

The main justification of the quest for rationality is the assertion that priorities are made, at least by implication, and therefore they should better be explicit and rational. The

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23. Bjørn Lomborg in the Danish newspaper *Politiken*, 19 January 1998.

24. Cf. comments upon the Stern Report by William Nordhaus and Partha Dasgupta, *The Economist*, 16 December 2006, p 8; Weitzman, 2007; Nordhaus, 2007.

motto is a substitution of simple principle for complicated reality: we *must* chose, ergo we *can* chose. Sometimes it might be wiser to realize our ignorance and the impossibility of consistent choice, witness Aischylos, Shakespeare, Racine, Corneille and Schiller. An example: would it not have been better, if the wealthy princes of Italian *Rinascimento* had spent resources on feeding and educating the poor rather than erecting the *duomo* in Firenze and financing the treasures of art? It is impossible not to say yes, but to say yes is equally impossible; the poor are always with us, and an affirmative answer would imply rejection of philosophy, literature, music, architecture, science, religion and all other manifestations of culture and civilization.

Now for the third class of problems. What are the contributions of economics? Squeezed between the first two classes of problems there is little room left for economic analysis, the contribution of which is to examine the effects of economic incentives under various institutional arrangements, once the answers to the first two classes of problems are known. Adequate supplies and optimal use of resources is a technical, scientific and political issue, not primarily an economic one.

Yet, economics can contribute substantially, although marginally, to environmental policy. First of all, there is a need of book-keeping, for tracing the short-term macro-economic effects of environmental changes and policies. Secondly, economics gives useful insights into resource price developments if left to a competitive market. Thirdly, economic analysis is useful concerning institutions, incentives and effects of various policy instruments, e.g. analysis of administrative instruments, pollution taxes and tradable permits. A couple of examples of theoretical conclusions: Firstly, pollution taxes and tradable permits have essentially identical effects, except probably the likelihood of price fluctuations, and both will often be more cost-efficient than



administrative orders.<sup>25</sup> Secondly, taxation of income from the ownership of natural resources, i.e. the resource rent, is an attractive type of taxation, because it does not distort economic activity.<sup>26</sup>

Hopefully, the changing attitudes among influential economists herald a new, constructive role for economics in environmental policy. It is badly needed, as moral reorientation is

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25. Thus, as part of the ongoing efforts to reduce nitrogen leaching from agriculture to the inner Danish waters the cost-efficiency of various measures (using late crops, better utilisation of animal manure, reducing the use of mineral fertiliser etc.) has been computed, and it was estimated that efficiency gains from using a tax, where the tax base for individual farms is nitrogen input in fertiliser and fodder less nitrogen contents in farm output, would be 20% as compared to administrative instruments used so far. Hansen & Hasler, 2007:55-59; Jacobsen et al., 2004:97,128.

26. Pearce & Turner, 1990.

required, if we want to move ahead in less blind darkness than we used to do in the past - this is the true lesson of history - and if we want to approach the global environment and the global distribution - the big challenges of our time - in a civilised manner without resorting to the familiar regulatory mechanisms, namely wars, famines, migrations, and pandemics. Probably the Gulf and Iraq wars are a matter of Kuwaiti and Iraqi democracy, but Middle East oil extraction certainly is not insignificant.<sup>27</sup> As for the foreseeable, future scarcity of oil, American military interest may be more eloquent than the presently increasing prices of oil.

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27. "In fact, the Iraq war was part of a Bush-Cheney strategy to secure what Mr. Clare calls 'the strategy of maximum extraction' of the Middle East's oil", as Jeffrey Sachs puts it, *The Economist*, 13 November 2004, p 18. According to Alan Greenspan the Iraq war is "largely about oil", *The Economist*, 22 September 2007, p 91. For the recent handing out of oil extraction rights in Iraq cf. *The Economist*, 3 March 2007, p 40.

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