CHAPTER 6

Refining the Role of Government in the U.S. Market Economy

WHAT IS THE APPROPRIATE ROLE, IF ANY, of government in regulating the manufacture, distribution, prices, and quality of products in the U.S. economy? Much of the 20th century has seen an expansion of the role of government as regulator. But since the late 1970s the regulatory tide has ebbed in many important respects.

The first major deregulatory efforts were in industries such as airlines, railroads, trucking, banking, and natural gas. (Box 6–1 illustrates some of the benefits of deregulation.) Deregulating the traditional utilities, particularly telephones and electricity, has taken a slower course. However, both of those industries have been the object of significant procompetitive policy initiatives in the past year. On February 8, 1996, the President signed into law the long-awaited Telecommunications Act of 1996. Two and a half months later the Federal Energy Regulatory Commission (FERC) issued its Orders No. 888 and No. 889, which set rules for opening up interstate transmission networks to all generators and resellers of electricity.

These two enormous steps toward bringing competition into the utilities sector represent a sea change in the traditional relationship between public policy and private enterprise. During most of the 20th century, government and markets were typically viewed as substitutes. Citizens and policymakers had to choose between government mandate and market forces. As the 21st century approaches, we see that market forces and public policy are less often substitutes than complements. The Telecommunications Act, the FERC's Order No. 888, and the ongoing Federal and State efforts to implement their principles and mandates show how judiciously crafted public policy can increase rather than decrease the role and effectiveness of market forces in the economy, and thereby improve the economic and social prospects for the American people.

Complementarity between markets and government extends in the other direction as well. Just as well-crafted government policy can make markets work better, so the introduction of market mechanisms into the regulatory process can help government achieve society's goals. For example, to ensure that wireless technologies best

meet the public's demand for communication services, the Federal Communications Commission (FCC) has turned to auctioning off portions of the electromagnetic spectrum. These auctions not only have been enormously successful in getting licenses quickly into the hands of those who can use them most efficiently, but have raised over $20 billion for the U.S. Treasury in the process. A second success story has been the use of market forces to provide greater flexibility in meeting environmental goals (e.g., tradable permits for sulfur dioxide emissions). Last but not least, market forces can help improve the management, use, and disposal of public lands.

Box 6-1.—The Benefits of Deregulation

That deregulation produces economic benefits when it leads to effective competition is not merely a theoretical proposition. Data from the field bear this assertion out as well. An assessment by a Brookings Institution scholar finds that deregulation not only has brought considerable short-run benefits, by making markets work better, but also has led to technical and operating innovations that promise even greater benefits in the long run. The table below gives some examples of this study's findings.

Industry	Cost Reductions	Innovations
Airlines	24 percent decline in costs per unit of output	Hub-and-spoke systems Computer reservations
Trucking	25-35 percent decline in operating costs per mile	Computer networking Coordinating with logistics firms
Railroads	50 percent decline in costs per ton-mile, 141 percent increase in productivity	Better contracts Double stack cars Intermodal operations
Natural gas	35 percent decline in operating and maintenance expense	Computer planning Contracting through market centers

Source: Clifford Winston, Brookings Institution

MARKETS, GOVERNMENTS, AND COMPLEMENTARITY

As a prelude to discussing the potential for complementarity between private markets and the public sector, we review the purposes each serves in a primarily market-driven economy.

THE ADVANTAGES OF MARKETS

The argument in favor of deferring to markets typically relies on the efficiency of their outcomes. If markets are competitive and function smoothly, they will lead to prices at which the amount sellers want to supply equals the amount buyers demand. Moreover, the price in any market will simultaneously equal the benefit that buyers get from the last unit consumed (the marginal benefit) and the cost of producing the last unit supplied (the marginal cost). These two conditions ensure efficiency: when they hold in all markets, the Nation's labor and resources are allocated to producing a particular good or service if and only if consumers would not be willing to pay more to have those resources employed elsewhere.

This familiar story is profound and important, yet it understates the role of private markets in making economies work. Since at least the 1930s, economists have noted that in theory the government could reach efficient outcomes without relying on markets, if government officials had sufficient information and the right incentives. But it is markets' superior information-processing ability and preservation of individual incentives that explain their general superiority to government management of the economy. Markets allow transactions to be decentralized to the level where decisions are made by those most affected by them, in direct response to budget constraints and tradeoffs. Market participants themselves then have powerful incentives to generate and gather information and make the deals that best serve their interests.

Information

An insufficiently appreciated property of markets is their ability to collect and distribute information on costs and benefits in a way that enables buyers and sellers to make effective, responsive decisions. Because market prices measure the marginal benefits of goods and services to consumers, firms that maximize their profits simultaneously maximize the difference between benefits and costs. Similarly, consumers look to market prices to decide which goods and services to purchase, and how to use their labor, resources, and financial wealth to generate the income to pay for them. As tastes, technology, and resource availability change, market prices will change in corresponding ways, to direct resources to the newly valued ends and away from obsolete means. It is simply impossible for governments to duplicate and utilize the massive amount of information exchanged and acted upon daily by the millions of participants in the marketplace.

That markets normally process all of this information so well and so rapidly tends to be taken for granted. In light of all the investments, hires, plans, purchases, marketing efforts, sales, contracts, and exchanges necessary to bring goods to market, the fact that the price system normally works as well as it does—for instance, that

the products consumers want are usually on the shelves—ought to be regarded as astounding. Instead, it's literally business as usual.

Incentives

Even if the public sector could gather and quickly respond to all available information on changing consumer tastes and production technologies, private markets would still have the advantage of preserving the incentive to produce efficient outcomes. In private markets, buyers and sellers directly reap the benefits and bear the costs of their demand and supply decisions. Each makes decisions aimed at achieving the greatest benefit, or economic return, net of cost. These incentives not only affect how resources are used today, but also lead to innovations that will increase the efficiency with which resources are deployed in the future and result in new products that raise living standards.

In contrast, the links between the government and the individuals who reap the benefits and who bear the costs of its decisions are frequently weak. The nature of day-to-day legislative, executive, judicial, and regulatory proceedings runs a risk of favoring organized, established interests rather than the public at large. Accordingly, government's role in the operation of the private economy must be limited and judicious. Initiatives to increase our economy's reliance on markets, and to improve the efficiency of regulation through market mechanisms, reflect an awareness of the tremendous benefits that market forces can bring to bear by employing private incentives to achieve social goals.

WHY HAVE GOVERNMENT AT ALL?

If markets generally outperform government, why not leave everything to the market? To begin with, it is useful to remember that markets and governments can and do work together. For markets to function effectively, deals must be enforced and fraud discouraged. Without a governmental legal system to guarantee property rights and enforce contracts, corporate organization and market exchange would be virtually impossible. Anarchy and the free market are not synonymous. (Box 6–2 discusses the role of government in protecting property rights in information in an era of electronic, global markets.)

But government has other roles beyond refereeing private transactions. Markets left to themselves sometimes produce inefficient outcomes. For example, markets efficiently transmit information and provide proper incentives only when sellers compete with enough intensity to drive prices down to cost. But in some circumstances, firms can impede the forces of competition by agreeing among themselves to maintain high prices, or by merging to the point where individual production decisions substantially affect prices. The antitrust laws are the public policy instrument for pre-

Box 6-2.—The Role of Copyright in an Electronic Global Economy

The growth of telecommunications, computing power, and their joint progeny, the Internet, is revolutionizing the way in which information is created and shared. Whether by satellite or by fiber-optic cable, electronic telecommunications networks today transmit vast amounts of scientific and commercial information, and entertainment, around the globe in a heartbeat.

Since the 18th century, markets for the products of creative expression and technical innovation have been supported through copyright and patent laws, which extend private property rights to intellectual property. These laws have historically attempted to strike a balance between enhancing economic incentives to create and promoting widespread use of the thing created. By preventing unauthorized copying, intellectual property laws allow creators and innovators to profit from their original works and inventions.

Strong copyright and patent protection can help provide the appropriate incentives to create, by allowing creators to capture a greater share of the marginal benefit of their efforts. The cost of strong protection, however, is that prices to use copyrighted works or patents may remain high for some period of time. Ironically, because patents and copyrights build on the work of others, overly strong intellectual property protection today could discourage innovation and creativity in the future.

An increasingly important policy question is whether these traditional legal means for striking the balance between incentives to create and incentives to use will continue to apply in a global information-based economy. Difficult issues to resolve include:

- rights to display copyrighted information on computer screens
- the applicability of copyright to electronic data bases
- "fair use" rights and other traditional exceptions for the educational and research community, and
- competition within broad-based collective copyright licensing organizations.

The need to coordinate our efforts with other nations makes the resolution of these crucial questions even more complex.

venting such anticompetitive collusion and mergers. Public antitrust enforcement complements market forces by supporting conditions conducive to competition. A second important means of promoting competition in U.S. markets is the reduction of trade bar-

riers and other distortions that deter entry by foreign providers of goods and services. There may also be a role for government when large firms have cost advantages that discourage entry by other firms and thus make sustained competition impossible. For instance, the government may directly regulate prices as a substitute for market forces in such circumstances.

Markets also produce inefficient outcomes when the prices that buyers and sellers agree on do not take account of benefits and costs falling on third parties. The result is called an externality, a textbook example of which is air pollution. It would be prohibitively costly to define and enforce property rights to the use of clean air. Therefore, unless polluters can be made to pay a compensatory tax, purchase emission permits, comply with regulations, or face liabilities imposed by environmental or tort law, they do not take the cost of their pollution into account. This leads to excessive levels of undesirable emissions—a negative externality. Externalities can be positive as well as negative, conferring benefits rather than imposing costs on third parties. For example, inoculations not only protect those who receive them from contagious disease, but may prevent its spread through the rest of the population.

An important example of a public good with positive spillovers is basic scientific research, whose benefits can far exceed those realized by the firm or institution undertaking the research. In such cases, targeted Federal support can more than pay for itself through the technological innovations and product improvements bestowed upon the economy overall. Investments in transportation and communications infrastructure are another example. Numerous recent initiatives, such as the Department of Transportation's programs to provide and leverage financing for public highways and private toll roads, can generate widespread benefits by promoting regional economic development.

Information asymmetries, where one party to a transaction knows more than the others, can also undercut market efficiency. Health insurance offers an instructive example. If consumers of health insurance know better than providers the chances of their falling ill in a given year, only those who know they are more likely to get sick might purchase insurance. As premiums rise to reflect the higher risk of the those buying insurance, the healthier among them—for whom the insurance costs now exceed their expected care needs—drop out of the market. This process of adverse selection can repeat itself to the point where the market collapses. One reason why the government, rather than private insurers, provides health insurance for the elderly through Medicare is that the elderly may have more knowledge regarding their health status than any private insurer, giving rise to an adverse selection problem (see

Box 3–1 in Chapter 3). Maintaining a population-wide risk pool eliminates the problem.

Finally, the efficiency standard is not the only basis for judging the performance of an economy. Probably the most frequent indictment laid against markets is that they can be consistent with significant inequality of opportunities and outcomes. Progressive income taxation, free public education, and numerous transfer programs—all acts of government—moderate some of the inequality in our market-based economy. Civil rights laws prohibit discrimination that market forces may fail to eliminate. In addition, because markets are driven by the pursuit of personal, not collective, interests, market transactions may not fully support our shared social values. Prohibitions on child labor, laws to preserve habitats for endangered species, and public support for the arts exemplify ways in which government seeks to give our important social values their due.

This list of potential limitations to the market is not meant to be exhaustive. And markets, of course, often can and do respond to these and other imperfections on their own. If a market is not competitive, firms may enter that market or buyers may begin production in-house rather than continue to deal with a monopolist. Markets may internalize externalities in cases where it is possible to define property rights or to bring within the same organization all those who reap the benefits and bear the costs. In some cases, warranties and independent testing agencies can mitigate adverse selection and other problems resulting from imperfect information.

The pursuit of goals other than efficiency, such as alleviating inequitable distributions of wealth, is of paramount importance. Chapter 5 of this Report discusses an array of policies for addressing inequality, from transfer payments to progressive taxation to the earned income tax credit. Because reducing inequality is so vital a concern, we need to recognize that few strictly regulatory decisions will have much of an effect on the distribution of wealth or income. The controlled pricing of telephone service, electricity, or other products of regulated firms may promote other social objectives, but it is unlikely to have much effect on the prevalence and intensity of poverty. Efforts to reduce inequality will be more effective if directed at wages, taxes, and other determinants of disposable income, rather than at prices for particular products, especially those that make up only a small fraction of household budgets. However, firm and even-handed enforcement of broad public health, environmental, and other regulatory protections can help to ensure that low-income and minority communities are not disproportionately affected by pollution and other activities that generate harmful spillovers.

MARKETS AND PUBLIC POLICY AS COMPLEMENTS

The conventional emphasis on markets and governments as substitutes, rather than complements, has often led well-meaning, thoughtful people to take extreme positions on the role of the public sector in the economy. Proponents of a strong government role frequently compare real market failures with an idealized vision of a government possessing unlimited information and purely beneficent objectives. Opponents of government often fall prey to the opposite fallacy, contrasting the qualities of an ideal market with the behavior of real governments, which must act upon limited information and often with distorted incentives. Both institutions have limitations; neither measures up to the ideal.

A more useful approach is to compare real markets with real policy effects, to understand when and where lines between the public and the private sectors should be drawn. Finding this boundary is difficult; reasonable people can and do differ on its location. Comparing the actual performance of markets and governments also helps us see how public policies can make private markets work better, and how using market incentives can improve the performance of the government.

Nineteen ninety-six saw the realization of major initiatives to establish and extend competition in two markets where it had long been absent: local telephone service and electricity generation. Last year's *Economic Report of the President* examined the future of deregulation of those two industries in detail. When that *Report* was written, these initiatives were optimistic prospects. Now the complex task of implementing the visions behind them has begun. Policymakers are working to devise ways to bring about competition while protecting against the undue exercise of market power. Much of the responsibility for maximizing competition in electricity sales and telephone service falls to State government. As we report below, the States have not shied from the task.

Markets also help the government do its job. A profound innovation of the last few years has been the use of market mechanisms to help the government achieve its goals at least cost to consumers and taxpayers. Even where the case for government intervention is persuasive, policymakers have been able to exploit the advantages of the market so that public policies generate greater benefits at lower cost.

Three examples of that success are especially noteworthy. The first is the use of tradable emission permit programs, in which the government distributes rights to emit some pollutant and then allows firms to allocate those rights across their plants and to buy and sell them among themselves. Programs such as these encour-

age abatement of pollution at least cost. The second example is spectrum auctions. Here the policy goals are twofold: get spectrum into the hands of communications service providers who can generate the greatest economic benefit from it, and raise funds to reduce the need for taxes to cover government expenses. The third example is the use of market-based prices to lead to more efficient use of public lands for mining, grazing, timber, and water supply, while protecting their environmental value. The remainder of this chapter discusses all three examples and concludes by looking at the limits to transferring public responsibilities to the private sector.

USING PUBLIC POLICY TO BRING COMPETITION TO REGULATED INDUSTRIES

In light of the Federal Government's success in introducing competition into airlines, banking, trucking, and natural gas, its delay in deregulating the telephone and electricity industries may be puzzling. The reasons for the delay explain why government is likely to be a complement to the development of competitive markets in these industries for some time to come.

REASONS FOR THE DELAY IN DEREGULATING ELECTRICITY AND TELEPHONE SERVICE

Jurisdictional issues have made it legally and politically more difficult for the Federal Government to deregulate electric and telephone utilities than other industries. Much of the regulation of these industries takes place at the State level, through public utility commissions. The Federal Government generally regulates only those portions that involve interstate commerce. (Box 6–3 discusses some of the economic issues involved in assessing whether regulation should take place at the State or the Federal level.) In the telephone industry the FCC has traditionally asserted authority over long-distance calling between States, wireless services, and interstate access services that local telephone companies provide to long-distance carriers. In electricity, the FERC's jurisdiction covers wholesale power sales, the transmission of electricity for resale to final customers, and (it asserts) transmission service to retail buyers where such transmission service is unbundled from the power itself.

A more fundamental difficulty is the widespread presence of substantial economies of scale, which create natural monopolies. A natural monopoly occurs when a good or service can be provided at lower cost by one firm than by two or more. With a few exceptions, the industries first deregulated in the 1970s (e.g., trucking and the airlines) were not natural monopolies. This choice was by design.

Box 6-3.—The Economics of Federalism in Regulation

Historically, responsibility for regulating electricity and telephone service has been divided between the States and the Federal Government. As a legal matter, the scope of Federal authority depends upon interpretations of the commerce clause of the Constitution, which says (Article I, Section 8), "The Congress shall have Power . . . [t]o regulate Commerce . . . among the several States . . . ." Economics, however, can inform these interpretations by examining a variety of factors, including:

- *Economic effects that cross State lines.* When problems are local, solutions in general should be local. The case for leaving matters of economic regulation or policy to the States is stronger if a State's policy choices do not impose costs on residents of other States. For example, if a State chooses to regulate in ways that raise prices, the strength of the Federal interest should depend on whether consumers in other States are affected by those high prices as well. A second important example involves environmental effects that cross State borders, such as airborne pollutants. A State may fail to impose sufficient pollution controls on plants within its borders if those in other States incur the damages.
- *Economies of scale in regulation.* Just as the economy gains by having firms compete in the marketplace, it may also gain by having government jurisdictions compete in the form and content of their regulations. In some cases, however, effective regulation may require the devotion of considerable resources and specialized expertise to gathering and providing information, assessing costs, evaluating the state of competition, estimating environmental effects, and overseeing compliance. It may be more efficient for one entity—the Federal Government—to undertake these responsibilities than to have them divided among the 50 States, the District of Columbia, and other jurisdictions. The case for Federal regulation is stronger if considerations determining the best way to regulate vary little from State to State.
- *Comparative performance of government institutions.* Public institutions may have incentives to act in accord with special interests rather than those of the public at large. When this problem is more prevalent at the State level, the Federal level is likely to be the better venue in which to vest regulatory authority.

In both electricity and telephones the most important natural monopoly was the local distribution network. It was believed wasteful to lay a parallel set of electric cables or telephone lines through cities and towns to enable different sellers to compete for customers. The value of having everyone on the same network further argued at the time for a local telephone monopoly.

Accordingly, electricity and telephone service used to be provided by companies that managed virtually every important aspect of the industry from top to bottom. Telephone service was largely the province of the American Telephone and Telegraph Co. (AT&T), which provided most local networks, long-distance service, and telephone equipment. The electricity industry was more complex, but the dominant form of organization was the vertically integrated investor-owned utility. These utilities generated power and transmitted it over high-voltage lines to their local distribution networks, which in turn delivered it to homes, offices, and factories.

Technological change and new forms of organization in the last two decades have eroded the natural monopoly characteristics of both these industries. Combined-cycle gas turbine generators reduced the scale necessary to produce electricity at low cost, increasing the potential for competition in power production. The telephone industry has seen the development of wireless technologies, along with reductions in the cost of fiber-optic transmission lines and of the computers and software that may someday route telephone calls over alternative pathways such as cable television systems. These innovations have encouraged some to believe that entry into local telephone service, the last telecommunications monopoly, may soon take place on a massive scale, but such entry has not yet occurred to a substantial degree outside of specialized mobile and business services.

Elimination of natural monopoly in the physical distribution and transmission of electricity may take longer. It remains generally uneconomical to build overlapping sets of power lines for the local delivery of electricity. Long-distance power transmission also has monopoly characteristics. Because directing electricity along a particular transmission path is prohibitively costly, current supplied into a grid will take all available paths between two points and therefore affect power loads and congestion on many lines. Consequently, the interconnection of independently owned transmission lines—a practice to promote reliability of the system as a whole—tends to convert the separate grids into a single entity.

Experience with structural change in these industries has complemented these technological developments in opening utility markets to competition. In electricity, public policies that have created an independent power producing industry, mostly to promote cogeneration (production of electricity by factories as a by-product of

manufacturing) and renewable technology, had the side effect of demonstrating the feasibility of relying on nonutility generators for power supply. The analogues in telephones were the "equal access" rules, imposed on the local telephone companies created in 1984 by the AT&T divestiture, to give all long-distance carriers equivalent technical interconnection, telephone numbering, customer subscription, and billing arrangements. The divestiture created distinct local and long-distance companies, and compliance with the equal access rules provided valuable experience in how to interconnect separately owned and managed facilities. Interconnection is, as we discuss below, a crucial prerequisite for competition in local telephone service and in electric power generation.

THE TELECOMMUNICATIONS ACT OF 1996

The Telecommunications Act of 1996 outlines the route that competition and deregulation in the telecommunications industry will follow. It first takes on the challenge of facilitating competition in local telephone service. New competitors may fall into any of three categories: providers with facilities offering all aspects of local telephone service; partial facilities-based carriers that would purchase unbundled network elements, such as switching capacity, from the incumbent local carrier; and resellers that would purchase local service at wholesale and resell it at retail, often as part of a "one-stop shopping" package of local and long-distance telephone service. (Box 6–4 discusses some other aspects of the Telecommunications Act.)

The Telecommunications Act requires each incumbent local telephone company to allow facilities-based competitors to interconnect with its networks so that customers on both networks can call each other. Responsibility for interconnection rests initially with the carriers themselves, who can negotiate nondiscriminatory terms and conditions, subject to State Government mediation and arbitration. Incumbent local telephone companies must make network elements and wholesale local service available to competitors. To eliminate unnecessary entry barriers, they must also adopt technology to permit customers to keep their phone numbers when switching carriers, and must provide information necessary for network interoperability. The Telecommunications Act also charges the States and the FCC with devising competitively neutral policies to promote universal service, that is, to ensure that telephone service is reasonably available to all income groups and geographic areas in the United States.

The Telecommunications Act also eliminates court-imposed rules keeping the regional Bell operating companies (RBOCs, the regional telephone companies created by AT&T's breakup) out of other communications businesses, most notably long-distance tele-

Box 6–4.—Telecommunications Policy Is Not Just for Telephone Companies

The Telecommunications Act covers much more than the current set of firms in the telephone industry. It also expands the number of radio and television stations a single firm may own, simplifies license procedures, and sets policies applicable if the FCC grants existing broadcasters rights to additional spectrum for tomorrow's advanced digital television services (while giving the FCC the power to reclaim those additional rights or even those that broadcasters currently have). But because the act also loosens FCC rules on concentration of radio and television station ownership, such concentration may raise antitrust concerns. Increasingly, radio and broadcasting mergers are now being scrutinized by the Antitrust Division of the U.S. Department of Justice.

The Telecommunications Act also reduces price regulation of some cable television systems, while maintaining for 3 years regulations on cable systems that do not face effective competition. Cable television shares the wire-based network characteristics that have made local telephone and electricity service natural monopolies, but it arguably faces greater competition from other video media such as broadcast television, videocassettes, and direct broadcast satellite service. To encourage telephone companies to compete with cable operators, the Telecommunications Act establishes a common-carrier "open video systems" framework that local telephone companies can use to provide cable television service with substantially less regulation. In addition, the act amends the Public Utility Holding Company Act of 1935 to permit public utility holding companies to acquire or maintain an interest in "exempt telecommunications companies" (ETCs), which could provide telecommunications or information services in competition with incumbent providers. Since the act was passed, the FCC has approved a number of petitions for determination of ETC status.

Other major provisions of the act seek to control the availability of obscene and indecent material to minors via the Internet and require that televisions with screen sizes exceeding 13 inches include a so-called V-chip, which when activated blocks programs with ratings designed to inform parents of sexual, violent, or indecent content that their children might see. As of this writing, several Federal courts have ruled that the content provisions regarding indecency on the Internet violate freedom of speech.

phone service (Box 6–5). The act replaced these rules with a long-distance entry approval procedure administered by the FCC. For an RBOC to receive FCC authorization to provide long-distance service to its local service customers, it must have an approved interconnection agreement with a facilities-based competitor, or, if no competitor has made a good-faith request for interconnection or network elements within a specified time, it must have an approved statement of terms and conditions under which it will provide interconnection. In either case the RBOC must offer interconnection under terms and conditions that meet a 14-point statutory checklist. The FCC then must determine whether granting the RBOC's application to provide long-distance service "is consistent with the public interest." In making its determinations, the FCC is required to consult the regulatory commissions of the relevant States to verify compliance with the checklist, and to solicit and grant substantial weight to the Department of Justice's evaluation of the application. The Antitrust Division of the Department of Justice has long experience in competition analysis, and thus has the expertise to judge the effects of an RBOC's provision of long-distance service.

Similar prohibitions against manufacturing of telecommunications equipment by the RBOCs are repealed, effective when the company obtains approval to provide long-distance service. The Telecommunications Act prohibits RBOCs from discriminating against competitors in areas such as procurement and access to technical network information. To protect against anticompetitive discrimination and the possibility that local telephone customers will end up paying for the RBOCs' ventures into long-distance service, manufacturing, and other new enterprises, these offerings must be provided by separate subsidiaries for a minimum of 3 years.

Yet creating competition is not simply a matter of legislative declaration; controversies regarding market power and dominance will persist for some time. Exemplifying both the complexity of the issues and the case for regulatory oversight is the FCC's First Report and Order implementing the local competition provisions of the Telecommunications Act. Table 6–1 summarizes some of the controversy and the FCC's decisions.

As of this writing, the 8th Circuit Court of Appeals has stayed implementation of parts of the order, holding that the FCC went beyond its jurisdiction in prescribing prices and pricing methods for network elements and wholesale telephone service. While the courts consider these issues, State regulators continue to mediate, arbitrate, and approve interconnection negotiations between incumbent local telephone companies and new entrants. The FCC will still have to make decisions regarding whether the RBOCs have met the prescribed conditions for being allowed to offer long-dis-

Box 6–5.—Why Were the Regional Bell Operating Companies Kept Out of Other Markets?

The RBOCs are the local service companies spun off by AT&T in 1984 as part of the settlement of the antitrust case brought against it by the Department of Justice. The divestiture was premised on the economic harm created when a regulated monopoly can evade controls on prices and profits by operating businesses in other unregulated (or less tightly regulated) markets. In *U.S. v. AT&T,* the regulated monopolies in question were AT&T's local service companies, and the relatively unregulated businesses were its long-distance service and its telecommunications equipment manufacturing subsidiary. The leading concerns were:

- *Anticompetitive discrimination.* A regulated local telephone monopolist that also provides long-distance service might, for example, provide delayed or inferior connections to other long-distance competitors. If long-distance companies can only complete calls through the local network, those competitors cannot turn elsewhere for adequate connections. This boosts demand for the monopolist's own long-distance service, allowing it to raise long-distance prices.
- *Cross-subsidization.* A regulated local telephone company might purchase equipment and labor to provide long-distance service and record these purchases as costs of providing local service. It could then cite these added costs to justify to its regulator an increase in its local telephone rates. Because it has a local service monopoly, customers cannot turn elsewhere and must pay the higher rates. The profits show up on the books of the unregulated long-distance service.

In the 1970s and early 1980s the local telephone monopoly appeared permanent and regulatory approaches ineffective. The Department of Justice's Antitrust Division therefore pressed AT&T to divest its local operations, creating the RBOCs. To prevent anticompetitive discrimination and cross-subsidization from recurring, the RBOCs were kept out of long-distance service and other markets. Enacted 12 years after that divestiture, the Telecommunications Act of 1996 reflects technical change that has made the prospect of local competition more realistic, and gives the RBOCs a reasonable opportunity to meet conditions under which their provision of long-distance service would promote rather than inhibit competition.

TABLE 6–1.—*The Interconnection Debate*

Entry method	Entrant side	Incumbent side	FCC policy (absent a negotiated agreement between the parties)
Facility-based total service providers	Incumbent would preserve monopoly by refusing to interconnect.	Act left interconnection to bilateral negotiation; FCC intervention will give too little weight to local market considerations.	Set basic rules for interconnection between existing local telephone companies and new end-to-end providers.
Purchase of "network elements"	Incumbent would offer too few elements at too high a price.	Entrants demand inefficient slicing of network; rates based on forward-looking costs will not provide enough revenue to pay for past investments.	Determine the "network elements" (loops, switches, other components) incumbent carriers should make available; specify cost-based methods for setting their prices.
Resell incumbent's service at retail; own no facilities	Wholesale discounts below retail rates are necessary for profitable retail competition.	Resellers should not get service at prices discounted from retail rates that, because of regulation, are below the cost of providing service.	Set a default wholesale discount of 17–25 percent below retail, based on estimates of incumbents' costs related to retailing that incumbents would avoid.

Source: Council of Economic Advisers, based on Federal Communications Commission interconnection order.

tance service, in accord with the checklist and the "public interest" standard in the Telecommunications Act.

While the interconnection issue is pending, the Joint Board of FCC and State Public Utility Commissioners has adopted recommendations for funding universal service subsidies for telephone service to low-income or high-cost (generally rural) areas through competitively neutral contributions from interstate telecommunications service providers. The proposal defines universal service as including basic voice telephone service and ancillary services. The current practice of subsidizing universal service through "access charges" (fees that long-distance companies pay the local incumbent to originate and terminate calls) is neither transparent nor likely to be sustainable in a competitive environment, as the entry of new telephone companies fosters bypass of the payment system. In December 1996 the FCC initiated proceedings to reform access charges. It is proposing to prescribe specific changes in access charges and/or to grant a local telephone company different degrees of pricing flexibility depending upon whether it faces potential entry, actual competition, or substantial competition.

One question in addressing universal service and access charges is whether, after deregulation, the earnings of incumbent telephone companies will suffice to cover the infrastructure costs mandated under prior regulatory regimes. As last year's *Economic Report of the President* argued in the context of "stranded costs" of electric utilities (which are discussed further below), recovery of costs le-

utilities (which are discussed further below), recovery of costs legitimately incurred pursuant to regulatory obligations would be warranted. Such recovery should be limited, however, to investment expenses not already recovered through past earnings. It is also crucial that any such recovery be accomplished in a manner that is competitively neutral—for example, creating neither artificial price nor cost advantages for the incumbent carrier.

The years of debate that preceded passage of the Telecommunications Act are likely to presage additional years of regulation and litigation to realize its goals. These complex issues will require active policy oversight to ensure a proper outcome.

EXPANDING COMPETITION IN ELECTRICITY: FEDERAL ORDERS AND STATE INITIATIVES

Telecommunications was not the only industry during the past year to be the object of procompetitive policy initiatives. Major regulatory decisions by the Federal Energy Regulatory Commission, along with ambitious State initiatives, are already opening markets in electric power generation to competition. Legislation to increase competition in electric power markets is under active consideration by the Congress and the Administration. (Box 6–6 discusses the important role of merger enforcement during the transition to competition in the electricity and telephone industries.)

The 1992 Energy Policy Act authorized the FERC to order a transmission-owning utility to provide wholesale transmission service. This enabled generators owned by the transmission utility, by other utilities, or by independent power producers to compete to sell power to local distribution companies or anyone else engaged in the resale of electricity. Opening up wholesale markets and interstate transmission networks to the panoply of generating companies should lower prices and will be necessary for effective retail competition. State regulators are now determining the extent to which competition in electricity may extend to retail markets.

The key provisions of the FERC's Order No. 888, issued April 24, 1996, require public utilities to file nondiscriminatory "open access" tariffs for the interstate transmission of electricity sold at wholesale. Order No. 888 also requires "functional unbundling" by utilities of generation from transmission, with separate rates for wholesale power, transmission service, and other ancillary services. These tariffs are intended to ensure that the utility treats nonaffiliated power companies the same way it treats its own generators in terms of prices and service options. To implement these procedures, Order No. 889 mandates the creation of Open Access Same-Time Information Systems (OASIS) to provide all generators with up-to-the-minute data regarding power flows and congestion in the transmission network. The thrust behind these two orders is the

Box 6–6.—Mergers During the Transition to Competition

At the same time that the FERC, the FCC, and State governments are engaged in designing regulations to facilitate competition in telephone and electricity markets, these industries are seeing considerable merger activity. Mergers may enable firms to exploit economies of scale, but they can also engender concerns that competition will be reduced. The Horizontal Merger Guidelines promulgated by the Department of Justice and the Federal Trade Commission point out that mergers can lessen competition by making it easier for firms to collude and, in some cases, by giving monopoly-like power to the merging parties.

A crucial consideration in evaluating mergers is what antitrust experts call market definition: identifying who is in the market and who is not. All else being equal, the more sellers that remain in the market after a merger, the less likely it is that the merger will reduce competition. As the industries have been structured up to now, mergers between local telephone companies, or between electric utilities, might have little anticompetitive effect, because the two would by law and economics be in separate markets. Following the Telecommunications Act of 1996 and Order No. 888, however, the concern is that these mergers might reduce potential competition in the future. The effects of a merger in these industries depend on how those initiatives are implemented and how the industries respond. We do not yet know how the markets will turn out—whether two, three, or ten companies will compete to provide electricity or local telephone service to customers in any particular area. Moreover, the mergers themselves may reflect the firms' belief that they should merge now before authorities can prove that the mergers would reduce competition.

In principle, mergers can be a way for firms to reduce costs and improve their ability to compete. However, efforts to block anticompetitive mergers are crucial if legislative and regulatory efforts at all levels of government to promote competition are to realize their full potential.

creation of institutional arrangements that will support greater competition in the industry.

Among the many complex issues to be resolved in managing the transition from regulation to competition in electric power generation, two stand out. One is the degree to which more stringent forms of separation between generation and transmission will be necessary to prevent discrimination. Order No. 888 did not require

strict corporate separation between transmission companies and generators. A widely discussed alternative is to create so-called independent system operators (ISOs). An ISO would operate (but not own) a transmission grid, keep power supply equal to use, and manage responses to emergencies and blackouts. The FERC recognizes the need to prohibit conflicts of interest between ISOs and power providers and has set forth principles that ISOs must satisfy. However, the agency has left the development and implementation of ISOs to the utilities and the States.

A second major issue involves what are known in the electricity industry as stranded costs. As discussed in last year's *Economic Report of the President,* electric utilities facing competition from new, low-cost power suppliers may be unlikely to recover substantial amounts of their undepreciated investments in high-cost power plants. A second source of stranded costs is long-term contracts with high-cost renewable power suppliers. Such contracts were mandated by Federal laws intended to promote purchases of such power by utilities at their avoided costs of new plant construction. Over time, however, those contract prices have probably turned out to be higher than the projected cost of power under deregulation.

Allowing utilities to recover prudently incurred investment and contract costs is important. Investors in regulated enterprises need to be reasonably confident that the government will not renege on its commitments by arbitrarily denying the investors any opportunity to recover their upfront costs. At the same time, however, regulated firms may engage in wasteful investments if recovery is guaranteed unconditionally. To avoid creating this incentive, a presumption in favor of cost recovery should apply only for costs incurred to comply with specific regulatory mandates or before competition became a significant prospect.

In its recent Order No. 888, the FERC granted utilities the right to seek recovery of costs stranded when a former wholesale customer purchases power from new suppliers. The FERC's rule only covers contracts established prior to July 11, 1994, the day the agency published its stranded cost rulemaking in the *Federal Register*. It served notice that it would not consider a request for wholesale stranded cost recovery for contracts entered into after that date. Much of the potentially stranded costs, perhaps over 90 percent, fall under State jurisdiction, however, and are being resolved by the various States in different ways.

States across the country are also expanding competition in electricity. New Hampshire has already undertaken a pilot program in which 16,000 randomly selected customers were allowed to choose their electric company. In response, over 30 power companies have offered a variety of flat rates and usage discounts, rebates and other inducements, and promises of environmental sensitivity. In

February 1996 the Wisconsin Public Service Commission submitted a proposal to the State legislature describing a 32-step plan to bring retail competition to consumers there by 2001. In September 1996 California enacted a plan that would offer consumers a choice of power providers as early as January 1998, with deregulation of retail power prices by 2002. These initiatives illustrate how complementarity between public policy and private markets holds at the State level as well as for Federal regulation.

The existing statutory and regulatory framework may make it difficult to resolve the complex issues, such as ensuring system reliability, that are sure to arise as competition in electricity evolves. Accordingly, the Administration is considering a variety of legislative proposals to modify existing regulatory frameworks. Such legislation could promote competition and efficiency in the electricity industry by permitting more flexible industry structures and clarifying the jurisdictional boundaries between State and Federal Governments.

MARKETS COMPLEMENTING GOVERNMENTS

The Telecommunications Act, the FERC's open access orders, and State and Federal actions to implement them illustrate how government policy can facilitate the development of responsive, competitive markets. The street goes both ways, however. Recent policy developments regarding pollution control, spectrum management, and land use show how government can use market forces to help achieve important social objectives. (Box 6–7 indicates how advances in telecommunications are making the government more accessible to the public.)

EMISSIONS TRADING: APPLICATIONS TO AIR POLLUTION

Concerns about environmental degradation and resource depletion have led to an intensified search for innovative, cost-effective solutions. One fairly new approach is emissions permit trading. Proposed at least as long ago as the 1971 *Economic Report of the President,* emissions trading is now often regarded as the preferred policy approach to a range of environmental problems. By giving polluters a financial incentive to reduce emissions in the least expensive possible way, emissions trading reduces the costs of environmental protection. Firms with high abatement costs can purchase permits from firms with low abatement costs, which thus find it profitable to reduce their emissions and sell their surplus permits. As a result, greater responsibility for reducing emissions is allocated to those firms that can do so at least expense.

Box 6–7.—Bringing the Government to the People via the Internet

An important advance in the use of telecommunications technology to promote democracy is the expanding availability of government information via the World Wide Web on the Internet. Any citizen with access to a computer and a telephone line at home, work, or the public library can now search this vast hoard of information.

To get to these sources of information, one enters a website address (formally called a uniform resource locator, or URL) in a World Wide Web browser program. The URL usually takes the form:

http://www.name.gov/

where in place of "name" the user specifies the site. Some of the leading government websites are:

Library of Congress	loc
White House	whitehouse
Department of Agriculture	usda
Department of Commerce	doc
Department of Education	ed
Department of Energy	doe
Department of Health and Human Services	dhhs
Department of the Interior	doi
Department of Justice	usdoj
Department of Labor	dol
Department of State	state
Department of Transportation	dot
Department of the Treasury	ustreas
Department of Veterans Affairs	va
Environmental Protection Agency	epa
Federal Communications Commission	fcc
Federal Trade Commission	ftc
Government Printing Office	gpo
National Aeronautics and Space Administration	nasa
National Science Foundation	nsf

Within the Library of Congress website, a useful source of information on the Congress and on Federal legislation is the Thomas data base. From the White House website, one can use the "Interactive Citizens' Handbook" to find websites for other Executive Office agencies, including that of the Council of Economic Advisers, which includes an electronic edition of this *Report*.

Emissions Trading in Practice

Much of the enthusiasm for emissions trading is due to its success in attaining mandated reductions in sulfur dioxide (SO_2) emissions from electric utilities, at lower-than-expected costs. The Environmental Protection Agency (EPA) implemented emissions trading as part of its Acid Rain Program. That program, instituted under the 1990 Clean Air Act Amendments, called for major reductions of atmospheric SO_2 and nitrogen oxides (NO_x), the pollutants that cause acid rain. To hold SO_2 emissions to a targeted maximum total level, the EPA issued each polluter a number of permits based on fossil-fuel usage in the mid-1980s. (Box 6–8 discusses the relative merits of giving away emissions permits, auctioning them to the highest bidder, and charging emissions fees.) After the initial distribution, permitholders were allowed to buy or sell permits or use them to offset excess pollution in other parts of their own operations.

During the debate over the Clean Air Act in the 1980s, utilities warned that annual compliance costs could exceed $4 billion by the year 2000, and SO_2 pollution allowances were predicted to trade at prices ranging from $170 to almost $1,000 per ton of emissions. By the end of 1995, however, the price of SO_2 permits was around $80 per ton. Some preliminary analyses suggest that several factors—deregulation that reduced the cost of shipping Western low-sulfur coal by rail, improvements in fuel blending technology, and subsidies for the installation of equipment (called "scrubbers') to filter out emissions from smokestacks—reduced demand for and thus the price of SO_2 permits. The flexibility provided by the emissions trading system, however, is credited with promoting competition in coal markets and encouraging innovation that led, at least in part, to these cost reductions. Whatever the linkage, as market-based methods reduce the costs of abatement, more stringent environmental standards become easier to justify.

The first phase of SO_2 emissions trading, affecting 110 plants, began January 1, 1995. Phase II of the Acid Rain Program is slated to begin in 2000, when an additional 700 fossil fuel-burning plants will be subject to emissions caps. Moreover, analysts expect that permit trading will play a greater role in other ways as the market expands. The EPA is examining ways to respond to increased competition following the FERC's Order No. 888, which according to the EPA's analysis will increase the market share of relatively high emission coal-fired plants. A trading system for NO_x is a strong contender.

Emissions Trading and Climate Change Policy

In July 1996 the Administration announced that the United States would support an international effort to set reasonable and attainable, binding emissions-reduction targets for greenhouse

Box 6–8.—Taxing Pollution Versus Giving Away Emissions Trading Permits Versus Auctioning

The first emission permits under the EPA's Acid Rain Program were issued to utilities without charge. But handing out tradable emissions permits for free is not the only way to introduce markets into environmental protection. Other policy options include placing fees on emissions, and auctioning rather than giving away permits. By changing relative prices, and therefore incentives, all of these policies seek to improve upon traditional command-and-control methods that specify pollution limits for each plant and, in some cases, even the technologies to be used to achieve those limits. Market-based incentive policies tend to increase efficiency by imposing a marginal cost on firms for polluting, through either paying more fees, purchasing more permits, or forgoing the opportunity to sell permits to someone else. Facing these costs gives firms the incentive to reduce pollution most at plants where it costs the least to do so, and by developing and using less expensive abatement technologies.

Economically, the choice between fees and marketable permits is of secondary importance. If it is crucial to set some absolute limit on the quantity of pollution introduced into the environment, permits together with stringent enforcement can ensure that that limit is not exceeded. If the incremental social cost from adding pollutants is known to be relatively constant, the theoretically better approach would be to set fees equal to that cost. Collecting emissions fees, and auctioning rather than giving away permits, also raise revenue that can be used for deficit reduction or to cut other, more distortionary taxes.

Whether regulators give away permits, auction them off, or impose pollution fees, anything that forces firms to abate pollution or cut back output is sure to raise the cost of supplying the goods and services those firms produce. These higher costs translate into higher product prices. Higher prices, however, lead consumers to take pollution costs into account when making their own purchasing decisions.

gases—the gases whose emission is believed to cause global warming. The possible effects of global warming include risks to coastal areas from rises in sea level; changes in rainfall and agricultural productivity; and increased incidence of diseases such as malaria, yellow fever, and cholera. Combustion of fossil fuels, primarily coal and oil, is the main source of elevated levels of carbon dioxide, the most prevalent of the greenhouse gases.

The United States has called for flexible and market-based approaches for reducing these emissions, one of which may be domestic and international greenhouse gas emissions trading systems. Extending trading internationally is especially intriguing. An international trading system would be able to take advantage of greenhouse gas reductions in those participating nations where the marginal cost of reducing emissions is relatively low.

Other Implementation Issues

Determining the initial distribution of emission permits can be contentious. The alternative to allocating permits through the market by auctioning them is to rely on a formula, which may be based on past and current pollution. Such formulas can be controversial because recipients of permits are given a scarce and valuable resource. Moreover, companies anticipating an allocation based on current practices have an incentive to delay actions to limit pollution or other environmentally harmful activities, in order to qualify for more permits. This incentive can be partially neutralized by linking reductions to some prior historical baseline. However, this approach can make the choice of allocation formula more difficult, since participants will realize that a distribution of permits based on historical practices penalizes those who were the first to undertake actions to improve the environment.

In cases where the incremental harm from emissions is relatively constant over time, the efficiency of emissions trading can be enhanced, at least in the short run, by allowing polluters to bank and borrow permits. Under such a system, polluters could defer their use of a permit, or borrow against future allowances, as their costs dictate. Where workable, this can allow the emissions trading market to allocate reductions over time in a more efficient manner. Timing flexibility can reduce compliance costs through better coordination of emissions reductions when replacing old facilities with less polluting technology. In the first year of the EPA's SO_2 trading program, emissions reductions were about 40 percent greater than the target level, as utilities "banked" allowances for future years.

A problem can arise when the damages from emissions are not distributed evenly over the geographic area in which firms can trade permits. If polluters with high abatement costs—the ones most likely to buy permits—are geographically concentrated, a "hot spot" area that is persistently in serious noncompliance may result. Hot spots are a potential problem with SO_2, but they may be more serious with regard to NO_x. Better market mechanisms for dealing with hot spots should be developed.

Despite these and other complications, interest in emissions trading remains strong, primarily because of the potential cost savings and efficiency gains. The EPA estimates that meeting possible SO_2,

NO_x, and mercury targets through an emissions trading program with banking would reduce abatement costs in 2005 by almost two-thirds compared with a traditional command-and-control approach. Researchers at the Stanford Energy Modelling Forum have predicted that international emissions trading for carbon dioxide could reduce costs as much as 50 percent below the minimum achievable using purely domestic programs—and as much as 80 percent if flexibility in the timing of emissions reductions is allowed. These cost savings do not conflict with considerations of intergenerational equity, because they take place within a program designed to ensure that concentrations of carbon dioxide never exceed critical target levels in any year.

SPECTRUM AUCTIONS

Auctions of rights to use publicly owned resources can allocate those resources efficiently, as well as generate revenues to help cover the costs of government programs. The chief example in 1996 was the FCC's auctions of rights to use parts of the radio spectrum for personal communications systems (PCS). By virtually all accounts, this was an enormously successful example of using market forces to complement the public sector.

Auctions can be designed in numerous ways. Some feature one-time sealed bids, whereas others feature repeated open bids. Rights or permits to be auctioned can be offered together or one at a time. Winning bidders may pay the bid they offer or, to limit strategic incentives to underbid, they may pay the second-highest bid offered. The winner can be determined either as the last to make an offer higher than all preceding offers, or as the first to speak up as an auctioneer offers a succession of declining sales prices. Regardless of the method, the goals are the same: to get assets into the hands of those who will derive the greatest economic value from them, and to do so rapidly and efficiently. How best to design the auction depends on a variety of strategic considerations. A primary factor in the PCS auctions (Box 6–9) was to enable bidders to pursue collections of licenses and preserve their options when strategies needed revision. This added flexibility is likely to have increased firms' willingness to bid, allowing the government to capture some of the economic benefits created by making it easier for firms to place bids for one license based on their beliefs about whether they will win others.

Spectrum auctions have particular advantages over earlier methods of issuing spectrum licenses. Comparative hearings, in which the FCC attempted to distinguish among prospective licensees on noneconomic grounds, generated enormous delay and expensive litigation with little if any public benefit. Using lotteries to distribute licenses randomly to applicants eliminated the need for the

Box 6–9.—Spectrum Auctions: A $22 Billion Economic Idea

As a mechanism for capturing the value of the electromagnetic spectrum for the public, and for getting spectrum quickly into the hands of service providers, auctioning has been spectacularly successful. The most dramatic examples have been the auctions of spectrum for broadband personal communications systems (PCS). Broadband PCS might be thought of an advanced form of wireless mobile telephone, fax, and data service, akin to cellular radio.

To understand the success of PCS auctions, it is important to understand how they work. The FCC first defines spectrum blocks, each consisting of a range of frequencies and a geographic area over which a winning bidder may use these frequencies. In the first broadband PCS auctions, concluded in early 1995, two 30-megahertz blocks (designated A and B) were assigned to each of 51 "major trading areas." These auctions were open to all firms, subject to ownership restrictions to promote competition. In the second PCS auction, which took place in 1996, an additional 30-megahertz block (designated C) was offered in each of 493 "basic trading areas" across the United States. Bidding in that auction was restricted to smaller "entrepreneur" firms, with discounts built in to promote participation by the smallest (those with less than $40 million in annual revenue).

A key innovation was to allow bidding to continue for all areas until no one wanted to place a higher bid on any particular area. This allowed firms to bid in an effort to combine PCS licenses so as to provide services over broad territories. These innovative auctions, designed by the FCC with the help of experts in auction theory, achieved the FCC's goals in outstanding fashion. Bids on the A and B blocks fetched $7.7 billion, and those on the C blocks over $10 billion more. The FCC's recently completed auctions of its D, E, and F blocks for PCS service raised more than $2.5 billion. This same method had already raised over $1 billion in 1994, in auctions for narrowband PCS services—useful for paging and voice message services.

When the less complicated auctions for interactive video and data services and direct broadcast satellite licenses are included, auctions so far have raised over $22 billion and, more important, rapidly promoted the use of innovative, advanced telecommunications technologies throughout the economy.

FCC to determine which firm would be a better service provider. Unfortunately, they also created a cumbersome and expensive mechanism for collecting and processing vast numbers of applications, many from those with no motive other than to sell their "winning ticket" to an actual service provider. Instead of the government collecting revenues to cover the costs of public programs, a few lucky winners got windfalls. Moreover, the cellular lotteries did nothing to eliminate delays in the efficient aggregation of licenses, whereas the PCS auctions incorporated such aggregations into the bidding mechanism.

Auctions eliminate the need for arbitrary comparisons and the cost of filing and processing speculative applications. The winner is presumably the firm that believes it can make the greatest profit in markets for telecommunications services for which the license can be used. If it fails, it can generally sell its license, just as firms throughout the economy that overestimate the profits they expected can sell their plant and equipment to other entrepreneurs.

Auctions need not be inconsistent with achieving important noneconomic objectives associated with spectrum use. Providers can bid for licenses that include, for example, designated public service obligations. But auctions are no panacea:

- If spectrum uses are specified in advance, auctions may not lead to efficient outcomes. The economic value of spectrum, and thus the revenue to the government, are greater when bidders have more flexibility in how they can use the spectrum. To promote these goals and implement recent legislation, the FCC is proposing a new wireless communication service, with licenses to be auctioned during 1997. Licensees would have considerable flexibility to lease portions of either their spectrum or their geographic coverage to other providers.
- If auctions are regarded primarily as a revenue-raising device, the government may have an incentive to restrict the spectrum available for any particular service. We need to recognize, however, that a tax on any good or service has the effect of reducing its supply. In that regard, the potential output effect of using spectrum auctions specifically as a means for raising revenue for the government would not be unique.
- A dominant firm might outbid potential entrants simply to preserve its market power. Antitrust oversight and restrictions on bidders may be necessary to preserve competition in spectrum-related services.
- The incentive to develop new spectrum uses might be diminished if auctions take place only after developers of those uses disclose their innovations. If disclosure of the new idea is what leads to the auction, innovators will have to bid for spectrum made valuable only because of that idea. This could reduce the

incentive to innovate in the first place. An approach sometimes used to deal with this problem is to grant "pioneer preferences" in spectrum auctions to innovators. A better long-run policy might be to commit to auction useful portions of the spectrum up front, rather than make auctions contingent on public disclosure by innovators of their ideas.

NATURAL RESOURCE POLICY REFORM

America's natural environment is an important part of our national heritage and has contributed to the development of our economy. Federal agencies, including the Bureau of Land Management (BLM) and the National Park Service of the Department of the Interior and the U.S. Forest Service (USFS) of the Department of Agriculture, manage large tracts of land, particularly in the Western United States. Indeed, the majority of land in several Western States is regulated by these agencies. The Bureau of Reclamation of the Department of the Interior and the U.S. Army Corps of Engineers also influence the quality of many of the Nation's aquatic ecosystems through their construction and operation of numerous diversion, flood control, hydropower, and navigation projects.

Federal public lands are used for a number of purposes, including recreational use and resource extraction. Historically, three industries have dominated the extractive use of public lands: livestock grazing, mining, and timber harvesting. All these activities continue today: grazing, for example is permitted on over 240 million acres of Federal rangeland. Policies for management of the Nation's public lands and aquatic resources have evolved over time as the result of legislation and its interpretation by other branches of government. The Administration is committed to ensuring that natural resource policies reflect today's realities and balance the diverse and sometimes competing objectives of all who derive benefits from the natural environment.

Current Policies

Current policies toward natural resource use are mainly rooted in past legislation intended to stimulate the economies of the West and encourage settlement of the region. These policies facilitate the development and exploitation of natural resources.

Subsidized Use of Federal Public Lands. Most uses of Federal public land are currently subsidized in one of at least three possible ways. First, a subsidy can exist when the price to the user is less than the government's cost of overseeing the activity. Second, a subsidy may exist when users of Federal lands pay the government a price below that paid for the similar use of comparable privately owned lands. Finally, resource users may receive a subsidy if they pay the government less than the opportunity cost of the land's use, which is defined as the value of the highest alter-

native use of the resource. The type and amount of subsidy offered on Federal lands vary with the nature of the activity and with the location of the land.

Public grazing fees are almost always below private fees and may not even cover the government's cost of administering the grazing program. The amount of the subsidy varies widely by location. The Public Rangeland Improvement Act of 1978 dictates that grazing fees be determined as a function of aggregate livestock market conditions, including a forage value index, the price of beef cattle, and an index of prices paid by farmers; because the formula disregards local factors, public grazing fees are the same everywhere. Private grazing fees, by contrast, differ widely and systematically throughout the West, depending upon the quality of local forage and regional livestock market conditions. A recent study concluded that average private grazing fees between 1965 and 1992 were $12.75 per animal unit month (AUM) in Montana, $7.80 per AUM in Arizona, and $11.20 per AUM across the 11 contiguous Western States. Public grazing fees, by contrast, averaged $1.20 per AUM during this same period. Although these figures do not account for the higher quality of forage often found on private land, or for the value of private landlord services, they nevertheless represent a significant subsidy for grazing domestic stock on public land.

The subsidy offered to ranchers is small, however, compared with that given to miners taking hardrock minerals such as gold, copper, silver, and uranium: miners do not pay the government any significant revenue or fee for hardrock minerals extracted from Federal public lands. This policy, established in the 1872 General Mining Law, bestows a large subsidy on private mining companies. In 1994, for example, a mining company patented a claim in northern Nevada with a gross mineral value of $10 billion, for which the Department of the Interior collected only $9,765. Although this was the largest single transfer of public mineral assets in recent years, it is not the only such case (Table 6–2). Between May 1994 and September 1996 the Federal Government was forced by the General Mining Law to give away over $15.3 billion worth of minerals, in return for which taxpayers received only $19,190.

Timber extraction from Federal public lands is also subsidized, although the subsidy is more subtle than those for mining and grazing. Generally, the USFS subsidizes timber extraction from public lands by collecting less in timber sale revenues than it spends on timber program costs. In 1995, for example, the USFS collected $616 million in timber receipts but spent over $850 million on timber management, reforestation, construction of logging roads, payments to States, and other program costs. Closer analysis of this negative cash flow reveals that the losses vary by region. In seven of the nine National Forest System regions, annual cash

TABLE 6–2.—*Examples of Mining Patents Issued Since 1994*

Location of patent	Date	Mineral	Mineral value	Paid to United States
Eureka and Elko Counties, Nevada	5/1994	Gold	$10,000,000,000	$9,765
Clark County, Idaho	9/1995	Travertine limestone	1,000,000,000	275
Humboldt County, Nevada;. Imperial County, California	3–6/1995	Gold	1,200,000,000	3,585
Pima County, Arizona	12/1995	Copper and silver	2,900,000,000	1,745
Eureka County, Nevada	9/1995	Gold	68,000,000	540
Mohave County, Arizona	4/1996	Gypsum	85,000,000	100
Seward Peninsula, Alaska	9/1996	Gold	38,600,000	2,680
Pinal County, Arizona	9/1996	Copper	56,000,000	500
Total			15,348,000,000	19,190

Source: Department of the Interior.

receipts from timber harvesting have consistently failed to cover the USFS' annual expenditures. This problem is particularly severe in the Rocky Mountain, Northern, and Intermountain regions, where expenditures have exceeded receipts from timber sales by a ratio of 3 to 1 over the past decade.

Federal water projects constructed and managed by the Bureau of Reclamation, the Army Corps of Engineers, and the Natural Resource Conservation Service of the U.S. Department of Agriculture are all highly subsidized. For example, projects constructed by the Bureau of Reclamation embody a number of different subsidies. These include interest-free repayment for capital invested in irrigation facilities, limitation on repayment associated with "ability to pay" guidelines that do not necessarily reflect changing economic or market conditions or individuals' income, and the repayment of costs above an irrigator's estimated ability to pay by using hydropower revenues far in the future. The length of the repayment period is also important in determining the overall magnitude of the subsidy. Subsidy amounts vary by project depending on date of construction, repayment terms, and interest rates, but on many projects the subsidy is significant. Moreover, even when farmers and other users pay some portion of the true cost of delivering water, they pay nothing additional for the value of the water itself.

Recreational use of Federal public lands is also heavily subsidized: in many areas fees paid by recreational users do not cover the costs of maintaining the resource for recreation. The Park Service spends around $250 million annually to provide visitor services at its 374 parks, monuments, and historic sites. Entrance fees raise only $80 million annually.

The National Park Service is currently implementing new fees in accordance with the demonstration projects authorized in Public Law 104–134. Fees for the recreational use of USFS and BLM land

are charged sporadically. The revenues are far smaller than for National Park lands and are well below costs. These agencies are also implementing selective fee increases.

Environmental Damage. Grazing, mining, timber harvesting, and water project development have all placed heavy burdens on the Nation's natural resources. Streams and rivers in the Western States are particularly affected.

Ever since the first European settlement of the West, rangeland vegetation there has been affected by the introduction of livestock grazing and related changes in the occurrence of fire. Livestock grazing has reduced native grasses and palatable shrubs in upland communities, exposing bare ground and increasing soil erosion. More important, however, is the damage done by grazing to the riparian (river-related) areas upon which all fish and nearly all terrestrial species depend. Whereas the condition of uplands has improved since rangeland management began in the 1930s, riparian areas in the Western United States have continued to decline under the impact of grazing and are considered to be in their worst condition in history.

Mining operations have also caused significant environmental damage. Although problems of acid drainage have been reduced by the Clean Water Act, and dangerous mining of mercury and asbestos has been curtailed, mining operations still pose serious environmental risks. Groundwater infiltration of abandoned mine sites and cyanide contamination of streams and aquifers from gold extraction are serious concerns (Table 6–3). The mining industry and State and Federal regulators have taken steps to reduce the ongoing damage, but much remains to be done.

TABLE 6–3.— *Miles of Streams Polluted by Hardrock Mine Wastes*

State	Miles
Arizona	200
California	578
Colorado	1,298
Montana	1,118
New Mexico	69
Utah	83
Total	3,346

Source: Western Governors' Association.

Federally sponsored water projects inflict significant damage on our aquatic resources. Dams can inhibit the spawning of migratory fish such as salmon and steelhead. The vast Columbia River basin is in many respects the most affected by water project develop-

ment. The Columbia River watershed now contains, by one count, 79 hydroelectric projects; 30 of these are Federal projects that provide subsidized power. The basin holds 450 major dams, if those for irrigation are included, many of which have no fish passage facilities. Diversion of water to farms and cities for crop irrigation and drinking reduces the quantity of water in rivers and streams; return flows are often warmer than desirable and may contain agricultural chemicals and other pollutants that lower water quality. Timber harvesting, mining, and ranching have also degraded Western fisheries by inundating spawning habitat with silt and debris.

Use Restrictions. Use restrictions are one tool by which Federal agencies coordinate activities on public lands. The fact that the price of resource extraction and recreation is often subsidized places more emphasis on such nonprice policies for controlling the use of public lands.

Those extracting resources from Federal public land often have exclusive rights in a given area for the activity in which they are engaged; this is one sense in which public lands have already been partially privatized. For example, the General Mining Law of 1872 provides for exclusive possession as against other miners, even while prospecting. Similarly, the Taylor Grazing Act of 1934 grants an exclusive grazing right to a single permitholder in a given area of BLM-managed land. This provision of grazing law was created largely to avoid the "tragedy of the commons" that had afflicted these public rangelands. With open access, each rancher has an incentive to introduce additional animals to the range until the average benefit equals the marginal cost. In this way, open access can dissipate the overall economic benefits from grazing.

Use-it-or-lose-it provisions are another type of use restriction on extractive activities. Under these provisions, whoever holds the right to extract a given amount of a resource in a certain time period must extract the resource as specified or face the possibility of losing the right. For example, grazing permits issued by the USFS require that a rancher graze close to the maximum permissible number of cattle or face termination of the permit (temporary exemptions are available, however). Similar provisions apply to timber harvesting permits and to water diversion rights. These provisions were intended to promote the utilization of public lands; in practice, however, they limit the transferability of extraction rights by reducing the incentives for conservation interests to obtain them.

Changing Conditions in the West

Current Federal resource policies are thus characterized by subsidized extraction and use restrictions that limit the transferability of extraction rights. These policies have resulted in overextraction and significant environmental damage. Changing economic condi-

tions in the Western States and increasing recognition of environmental values suggest that many of the original motivations for these policies no longer apply. The Western regional economy is now prosperous and diverse, and extractive activities there provide far less income and employment in the aggregate than do recreation, tourism, manufacturing, and finance.

Less Reliance on Resource Extraction. The economy of the Western States has become highly diversified. Total employment in the West was more than 22 million in 1982. This figure had increased by nearly 50 percent to over 33 million by 1990. Industries in which employment has increased as a share of total employment include services, finance, insurance, real estate, construction, and retail trade. The Western regional economy produced more than $1 trillion worth of goods and services in 1982, and $1.35 trillion in 1990 (both figures are in 1993 dollars). Industries whose income has increased as a share of total regional product include services, manufacturing, and retail trade. In many respects these changes in employment and income generation mirror broader trends in the Nation's economy, with the result that the West does not look as different from the East as it did in the 19th century. Extractive industries now make up only a small and declining fraction of economic activity.

Agriculture (including timber extraction) and mining together provided only 6.3 percent of income and 5.3 percent of employment in these States in 1990, and their importance is declining. Their share of employment in the Western States fell by 21 percent between 1982 and 1990, during which time their share of regional income fell by 15 percent.

A declining number of Western families rely solely on income from ranching, mining, timber extraction, or farming. For example, ranch families in Arizona have, on average, two people employed off the ranch, who together contribute 53 percent of household income. In part this trend reflects the maturation of the regional economy. More jobs in the region translate into more opportunities for outside employment. This trend also implies that the incomes of families with a member employed in the resource extraction sector are also affected by public policies that strengthen the nonagricultural economy.

Nor should one overestimate the importance of extraction from Federal public lands to the livestock and timber industries as a whole. Permitted use on Federal lands accounts for only about 7 percent of beef cattle forage and about 2 percent of the total feed consumed by beef cattle in the 48 contiguous States. Similarly, less than 15 percent of the national timber harvest is from Federal lands.

The small contribution of extractive industries to economic activity in the Western States and the small contribution of public lands to total national cattle and timber production should not, however, obscure the fact that many rural communities and individual businesses in the West currently depend on Federal public lands for their economic well-being. Moreover, participants in the traditional Western industries represent, in the Department of the Interior's words, "a significant part of the world's image of America and America's image of itself." The unique cultural institutions of the West are valuable, and their preservation should factor into the debate about the nature of economically desirable natural resource policies.

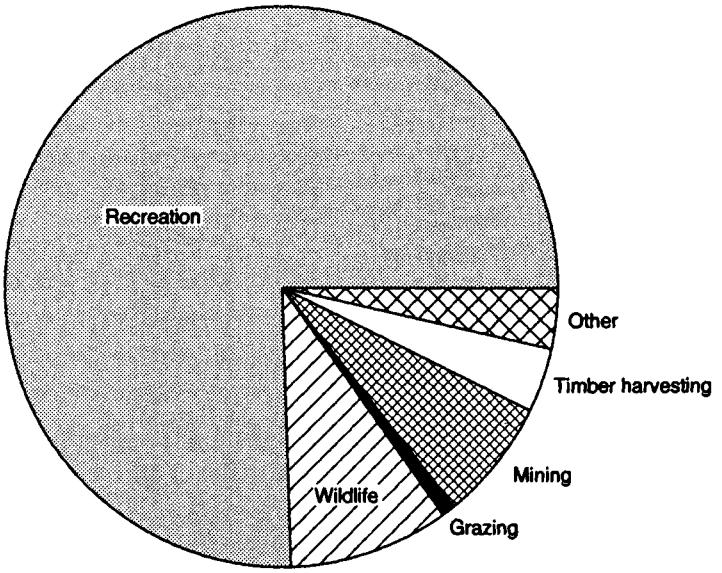
Increasing Value Placed on the Environment. The American public places more importance on a healthy environment today than at any other time in our history. This change in values is revealed in several ways. Public interest groups play an increasingly prominent role in the debate over public lands policy and have prompted various Federal agencies to enact important changes in policy. In recent years the Congress has enacted historic legislation designed to enhance the quality of the Nation's environment. To the extent that legislation reflects social preferences, these laws reveal an increasing value placed on environmental quality and a recognition of resource scarcity.

Recreational use of public lands is also increasing rapidly. On USFS lands, for example, such use increased by over 20 percent between 1991 and 1995, from 279 million to 345 million visitor-days. This rate of increase far outstrips the rate of population and income growth during this time period and may well reflect a change in preferences when compared with changes in other determinants of recreation demand.

A recent USFS study shows that recreation on National Forest System lands produces far more income and jobs than do traditional extractive industries. The agency calculated that recreation on these lands (including hunting, fishing, and wildlife viewing) contributed over $105 billion to GDP in 1993, or nearly 85 percent of the total Forest System contribution to GDP (Chart 6–1), and resulted in over 2.7 million jobs. Grazing, timber harvesting, and mining together contributed less than one-seventh as much income and employment as did recreation. The USFS projects that, by 2045, recreation will generate an even larger share of the economic benefits from the Forest System, particularly if environmental quality improves.

Changing National Fiscal Priorities. Finally, it is important to consider Federal natural resource policy in the context of Federal deficit reduction. Deficit reduction produces numerous public bene-

Chart 6-1 **Economic Activity Attributable to National Forest System Programs**
Recreation use of the National Forest System contributes by far the largest share of the $125 billion in annual income produced by these public lands.



Note: Data shown are for 1993. Wildlife includes activities such as hunting, fishing, and bird-watching.
Source: Department of Agriculture.

fits, detailed elsewhere in this *Report*. Reducing the Federal deficit is a prime economic policy objective of this Administration.

With this emphasis on deficit reduction, all public spending, including subsidies on public land use, is under closer scrutiny than in the past. Economic principles suggest that the marginal benefits of all government expenditures should be equal when the government is making maximal use of its fiscal resources. This means we must compare the value of an additional dollar spent subsidizing timber extraction or grazing—or on environmental restoration—with the value of a dollar spent on providing school lunches or job placement assistance or supporting basic research. If these marginal values are not equal, then an optimal allocation of public funds requires reducing some expenditures that provide lower marginal benefit while increasing others with higher marginal benefit.

New Foundations of Natural Resource Policy

These changing economic and social conditions—the maturation of Western economies, the emphasis on deficit reduction, and the increasing value placed by the public on environmental quality—motivate a new set of objectives for Federal natural resource policy.

Market Incentives. Users of Federal public lands should be more exposed to market signals, so that their decisions will help maximize economic welfare for all. Economics teaches that subsidizing

the use of public lands affects economic behavior in ways that may prove costly. By encouraging overinvestment and overproduction in the livestock, mining, and timber industries, subsidies attract resources away from other, more productive sectors of the economy and reduce overall economic well-being. Reducing subsidies can improve economic performance by giving producers better information about the true cost of using public land.

Increasing the transferability of extraction rights is another market-oriented reform that may increase aggregate economic welfare. Some rights to extract resources from public lands are currently tradable in a limited sense. For example, Federal grazing permits are often transferred with the sale of a ranch to other qualified ranchers. One possibly beneficial reform would be to allow conservation interests to compete for extraction rights on an equal basis with other interests. For example, environmental groups could acquire grazing permits and use the land to introduce native plant species and improve wildlife habitat, or acquire permits for the use of timberland and permanently retire that land from commercial harvesting. Such voluntary transactions can provide value to the seller as well as to the buyer, and thereby maximize the value received by all elements of society from the stock of public land. Environmental groups already have acquired grazing permits at the State level.

Not everyone favors the trading of extraction rights. Rural communities sometimes assert that allowing conservation interests to acquire permits reduces the number of extractive businesses, thereby threatening the livelihood of their suppliers and possibly raising input costs to those producers who remain. Although some rural communities have indeed suffered from the loss of input supply businesses, it is important to recall the backdrop against which changes in public land policy are taking place: a maturing and diversifying Western economy. It is possible that these businesses would fail in any case, as the economy shifts away from natural resource-based industries, and jobs lost as a consequence are increasingly likely to be replaced by others within the community or region.

Another objection comes from resource managers who argue that grazing and timber cutting in particular play a key role in managing biological activity on public lands. For example, grazing of livestock and thinning of timber can reduce the danger of destructive fire. However, conservation interests have many of the same incentives as the government—and perhaps even greater incentive—to preserve resources in good condition. These groups may, for example, allow grazing, but at a low level of intensity.

Contribution to Deficit Reduction. Reducing subsidies can contribute to deficit reduction. For example, requiring royalty and bonus

payments for hardrock mineral extraction, as many private landowners do and as the Federal Government itself does for oil and gas, could provide additional revenues. The Department of the Interior has calculated that an 8 percent net income royalty on hardrock minerals extracted from Federal public lands would generate at least $275 million for the Treasury over the next 5 years. Reducing subsidies for timber extraction, grazing, water deliveries, hydropower, and recreation would have beneficial fiscal impacts as well.

Increasing reliance on market mechanisms can also support deficit reduction. For example, grazing permits could be allocated through competitive auctions (much like the successful spectrum auctions described earlier in this chapter); it is quite possible that such a reform would raise more money for the government than the grazing fee increases proposed in 1994. Similarly, the current patenting process for mineral extraction could be replaced with a system of royalties and competitive bidding on bonus payments to the government. Such a system, already used for other minerals and by numerous other landowners, is likely to raise more revenues than a simple royalty payment as envisaged in current reform attempts. However, replacing the current patenting system with a leasing-competitive bidding regime might raise difficult policy and administrative issues.

Timber contracts are currently allocated competitively. However, the bidding process could be fine-tuned to the benefit of taxpayers by incorporating a larger share of road and overhead expenses in the minimum acceptable bid. This adjustment would reduce continuing Federal losses from many timber sales and would give logging interests more accurate price signals about the true resource cost of timber extraction.

Environmental Stewardship and Efficient Land Use. Reducing or eliminating resource subsidies can improve environmental quality on Federal public lands. To the extent that environmental damage is related to the level of production, reducing subsidies reduces the incentives for production and thereby reduces environmental damage.

Of course, the environmental impact of resource extraction is not just a question of production levels; technique is also important. For example, the environmental damage from grazing may be due both to the number of livestock grazed and to the way in which grazing is managed: where animals are permitted to graze and for how long. Similarly, the impact of mining on water quality depends not only on the volume of minerals produced; control technologies and reclamation practices also have important effects. Direct use restrictions and reclamation requirements can help correct for the environmental damage done. For example, the government can ex-

clude riparian areas from grazing. It can also place more environmentally sensitive lands off-limits to mineral location and production. Without environmental taxes to provide price incentives, direct controls can be an important way to improve environmental quality and achieve an efficient resource allocation.

Subsidizing the price of environmentally friendly extraction technology may also be consistent with increasing efficiency. Reducing the price of such technology increases the likelihood that it will be adopted. Such a subsidy can be implemented in a number of ways. Public investment in agricultural research and development is one approach that has generally paid impressive returns. Land-grant universities and the cooperative extension system have helped farmers increase productivity and, more recently, cope with environmental problems. Increased funding of land-grant research, development, and outreach directed at public lands management is one way to encourage the adoption of more benign, and more productive, extraction technologies.

Transferability of extraction rights can also be consistent with environmental stewardship in at least two ways. Trading can allow conservation interests and various levels of government to acquire the resources they value the most at prices that compensate willing sellers. For example, the Department of the Interior has initiated innovative willing-seller programs to reallocate water from agriculture and enhance instream flows in the San Francisco Bay/Delta estuary and Nevada's Truckee River basin. As the government excludes more resources from extraction, trading among the remaining permitholders can also help mitigate the industry's economic losses by allocating extraction rights to those entities that can use them most profitably. At the same time, trading can lead to a more efficient economy-wide allocation of resources, effectively allowing us to produce more with fewer resources.

Reconfiguring the Public Land Base. The Federal Government owns a substantial share of the Nation's natural resources. It owns about one-third of all the land in the United States, including 29 percent of forestlands and 43 percent of rangeland. State and local governments and American Indian Nations own another 8 percent of U.S. lands. Over 10 percent of the U.S. population receives water from Federal diversion projects.

Sound economic reasons argue for the government keeping such a large share of our natural resources in its possession. Most goods in our economy are private property, traded in markets that appropriately determine prices and quantities. But many natural resources possess characteristics that make them unsuitable for private market control. The most important of these is the fact that many natural resources are public goods.

A public good is anything that can be used or enjoyed by one person without detracting from the use or enjoyment of others, and to which it is difficult to restrict access. For example, suppose that the land comprising Yosemite Valley were subject to being bought and sold in a market. A developer thinking of purchasing the land might consider only how to maximize the individual returns from owning it: he or she might weigh the potential profits earned from preserving the land for tourist use against, say, developing a housing tract or a shopping mall on the site. There is no guarantee that preservation would win out, even if Americans would value that outcome more highly in the aggregate. Even if concerned citizens established a fund to preserve the land, the money collected might well fall short of the actual value the Nation places on preserving this important site. Each potential contributor would have an incentive to wait, hoping that someone else would make the necessary donation to prevent development. In this case the public good character of the natural resource leads to a failure of the market to reflect collective values, and society is better off if the government manages the asset.

This discussion suggests another principle for resource policy reform that should receive serious attention. Federal public lands that private owners could manage efficiently, in a manner that protects the public interest, should be considered for privatization. Conversely, many lands currently in private hands have certain characteristics of public goods, and thus might be more efficiently owned and managed by the Federal Government. Achieving the most efficient mix of public and private lands may require reconfiguring the public land base, adding to it in some places and divesting in others. The Administration is currently working on several exchanges that are consistent with this general principle: for example, the Federal Government is in the process of acquiring the Headwaters forest in Northern California and the New World Mine adjacent to Yellowstone National Park in exchange for surplus properties elsewhere.

Reconfiguring could be accomplished directly through swaps of public for desired private lands, as is most common today, or public lands could be sold and the proceeds put into an account for land purchases elsewhere. Economists have long recognized that the swap option is limited by the "double coincidence of wants" problem. It is often hard to find a swap partner who both owns an asset the government wishes to acquire and places a similar value on an asset the government wishes to sell. For this reason, a land purchase fund that decouples buying and selling land assets is superior to direct swaps.