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The Limits of Market-based Environmental Policy

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Abstract

Market based policies are fast becoming the recommended policy panacea for all the world's environmental problems. Implicit in such recommendations is the theory that free markets, adjusted for externalities, can always create an "efficient" allocation of society's resources. As a result, many contemporary policymakers advocate rolling back regulations in order to let the market protect the environment.

There is a fundamental distinction between the use of the market as a tool to help achieve society's goals, and as a blueprint for society's goals; the market is a reasonable policy tool but not a reasonable blueprint. The market as blueprint fails because there are significant public purposes that cannot be achieved by prices and markets alone. Five major arguments show that getting the prices right is often a narrow or meaningless objective; society may intentionally and appropriately choose to "get the prices wrong" in order to pursue more important goals.

Keywords: Economic theory; Environmental Policy; Sustainability

Introduction: The Transformation of the Debate

Public discussion and debate over environmental policy has been transformed, in recent years, to focus on the idea of market-based mechanisms. In the 1970s and 1980s, many newly recognized environmental problems were addressed with laws and regulations that told polluters to stop polluting – a straightforward, common-sense approach that is now frequently stigmatized as "command and control." During the 1990s, a near-consensus emerged in policymaking circles for a sharp turn away from past patterns of regulation toward the theoretically greater efficiency and lower cost of environmental taxes, tradeable emission permits, and other market incentives. Today, to cite just one example, the official U.S. position on climate change negotiations slights the obvious regulatory options such as increased vehicle fuel efficiency standards. Instead it relies above all on the hopes that an unprecedented international emissions trading system can be created, and will prove effective.

There are many voices in the chorus of market enthusiasts. Most economists have always called for reliance on the market; in recent years they have gained a much higher public profile, with widely discussed publications, and major conferences on market-based environmental policy at leading universities. The influential "Project 88" papers and conferences in 1988-91 first brought the economists' theories to the attention of a wide and receptive audience of policymakers (Stavins et al. 1988, 1991). Important activist groups and individuals within the environmental movement have become advocates of market-based policies, while researchers continue to elaborate the economic models and theories on which those policies rest.

For some of the participants in the debate, the environment is almost an afterthought. The most passionate free marketeers seek to roll back all government programs, laws, and regulations that affect business and property. For the true believer, the market is the answer regardless of the question, and even irreversible climate change is just another opportunity for private profit:

> ...free market environmentalism suggests two avenues for dealing with global warming. The first takes changes in the Earth's temperatures as given and asks whether individuals have the incentive to respond with innovative solutions. The second focuses on the evolution of property rights to the atmosphere. (Anderson and Leal, 1991:163).

On a more sensibly nuanced view, the market is the answer to some but not all questions. The challenge is to understand what the market can do, and what it cannot. In the current climate, there is little danger of overlooking the market's strengths. To restore a balanced perspective, more attention needs to be focused in the opposite direction, examining the cases in which market incentives are less effective or appropriate.

Uses of the Market: Tool or Blueprint?

Market-based policies have made an undeniable contribution to environmental protection. Innovations such as emissions trading have in some cases lowered the cost of pollution abatement by increasing flexibility, decreasing the burden of bureaucratic regulation, and using the market to pursue environmental goals in an efficient manner. But such success has not been, and will not be, achieved on

every issue.

There is a fundamental distinction between using the market as a *tool* to achieve society's goals, and adopting it as a *blueprint* of those goals. These two similar-sounding positions turn out to have very different implications. Is the market, as tool, the most efficient means to reach the environmental objectives that society has chosen? Or is the competitive market itself the blueprint, the ultimate description of society's objectives, with some environmental concerns pencilled in?

Under the tool perspective, environmental goals may be set through a process of public deliberation, and may have no inherent relationship to the market. It is then a pragmatic question to determine when market-based policies offer the best tools for achieving those goals, and when traditional regulation or other approaches are preferable. The answer naturally differs from one issue to the next.

If, on the other hand, the market is the blueprint of society's objectives, then there is little scope for pragmatism and pluralism of political strategies. From this perspective, what matters above all is "getting the prices right," i.e. adjusting selected prices as necessary to reflect the true valuation of environmental costs and benefits. Once the prices are right, the market automatically produces the right allocation of resources and the appropriate level of environmental protection; the less additional intervention, the better the market outcomes will be. On this view, public deliberation about environmental objectives is unnecessary or even harmful; society should do no more than endorse the

mechanisms that allow the market to work.

The blueprint offered by the market is spelled out in general equilibrium theory. Under a series of idealized assumptions, a competitive economy is guaranteed to have an equilibrium which is Pareto-optimal, and every Pareto-optimal outcome is an equilibrium for some set of initial conditions. These well-known "fundamental theorems of welfare economics" are ultimately the foundation for the common idea that market outcomes are efficient. Yet the relevance of these abstract theorems is doubly limited, both in theory and in practice.

In the abstract, even if the assumptions of general equilibrium theory are accepted, its results remain mathematically problematical. There is no guarantee that the equilibrium of a general equilibrium model is either unique or stable. Intensive theoretical analysis has found no way around this problem, and in fact has found that the dynamic behavior of small (i.e. mathematically manageable) general equilibrium models is not necessarily a guide to the behavior of related, larger (i.e. more realistic) models (Ackerman 2000).

In reality, the assumptions of general equilibrium theory are inconsistent with what we know about people, firms, and technology. The neoclassical behavioral model and its assumption of well-informed, narrowly defined maximization clash with the results of most social sciences - and with common sense (van den Bergh et al. 2000). Major firms routinely fail to be as small and competitive as the theory requires; oligopoly and monopoly are obvious, persistent facts of life. Path-dependent technologies, involving "learning by doing" and network effects, further undercut the presumption that

market outcomes are reliably optimal or efficient (Arthur 1994).

In short, the equilibrium of a market economy is not necessarily an ideal outcome, either in theory or in practice. Our central argument is that *the market is a reasonable policy tool but not a reasonable blueprint for society's goals*. The market as blueprint fails because there are significant public purposes that cannot be achieved by prices and markets alone. There are many instances in which getting the prices right becomes a narrow or meaningless objective; in such cases, society may intentionally and appropriately choose to "get the prices wrong" in order to pursue more important goals.

Five Forms of Failure

There are at least five general reasons why market-based policies fail to address some of the most basic environmental objectives.

1. Large, irreversible damages must be prevented.

The market does not guarantee that producers will always do the right thing; it only ensures that those who do the wrong thing too often will go out of business. In the textbook model of perfect competition, every surviving producer is forced to adopt the most efficient, least-cost technology, because those who do not keep up with the state of the art will be undersold and driven out by those who do. Implicit in this model is a process of trial and error in which unsuccessful producers may do the wrong things

(produce things that are needlessly expensive, or that fail to meet consumer desires) for a while before giving up and trying a different line of work.

This is a useful way to make many resource allocation decisions -- *if* there is no great social cost or lasting harm caused by a few failed experiments (Koopmans, 1951; Krutilla, 1967). It is hard to imagine a better way to choose which restaurants should serve your community; the economic and environmental impacts of unsuccessful restaurants are minimal. But the same process of trial and error is less attractive as a strategy for disposal of high-level radioactive waste, where it is essential to get it right the first time and every time. When the potential damages are large and irreversible, as with radioactive waste, then society cannot afford the experimental learning process that is implied by market competition. Reliance on market mechanisms in this case would be an abdication of the most basic responsibility for public health and safety.

Many environmental problems are more analogous to the urgent questions of nuclear waste disposal than to the benign issues of consumer preference and restaurant choice. Threats of extinction of endangered species, destruction of irreplaceable wildernesses and other ecosystems, and emission of toxic and carcinogenic pollutants, all involve large, irreversible damages. The market can safely play a role on these issues only in a firmly regulated context, intentionally constrained by high minimum standards that safeguard the interests of nature and humanity.

2. Outcomes far in the future are important.

Discounting, the standard method for comparison of costs and benefits that occur at different times, is indispensable for near-term decisions but nonsensical for the long run. Application of this form of short-run thinking to our environmental future repeatedly leads to the mistaken conclusion that we should do almost nothing on behalf of future generations.

Discounting is essential, and indeed commonplace, for many practical financial decisions. If offered an investment opportunity with a payoff a few years in the future, you can (and should) compare it to the return you would get by putting the same amount of money into a predictable, safe alternative such as a bank account or government bond. Why does this innocuous bit of accounting become nonsensical when applied to society's long-run choices?

The solutions to many environmental issues such as climate change involve sizeable costs now that have their principal benefits far in the future. For an investment with a ten-year lifetime, one individual can weigh her own initial costs against her own ultimate benefits. But there is no one who will personally experience both the cost of investments in carbon reduction made today, and the resulting benefit of mitigation in climate change 100 or 200 years from now. In fact, there is no way of knowing what value our far-future descendants will place on the environment; they could consider it either much more or much less important than we do today. The problem is that by accepting the use of a discount rate we have implicitly imposed a specific pattern of preferences regarding the relative welfare of present and future generations (Howarth and Norgaard, 1993).

Moreover, thanks to the magic of compound interest, benefits far in the future have a very small present value. At 5% annual interest, $1 left in the bank is worth more than $17,000 after 200 years, and more than $2,000,000 after 300 years. So if it costs as much as $1 today prevent environmental damages worth $17,000 in the year 2200 or $2 million in 2300, economic theory says our descendants would be better off if we left $1 in the bank for them. As strange as it may sound, this argument is seriously advanced as a reason to go slow and minimize current spending on long-run environmental objectives (Hartwick, 1977; Solow 1986). The only reasonable conclusion is that economic theory does not offer a reasonable understanding of our responsibility to future generations (Bromley, 1998).

3. Many environmental values are not commodities that can be priced.

Economic theory usually assumes that environmental damages can be meaningfully measured in monetary terms. From this it is only a short step to calculating the prices that "should" be applied to clean air, clean water, and other values. The vision of the market as blueprint for environmental protection generally assumes such prices have been put in place, so that the market can balance supply and demand in order to achieve the optimal level of pollution reduction. That is, economists assume that environmental values can be treated as commodities like any others.

This approach is problematical on several levels. On a practical level, there are serious conceptual and technical critiques of the standard methods of monetizing environmental damages by economists and lawyers alike (Diamond and Hausman, 1994; Harvard Law Review, 1992).

Economists frequently rely on "contingent valuation" surveys that ask people to place a hypothetical dollar value on some aspect of the environment; the question does not always produce a meaningful answer.

A subtler problem is that every unit of a commodity typically sells at the same price: three tons of steel are worth three times as much as one. However, for pollutants with threshold effects or critical levels, three tons of emissions may have vastly more than three times the impact of one ton. In contrast to traditional regulations, market-based policies such as emission trading are more prone to creating "hot spots" where critical levels of pollutants are exceeded.

On the most fundamental level, there are deep ethical, philosophical, and religious objections to assigning dollar values to human or other life (Anderson, 1993; Kelman, 1981). For many people, the protection of endangered species and unique natural habitats, or the prevention of avoidable deaths and injuries, involve a realm of fundamental principles that transcend the market. From this perspective, monetization of human life and health, or of the existence of other species, is either meaningless or degrading. It is important to talk about these principles and their policy implications, but that conversation cannot be reduced to purely monetary terms (Vatn and Bromley 1994).

4. Volatile market prices can cause wasteful misallocation of resources.

When prices change too fast, the investment that made sense yesterday may no longer be profitable today -- as many people have learned the hard way in the stock market. This problem can

also affect the environment, when volatile markets send mixed signals about the value of environmental policies and initiatives. Sky-high prices for recycled materials in 1995 inspired more than a billion dollars of investment in new recycled paper mills; by 1997 those new mills had closed, most of them bankrupt (Ackerman and Gallagher, 2000). High oil prices in the early 1980s drove the auto industry to retool for small car production, just before prices fell and consumers went back to buying big cars. More recently, as the restructured electricity industry increasingly relies on auction-style pricing to set electric rates, there have been cases where summer peak power has sold for hundreds of times the normal price. This is sure to be a misleading signal about the value of new generating capacity.

Day trading is not an example of the efficiency of the market. In a world with high, industry-specific sunk costs of both physical and human capital, there is a limit to the velocity at which people and businesses can sensibly respond to new price signals. When the market exceeds that speed limit, it leads to wastefully rapid, extreme changes. The government can improve matters by intervening in such markets, enforcing a reasonable speed limit and establishing a sustainable pace of change.

5. If it's not broken, don't fix it.

It is not always the case that market incentives are superior to old-fashioned environmental controls. There are substantial areas – protection of public health, provision of urban infrastructure, and emissions monitoring, among others – where traditional regulatory or public spending approaches remain more effective than market-based policies. The two strategies provide different benefits: the

market maximizes consumer choice and creates incentives for cost minimization; the government can supply public goods, minimize transaction costs, and create a transparent standard of fairness. The relative importance of these contrasting strengths will differ from case to case.

Market-based approaches have much higher costs, and hence more limited advantages, in some circumstances than in others. Economists have analyzed the conditions under which market incentives are more or less effective; for example, when pollution approaches thresholds beyond which damages rise rapidly, the rationale for strict emission controls becomes stronger. There is also some evidence that market incentives, like any other policy, are less effective in practice than they were projected to be in theory (Gustafsson, 1998).

Finally, market incentives frequently involve taxes. (The principle alternative, emissions trading, involves high start-up and transaction costs, and is not appropriate in every case.) No one wants any new taxes; most politicians can't bring themselves to utter the word. Traditional regulation, involving rules that lower or prohibit certain emissions, may be more politically feasible – even if, in a theoretical world divorced from politics, market incentives might appear to be more efficient.

Two Cheers for the Market

Despite this catalogue of things the market cannot accomplish, there are things at which it does excel. Guidelines for the appropriate use of market incentives can begin with the negation of the five points listed above. Market-based policies should be used in cases where: there is little risk of

irreversible damages; the relevant outcomes are relatively short-term; there are no fundamental ethical or philosophical issues at stake; prices are not excessively volatile; and traditional regulation is expensive or ineffective.

In more positive terms, the great strength of the market is that it decentralizes information processing and decision-making, allowing each firm to analyze and respond to the data that affects its operations. This is one of the key points of the economic critique of traditional regulation: regulators cannot possibly keep up with all the relevant information on complex, changing technologies, let alone the site-specific information about the relative cost of installing new technologies at each location. When there are complex technical choices, especially when the choices depend on site-specific information, it is more efficient to set broad standards and allow firms to choose the most cost-effective means of meeting those standards.

The allowance trading system for sulfur emissions under the 1990 Clean Air Act Amendments comes close to meeting these standards, although it has not been entirely free of problems. Sulfur emissions have been reduced more rapidly, and at lower cost, than anyone thought possible in 1990 – though there are other factors that contributed to this happy outcome, such as the increased availability and lowered price of low-sulfur coal in the 1990s (Ackerman and Moomaw, 1997). Moreover, many observers have concluded that the allowances should have been auctioned by the government, rather than given away to the existing producers. Other changes could make the system more environmentally palatable: if the cap on total emissions was steadily declining, rather than constant, the trading system

would not create a permanent "right to pollute."

Still, the process of emissions trading is an interesting innovation that has played at least some part in an environmental success story. Our suggested guidelines for the use of market incentives fit well in this case: the damage from acid precipitation appears to be reversible; it occurs promptly following emission; ethical issues about human life or biodiversity are no more prominent here than they are in any environmental issue; relevant prices are not unusually volatile; and traditional regulation, calling for scrubbers at all coal-burning plants, was indeed expensive and inflexible, while trading allowances between U.S. power plants is simple and fairly cheap to administer. There is a complex choice of strategies for sulfur reduction, in which the best choice depends on site-specific information.

Yet in the current climate of celebration of the market, it is important to stress that this is *not* to say that emissions trading is always a good idea. The proposed application of emissions trading to worldwide carbon emissions fails several of our criteria, and raises technical problems of coverage, administration, verification and enforcement. In general, there is far more danger of exaggerating than of overlooking the potential of market-based policies today. The greater need is to re-legitimize other approaches, and to open a broader dialogue about the full range of options for environmental policy.

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