

**Chapter 14**

# **Public Regulation and Incentives**

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# Public Regulation and Incentives

## THE CHALLENGE

New technologies and the expansion of economic networks around the globe have the potential to increase the welfare and promote the happiness of all Americans. The changes could:

- lead to rapid growth in the choices available to consumers;
- create unprecedented opportunities for communication, self expression, and entertainment;
- eliminate the least attractive jobs in the economy, and add large numbers of jobs that are rewarding in pay as well as in other ways;
- allow rapid economic growth without stressing the natural environment; and
- make training in any subject available to any person at any point during a career.

The new environment, however, also creates significant risks:

- Employers may attempt to achieve flexibility by avoiding long-term commitments to employees and hiring more temporary and part-time workers with little job security.
- There may be a growing gap between the kinds of jobs created by an economy capable of supplying a large fraction of its workers with good jobs paying high wages and the kinds of workers entering the work force.
- Failure to restore balance in U.S. trade accounts could trigger a trade crisis, undermining the economic security of the United States and its allies.
- The United States could become vulnerable to a sudden increase in world oil prices or a sudden disruption in oil supplies.
- Information technologies can be used in ways that threaten the privacy and independence of individuals in and out of the work environment.

There is nothing inevitable about either of these outcomes. The difference depends heavily on the choices made by American producers, investors, and consumers during the next few decades. These decisions are, in turn, heavily influenced by a complex network of Federal, State, and local rules and incentives. The question addressed by this chapter

is whether the set of policies designed to promote growth and welfare in the United States, developed through accretion and tinkering over the last two generations, is well adapted to the current environment. In many cases the answer is no. An economy operating as an interlinked network may operate best with a set of rules that are very different from those which performed well for an economy built around well-defined production operations that acted in relative isolation. Programs that work well in a situation where products and production methods change comparatively slowly may be counterproductive in a world characterized by enormous uncertainty. Approaches to business sectors dominated by small, rapidly changing establishments—which may or may not be parts of a large firm—may be quite different from those designed to optimize the performance of an economy operating with a few dominant producers operating from large facilities.<sup>1</sup>

The policy opportunities discussed here are designed to provide a framework for developing a coherent set of programs to stimulate real growth throughout the economy, rather than being a detailed assessment of specific programs. The chapter follows the rules and incentives that influence the four crucial elements of all networks: consumption recipes (from Part I of this document), production recipes (Part II), trade in the production recipe (Part III), and people in the production recipe (Part IV). *A detailed analysis of the costs and benefits of specific policy opportunities is not attempted in the discussion that follows.* Instead, the material is divided into two parts. *The first part identifies a set of general objectives against which policy proposals should be measured.* These objectives are clearly traceable to issues identified in earlier parts of this document.

*The second part of each discussion deals with specific options. None of these proposals have been analyzed in depth, nor has an attempt been made to provide a comprehensive list of options relative to*

<sup>1</sup> See the discussion in Michael Piore and Charles Sable, *The Second Industrial Divide* (New York, NY: Basic Books, 1984).

each objective; indeed, other such strategies could and should be considered. The examples are provided simply to illustrate the central thesis of the chapter: public choices made about the rules under which the U.S. economy operates have unprecedented power to determine whether the economy grows, and to guide the direction this growth will take.

Previous chapters argue that American's major economic networks are becoming more similar in the way they are managed, in the skills they look

for from people at work, in the way they are affected by world trade, and in the way they are affected by financial markets. Nonetheless, each network remains unique in many ways. Each operates with a unique mix of public and private spending, and a unique set of regulatory controls and incentives. While opportunities for new policies are suggested by the separate discussions of networks in chapters 3, 6, 9, and 12, no attempt is made to summarize them here.

## A FRAMEWORK FOR PUBLIC CHOICE

### **Consumption Recipes (Part I)**

#### Objectives

The growing complexity of consumer choices were explored at some length in chapters 2 and 3. Consumer choices are becoming more complex as new technology and new patterns of competition increase the variety of products offered. At the same time, consumers may have less time to make informed choices.

Consumer choices are affected by public policy in four primary ways: regulations, deductions and credits in the personal income tax, product labeling, and consumption taxes (generally on "luxuries" and items like cigarettes and alcohol). Many of these policies were developed using paradigms that may need serious reexamination as the economy moves in new directions. The government, of course, is also a major consumer, spending nearly \$30 for every \$100 of private consumer expenditures. There are several areas where more sophisticated purchasing strategies by the government would not only improve the productivity with which public interests are served, but would stimulate innovation that could work to the benefit of private markets.

Education (largely supplied at public expense) also plays a critical role in shaping consumer choice. A good education can make a person aware of a greater variety of choices and improve the process of choosing. There is, for example, evidence that education can influence a person's ability to construct a "consumption recipe" for staying healthy. Similarly, it can allow a person to navigate the complexity of modern consumption decisions made massively more dif-

ficult by the new range of choices available. And it can open new opportunities for enjoyment (one of the traditional functions of education was to increase a student's ability to take pleasure from the culture that surrounded him).<sup>2</sup> Opportunities for improving education are discussed under the section on production recipes.

#### Illustrative Options

**Regulation.** -Regulation has been justified for a variety of reasons: controlling the abuse of monopoly power, preventing destructive competition in areas where there appeared to be a "natural monopoly," protecting public health and safety, and ensuring the availability of information in areas where the absence of information could be dangerous or where obtaining such information could be prohibitively expensive. Regulation has also been justified when the market does a poor job of allocating costs and benefits. Examples include: the maintenance of environmental quality, ensuring the safety of products, and ensuring that the United States does not become dangerously dependent on foreign sources of oil.<sup>3</sup>

The changes now transforming the economy undermine many of the reasons given for regulation

<sup>2</sup> "In the nineteenth and early twentieth centuries, education in the United States became universal, but it also became more and more a training in production skills and less and less a preparation for the enjoyment of life. Our puritan attitude and the requirements of our capitalist economy are equally to blame or credit . . ." Tibor Scitovsky, *The Joyless Economy*, (London: Oxford University Press, 1976), p. 229.

<sup>3</sup>For a comprehensive review of this subject, see S. Breyer, *Regulation and its Reform* (Cambridge, MA: Harvard University Press, 1982); and *Regulation: Process and Politics* (Washington, DC: Congressional Quarterly, Inc., 1982).

to ensure effective competition, but increase the need to provide consumers with information, protect consumer safety, and ensure environmental quality.

*Regulating Monopolies and “Destructive” Competition.*—Technology and other factors have reshaped production recipes in ways that appear to have reduced the danger of monopoly concentration. Regulatory restrictions have been sharply decreased in airlines, rail, trucking, long-distance telephone communication, and some aspects of banking. Regulatory reform may soon spread to other major business sectors. Private networks can bypass regulated telephone lines; onsite cogeneration units may compete with regulated producers of electric power; cable and video tape rentals compete with broadcast television (regulated through licensing).

Excessive regulation may prevent the emergence of business structures more compatible with emerging technologies, and may limit the ability of U.S. firms to compete abroad. Enthusiasm for reform must be tempered by the fact that structural change may well result in new kinds of monopoly manipulation of markets. It is unlikely that any simply or universal rule can be developed for prescribing regulations preventing the abuse of monopoly power.

*Regulation to Supplement Consumer Information.*—The cost of obtaining information for making informed consumer decisions may be on the rise, because the number and complexity of decisions are growing while the time available for making choices is in increasingly short supply. The cost of acquiring information needed to make wise purchasing decisions is part of the price (or the entertainment) of shopping. Some kinds of information, however, are prohibitively expensive to obtain—even though the information about such things as product safety may be of great value to the consumer. Few individuals can afford to pay for tests to ensure, for example, that food is not contaminated, or that children’s clothing is not flammable. Passengers assume that airlines meet safety standards, and workers assume that the chemicals to which they are exposed have been tested to determine their health effects.

The net social value of informed consumer choice is large, since consumers are ultimately responsible for ensuring the efficient performance of free markets. The provision of information has always been an important function of regulation for this reason.

In effect, consumers use regulation to buy collectively the information that would be difficult to buy as individuals. While ordinary markets could handle most such problems given negligible bargaining costs, this has not always occurred in important cases.<sup>4</sup>

Significant improvements could be made in the kind of information available to consumers through improved labeling. An alternative is taxes applied to specific products like cigarettes, alcohol, or gasoline, which force consumers to consider the social cost implicit in such purchases.

Unfortunately, there are no set rules about the kinds of information that should be provided at public expense. Information about the energy use of automobiles and appliances has clearly helped create a market for efficiency. Information about nutrition appears on food packages. There are many other areas where more information would be useful. Food labels may contain no information about potentially harmful components such as sodium, alcohol, cholesterol, saturated fats, or chemical contaminants. Energy consumption of homes and other aspects of housing quality remain a matter of conjecture for most home purchasers.

*Personal Income Tax Reforms.*—Spending decisions of individuals can be strongly influenced by Federal tax policy. In spite of major reforms, the U.S. tax code still contains long lists of consumer purchasing choices that are subsidized, or by default not subsidized, through tax relief. The net effect may not be appropriate for the emerging economy. Taking only a single example, the code places no limits on deductions for purchasing first or second homes (thereby encouraging savings in the form of home purchasing) but does not provide complete deductibility for education (thereby discouraging savings taken in the form of human capital).

## ***Production Recipes (Part II)***

### Objectives

The challenges and choices faced by American producers were outlined in some detail in earlier chapters. It is clear that most people will need to endure a period of great uncertainty as deep structural changes undermine traditional production networks. It is not clear how Americans will elect to

<sup>4</sup>See discussion in S. Breyer, *op. cit.*, footnote 3.

manage uncertainty. Two broad strategies seem possible. The first is to avoid commitments of any kind: keep investments in new plant and equipment to a minimum, minimize permanent commitments to employees, minimize investments in training, and wait for someone else to develop technology. The second strategy is to invest heavily in being “smart,” with the aim of profiting in all kinds of economic environments. This means reacting quickly to exploit market opportunities, and moving adroitly when bad luck strikes. Such a response to uncertainty requires a well educated work force capable of prospering in a period of continuous change, and a strong long-term commitment to the development and exploitation of technology.

Much evidence suggests that while the second strategy may work well for some firms in some circumstances, the Nation’s economy would be placed at considerable risk were it widely adopted. The choice between the two strategies will be strongly influenced by the rules established through tax law, support of innovation and invention, and other aspects of public policy.

Previous chapters also argued that the second kind of flexibility can be achieved using technology now entering the marketplace. Capturing this potential requires a willingness to undertake basic changes in the way businesses are managed, in the size and scope of individual establishments, and in the way establishments are linked together through formal and informal production networks. These changes will require some wrenching transformations, the effects of which can be measured in terms of job redefinition within firms, the opening and closing of plants, and changes in the location of productive activity. Constructive change requires both a continuous flow of innovation and a financial market willing to make the changes needed to convert these inventions into profitable products and services. An appropriate response to the challenges of new technology and expanded international competition requires highly flexible capital markets willing to rethink old paradigms about the design of business networks.

On the other hand, there can be too much of a good thing. There may be a narrow line separating a financial market capable of moving rapidly to restructure production around new processes, and one

that has become a casino crippled by short-term speculation largely unrelated to the long-term health of a production enterprise. The challenge in designing policy is finding a way to encourage flexibility without sacrificing an ability to undertake research, marketing strategies, or restructuring plans that may pay returns only after many years.

Two major classes of public action in this area are discussed with these challenges in mind:

1. programs designed to improve the performance of U.S. financial markets; and
2. programs designed to create new incentives for innovation, which include a look at strategies to improve the Nation’s infrastructure in ways compatible with the emerging economy.

Programs designed to improve the quality and productivity of the Nation’s education and training activities are discussed in the section concerning choices for public policy concerning the U.S. work force.

### Illustrative Options

**Helping Financial Markets Work Better.**—The central challenge in this area is finding a source of capital for projects that require continuity over a period of 5 years or more. Venture capital has proven to be an invaluable source of funds for small startup firms, supplying sums up to \$20 or \$30 million for new projects.<sup>5</sup> But venture capitalists cannot supply the \$100 million required for a large manufacturing initiative. For this, companies must turn to public offerings and investors that generally demand competitive quarterly returns. This is perfectly satisfactory for low-risk ventures or ventures where losses can be cut quickly. It is not well matched to many of the kinds of investment that are needed to bring something like digital television to consumer markets, or to develop and market a 64-megabyte computer memory device. Such ventures require deep pockets and patience.

The concepts outlined below are designed to demonstrate that choosing to revise public rules can encourage a more dynamic response in the creation

<sup>5</sup> While supplies of venture money remain high in relative terms, in 1986 even American venture capital began moving away from technology-intensive products and moving sharply toward investments like discount shopping malls.

of new production strategies. The last of the three items on the list complements the set, attacking defects in rules governing both production and consumption recipes.

*Tax Reform.*—Revisions in the tax code during the 1980s, intended to increase savings rates and concentrate investment in innovation and research, have not achieved the effect once hoped for. Rates of savings and investment in new plant and equipment have not increased, while many indicators show that income inequality has grown during the past decade. Personal savings rates have actually fallen since 1981 and in 1986 reached their lowest level since the second world war. (This is due in part to the high rate of retained earnings in business—as a percent of GNP, the sum of personal and business savings has not changed significantly (see figure 2-4 of ch. 2).) Moreover, changes in the tax code, such as removal of the R&D tax credit, may have the effect of decreasing incentives to invest in research and innovation. The proposals sketched below have the common purpose of discouraging short-term, speculative investment and encouraging patient capital.

The tax code also provides a grab-bag of deductions that are essentially hidden expenditures, designed to encourage everything from housing to religious contributions. The value of these deductions rose from about one-quarter of Federal revenues in 1967 to one-half in 1983. These “hidden” appropriations were reduced in the 1986 tax reform, but are still enormous.

Proposals to reform the tax code would fill a small stadium. The following are exhibited to illustrate the power the tax code has in influencing the structure of the American economy. They are not a systematic review of alternatives and no effort has been made to explore their implications in detail.

- *Reducing taxes on high-risk, long-term personal investment.* Tax rates on capital gains could be changed so that gains realized on investments held for long periods of time (5 to 10 years) are taxed at much lower rates than gains earned on short-term investments. This could be done without affecting total revenues received from capital gains taxes.
- *Limitation of interest deductions for personal income to a fixed amount per family.* Interest

deductions provide an incentive for homeowning. Without questioning the logic of subsidizing the housing expenditures of the middle class instead of expenditures in other areas, it is obvious that overly generous incentives can distort consumption decisions and encourage the affluent to invest in extravagant housing and multiple residences.

- *Reform or abolish the corporate income tax.* The corporate income tax has three principal virtues and many liabilities. It provides a source of revenue other than the ever unpopular personal income tax, it provides a way to influence corporate behavior to achieve a variety of goals, and it provides a way to tax foreign investors. These benefits carry a high price:
  - The byzantine complexity of the corporate tax codes means that tax lawyers play a major role in mapping private investment strategies. The Tax Reform Act of 1986 will raise net corporate taxes and eliminate some of the distortions inherent in the older system, but this increase also raises the importance of skillful manipulation of tax law. Decisions distorted by tax considerations are likely to be less efficient than decisions motivated entirely by considerations of the risks and rewards of alternative products and production methods.<sup>6</sup>
  - Corporate taxes do not result in a significant amount of income for government. In 1986, corporate taxes contributed only 10.1 percent of all Federal revenues and only 7.8 percent of all Federal, State, and local government revenues.
  - The transactional costs of complex tax law are high, requiring many businesses to retain a small army of lawyers, accountants, and other professionals that adds to the unprofitable overhead of business activity.
  - Corporate taxes also have the effect of discouraging savings taken in the form of corporate investment, since the income is taxed twice: once as corporate income, and once as dividends from the investment as personal income.

<sup>6</sup> Auerbach estimated that the social cost of capital misallocation resulting from differential asset taxation was 3.19 percent of the corporate capital stock. See Alan J. Auerbach, “Corporate Taxation in the United States,” *Brookings Papers on Economic Activity*, No. 2, 1983, pp. 451-513.

—The corporate tax can hurt U.S. exports. U.S. export prices include domestic taxes in the price of what is sold, while foreign competitors often use tax systems, like value-added taxes, that can be reimbursed if goods are exported.

*Reform Regulation of Financial Institutions.*—Restrictions on the operation of banks in the United States may no longer be consistent with the new demands of international competition and the capital requirements of innovative enterprises.<sup>7</sup> A majority of the world's largest banks are foreign-owned, in part because U.S. law limits interstate banking and may therefore discourage expansion. The Glass-Steagall Act of 1933 prevents firms that accept savings deposits from making equity investments or sitting on boards of directors. Merchant banks in Japan and West Germany, in contrast, provide important sources of patient capital. Japanese banks also benefit from relatively inexpensive capital, due to both high national savings rates and government sponsorship of certain classes of investment.

Reforms in this area might include:

- Revisions in banking law could create financial institutions better able to provide funds for projects that had outgrown venture funding but were deemed too risky for public holdings judged on the basis of quarterly returns. Banks could also provide a defense for firms that might be vulnerable to predatory takeovers because of heavy investment in long-term research efforts,<sup>8</sup> and
- Revisions in Labor Department regulations governing pension investments (funds that hold 22 percent of all U.S. corporate equities and 16 percent of all U.S. bond issues) could allow a fraction of the funds to be used for investments in innovations carrying higher risk.

*Reducing "Transactional Costs."* —Chapter 5 illustrated spectacular growth in the transactional "over-

head costs" of the American economy that can result from unproductive speculation. But it is far easier to complain about transactional costs than to develop concrete steps to avoid them. The difficulty of measuring transactional costs means that changes in regulation may have the effect of reshuffling costs without actually affecting the total.

Strategies for reducing national transactional costs need careful review. Several of the steps suggested above, such as elimination of the corporate income tax or revision of formal regulations on price and market entry, could do much to lower unneeded legal, accounting, and other professional services. On the other hand, greater market freedom might also encourage more complex contracts and more lawsuits. Other ways to alleviate transactional costs include:

- A comprehensive review of tort law could determine how best to match formal safety regulations with legal redress open to individuals through the courts. Recent reforms, notably in California, have established new criteria for assigning liability costs—such as payment in proportion to contribution to proven negligence—and for limiting prohibitive punitive payments. The review could be analogous to the review recently conducted for Federal criminal law.
- Improving the efficiency of public services and channels for communicating with individuals, so that routine tasks such as access to data, title searches for property, or tax filings can be undertaken without professional assistance, is another possibility.

*Support for Innovation.*—Private support of research and innovation falls short of levels that serve the Nation's interest for a variety of reasons:

- Many kinds of long-term research (such as space exploration and basic research in areas like mathematics, chemistry, and biology) have no clear links to a company's "bottom line"; if they do, the payoff is so distant that few rational investors would be interested. Yet yesterday's basic research is the stuff on which today's productive innovation is based.
- Many sectors of the U.S. economy are so fragmented that no single firm has the competence or resources to undertake major research programs. Farming, the health industry, and the

<sup>7</sup>For a comprehensive discussion of this issue, See U.S. Congress, Office of Technology Assessment, *International Competition in Services: Banking, Building, Software, Know-how*, OTA-ITE-328 (Washington, DC: U.S. Government Printing Office, July 1987).

<sup>8</sup>There is, however, little empirical evidence to support a contention that hostile takeovers are primarily directed at firms that engage in long-term planning. See J. Pound, K. Lehn, and G. Jarrell, "Are Takeovers Hostile to Economic Performance?" *Regulation*, September/October 1986, p. 25.

- construction industry are obvious examples.
- Even the most technologically sophisticated businesses invest less in research than levels that could be justified to maximize collective wealth and social welfare, since no individual business is able to capture all possible benefits of the research.<sup>9</sup> Many domestic and even international competitors may enjoy some of the benefits of innovation, thereby reducing any one firm's net returns on an invention. While the Nation's interest is served, for example, by research designed to offset the effects of rapidly increasing oil imports during the 1990s, private planning horizons are typically too short to contemplate major long-term research in the area. Research in projects of common interest may go underfunded unless there is a social mechanism for sharing the costs and benefits of major classes of invention.
  - Financial markets may be organized in a way that discounts the value of innovation and risk-taking when measured against speculative "paper" investment alternatives.

There is little doubt about whether public support of innovation is needed in these cases. There is little agreement about how this public support should best be provided. History is littered with failed government research projects—the Department of Energy's electric car; the Department of Transportation's Transbus; the Department of Housing and Urban Development's "Operation Breakthrough" in housing technology; the liquid metal, fast breeder reactor; and supersonic transport are some examples. It is possible to make major improvements in funding strategies because of the lessons learned from past experience. And there are success stories, as evidenced by the clear and continuing pipeline connecting innovation in federally supported agricultural and medical research laboratories with private manufacturers and practitioners.

Much can be learned from a close examination of successful foreign experiments. The Japanese have forged effective techniques for pooling corporate and

government funds to develop and transfer technologies of mutual interest to participating firms, while leaving participants with proprietary protection in most areas. The Japanese semiconductor industry, for example, shared in the development of some chip manufacturing equipment needed by all participants, but manufacturers retained proprietary rights to the details of circuit designs.

Developing good ideas is necessary but not sufficient. Financial markets must be receptive to new ideas, and there must be a clear channel connecting publicly supported innovation with investors prepared to apply such efforts. These steps require businesses capable of grasping the implications of research results, and of collecting the resources needed to back such results with money and talent. As earlier discussion suggests, the transfer of technology is by no means certain in many critical parts of the economy.<sup>10</sup>

Apart from the programs to stimulate innovation through financial markets discussed earlier, government funding of innovation could take a variety of other forms, including the following.

*A National Vision.*—A set of national goals, including but not limited to national security, could focus public imagination on research and investment. Such programs might involve:

- development of technology permitting a *radical* improvement in the productivity (and fun) of education that would allow access to instruction for all, in virtually any subject, at any time during a career;
- development of a low-cost, high efficiency personal vehicle, which could replace the automobile in a world of expensive petroleum and possibly become a major U.S. export;
- support for ambitious scientific ventures, such as a series of unmanned probes of the planets or a permanent scientific station in space;

If such goals are accepted, they would provide a market for an enormous variety of innovations and private initiatives. Selection of the education "vision," for example, could stimulate private developments across a wide arena, including consumer electronics, software development, communications, basic re-

<sup>9</sup>See Kenneth J. Arrow, "Economic Welfare and the Allocation of Resources for Invention," in National Bureau of Economic Research, *The Rate and Direction of Innovation Activity* (Princeton, NJ: Princeton University Press, 1962); R.R. Nelson, "The Simple Economics of Basic Science Research," *Journal of Political Economy*, vol. 67, 1959; E. Mansfield et al., "Social and Private Rates of Return From Industrial Innovations," *Quarterly Journal of Economics*, May 1977.

<sup>10</sup>See Fred V. Gutierl, "Technology Transfer Isn't Working," *Business Month*, vol. 130, No. 3, September 1987, pp. 44-46.

search on artificial intelligence, and factors that contribute to learning and reasoning.

*Expanding the Use of "Engineering Research Centers" and "University Research Initiatives".*—The Bell laboratories provided a unique mixture of basic research and corporate business interest under the shelter of communications regulation. This environment resulted in many of the inventions on which today's information revolution is based. In this regulated environment the laboratory had several key elements:

- it was able to attract some of the best people in the field,
- it was able to combine support of basic research with an interest in applied problems—in effect, basic problems were tackled by people predisposed to see practical applications,
- support was continuous, and projects could maintain continuity without the burden of a constant scramble for "soft" funding, and
- there was a critical mass of equipment and professional talent assembled on a single site.

The challenge here is to assemble a similar combination of elements in other areas, in order to spark both innovation and application. This quest is particularly important in areas lacking the luster of "glamour" technologies like superconductivity or artificial intelligence. The problems of manufacturing a building, automating apparel assembly, or improving information flows in an office may also be of vital importance to the national welfare.

Tax resources used to support industrial research and innovation should be considered a source of national savings, and not consumption. But it is treated as simple public consumption in official accounts, and in the minds of most people who think about the use of government funds. Properly managed Federal investment in innovation is likely to pay rich rewards to the Nation as a whole. Untraditional sources of income could be sought for subsidizing such research. The Japanese, for example, use receipts from national bicycle racing to support research.

Combining public and private funds not only amplifies the effect of public spending. It can ensure that research priorities are set in a way that allows graceful transfer of collective research to proprietary products—a development that can have a positive

impact on the productivity of both individual businesses and entire industries. Several models are available, including:

- The National Science Foundation (NSF) has funded 13 Engineering Research Centers (ERCs) (similarly, the U.S. Department of Defense is contemplating a University Research Initiative). These provide a useful model for such programs, even though total funding remains low; the ERC program was funded at \$30 million in fiscal year 1987, and the entire NSF Engineering Directorate had a budget of \$163 million.
- Trade associations like the Electric Power Research Institute (EPRI) may provide a good model for pooling research funding in fragmented businesses. EPRI is funded primarily through voluntary contributions from member companies, which include public utilities, and matching Federal funds are sought for certain specific projects. Many other business sectors have trade associations that might serve as a good foundation on which to build jointly funded research programs, for both production and non-production sectors in the U.S. economy.
- The National Laboratories could also provide a sound technical base for applied research, if their civilian programs could be expanded and properly managed.
- Massachusetts, Michigan, and several other States have programs that in effect mingle private and public funds for investments in new ventures.

Another approach to public support of innovation is to hope that funding for defense-related research will "trickle down" to civilian industries. While the United States spent 2.8 percent of its GNP on research in 1986, a fraction only slightly higher than the amount spent by Japan, West Germany, and other major industrial nations, over 69 percent of U.S. research spending goes for defense-related research—this compares with (as of 1984) 50 percent in the United Kingdom, 30 percent in France, 10 percent in West Germany, and 3 percent in Japan.<sup>11</sup> The fraction of all Federal research spending going for defense fluctuated between 48 and 54 per-

<sup>11</sup> U.S. Congress, Congressional Research Service, "The Federal Contribution to Basic Research," CRS 87-633 SPR, July 23, 1987, table 12.

cent during the 1970s, but climbed sharply in the 1980s (see figure 14-1).

There is a longstanding debate over the extent to which defense research is an efficient way to ensure innovation in the civilian economy.<sup>12</sup> There is evidence that the rapid military buildup of the 1980s did not place a major burden on overall supplies of engineers; <sup>13</sup> it is obviously difficult to determine whether defense projects have attracted the best graduates. But there is evidence that civilian applications of defense research are difficult to find. While 13 percent of the patents generated by the U.S. Department of Agriculture are licensed by private firms, only about 1 percent of Navy patents are so licensed.<sup>14</sup>

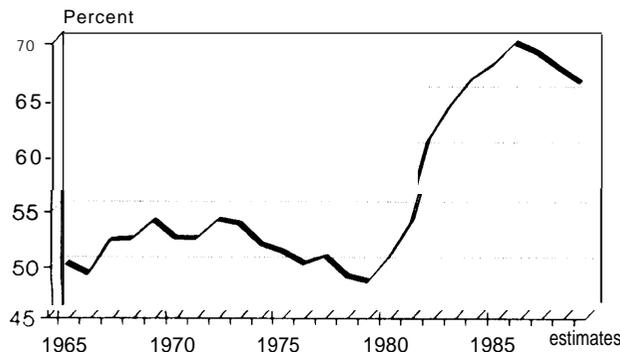
The U.S. Department of Defense (DoD), concerned by the lack of innovation in the civilian economy, has begun to take direct action. Concerned about the rapidly growing dependence of DoD on foreign sources of semiconductors, a task force of the Defense Science Board recently found that U.S. defense industry relied heavily on products purchased from worldwide commercial markets. This group expressed

<sup>12</sup> See a review in U.S. Congressional Budget Office, *Defense Spending and the Economy* (Washington, DC: U.S. Government Printing Office, 1983).

<sup>13</sup> Panel on Engineering Labor Markets, National Research Council, *The Impact of Defense Spending on Nondefense Engineering Labor Markets* (Washington, DC: National Academy Press, 1986).

<sup>14</sup> F.R. Lichtenberg, "Military R&D Depletes Economic Might," *The Wall Street Journal*, Aug. 21, 1986.

**Figure 14-1.-Defense Research and Development Funding (as a percent of all federal research and development)**



SOURCE: M.E. Davey and Genevieve Knezo, "The Federal Contribution to Basic Research," U.S. Congressional Research Service report No. 87-633-SPR, Washington, DC, July 23, 1987, table 12. Updated for 1967 and estimates for 1988 and 1989 by the National Science Foundation, data provided by the Congressional Reference Service, Mar. 9, 1988.

concern that declining non-military sales of U.S. technology firms often left the United States with a Hobson's choice: "buy foreign" or "buy second-best." The task force concluded that

*The major reason for the relative inadequacy of technology development in the United States vis-a-vis that in Japan has been the difference in the industrial policies and structure of the two countries [emphasis in original document].*

They went on to state that DoD could move rapidly to:

1. Support the establishment of a semiconductor manufacturing technology institute,
2. Establish at Eight Universities Centers of Excellence for Semiconductor Science and Engineering,
3. Increase Department of Defense spending for research and development in semiconductor materials, devices, and manufacturing infrastructure,
4. Provide a source of discretionary funds to the Defense Department semiconductor suppliers,
5. Establish under the Department of Defense a Government/Industry/University forum for semiconductors [emphasis in original document].<sup>15</sup>

In part responding to this recommendation, the Secretary of Defense initiated a "Department of Defense Initiative on the U.S. Industrial Base," designed to:

... effectively pursue a DoD strategy to support the fundamental goal of U.S. technological and manufacturing leadership and world class capability. The strategy will explicitly recognize that potential solutions will fall within two basic categories. First, those for which DoD has a direct responsibility and which can be pursued within the full potential of DoD policies and programs. Second, those for which the responsibility falls elsewhere in the Government and for which DoD must attempt to lead and/or influence other agencies' consensus to revitalize the U.S. technological and manufacturing base.<sup>16</sup>

There is clear consensus on the need to ensure a competitive and vigorous civilian economy in order to maintain a sound defense. There is less agreement about whether a strategy directed primarily by defense objectives is an adequate substitute for ci-

<sup>15</sup> Defense science Board, "Task Force on Defense Semiconductor Dependency" (Washington, DC: U.S. Government Printing Office, December 1986).

<sup>16</sup> Memorandum from the Secretary of Defense, "Manufacturing, Industrial Base, and Competitiveness," Washington DC, May 5, 1987.

vilian programs. Obviously, the two should be coordinated. Whatever mechanism is used, it is critical that no institution gain a monopoly on research.

*Making Government More Efficient as an Information Enterprise.*—The Federal government is one of the Nation's largest information-based enterprises. Outside of defense, the Federal government directly employs 3 percent of the Nation's work force. State and local government employees (other than those employed in education) represent another 6 percent. Most government workers are in the business of gathering, communicating, or processing information in one way or another. Research and investment directed at making this process more efficient could not only improve government efficiency, but could provide an information base of value to other enterprises.

Wisely managed Federal procurement could create a market for a variety of service sector innovations, and could force the adoption of standards, protocols, and conventions that might facilitate the formation of a market for service sector technologies. Given the important role that productivity increases play in establishing patterns of international trade, wages, and economic growth, and given the fact that the service sector represents a huge portion of the U.S. economy, improved productivity in this area would be of direct benefit to governments—as well as to consumers and businesses. The national accounts themselves may be a barrier to clear thinking in this area, since they treat all funds spent to improve productivity in government as consumption and not as investment.<sup>17</sup>

*A Careful Review of Priorities for Federally Supported Loans and Borrowing.*—The Federal Government now allocates much of its \$200 to \$300 billion in loan accounts to the housing and agriculture industries. But in 1983, the government lost at least \$8.4 billion in tax income by subsidizing loans through the Rural Electrification Administration, the Farmers' Home Administration, the Commodity Credit Corp., farm export credits, foreign military sales credits, and other programs; such losses continue to plague the entire farm finance system. An approximately equal amount was lost through loans for subsidized housing, student loans, tax-exempt

industrial development bonds, and other tax exemptions for private purposes. Approximately \$59 billion in tax credits for investment were claimed.<sup>18</sup>

It is reasonable to ask whether these largely hidden costs are appropriate, given the areas most likely to stimulate national economic growth. At a minimum, there should be a clear accounting of public spending that results directly and indirectly from these programs but escapes the scrutiny of annual appropriation.

*National Competitions.*—In many cases, innovators within large firms are unable to move an idea from the laboratory into a fully developed product because they cannot guarantee a market. One way to avoid this problem would be to run a series of publicly sponsored competitions for the development of specific products or software capabilities. The government could establish a series of generic application procedures, and could encourage businesses to submit designs. The winner might be given a cash reward, and the government could either purchase the initial production run at an agreed price or subsidize its sales price.

Other competitors finishing near the top might have the cost of their research covered. For example, if the project covered the cost of an innovative, highly efficient automobile, the government could pay a manufacturer the difference between \$20,000 and the manufacturer's list price for the first 10,000 vehicles meeting the performance specification sold to the public at a price between \$6,000 and \$6,500.<sup>19</sup> If the concept worked, the government would have encouraged development of a new product with minimal interference, at a total cost of less than \$140 million.

It might also be useful to consider introduction of significant awards for individual researchers or research teams, which could permit specially talented groups to pursue a line of research comparatively free of interruption for 5 years. Such research could be in areas of importance to both manufacturing and service enterprises, aimed at improving the performance of the integrated networks linking all U.S. producers.

<sup>17</sup> Robert Eisner, "The Federal Deficit: How Does it Matter?" *Science*, vol. 237, No. 4822, Sept. 25, 1987, pp. 1577-1582.

<sup>18</sup> Herman B. Leonard, *Checks Unbalanced: The Quiet Side of Public Spending* (New York, NY: Basic Books, 1986).

<sup>19</sup> This was proposed by Battelle Laboratories in 1982.

## ***International Trade Policy (Part III)***

### Objectives

U.S. and international production networks are now tied together in intricate ways. This includes large-scale flows of financial resources, production and supply networks linked through sophisticated communications and transportation systems, and even interconnected design and research projects. World debt (including the U.S. foreign debt) has become a global problem, transcending national borders.

The clear objective of U.S. trade policy should be to create an international trading environment that can do what economists have always claimed it could do: raise living standards among all trading countries simultaneously. It is obvious, however, that while trade has generally served both the United States and its trading partners well, the international market is far from free. The United States faces vigorous international competition from firms supported by their home governments, and America may have as many, if not more, trade barriers than many of its competitors. There is reason to believe, however, that other nations have benefited more from their management of trade than has the United States because of the skill with which they have pursued this strategy.

U.S. trade policy has often been conducted in virtual isolation from domestic policy. The trade policy that exists has all too often been limited to quota protection for business sectors with strong political support. The consequences on U.S. trade of changes in domestic programs for communications, banking, agriculture, or other sectors are often not given adequate attention. Given the expansion of the U.S. economy into international production networks, these issues can no longer be ignored.

It is unlikely that any unilateral U.S. action can succeed in transforming the world trading system in ways that allow for the benefits inherent in a freely operating world trading system. Indeed, international links severely constrain the extent to which the United States can control its own economy. Standard Keynesian strategies for stimulating demand can result in increased imports instead of new domestic jobs. Monetary strategy can be frustrated by international capital flows. Designing domestic tax pro-

grams will become increasingly difficult as firms around the world develop complex relationships with each other.

Only collaborative efforts involving both advanced and underdeveloped nations are likely to create a trading regime consistent with the broad objective of making trade a "positive sum game" for all nations, and stimulating rapid growth in the world economy. There is no simple way to accomplish this; there can only be painstaking and skillful bargaining in a variety of international forums. Success will require intelligence and endurance.

Calls for greater coordination are obviously not new. Any effort to encourage nations to cooperate on matters so closely tied to domestic political programs is likely to encounter enormous obstacles, such as nationalism and conflicting domestic priorities. Yet the need for coordination grows more important as the economies of the world become ever more interconnected. Inward-looking national fiscal programs that work at cross purposes are likely to grow steadily more dangerous. The need to coordinate foreign economic assistance, banking, and trade policy provides a major example. The best long-term solution to third world debt is to help them become prosperous trading partners. This will require intelligent coordination of policy throughout the developed world.

U.S. leadership in this area is crucial. This leadership, of course, depends on the development of a coherent strategy patiently administered.

### Illustrative Options

It is extremely difficult to separate programs designed to improve the performance of the domestic economy from those designed to improve the U.S. position in international markets. Most of the programs described in this chapter are focused on creating an environment where the American economy can grow and prosper by building around a new set of opportunities introduced by technology. Renewed growth in national productivity, and the need for flexible response to new opportunities, are of critical importance if the United States is to improve its living standards and compete successfully in international markets. At the same time, it is clear that domestic policies leading Americans to consume more than they produce are related to current U.S. trade defi-

cits. While tracing causes and effects is difficult and controversial, it is obvious that trade policy cannot be separated from domestic fiscal policy.

Examples of projects applying specifically to trade include, but are certainly not limited to, those outlined below.

**Improved Coordination of OECD Banking and Fiscal Policies.**-Until very recently, there has been more rhetoric than reality in programs for controlling wild fluctuations in exchange rates, and little serious effort to guarantee that U.S. and foreign macroeconomic policies are not working at cross purposes. But the sheer volume of international trade has now made it impossible for a nation to alter its domestic economy without considering the potential reactions of trading partners. Moreover, international firms have developed great facility in moving assets in ways that can frustrate the efforts of a nation acting alone. Currency traded in private markets, for example, can overwhelm currency purchases by central banks.

If national fiscal and monetary policies are not coordinated, each nation will find its efforts to regulate its economy increasingly frustrated. The Basel Committee offers a framework for coordination of banking policy,<sup>20</sup> while recent actions taken by the "group of seven"—the United States, Canada, Japan, France, West Germany, Great Britain, and Italy—to control currency fluctuations could also be built upon.

**Increased Efforts to Develop Cooperative Research Projects.**-The problems the United States faces in improving education, health care technology, or transportation networks are not unique. A revolution in education technology or rapid progress in pure scientific research would benefit all nations. Significant efficiencies could be achieved from greater use of international funding for research projects with benefits likely to be of universal value.

**Export Promotion Activities.**-A variety of techniques are available for using national resources to promote U.S. exports. If nothing else, personnel in overseas missions can keep U.S. producers abreast of the complex regulations and procedures that must be understood to complete transactions in foreign markets. This is particularly helpful for small busi-

nesses, which are often unfamiliar with practices abroad and unable to invest in a large staff to follow such issues. In West Germany, trade associations have helped small firms to pool resources and bid on overseas projects. It would be possible to provide direct Federal support for such efforts among U.S. enterprises.

The Agricultural Information and Marketing Service, operated by the U.S. Department of Agriculture, runs a computer database that includes current and highly specific information on potential foreign markets. A surprisingly large fraction of successful U.S. farmers now own personal computers, and this project appears to be a success. The concept might be useful in other markets.

**Subsidies for Language Training, Translation, and Education.**-One problem faced by U.S. exporters is their sheer ignorance of the nature of foreign markets-ignorance magnified by a widespread inability to speak any language but English. While it may once have been true that products made in America virtually sold themselves, combining quality with an image of being at the cutting age of taste and technology, in many areas this is no longer the case. While many U.S. firms still demonstrate a reluctance to learn about developments in other countries,<sup>21</sup> sales abroad depend as never before on understanding foreign cultures, tastes, and business practices. There is an unpleasant history of U.S. firms failing in attempts to sell large refrigerators to countries with tiny kitchens or blond-haired dolls to African or Asian nations.<sup>22</sup>

Successful exporting depends increasingly on an understanding of the history and culture of the people with whom U.S. firms expect to trade. Understanding could be facilitated through expanded support for programs designed to send U.S. students abroad for study, and increased funding for joint research programs that involve close working relationships between U.S. and foreign engineering and scientific staffs.

**Temporary Tariff Protection.**-The merits of protection have been hotly debated in the United States at least since Alexander Hamilton's Report on

<sup>21</sup>Clay Chandler, "U.S. Industry Cool to Japan's High-Tech Publications," *The Washington Post*, Sept. 8, 1987, p. D1.

<sup>22</sup>C.H. Deutsch, "U.S. Industry's Unfinished Struggle," *The New York Times*, Feb. 21, 1988, sec. 3, p. 1.

<sup>20</sup> See *International Competition in Services*, op. cit., footnote 7.

*the Subject of Manufactures* argued for the protection of “infant” U.S. industries. Protectionism typically penalizes low-income groups by imposing an implicit sales tax on many essential goods, while benefiting specific workers, regions, and industries.<sup>23</sup> There is considerable debate over whether the cost of saving a job through protectionist measures is higher than alternative methods of job generation.<sup>24</sup> The political dilemma, of course, is that the consumer tax implicit in protection is effectively hidden while direct taxation to promote education or training, and therefore competitiveness, is extremely visible.

Protectionist measures can also be damaging to long-term U.S. interests if they have the effect of diminishing incentives for invention and innovation. In principle, U.S. markets are so large that vigorous competition among domestic firms would be likely even if foreign firms were excluded. In practice, however, comfortable domestic arrangements have often blocked the effective operation of domestic competition. Prior to sharp competition from abroad, for example, U.S. automobile companies vied with each other primarily over styling and not over price, quality, or efficiency.<sup>25</sup> Foreign entrants into the automobile industry demonstrated that real improvements in quality and performance could be made, and thereby provided urgent incentives for U.S. automobile manufacturers to match their performance.

Arguments in favor of increased protection have come from affected industries and employees, and from a group of trade theorists who argue that government intervention can shape an environment in which firms make strategic decisions affecting trade.<sup>26</sup> They argue, for example, that if an innovator can capture “super-normal profits” by being first with a new technology, the government can help domestic firms maintain comparative advantage in areas

where such benefits can be captured.<sup>27</sup> It could do this by subsidizing domestic research and the dissemination of this research, and by protecting domestic markets in ways that would give domestic firms an opportunity to reduce costs by perfecting techniques. This learning would allow them to enter foreign markets with costs lower than their competitors and thereby to move rapidly in capturing market shares. This success itself may deter competitors from entering the market.<sup>28</sup> The fact that the U.S. government would be willing to undertake such a strategy might deter other nations. The Japanese record in implementing a strategy of this sort has been reported as both a success and as a failure. It appears that the Ministry of International Trade and Industry has made a number of costly mistakes as well as championing several successes.<sup>29</sup> As outlined earlier in this chapter, of course, support for domestic research can be justified for many reasons other than its potential impact on the competitiveness of domestic U.S. firms in international markets.

To the extent that explicit protectionist measures can be justified, the cost of tariffs appears to be significantly lower than that of non-tariff protection for a variety of reasons:<sup>30</sup>

- Protection necessarily raises the price of goods sold to domestic consumers, but tariffs ensure that this price increase is captured by the United States. Quotas allow foreign producers to raise prices or change product mixes, and the price differential is left primarily in foreign hands.
- Tariffs retain competitive pressure on domestic producers to promote continuous progress in efficiency, and protect consumers against price increases that might be taken by monopoly suppliers under the shelter of the quotas.
- The cost of tariffs is clear and visible to the public, while quotas make the price consumers pay for trade protection difficult to see.

<sup>23</sup> Susan Hickok “The Consumer Cost of U.S. Trade Restraints,” *Federal Reserve Bank of New York Quarterly Review*, summer 1985, pp. 1-12, cited in World Bank, *World Development Report*, Washington, DC, 1986.

<sup>24</sup>U.S. Congress, Office of Technology Assessment, *Technology and Structural Unemployment—Reemploying Displaced Adults*, OTA-ITE-250 (Washington, DC: U.S. Government Printing Office, February 1986).

<sup>25</sup>Ian Altschuler, et al., *The Future of the Automobile: The Report of MIT's International Automobile Program* (London: George Allen & Unwin Publishers Ltd., 1984).

<sup>26</sup>Anne Krueger and Baran Tuncer, “An Empirical Test of the Infant Industry Argument,” *The American Economic Review*, vol. 72, No. 5, December 1982.

<sup>27</sup> James A. Brander and Barbara J. Spencer, “Export Subsidies and International Market Share Rivalry,” National Bureau of Economic Research, working paper No. 1464, Cambridge, MA, 1984; and David J. Richardson, “International Trade Policies in a World of Industrial Change,” in Federal Reserve Bank of Kansas City, *Industrial Change and Public Policy*, 1983, p. 286.

<sup>28</sup>Federal Reserve Bank of Kansas City, op. cit., footnote, 27, p. 287.

<sup>29</sup>Ira Magaziner and Thomas Hout, *Japanese Industrial Policy* (Berkeley, CA: University of California, Institute for International Studies, 1980).

<sup>30</sup> See Robert Lawrence, *Can America Compete?* (Washington, DC: The Brookings Institution, 1984).

## ***Improving the Flexibility of People at Work and the Quality of the U.S. Work Force (Part IV)***

### Objectives

Part IV paints starkly contrasting possibilities for the future of working life in America. The economy could expand by building on the talents of employees in jobs that permit greater freedom to work on a continuously changing set of products and problems. On the other hand, tomorrow's workplace could be built around disposable employees, as employers avoid any commitment to workers in the form of expected job tenure and any investment in the form of education or training. Many firms now maintain flexibility by using comparatively large numbers of temporary and part-time employees, minimizing commitments to employees in the form of retraining, and undertaking change largely through layoffs and early retirements. There could be a major mismatch between labor supplies (many new workers are likely to be members of minority groups with comparatively poor educations) and growing demands for well educated workers (see ch. 11).

Objectives for policy designed to improve the performance of people in the production recipe, therefore, include the following:

- ensuring a well-trained work force, in which the skills of those needing jobs are appropriate for the employment opportunities that will appear over the next two decades;
- compensation systems that maintain incentives and improve the match between compensation and individual contributions to insurance and retirement plans, while avoiding any unhealthy growth of inequality in the distribution of national income;
- achieving a level of job security that does not strangle the mobility and flexibility necessary in the emerging U.S. economy;
- helping two-earner households and single parents gracefully combine the responsibilities of child raising with a working life; and
- providing adequate safeguards for health and safety in-the workplace.

### Illustrative Options

The discussion that follows explores ways of encouraging business owners to increase their com-

mitments to employees, instead of trying to achieve flexibility through a constant series of layoffs and rehiring. The options also reflect ways of affecting the overall framework of people in the production recipe, encouraging the use of training and experience by subsidizing supplies of skilled individuals.

A Learning Research Institute.—There is no enterprise more critical to the Nation's future than its system of education. Education is a major part of the U.S. economy, employing 8 percent of the work force. Yet educational enterprises are organized in away that frustrates attempts to make basic changes in the productivity of the educational process. It is often assumed that there can be no efficiency gains from capitalization of employees, or from basic changes in management strategies of delivering educational services. Both assumptions may be wrong. Unfortunately, few levels of management appear capable of even questioning the educational process.

Much of the educational system is, in effect, a series of isolated fiefdoms built around individual school systems, if not individual classrooms, that communicate ineffectively. One symptom of the inefficiency of the system performing as a whole can be seen by examining investments in research as a fraction of gross receipts. If the Nation's educational enterprises invested in research and development in the same proportion to gross receipts as the average U.S. industry, investment would have amounted to between \$8 and \$12 billion in 1985—60 to 90 times more than the actual total.<sup>31</sup> Although the National Science Foundation, the Department of Education, the Department of Defense, and some of the more affluent States have made modest investments in improving the process and the technology of education, support and management of the sum total of such programs seems incommensurate with the critical importance of the improvements. At one time, it might have been argued that no technology was available for attacking the basic problems of productivity of teachers or learners. But technologies now entering the market have made this assumption obsolete.

<sup>31</sup>In 1987, the U.S. Department of Education and the National Science Foundation spent approximately \$130 million on research and development in education. This is approximately 0.06 percent of total government spending on education and 0.025 percent of all spending on education. As a nation, the United States spends roughly 2.5 percent of GNP on research and development.

While the potential for technological improvements in education exists, the institutions available to evaluate innovation, and to examine the radical changes in management that may be needed to exploit this potential, seem inadequate to the task. One possible remedy, designed in part to highlight the importance of the problem, would be to create a new institution with a clear charter to improve the productivity of teaching and learning throughout the U.S. economy.

Several models could be considered. One would be an independent "Learning Research Institute," managed in much the same way that the National Institutes of Health are managed and sheltered from political change to the greatest extent possible. Lessons learned from research institutes in other areas could be used to construct a charter that would provide the greatest possible insulation from political manipulation while ensuring that the system was responsive to the needs of its clients—the Nation's students and teachers.

The Institute's charter could include K-12 schooling, post-secondary education of all kinds, and training and retraining programs. Its responsibility could be the development of a range of new teaching strategies making appropriate use of information technology. Programs might range from active research in techniques of pedagogy to strategies for managing instruction in the classroom, at home, and in business settings. This public resource could also make major investments in the development of instructional software, appropriate for such areas as public television programming or the learning of ambitious teaching systems based on technologies likely to be available over the next two decades. And since the problems confronted by such a program would be of international interest, it is likely that the project would attract strong international support (see the discussion of cooperate international research programs earlier in this chapter).

Subsidies for Education Beyond High School.—It seems possible to increase the productivity of schools to the point where most students would have the equivalent of 2 years of college education by the time they reach the age of 18—the age at which they are still supported by public education funding. A solid grounding in basic mathematical, scientific, and cultural concepts facilitates the adjustment to more specialized training.

At present, however, support for post-secondary education is largely in the form of loans for college, with a scattered assortment of programs for "retraining." Typically, this training is available only after a person has lost a job. The pain of adjustment could be significantly reduced if training were conducted before calamity strikes. Advanced warning of layoffs would clearly help.<sup>32</sup>

Subsidies for training beyond high school could be available throughout a person's career, and not be limited to formal university curricula. A combination of entitlements and loan subsidies could allow flexibility in the timing and location of post-secondary education. The entitlements might cover the equivalent of 2 years of college tuition, with some further amount of training receivable at any point in an individual's career. With appropriate safeguards, such programs could also be used to support in-house corporate training programs. Loans could be repaid automatically through payroll deductions when the person is working, but would not exceed an acceptable percentage of gross income—6 percent might be such a level.

Universal National Service.—A program requiring all young Americans—possibly between the ages of 18 and 26—to undertake some kind of public service for 1 or 2 years could have a variety of benefits. Joining the armed services would be one of several options; teaching assignments might be more appropriate for college graduates, and such work could also help reduce the cost of publicly supported education. If entry into a service program could be adjusted to coincide with periods of excessive unemployment, it might provide a useful tool to smooth large fluctuations in unemployment rates.

One of the dangers inherent in the highly fragmented, market-oriented future suggested earlier is that citizens will fail to recognize their obligations to the society that supports them. This program would give participants an opportunity to acquire that sense of responsibility, and to view aspects of American life that they would otherwise never experience first-hand.

<sup>32</sup> For more on this subject, see *Technology and Structural Unemployment—Reemploying Displaced Adults*, op. cit., footnote 24; and U.S. Congress, Office of Technology Assessment, *Plant Closing: Advance Notice and Rapid Response*, OTA-ITE-321 (Washington, DC: U.S. Government Printing Office, September 1986).

Encouraging Commitment to Employees Through Greater Use of Bonuses and Profit-Sharing.-Employers can be encouraged to achieve flexibility through compensation adjustments instead of layoffs, tying private bonus payments to changes in a business' value-added or using bonus payments for the government payrolls that comprise nearly 20 percent of the total work force (see discussion inch. 11). Bonuses allow a company to adjust its payroll costs during difficult times in a transparent way without the need to renegotiate all wages.<sup>33</sup>

It is possible that if enough firms adopted a policy where wages represented a fixed base with bonuses dependent on a firm's performance, the U.S. economy could more efficiently respond to problems encountered during economic downturns. There has already been considerable movement in this direction: apart from small business, 19 percent of all production employees, 27 percent of all technical and clerical employees, and 23 percent of all professional and administrative employees were covered by some kind of profit sharing agreement in 1983.<sup>34</sup> One way of encouraging such programs might be to lower the taxes paid on bonuses.

Universally Retainable Pensions and Health Insurance.-Even with a significant change in compensation plans, it is likely that structural change in the U.S. economy will result in a continuous series of new business starts and failures. Labor mobility will be essential to ensure that the system adjusts efficiently to new opportunities. It is not reasonable to expect individuals to bear the full cost of the adjustment. Apart from retraining and unemployment support, it is important that people forced to shift jobs be able to maintain pensions and health insurance.<sup>35</sup>

Currently, it is difficult to hold onto a pension while changing jobs. In 1986, 80 to 90 percent of all pension plans required workers to remain with a firm for ten years before being "vested" (receiving rights to a pension). A 1981 survey found that only 2 percent of all employees covered by single-employer

corporate pension plans were able to transfer vested pension credits to another plan; evidence suggests that this ratio has not changed significantly since that time.<sup>36</sup> People forced to take a series of part-time or temporary jobs can expect to have no pension coverage. Correcting the problem may be critical for developing a consensus about the need for mobility within America's labor force.

Many workers also risk losing their pensions if their companies file for bankruptcy. Nearly 30 million Americans—the vast majority of those with "defined benefit" plans—are now covered by the Pension Benefit Guarantee Corp. (PBGC). The fund, however, is in grave trouble as the result of bankruptcies in firms with large, underfunded pension programs. Many are in the steel industry; the LTV Corp.'s failure alone threatened to exceed the PBGC's assets.<sup>37</sup> In addition, another 10 million workers are under "defined contribution" pension plans not covered by the PBGC.

Similarly, health insurance plans vary enormously around the Nation, making continuity very difficult. Many small firms offer limited coverage or none at all. Small firms pay much more than large ones to cover each employee, while health insurance costs for people who are not members of an organization qualifying for group insurance rates are higher still. Bankruptcy can threaten any coverage. Recent law has alleviated some, but far from all problems in this area.

Given that the economy as a whole benefits from labor mobility, it is reasonable to expect that companies, and society as a whole, should pickup some of the cost of this flexibility. Programs that ensure the continuity of pensions and health insurance could be improved. The displaced should not have to bear the entire cost. The government may not save money by ignoring the problem, since costs clearly increase when welfare cases grow in number, or when Medicaid is forced to cover the cost of serious illnesses that may develop because people without health insurance postpone medical treatment.

<sup>33</sup> M.L. Weitzman, *The Share Economy* (Cambridge MA: Harvard University Press, 1984).

<sup>34</sup> R. M. Kanter, "The Attack on Pay," *Harvard Business Review*, vol. 65, No. 2, March-April 1987, p. 61.

<sup>35</sup> See p. Choate and J.K. Linger, *High-Flex Society: Shaping America's Economic Future* (New York, NY: Knopf, 1986).

<sup>36</sup> Ray Schmitt, "pension Vesting, Integration, and Portability(VIP)," U.S. Congressional Research Service, report No. 85-884-EPW, Washington, DC, Aug. 9, 1985.

<sup>37</sup> The PBGC has recently ruled that LTV's pension liability must be handled by that company. See CindSkrzycki, "Agency Returns Pension Liabilities to LTV" *The Washington Post*, Sept. 24, 1987, p. D1.

Encouraging Greater Flexibility of Working Hours (under mutual agreement between employers and employees).-New information technologies make it possible to manage varying work schedules more easily than ever before. They even permit taking some work home, since much work in the U.S. economy now involves manipulation of information and not things. Greater flexibility in work time would not only make it easier for parents to combine work with child raising, it would make it easier for people to combine vocations with avocations and even to make better use of public highways and recreational facilities.<sup>38</sup>

Workers are understandably reluctant to allow employers the freedom to change work schedules, while employers are understandably reluctant to allow employees flexibility that might interfere with production schedules. Surely some compromise is possible. Initial steps might include:

- Encouraging the implementation of State, local, and private sector programs similar to the Federal Employees' Flexible and Compressed Work Schedules Act (first passed in 1978 and made permanent in 1985), which allows Federal government workers to adopt a schedule of either 8-hour days at odd hours or longer but fewer days. The success of this program, in which the employer and employee must both agree on the "flex-time" arrangement, has been documented by the positive response it receives from most of the nearly 500,000 employees involved, and by the higher productivity it appears to foster.<sup>39</sup>
- Second, the statutory restrictions on experiments with flexible work schedules of over 40 hours in a single week, like the Fair Labor Standards Act, which covers roughly two-thirds of the U.S. work force; and the Contract Work Hours and Safety Standards Act, which applies to all workers under contract to the Federal Government, might be reexamined.<sup>40</sup>

<sup>38</sup> See John D. Owen, *Working Hours* (Lexington, MA: Lexington Press, 1979).

<sup>39</sup> U.S. Congress, General Accounting Office, "Alternative Work Schedules for Federal Employees," GAO/GGD-85-63, Washington, DC, July 19, 1985.

<sup>40</sup> Legislation guiding standards for Federal contract workers is broken down by type (named for sponsors of each act) Walsh-Healy for suppliers of goods, Davis-Bacon for suppliers of construction, and McNamara-O'Hara for suppliers of services.

Subsidies for Child Care. -Children may too often be victims in the U.S. economy. Parents, particularly those with low incomes, are frequently forced to place their children in inadequate child-care facilities or leave them unattended at home as "latch key" children. Greater flexibility in labor markets, and better early education for children, would result from accepting some portion of child care as a public responsibility—day care programs now in place in various Federal agencies could serve as models for such an approach.

At some extra expense, schools that are closed during the summer could shift to year-round training, as they do in Japan and Taiwan. This would also alleviate the dilemma many teachers face in finding temporary employment during the summer. During the academic year, the functions of school facilities could be expanded so that children would be routinely kept in supervised activities unless parents wanted them home immediately after school.

Linking Welfare Programs to Reemployment Strategies.-Some welfare programs may have the effect of reducing incentives for individuals to rejoin the work force, or may even act to weaken family structures. Retraining, subsidized day care for working parents, and other programs designed to encourage reemployment need to be better integrated with welfare initiatives. Some interesting models for this exist at the State level, notably in Pennsylvania and Massachusetts.<sup>41</sup>

Providing Consistent Protection for Workers.-An economy built around flexible production networks, comparatively small firms or establishments, and an assumption of continuous change in production methods and products can undermine standard methods for protecting workers from harmful exposure to chemicals and other health risks. Many production methods are replaced even before the safety of a new process is completely understood. New technologies also introduce a range of health and safety issues unlike the more obvious risks of work in physically dangerous occupations. Management of stress, indoor air quality, and other factors becomes increasingly critical, Electronic supervision

<sup>41</sup> See Todd W. Rufuth, "Moving Clients Into Jobs," *Public Welfare*, Spring 1987, pp. 10-21.

of employees not only increases stress but can raise serious questions of privacy.<sup>42</sup>

New technologies and the changing occupational structure of the work force alter the nature of health and safety problems, while changes in the scale and scope of businesses affect opportunities for solving the problems. A basic review of priorities in the area may be needed.

### ***Improving the National Database***

It is essential that policy be built on the best possible information. While data collection is an unromantic subject, severe flaws in national statistics present barriers to clear thinking about both domestic and international policy (the list could be continued at much greater length):

- data linking consumer spending to household types are extremely limited;
- data on living conditions of the poor (i.e., how many are homeless, how many are hungry, how many lack health care) are largely speculative, and differ widely depending on the source being used;
- detailed benchmark input/output data, specifying what inputs are used by U.S. industries to produce the Nation's output—of critical importance to national accounts—are typically as much as 10 years old;
- input/output accounts lack information about the role of imports critical for important classes of analysis;
- data on service industries are far less detailed than data on manufacturing;

<sup>42</sup>U.S. Congress, Office of Technology Assessment, *The Electronic Supervisor: New Technology, New Tensions* OTA-CIT-333 (Washington, DC: U.S. Government Printing Office, September 1987).

- information about programs affecting trade by directly or indirectly promoting exports or discouraging imports is scattered throughout both the Federal Government and independent agencies like the International Trade Commission, and has not been assembled in a form useful for integrative analysis;
- information on inputs and employment in government is extremely limited;
- information on research and training in private and public firms is virtually nonexistent;
- different sets of government accounts track data in different ways and use a bewildering variety of categories, which often means that comparisons between the National Income and Product Accounts, input/output statistics, industry data from the Bureau of Labor Statistics, and trade statistics are incompatible; and
- accounts of government receipts and spending are maintained as unrelated entities, making it difficult to understand changes in net Federal commitments (such as commitments from pensions), in net subsidies (from guaranteed or subsidized loans or tax benefits), or in the overall value of Federal assets.

Perhaps most importantly, the basic structure of American economic statistics makes all government spending appear as current consumption—in effect, government investment is not allowed to appear as such. This can be dangerously misleading.<sup>43</sup> There are few investments that are more important to the future than when government taxes individuals for such collective purchases as education, roads and other national infrastructure, and basic research.

<sup>43</sup>See R. Eisner, op. cit., footnote 17.

## YOU CAN'T GO HOME AGAIN

The present chapter, and indeed this entire document, presents the future of the American economy in terms of a series of choices—choices that must be made by people acting as consumers, as investors, as employees, and as voters. New information technology, and an economy irrevocably enmeshed in international trade, have done far more than make old choices about the pursuit of happiness more complex. They have forced consideration of an unprecedented new range of choices.

Many of the paradigms that once described expectations about the American economy no longer apply. For example, it may once have been reasonable to expect that:

- the American economy could be managed without continuous concern for foreign economies,
- most significant technical innovations would be developed and used first by Americans,
- hands-on production jobs would dominate attractive employment opportunities,
- large “economy of scale” production facilities capable of driving down the price of mass produced commodities would dominate production, and
- a person with a conventional high-school education could earn an income adequate to support a middle-class family.

However desirable or undesirable, none of these are realistic descriptions of America’s future. Instead, it is not only possible, but likely, that networks delivering amenities ranging from housing to education will be transformed in fundamental ways over the next generation. None of the alternatives are familiar ones.

A particularly dramatic change is likely in the mix of marketable skills. These skills are likely to differ significantly from those that dominated the work force of the 1960s. Demand for manual skills will decline and demand for intellectual skills, and skill in working with people will increase. Specifically, a person’s success in the new environment is likely to depend critically on the extent to which the na-

tion’s educational system gives them basic skills and the ability (and opportunity) to upgrade knowledge and skills continuously. The key publicly-supported infrastructure in such a world may well be a productive system for teaching and learning.

The preceding pages have attempted to describe important characteristics of the practical options now available and the policy strategies likely to shape the direction taken. History may well prove wrong many of the details.

In the face of great uncertainty, two things seem clear:

1. The possibilities open to America in 1988 represent a set of stark contrasts. A society could be built that vastly increases the power of all Americans to express unique tastes, and find work that both pays well and is rewarding in other ways. But one could also be built that rewards only an elite while a majority of Americans are constrained to live with shrinking opportunities. While a highly linked world economy could increase prosperity throughout the globe, tension over trade could undermine longstanding friendships and the very foundations on which Western security has been based for a generation.
2. Secondly, the difference between the alternatives depends as never before on choice instead of necessity. These choices, in turn, hinge crucially on the management of public policy. This requires finding ways both to expand the economy in ways that create attractive employment opportunities and provide Americans with the training needed to take advantage of these opportunities.

It is inevitable that America’s system for connecting human talent, dedication, and sacrifice to the production of amenity will be transformed during the next few decades. Choices made today play a crucial role in determining which of many possibilities becomes our legacy.